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# IT GOVERNANCE IMPLEMENTATION FOR HIGHER EDUCATION INSTITUTIONS IN DEVELOPING COUNTRIES

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## Doctoral Programme in Information and Communication Technology

# IT GOVERNANCE IMPLEMENTATION FOR HIGHER EDUCATION INSTITUTIONS IN DEVELOPING COUNTRIES

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I DECLARE:

That the thesis titles *IT governance development and deployment for HEIs in developing countries,* presented by Beatriz Gómez to obtain a doctoral degree, has been completed under my supervision and meets the requirements to opt for an International Doctorate.

For all intents and purposes, I hereby sign this document.

Signature

Palma de Mallorca, on March 7th, 2022

A Adrián y a la Tía Teo.

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## Abstract

Information Technology (IT) is becoming an essential part of the business and the board is expecting to obtain value from it. However, results are not always as requested, and the board is realizing the necessity to govern IT. IT governance is not a choice anymore because it is gaining more and more attention by board members to better direct and control their IT assets. IT governance is a matter of any business including universities but unfortunately, the adoption of best practices to conduct to good governance is still scarce in this sector. To better align business needs and strategy with IT, several frameworks are arising trying to adopt best practices to obtain more value from IT. In the specific case of the universities, the adoption is still limited, situation accentuated in universities in developing countries because they must deal with the following obstacles: IT governance best practices absence, budget constraints, and the inexistence of any method for implementing a framework. Although the literature has provided solutions, guides, and frameworks for the implementation of IT governance in different sectors, due to the specific situation and needs in developing countries, some adaptations are needed before the adoption of such existing frameworks.

Under the scope of two Erasmus+ projects, we developed an *IT governance frameworks builder-metamodel*, using a research method that combines action and design. The action design research (ADR) method involves the active participation of both researchers and practitioners in various building cycles until the final output is obtained. Our metamodel consists of four phases, i.e., learning, development, deployment, and monitoring. By the improvement cycles, we finally added a prebuilding phase to self-asses their initial situation and attitude towards IT governance. Under each phase, we considered the three IT governance dimensions, i.e., the three IT governance mechanisms, the six ISO/IEC 38500 standard principles, and the three governance actions (direct, evaluate, and monitor). Thus, we presented a simplified best practices catalog, categorized by each standard principle, which framed the adoption and adaptation of their IT governance frameworks, incorporating the maturity model and the improvement activities.

Four Tunisian and four Albanian higher education institutions participated in each project, actively designing, developing, deploying, and monitoring their IT governance frameworks and implementation plans. After the IT governance assessment, partners showed similar and shared challenges and common problems, thus researchers and practitioners jointly tailored the best practices catalog adapted to each specific situation. However, although they shared similar problems, the attitude towards changes and improvements was different in each partner, also being influenced by their resources, and the engagement and commitment of their top managers.

Therefore, through this thesis we contribute with a metamodel for the implementation of IT governance frameworks in universities in developing countries, as a proposal to increase the adoption of IT governance in such regions. Our metamodel is flexible enough for conducing IT governance implementation in organizations because we followed the ADR phases and thus it can be actively adapted with practitioners. Furthermore, we also contribute with a proposal for the dissemination and training of IT governance concepts, and specifically the construction of IT governance frameworks considering practitioners awareness to the topic and increasing their engagement and maturity.

## Resumen

Las tecnologías de la información (TI) son ya una parte esencial del negocio y la junta directiva espera obtener valor gracias a las TI. Sin embargo, los resultados no siempre son los esperados y la junta directiva se está dando cuenta de la necesidad de gobernar las TI. La gobernanza de las TI ya no es una opción puesto que está ganando cada vez más atención por parte de los miembros de la junta directiva para dirigir y controlar mejor sus activos de TI. La gobernanza de las TI es un asunto de creciente interés en cualquier sector, incluidas las universidades, pero desafortunadamente, la adopción de mejores prácticas para llevar a cabo una buena gobernanza aún es escasa en este ámbito. Para alinear mejor las necesidades y la estrategia del negocio con las TI, están surgiendo varios marcos que intentan adoptar las mejores prácticas para obtener más valor de las TI. En el caso específico de las universidades, la adopción es aún limitada, situación que se acentúa en las universidades de los países en desarrollo porque deben enfrentar los siguientes obstáculos: ausencia de mejores prácticas de gobernanza de TI, restricciones presupuestarias y la inexistencia de cualquier método para implementar un marco de gobernanza de las TI. Si bien la literatura ha proporcionado soluciones, guías y marcos para la implementación de la gobernanza de TI en diferentes sectores, debido a la situación y necesidades específicas de los países en desarrollo, se necesitan algunas adaptaciones antes de la adopción de dichos marcos existentes.

En el marco de dos proyectos Erasmus+, hemos desarrollado un *metamodelo de construcción de marcos de gobernanza de las TI*, utilizando un método de investigación que combina acción y diseño. El método de investigación acción y diseño (ADR por sus siglas en inglés) implica la activa participación de investigadores y profesionales en varios ciclos de construcción hasta obtener el resultado final. Nuestro metamodelo consta de cuatro fases, a saber, aprendizaje, desarrollo, implementación y monitorización. Tras varios ciclos de mejora, finalmente agregamos una fase previa para autoevaluar su situación inicial y su actitud ante la gobernanza de TI. En cada fase, consideramos las tres dimensiones de gobernanza de las TI, es decir, los tres mecanismos de gobernanza de TI, los seis principios de la norma ISO / IEC 38500 y las tres acciones de gobernanza (dirigir, evaluar y monitorizar). Así, presentamos un catálogo de mejores prácticas simplificado, categorizado por cada principio del estándar, que enmarca la adopción y adaptación de sus marcos de gobernanza de las TI, incorporando el modelo de madurez y actividades de mejora.

Cuatro instituciones de educación superior tunecinas y cuatro albanesas participaron en cada proyecto, diseñando, desarrollando, implementando y monitorizando activamente sus marcos de gobernanza de TI y sus planes de implementación. Tras la evaluación de la gobernanza de las TI en cada institución, los socios mostraron desafíos y problemas comunes similares y compartidos, por lo que los investigadores y los profesionales diseñaron conjuntamente el catálogo de mejores prácticas adaptado a cada situación específica. Sin embargo, aunque compartían problemas similares, la actitud hacia los cambios y mejoras fue diferente en cada caso, siendo también influenciada por sus recursos y por el compromiso de sus altos directivos.

Por lo tanto, a través de esta tesis contribuimos con un metamodelo para la implementación de marcos de gobernanza de TI en universidades de países en desarrollo, como propuesta para incrementar la adopción de la gobernanza de TI en estas regiones. Nuestro metamodelo es lo suficientemente flexible para llevar a cabo la implementación

de la gobernanza de las TI en cualquier organización ya que está basado en las fases del método ADR y por tanto puede ser adaptado con la activa participación de los practicantes. Además, también contribuimos con una propuesta para la diseminación y formación de los conceptos de la gobernanza de las TI y específicamente la construcción de marcos de gobernanza de TI, teniendo en consideración la percepción de los asistentes a la temática e incrementando su compromiso y madurez en el tema.

## Resum

Les tecnologies de la informació (TI) són ja una part essencial del negoci i la junta directiva espera obtenir valor gràcies a les TI. No obstant això, els resultats no sempre són els esperats i la junta directiva s'està adonant de la necessitat de governar les TI. La governança de les TI ja no és una opció ja que està guanyant cada vegada més atenció per part dels membres de la junta directiva per dirigir i controlar millor els seus actius de TI. La governança de les TI és un assumpte de creixent interès en qualsevol sector, incloses les universitats, però desafortunadament, l'adopció de millores pràctiques per dur a terme una bona governança encara és escassa en aquest àmbit. Per alinear millor les necessitats i l'estratègia del negoci amb les TI, estan sorgint diversos marcs que intenten adoptar les millors pràctiques per obtenir més valor de les TI. En el cas específic de les universitats, l'adopció és encara limitada, situació que s'accentua en les universitats dels països en desenvolupament perquè han d'enfrontar els següents obstacles: absència de millors pràctiques de governança de TI, restriccions pressupostàries i la inexistència de qualsevol mètode per implementar un marc de governança de les TI. Si bé la literatura ha proporcionat solucions, guies i marcs per a la implementació de la governança de TI en diferents sectors, a causa de la situació i necessitats específiques dels països en desenvolupament, es necessiten algunes adaptacions abans de l'adopció d'aquests marcs existents.

En el marc de dos projectes Erasmus+, hem desenvolupat un *metamodel de construcció de marcs de governança de les TI*, utilitzant un mètode d'investigació que combina acció i disseny. El mètode d'investigació acció i disseny (ADR per les sigles en anglès) implica l'activa participació d'investigadors i professionals en diversos cicles de construcció fins a obtenir el resultat final. El nostre metamodel consta de quatre fases, a saber, aprenentatge, desenvolupament, implementació i monitoratge. Després de diversos cicles de millora, finalment afegim una fase prèvia per autoavaluar la seva situació inicial i la seva actitud davant la governança de TI. En cada fase, considerem les tres dimensions de governança de les TI, és a dir, els tres mecanismes de governança de TI, els sis principis de la norma ISO / IEC 38500 i les tres accions de governança (dirigir, avaluar i monitoritzar). Així, presentem un catàleg de millores pràctiques simplificat, categoritzat per cada principi de l'estàndard, que emmarca l'adopció i adaptació dels seus marcs de governança de les TI, incorporant el model de maduresa i activitats de millora.

Quatre institucions d'educació superior tunisianes i quatre albaneses van participar en cada projecte, dissenyant, desenvolupant, implementant i monitoritzant activament els seus marcs de governança de TI i els seus plans d'implementació. Després de l'avaluació de la governança de les TI en cada institució, els socis van mostrar desafiaments i problemes comuns similars i compartits, de manera que els investigadors i els professionals van dissenyar conjuntament el catàleg de millores pràctiques adaptat a cada situació específica. No obstant això, tot i que compartien problemes similars, l'actitud cap als canvis i millores va ser diferent en cada cas, sent també influenciada pels seus recursos, i pel compromís dels seus alts directius.

Per tant, a través d'aquesta tesi contribuïm amb un metamodel per a la implementació de marcs de governança de TI en universitats de països en desenvolupament, com una proposta per incrementar l'adopció de la governança de TI en aquestes regions. El nostre metamodel és prou flexible per dur a terme la implementació de la governança de les TI en qualsevol organització ja que està basat en les fases del mètode ADR i per tant pot ser

adaptat amb l'activa participació dels practicants. A més, també contribuïm amb una proposta per a la disseminació i formació dels conceptes de la governança de les TI i específicament la construcció de marcs de governança de TI, tenint en consideració la percepció dels assistents a la temàtica i incrementant el seu compromís i maduresa en el tema.

# Acronyms

| Acronym | Definition |
|---|---|
| ADR | Action Design Research. |
| AM | A fragment of the communication interface between IT governance and IT management: Act – Monitor. |
| AP | Alignment processes. |
| AR | Action Research. |
| AS8015 | Australian Standard 8015. |
| BIE | ADR method second phase: Building – Intervention – Evaluation. |
| BSC | Balanced ScoreCard. |
| CA | Communication approaches. |
| CBMBoIT | Component Business Model for the Business of IT. |
| CCK | *Centre de Calcul El-Khawarizmi*. |
| CDO | Chief Digital Officer. |
| CIO | Chief Information Officer. |
| CNI | *Centre National de l'Informatique*. |
| COBIT | Control Objectives for Information and Related Technologies. |
| COSO | Committee of Sponsoring Organizations of the Treadway Commission. |
| CS | Case Study. |
| CSF | Critical Success Factor. |
| CTO | Chief Technology Officer. |
| CxO | C-level executive. |
| dFogIT | detailed Framework of governance for Information Technology. |
| DP | A fragment of the communication interface between IT governance and IT management: Direct – Plan. |
| DSR | Design-science research. |
| EACEA | European Education and Culture Executive Agency. |
| EC | A fragment of the communication interface between IT governance and IT management: Evaluate – Check. |
| ECAR | EDUCAUSE Center for Analysis and Research. |
| EDM | Governance activities: Evaluate – Direct – Monitor. |
| EDPAA | Electronic Data Processing Auditors Association (before changing its name to ISACA) |
| EDUCAUSE | A nonprofit association whose mission is to advance higher education by using information technology. EDUCAUSE was formed in 1998 through a merger between CAUSE and Educom, two respected professional associations representing more than 60 years of combined service to the higher education information technology community. |
| ENIT | *École Nationale d'Ingénieurs de Tunis*. |
| ENSI | *École Nationale des Sciences de l'Informatique*. |
| FDSPT | *Faculté de Droit et des Sciences Politiques de Tunis*, from UTM. |
| FE | *Fakulteti i Ekonomisë*, from UT. |
| FMT | *Faculté de Médecine de Tunis*, from UTM. |
| FSEGT | *Faculté des Sciences Economiques et de Gestion de Tunis*, from UTM. |
| FSEG | *Faculté des Sciences Economiques et de Gestion de Sfax*, from USS. |
| FST | *Faculté des Sciences de Tunis*, from UTM. |
| FTI | *Fakulteti i Teknologjisë së Informacionit*, from UPT and UAMD. |
| GCGF | Global Corporate Governance Forum. |
| GRC | Governance-Risk-Compliance. |
| GT | Governance Team, the *IT governance steering group*. |
| GUTI | *Gobierno Universitario de Tecnologías de Información* (University Governance of Information Technology). |
| HEI | Higher Education Institution. |
| IBM | International Business Machines Corporation. |
| IFAC | International Federation of Accountants. |
| IGAP | IT Governance Assessment Process. |

| | |
|---|---|
| IOD | Institute of Directors. |
| IP | Intellectual Property. |
| ISACA | Information Systems Audit and Control Association. |
| ISAMM | *Institut Supérieur des Arts Multimédia de la Manouba*, from UMA. |
| ISI | *Institut Supérieur d'Informatique*, from UTM. |
| ISIMG | *Institut Supérieur d'Informatique et de Multimédia de Gabès*, from UGB. |
| ISIMS | *Institut Supérieur d'Informatique et de Multimédia de Sfax*, from USS. |
| ISO/IEC | International Organization for Standardization / International Electrotechnical Commission. |
| ISSBAT | *Institut Supérieur des Sciences Biologiques Appliquées de Tunis*, from UTM. |
| ISSHT | *Institut Supérieur des Sciences Humaines de Tunis*, from UTM. |
| IT | Information Technology. |
| ITG | IT governance. |
| ITG4AU | IT governance for Albanian universities. |
| ITG4TU | IT governance for Tunisian universities. |
| ITG4U | IT governance for universities. |
| ITGI | IT Governance Institute. |
| ITIL | Information Technology Infrastructure Library. |
| ITOMAT | IT Organization Modeling and Assessment Tool. |
| itSMF | IT Service Management Forum. |
| JISC | Joint Information Systems Committee. |
| KPI | Key Performance Indicator. |
| LDM | French acronym for Bachelor, Master, and Doctorate. |
| OCEG | Open Compliance and Ethics Group. |
| OECD | Organization for Economic Co-operation and Development. |
| PBRM | COBIT5's management activities: Plan – Build – Run – Monitor. |
| PDCA | Deming's cycle: Plan – Do – Check – Act. |
| PMI | Project Management Institut. |
| Risk-IT | Risk IT Framework. |
| ROI | Return on Investment. |
| SAM | Strategic Alignment Model. |
| SLA | Service Level Agreement. |
| SOA | Sarbanes-Oxley Act, also known as Sox, SarbOx, and SOA. |
| ST | Decision-making structures. |
| SUE | *Sistema Universitario Español* (Spanish University System). |
| UAMD | *Universiteti Aleksandër Moisiu Durrës*. |
| UET | *Universiteti Europian i Tiranës*. |
| UGB | *Université de Gabès*. |
| UMA | *Université de la Manouba.* |
| UPT | *Universiteti Politeknik i Tiranës*. |
| USS | *Université de Sfax*. |
| UT | *Universiteti i Tiranës*. |
| UTM | *Université de Tunis el Manar*. |
| Val-IT | Enterprise Value: Governance of IT Investments, The Val IT Framework 2.0. |

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| Citation | Complete citation. |
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# Contents

# Figures

# Tables

# 1. Introduction

Nowadays, Information Technology (IT) is present in almost every organization; IT is not only related to each activity developed for the business, but also has a significant impact on the success or failure of the business activities. This situation became much more pressing in recent years because organizations absolutely depend on IT to carry out their activities. Organizations today must survive in an environment of volatility, uncertainty, complexity, and ambiguity. In fact, to find an organization that can function adequately in the event of an eventual failure of its IT service is an arduous task. As a consequence, organizations invest considerable capital in their IT assets to support their employees and other stakeholders, to improve the effectiveness and efficiency of its activities and resources, as well as maintaining the sustainability of the business (Nolan & McFarlan, 2005; Van Grembergen et al., 2004; Weill & Ross, 2004; Wilkin & Chenhall, 2010).

The escalation of the Internet and the businesses through it will mean that the prospects for spending on software, hardware and infrastructure will continue to grow exponentially. However, investments in IT have not had the expected impact on the business or the economic return. The importance that an organization must give to its IT should not be reflected solely and exclusively for reasons of dependency or costs, but also as an integral part of its strategy to improve competitiveness. Organizations should ask themselves whether their IT capabilities improve the competitiveness of their business, whether their corporate IT investment goals are seen as a strategic priority, whether they are using IT efficiently according to business strategy, whether top managers or the board are aware of their responsibilities regarding IT direction and control or they delegate it to IT managers, whether IT projects are sustainable and deliver the expected results; in short, if the organization is achieving an acceptable *value* for its investments in IT (Weill & Ross, 2004).

These key questions refer to strategy, competitive advantage, or value generation through IT. Accordingly, researchers propose that IT should generate value and organizations should get more out of IT. The global business environment is increasingly depending on IT and therefore, changes in business models, major disruptions of processes and true digital transformations enabled only by new technologies, must be achieved quickly. For those reasons, IT must not only be managed but *governed*, i.e., good IT governance and good IT management are essential (Piattini & Ruiz, 2020; Van Grembergen & De Haes, 2009).

According to the ISO/IEC 38500 (2015, p. 5) standard, IT governance is a component, or a subset of corporate / organizational governance, and is a "system by which the current and future use of IT is directed and controlled". Venkatraman et al. (1993, p. 141) indicated that IT governance is the "selection and use of mechanisms for obtaining the required IT competences." Other authors focused IT governance on authority and responsibility for IT decisions: "IT governance arrangements refers to the patterns of authority for key IT activities in business firms, including IT infrastructure, IT use, and project management" (Sambamurthy & Zmud, 1999, p. 261), "IT governance extends the board's mission of defining strategic direction and ensuring that objectives are met, risks are managed, and resources are used responsibly" (Guldentops, 2002, p. 116), "IT

governance describes the distribution of IT decision-making rights and responsibilities among different stakeholders, and the procedures and mechanisms for making and monitoring strategic decisions regarding IT." (Peterson, 2004, p. 7).

All these definitions indicate that a *good corporate IT governance* has a direct implication in the alignment of business objectives with IT objectives. IT must be oriented to achieve institutional objectives, i.e., a strategic role must be assigned to IT. Because IT is becoming an essential part of the business and the board is expecting to obtain value from it, IT must not be a mere support tool for users. Thus, IT only increases the performance of those organizations that can *govern* them adequately (Weill & Ross, 2004).

IT governance is not a choice anymore; results are not always as requested, and the board is realizing the necessity to govern IT paying more attention to better direct and control their IT assets (Juiz & Toomey, 2015). However, public entities present more difficulties when quantifying the results by means of an economic ratio, while their operations improvement should not be relaxed. Specifically in the field of education, universities are currently required to increase their management effectiveness and efficiency to optimize their teaching and research performance. The university institution is a key piece for the modernization of society, both for its teaching function - which enables the dissemination of the most advanced knowledge through the training of students - and for its research function - which focuses on the generation of abstract knowledge, which forms the basis for solving specific problems of companies and institutions (Brooks, 2005; Buesa et al., 2009). Furthermore, the EDUCAUSE 2021 Top IT issues examine the role of technology in higher education focusing on three potential scenarios, i.e., restore, evolve, or transform, highlighting the following aspects: cost management, online learning, financial health, affordability and digital equity, information security, student success, equitable access to education, institutional culture, technology alignment, technology strategy, and enrollment and recruitment (Grajek, 2020). Accordingly, costs are important, but other aspects that IT will influence emerge. Even though universities implemented IT in their core activities, i.e., training, research, and management, their IT should be formally included in strategic plans for the effective use of IT.

Thus, IT governance is a matter of any business including universities but unfortunately, the adoption of best practices to conduct to good IT governance is still scarce in this sector. Numerous universities are making great efforts to properly govern their IT, highlighting those from Australia, Malaysia, and Indonesia, according to the number of papers about IT governance in these countries. According to Kajo-Meçe et al. (2020), the research interest in the last 5 years increased nearly 4 times compared to 5 earlier years. However, although the number of publications regarding IT governance in any sector is increasing, in the specific sector of universities, growth is smaller and slower. The reason could be the lack of culture of IT governance, support, and vision from top-level authorities in this sector. The main implications of the lack of adoption of IT governance are many and varied, from economic to structural or social. However, based on the main activities of the ISO/IEC 38500, they can be summarized in two: the organizations do not direct their IT, nor do they control (evaluate and monitor) their IT. By not directing their IT implies that IT do not have a defined direction, they are not based on a common strategy based on the mission and vision of the organization. Thus, it will be very difficult for IT to align with the business if it does not know where the

business is going. If IT goes off the rails, it could define conflicting interests or even against the business. In addition, IT could set new directions based on the facilities they provide for different objectives, i.e., improve the customer experience, offer new services/products, etc. But if the business does not set these new goals based on all that IT has to offer, they are missing out on one of its most valuable assets. Regarding control, according to Sir William Thomson, "What is not defined cannot be measured. What is not measured cannot be improved. What is not improved is always degraded." Therefore, if a joint business-IT direction, e.g., an aligned strategy, is not defined and then it is not measured whether such strategy is being carried out, the organization and therefore its IT cannot improve, nor provide value to the business, nor probably achieve the objectives or the expected return.

To better align business needs and strategy with IT, several frameworks are arising trying to adopt best practices to obtain more value from IT (Holt, 2013). In the specific case of the universities, the adoption is still limited, situation accentuated in universities in developing countries because they must deal with the following obstacles: IT governance best practices absence, budget constraints, and the inexistence of any method for implementing a framework (Subsermsri et al., 2015). Although the literature has provided solutions, guides, and frameworks for the implementation of IT governance in different sectors, due to the specific situation and needs in developing countries, some adaptations are needed before the adoption of such existing frameworks.

Under the scope of two Erasmus+ projects, we developed an IT governance frameworks builder-metamodel, using a research method that combines action and design. The action design research (ADR) method involves the active participation of both researchers and practitioners in various building cycles until the final output is obtained (Sein et al., 2011). Therefore, through this thesis I contribute with a metamodel for the implementation of IT governance frameworks in universities in developing countries.

## 1.1. Context

IT governance has increased in importance since organizations base their core business activity on IT. Boards expect IT to offer business value that means rapid solutions and safer and more quality services (B. Gómez et al., 2017). Organizations are striving to derive value from IT investments using various mechanisms widely known in the literature (e.g., Peterson, 2004; Van Grembergen et al., 2004; Weill & Ross, 2004). Furthermore, organizations are directing IT plans aligning them to business strategy, as well as controlling and monitoring whether results are as expected (Henderson & Venkatraman, 1993). IT is not only a very important aspect for organizations and enterprises as it plays a very important role in business activities but also a competitive element and of wide social impact. In this sense, higher education institutions (HEIs) do not fall behind, because, in their three main activities, i.e., teaching, research, and administration, IT is present and most needed. As in any other kind of organization, the board of these institutions is increasingly aware that IT is a strategic tool for their institutions. On the other hand, not only managing but also governing IT is getting attention from the practitioner and research side, given the need to align the organization's strategy and objectives with IT. IT governance helps to set clear expectations, gain participation, open communications, establish accountability and provide executive

management oversight. According to the ISO/IEC 38500 (2015), IT governance is the direction and control of current and future IT assets assuring the effective, efficient and acceptable use of it. Effective IT governance enables superior business performance as they promote effective and efficient resource allocations (Weill, 2004). IT governance permits an IT manager to focus on three essential requirements: reducing risks, controlling costs and extending the information systems' value (Tsai et al., 2015). Furthermore, IT governance and the alignment with business strategy in HEIs is gaining importance (Khouja et al., 2018).

However, even though there are various recognized frameworks and standards (e.g., COBIT 2019 (2018) and ISO/IEC 38500 (2015)), it seems that organizations are still dealing with the implementation of IT governance. According to Piattini and Ruiz (2020) the great challenge of IT governance is still the alignment of business processes with IT. In fact, the *Japan Information Technology Promotion Agency* highlights the three most important challenges: the ambiguity in the sharing of roles and the organizational structure, the definition of low-quality or incomplete requirements, and the gap between the business strategy and its required systematization. Apparently, the difficulties that organizations have in implementing IT governance may be due to several causes, which are extensible to HEIs:

- There are many definitions of what IT governance is and how is it different from IT management, each with different approaches (Ko & Fink, 2010; Robb & Parent, 2009).
- It seems that there are more popular topics/concepts in the definitions depending on the interests or needs of the author/researcher, showing no consensus (Raymond et al., 2019; Robb & Parent, 2009).
- Several empirical studies show the theory-practice gap of implementing IT governance in organizations (Buchwald et al., 2014; De Maere & De Haes, 2017; González-Rojas et al., 2018; Smits & Van Hillegersberg, 2018; Teo et al., 2013b).
- Some barriers in the implementation of IT governance are related to social aspects such as lack of communication between IT governance and IT management, lack of understanding and trust, and different executives' perceptions of IT business value (Buchwald et al., 2014; Parry & Lind, 2018; Phiri & Weiguo, 2013; Rahimi et al., 2016; Tallon, 2014; Teo et al., 2013a; Yudatama, Nazief, & Hidayanto, 2017).

Problems in IT governance are not particular of a given country or continent. IT governance artefacts can be common to almost all countries in the world. However, special needs in the deployment of IT governance frameworks are purely local (i.e., dependent on the university teaching portfolio, the ownership of the HEI, the level of knowledge on the topic, the local governance rules, the governance culture, etc.). For this reason, already implemented approaches in IT governance for universities in developed countries can be used as inspiration for a "Glocal" initiative. Previous success case studies and current competence on the topic will lead to a better IT governance setup.

Considering that dependence on IT in developing organizations is increasing (Gartner, 2019), in several regions such as the African continent and the Balkans the penetration of IT governance is weak (Kajo-Meçe et al., 2020; Khouja et al., 2018). Thus, in this sense, through the universities, IT governance concepts spreading can be achieved and influence society directly. However, several IT governance related research tends to focus more on developed countries, and thus the viability of these established IT governance artifacts in

developing economies is unclear as they might be generic and might require considerable effort and cost in customizing to a specific context (Nfuka & Rusu, 2011). In previous and recent studies like, for instance Subsermsri et al. (2015), the three main obstacles in IT governance implementation in universities are 1) lack of clear IT governance principles, 2) budget limitations and 3) lack of a method for selecting the IT governance framework. Some of these inhibitors, previously exposed by Luftman and Brier (1999), are still affecting organizations today: little relationship between IT and the business, not adequately prioritizing IT investments, IT does not get support or commitments, IT does not understand the business, top management does not support IT, IT managers lack leadership. Aasi et al. (2017, p. 14) studied IT governance in public organizations in developing countries. They interviewed the CIO belonging to a public university who stated that the implementation of IT was slower than in developed countries and therefore they are less mature in terms of IT governance. However, they feel the urge to be competitive quickly. The literature also showed problems when directly implementing existing frameworks and standards, e.g., ISO/IEC 38500 standard, COBIT, or ITIL, in developed countries (R. Almeida et al., 2018; Lee et al., 2017; Phiri & Weiguo, 2013; Steuperaert, 2016; Yokkhun & Papasratorn, 2018). Dahlberg and Kivijärvi (2006), R. Pereira and da Silva (2012), and Racz et al. (2010) posed that COBIT and ITIL are too complicated to implement, while Bartens et al. (2014) proposed an approach for reducing the perceived complexity of COBIT 5. Lee et al. (2017) identified IT-related goals (the designated Alignment Goal from COBIT 2019) whose priorities required to achieve such goals are not provided. They also highlighted a lack of process prioritization, addressed also by R. Almeida et al. (2018) and Steuperaert (2016). Walser (2013) exposed problems faced by the application of IT governance in public entities. Trying to reduce such difficulties, specifically in developing countries, El-Mekawy et al. (2015) focused on helping and facilitating practitioners' tasks when implementing business-IT alignment in any organization, adapting solutions and frameworks from the literature.

Therefore, considering this context, I pose the following research question:

*How can the adoption of IT governance be increased at HEIs in developing countries?*

The literature indicates several IT governance implementation guides that include the construction of models or frameworks (Cantor & Sanders, 2007; Coen & Kelly, 2007; Dahlberg & Kivijärvi, 2006; ISACA, 2016; ITGI, 2003). Accordingly, any framework should be tuned based on the specific situations or needs of the destination institutions. The fact that the IT governance and management framework is unique and particular to each organization must be considered. However, this cannot be done without the active participation and competence of partners with expertise on it. In other words, previous success case studies and current competence on the topic will lead to a better IT governance setup. Furthermore, IT governance should be present in any organization in any sector. However, we have selected the university sector because it can directly impact society in the developing country, as an example of a success story that inspires other sectors, as well as through the training of lectures and computer engineering students who, in the future, will work in companies in their region. Thus, considering such aspects and the explained context, this research question can be divided into the following associated questions:

*How an IT governance framework for HEIs in developing countries is built?* We should consider the IT governance aspects and concepts as well as their knowledge through the building process, and its sustainability. We should focus on knowledge acquisition and learning through implementation and practice.

*What would be the characteristics and structure of a good method for conducing IT governance implementation in such organizations*? We should consider the existing frameworks, guidelines, and standards, mainly focused on developed countries, and adapt them to the specific situation of each developing country institution.

*How the concept of IT governance, and specifically the construction of IT governance frameworks, can be disseminated and trained at HEIs in developing countries?* We should consider their low awareness on the subject, and the dissemination and exploitation ways to impact society.

*How can an IT governance framework be designed to increase IT governance awareness, engagement, and maturity at HEIs belonging to developing countries*? We should consider an active participation method for both researchers and practitioners. Researchers cannot be mere observers but should be actively involved in the development of research; practitioners should address their specific concerns aiming to improve through action and learning through reflection.

Thus, our aim is to tackle the abovementioned obstacles by providing a set of experts from HEIs with previous experience on the topic, to implement IT governance frameworks based on previous efforts, but also specifically designed for developing countries' universities. Developing a specific framework for such universities is itself a pioneering task. I expect that this research will also lead way to the development of new research lines in the field among developing countries universities. An introduction of such frameworks through a builder-metamodel would be an innovation not only to the specific participant countries, but also to the entire regions that they belong.

## 1.2. Research objectives

The main contribution of this thesis report is the design of an IT governance frameworks builder-metamodel for HEIs belonging to developing countries, through an action-design combination research method. Thus, the research objectives are as follows:

- Study and analyze different standards, reference models and techniques that indicate the basic characteristics that an IT governance framework should have.
- Determine the key evaluation parameters of IT governance in the organization and classify them according to the level of maturity reached.
- Design and build a method of IT governance framework implementation, jointly with practitioners, based on their basic characteristics, maturity levels as well as activities to be carried out at each level.
- Evaluate and validate such method assuring the active participation of the practitioners under study and the intervention of the researcher aiming to increase the IT governance awareness and presence in the region.

## 1.3. Thesis structure

This thesis is structured as follows:

*Chapter 1: Introduction*. It includes the context and motivation that frame this research, as well as its objectives.

*Chapter 2: Theoretical background*. It includes the state of the art on key concepts such as corporate governance, IT governance (definitions, mechanisms, and standards), main IT governance frameworks, and a review of IT governance state in universities and HEIs.

*Chapter 3: Methodology*. It develops the selected research method and applied research techniques. It focuses on the need to use a method that actively involves both researchers and practitioners, to participate jointly in the design and building of the solution.

*Chapter 4: The IT governance builder-metamodel*. It describes one of the outputs obtained after applying the research method, from the researchers' point of view: the builder-metamodel that design, develop, deploy, and monitor IT governance frameworks for HEIs in developing countries.

*Chapter 5: Empirical experimentation*. It describes other outputs obtained after applying the research method, from the practitioners' point of view: each IT governance framework adapted to their specific situation and needs at HEIs in developing countries.

*Chapter 6: Conclusion*. It concludes the research summarizing the research phases and their related activities, highlighting the contributions of this doctoral thesis, in addition to open a discussion about future lines of research.

Finally, the bibliography used to carry out this doctoral thesis is presented, as well as the annexes that complement such research.

# 2. Theoretical background

This chapter presents the main concepts regarding IT governance, explaining its importance and need, mechanisms, principles, and main activities, first defining what corporate governance is. Several frameworks and models are also presented seeking to align business strategy with IT strategy in a smooth way, by defining several objectives and indicators to achieve the expected value. Furthermore, the specific situation of IT governance in HEIs is also exhibited, and its different particularities if those institutions belong to developing or developed countries. Thus, this chapter aims to conceptualize and introduce the related work and limit the scope of this study.

## 2.1. Corporate governance

IT governance has been considered part of corporate governance since its inception, therefore before delving into IT governance, corporate governance is here defined. Corporate governance is a system to direct and control organizations. Board of directors plays an important role because they are responsible for defining and approving the business strategy, developing directive policies, and designing and supervising chief executives to ensure organization's governance and management in front of stakeholders, shareholders, and authorities (Cadbury, 1992). According to O'Donovan (2003), corporate governance is an internal system that includes policies, processes, and people. It serves shareholders and stakeholders' needs through directing and controlling administration activities with objectivity, integrity, and good business experience. Thus, corporate governance provides mechanisms by which stakeholders of a corporation control over corporate insiders to protect their own interests (John & Senbet, 1998). It is worth mentioning that the Organization for Economic Co-operation and Development (OECD) establishes a series of high-level organizational references called the *G20/OECD Principles of Corporate Governance* that define corporate governance as the establishment of organizational structures that determine the objectives and the monitoring of the organization's performance to ensure that the established objectives are achieved. These structures provide supervision and monitoring of the decisions of senior management, represented on the board of directors, to protect the interests of stakeholders both internal and external to the company. In this sense, the purpose of corporate governance is "to help build an environment of trust, transparency and accountability necessary for fostering long-term investment, financial stability and business integrity, thereby supporting stronger growth and more inclusive societies" (OECD, 2015, p. 7).

What is common to all these definitions is that they try to establish a system or mechanisms to control the investments of the shareholders as well as the interests of the stakeholders. This need is because ownership and control are separated, an endemic characteristic of the market economy. Thus, the concept of governance arose when the management of companies was delegated to third parties other than their owners because of the separation between the shareholders and/or owners from the senior management or board of directors (Hoogervorst, 2009). This concern dates to 18$^{th}$ century, according to Smith (1776) managers of other people's money would not watch over it with the same diligence as if it were their own. Although it is not until the 1930s and 1980s that, after several financial crises and scandals, interest in governance gained strength. That is why in 1992 the *Committee on the Financial Aspects of Corporate Governance* led by Adrian

Cadbury in England created the report *Financial Aspects of Corporate Governance*, also known as *The Cadbury Report*, widely used in various organizations and countries (Cadbury, 1992). Subsequently, the OECD published its *Principles of Corporate Governance*, the last revision of which dates from 2015, previously mentioned (OECD, 2015).

According to the Cadbury report (1992), depending on how effectively boards assign responsibilities to manage resources, determines how competitively positioned the company is. They must be free to drive their companies, but this freedom should follow a framework of effective and public accountability, thus being trusted by stakeholders. Hence, shareholders appoint directors and auditors to assure a good governance is in place.

Board of directors' responsibilities and actions are subject to laws and regulations, and include:

- Setting company's strategic aims.
- Providing the leadership to put them into effect.
- Supervising business management.
- Reporting shareholders on their stewardship.

Thus, directors set financial policy, oversee its implementation and report to stakeholders regarding the activities and the progress of the company. Otherwise, auditors provide the shareholders with external and objective monitoring on the directors' financial statements. "In its broadest sense," according to Sir Cadbury "corporate governance is about balancing economic and social goals between individual and community goals. The governance framework is established to promote the efficient use of resources and, to the same extent, to hold accountability for the management of those resources. Its purpose is to achieve the highest degree of coordination possible between the interests of individuals, companies, and society. The incentive for companies and their owners and managers to adopt internationally accepted management standards is that they will help them achieve their goals and attract investment. In the case of states, the incentive is that these rules will strengthen their economies and promote the integrity of companies." (Cadbury, 1992).

Correspondingly, *Principles of Corporate Governance* "are intended to help policymakers evaluate and improve the legal, regulatory, and institutional framework for corporate governance, with a view to support economic efficiency, sustainable growth and financial stability" (OECD, 2015, p. 9). The revised list is as follows:

I. Ensuring the basis for an effective corporate governance framework.
   *The corporate governance framework should promote transparent and fair markets, and the efficient allocation of resources. It should be consistent with the rule of law and support effective supervision and enforcement.*

II. The rights and equitable treatment of shareholders and key ownership functions.
   *The corporate governance framework should protect and facilitate the exercise of shareholders' rights and ensure the equitable treatment of all shareholders, including minority and foreign shareholders. All shareholders should have the opportunity to obtain effective redress for violation of their rights.*

III. Institutional investors, stock markets, and other intermediaries.
*The corporate governance framework should provide sound incentives throughout the investment chain and provide for stock markets to function in a way that contributes to good corporate governance.*

IV. The role of stakeholders in corporate governance.
*The corporate governance framework should recognize the rights of stakeholders established by law or through mutual agreements and encourage active co-operation between corporations and stakeholders in creating wealth, jobs, and the sustainability of financially sound enterprises.*

V. Disclosure and transparency.
*The corporate governance framework should ensure that timely and accurate disclosure is made on all material matters regarding the corporation, including the financial situation, performance, ownership, and governance of the company.*

VI. The responsibilities of the board.
*The corporate governance framework should ensure the strategic guidance of the company, the effective monitoring of management by the board, and the board's accountability to the company and the shareholders.*

(OECD, 2015)

The principles are intended to be concise and understandable, thus they can be applied considering the specific differences regarding country, economy, legality, culture, and even its size although they seem to fit better large companies than small or medium ones. In any case, the OECD highlights that their principles should be adapted to each organization because what may be useful for one company may not be applicable to another. In summary, "corporate governance encompasses a set of ***relationships*** between the management of the company, its board of directors, its shareholders and other ***stakeholders***. It also provides the ***structure*** through which company ***objectives*** are set and the ***means*** to achieve those objectives and monitor its ***performance*** are determined." (OECD, 2015).

Based on the OECD's principles, several institutions and forums distinguish two perspectives of governance: ***business governance*** that focuses on the internal behavior of organizations, i.e., their performance, efficiency, growth, financial structure, and the interaction between different actors; and ***corporate governance*** that focuses on regulations, i.e., rules, legal and judicial systems, financial markets, etc. (GCGF, 2005; Nestor, 2000). However, other authors combine both perspectives in what they name ***enterprise governance*** or ***organizational governance***, considering the responsibilities of the board of directors and other governance structures, strategic direction and the achievement of objectives, internal control, risk management and coordination of the company's operation (Hoogervorst, 2009; IFAC, 2004). In this sense, (ISACA, 2012a) indicated that the *organizational governance* constitutes the accountability of the organization which can be audited or assured following compliance codes and standards, while the performance perspective is described by *best practices*. In fact, the ISO 26000 (ISO, 2010) standard on Social Responsibility, highlights that *organizational governance* consists of formal governance mechanisms based on structures and processes, as well as informal mechanisms, which emerge from the culture and values of the organization, and the leadership of those who direct it. The organizational governance at the core of the ISO

26000 standard comprises a holistic approach of interdependence of several factors, i.e., human rights, labor practices, the environment, fair operating practices, consumer issues, and community involvement and development.

In addition to the Cadbury report, and the OECD principles, numerous legislative responses emerged to mitigate the effects of fraud and corruption. These regulations and guidelines mainly presented corporate governance guidance, specifying risks, compliance with requirements defined in laws and regulations, as well as corporate social and ethical responsibility (Holt, 2013; Piattini & Ruiz, 2020). For example:

- In 2002 the Open Compliance and Ethics Group (OCEG) was formed, who in 2004 presented the first version of the Governance-Risk-Compliance (GRC) standard. According to Mitchell (2007), GRC is the integrated collection of capabilities that enable an organization to reliably achieve objectives, address uncertainty and act with integrity. They posed that their standard goes beyond these three words because they also include governance and strategy, risk management, internal audit, compliance management, ethics and culture, and IT and security, affecting all sectors of the organization. Thus, *governance* includes the direction and control system used by directors (or the board of directors) to define the necessary structures and processes, assigning responsibilities, and ensuring that objectives are met efficiently and effectively; *risk management*, involves all the processes necessary for the identification, prioritization, planning, and mitigation of any risk that may affect the company; and *compliance* means adapting to the established requirements, identifying them from laws, regulations, strategies, policies, etc., ensuring their compliance state, their deviation from what was expected and applying corrective measures if necessary.
- The Sarbanes-Oxley Act of 2002, also known as Sox, SarbOx, and SOA, is a United States law on the Public Company Accounting Reform and Investor Protection. This law arose with the purpose of monitoring companies that are listed on the stock market, preventing the valuation of their shares from being altered in a doubtful way, while their value is lower. Its purpose is to avoid fraud and bankruptcy risk, protecting the investor. The act contains eleven sections addressing, among other aspects, corporate board responsibilities, criminal penalties, auditor independence, internal control assessment, and financial disclosure. Similar laws in other countries include the Canadian (2002), Germany (2002), French (2003), Australian (2004), Indian (2005), Japanese (2006), Italian (2006), Israelian and Turkish equivalent of Sarbanes-Oxley Act.
- South Africa opted for a non-legislative code based on principles and practices named the King Report on Corporate Governance, currently on its fourth revision (IOD, 2016). The King Report provides guidelines for South African companies' governance structures and operations defined by the King Committee on Corporate Governance. The King Report's philosophy is based under the following principles: ethical and effective leadership, the organization in society, corporate citizenship, sustainable development, stakeholder inclusivity, integrated thinking, and integrated reporting.

It is thus reflected that numerous Institutes of Directors across the world have been providing their own definitions of corporate governance, as well as guidelines, principles,

best practices, and frameworks, most of them through collaborations with board of directors. In the end, each company should find those practices and frameworks that best suit its specific situation to effectively and efficiently direct and control their organizations (Holt, 2013).

## 2.2. IT governance

As well as the OECD Principles or the Cadbury's and King IV's Reports were defined to deal with those agency problems, i.e., cases of misalignment and fraud, trying to pay attention to any bad practices, similar IT issues arose and they encouraged to also govern the organization's IT, in the same way that any other organization's asset is governed. Hence, the aim of IT governance is to direct and control the organization's use of IT, aligning business processes with the necessary investment in IT for the creation of business value (Juiz & Toomey, 2015; Weill & Ross, 2004).

Before delving into the concepts of IT governance that have just appeared, such as *business-IT alignment* or *creation of business value*, the question about why IT governance is so important or why do we care so much about it should be first addressed. The first reason is that other aspects like financial or human resources are common in organizations and companies from several centuries ago. IT, however, is in its infancy, being around 1960 when computers and mainframes began to be used in business, while its spread to any other aspect (social, political, educational, etc.) occurred barely 25 years ago. Thus, how to control, direct, manage, monitor, and be accountable regarding finance or human resources aspects are already well stablished and no one doubt or question them. However, and this is the second reason, as chief executives from finance or human resources departments are used to such activities of control, they are also used to use a common and understandable language and terminology that anybody could understand in reporting to a strategic level. That is not yet the case of IT. Although nowadays IT is present in almost every aspect of our lives, the used terminology tends to be too much technical, just understandable by experts and engineers. Another issue regarding the terms and the language is that technology is continually evolving, thus hindering, even more if possible, learning time with the increasing number of terms with different meanings in different contexts (Holt, 2013). Both reasons resulted in a lack of attention to IT governance activities by the board, sometimes accentuated by lack of resources. Therefore, IT governance is important because organizations need to ensure that there are no interruptions in the business processes that affect the service to customers, they do not spend excessively on uncontrolled investments in IT, and they comply with regulations and laws (Piattini & Ruiz, 2020). But above all, because such reasons have caused serious financial, reputational, and business losses, precisely everything that Cadbury, the OECD, and all those authors and institutions above mentioned wanted to avoid with their principles and reports of good governance.

### 2.2.1. IT governance evolution and definition

Nowadays IT is an organization asset, among others, that enables the development of business activities without which, such activities would not be possible. Consequently, the board of directors and top managers have realized the significant impact IT has on the success or failure of its business activities. They expect IT to bring business value, i.e., to provide fast solutions and secure, quality services. Such expectations are met when IT serves and achieves business objectives, IT is easily learned and adapts to change, and IT

judiciously addresses potential risks while helping to recognize new business opportunities. In fact, IT should generate a reasonable return of investment (ROI), by increasing the profitability due to efficiency and productivity to achieve value creation and effective business strategy. Unfortunately, such expectations have not been met in many organizations, leading to business losses, reputational damage, or weakened competitive position (Toomey, 2009; Weill & Ross, 2004).

The relationship between IT and the business has evolved within organizations, and therefore the awareness and understanding of IT governance. Traditionally, in IT dependent organizations for the development of business activities, two different domains emerged: the IT domain and the business unit domain (Figure 2.1). The business domain was concerned on the development of their operations and thus how IT enable and operate the business. Conversely, IT domain was concerned on manage and supply the requested services. Therefore, this is the classic supplier-consumer relationship, where IT provides services and business units, as its customers, consume them. IT role is merely that of a service provider, an activity that can easily be outsourced.

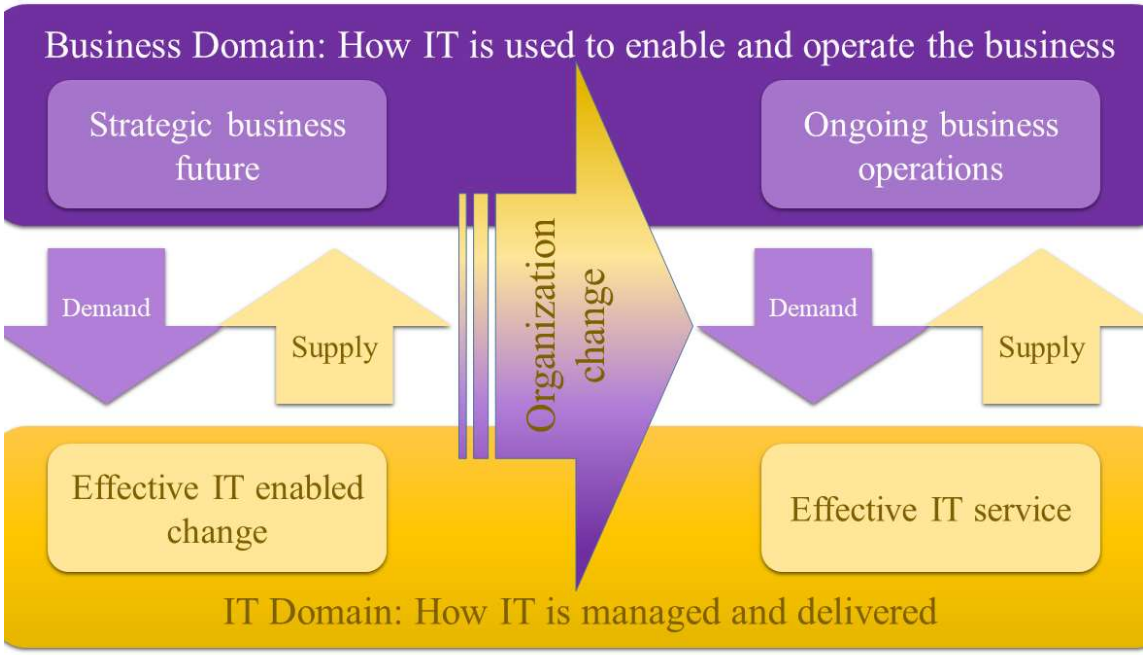


**Figure 2.1 – IT viewed as a service provider in Gómez et al., (2017) [adapted from Toomey (2009)]**

Furthermore, strategic alignment between business units and IT within the institution lacks in this service provider relationship as it exists in terms of management and operation, although the business knows the strategic business future. Once IT address the business units' demand, organizational change is produced through new processes and procedures deployed by the organization, requiring new services and operations supported and maintained by IT (B. Gómez et al., 2017; Toomey, 2009).

Therefore, the necessity to evolve from the traditional supply and demand view to a more mature vision emerges, a view where IT becomes an asset within the organization that creates value. In this next stage of the evolution of the relationship between the IT domain and the business domain (Figure 2.2), each of them is divided into two dimensions, the strategic dimension, and the management / operation dimension. By this model, not only IT supports business units' demand, but top managers should also support stakeholders' external pressures. Therefore, as top management has a strategic vision of

the company, business units carry out their activities with the objective of achieving the expected results established in the strategic plans, belonging to the business domain. Similarly, in the IT domain, IT strategic plans can be generated from the top management business vision, which will be implemented by IT management and operations; afterwards, its performance can and should be measured.

Thus, Figure 2.2 shows how the IT supply and demand are related in both, the two domains and in the two dimensions. According to this second model, alignment of IT with business units occurs when top management provides strategic business and IT plans, jointly, which include the mission and vision of the organization. In turn, IT responds with initiatives to carry out such plans. Therefore, the dialogue that takes place between these two domains is strategic, not simply operational. In the management / operation dimension, there is still a dialogue on supply and demand, as services require IT support, as was the case in the first model. The evolution of this second model is based on communication between strategy and operations, as well as between IT and business units.

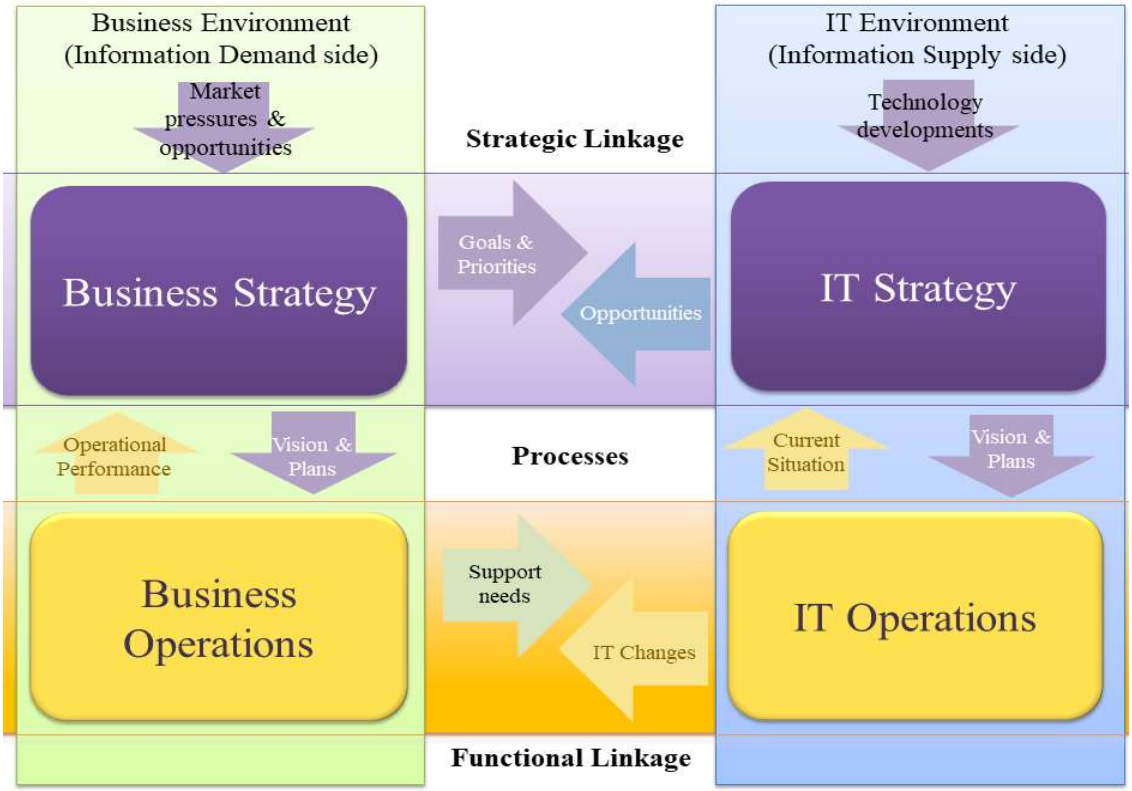


**Figure 2.2 – Schema of IT separated in two domains in Gómez et al. (2017) [adapted from Mueller et al. (2008)]**

Although this second view is clearly more mature than the previous one, organizations that have reached this stage still have difficulties integrating IT, as they are still divided into two different domains, despite being increasingly connected. However, communication between dimensions is just as important as between the two domains, giving way to the next stage of the evolution of the IT-business relationship.

In Figure 2.3, communication flows are more important than the different dimensions of business. In fact, a new dimension is introduced into this new model, IT governance. Top management has a business strategy and objectives, and therefore must be at the forefront of IT governance. The purpose of IT governance should be to drive alignment

between business goals and IT goals. Implementing IT governance implies making decisions about this alignment while, at the same time, establishing control mechanisms to verify that IT management is implementing these decisions.

Consequently, there are two communication flows, in the opposite direction, within an organization: direction and control. The maintenance of the processes that guarantee these flows should be part of the activities of middle managers and, particularly, IT service managers, who make decisions at the tactical level. Therefore, IT governance is simply the transformation of strategic objectives into a viable direction for the organization, while the top management provides the decisions to be executed in the processes cascading down to the lower layers of the organization. The act of control goes in the opposite direction, inquiring and monitoring the results achieved by that indicated direction.

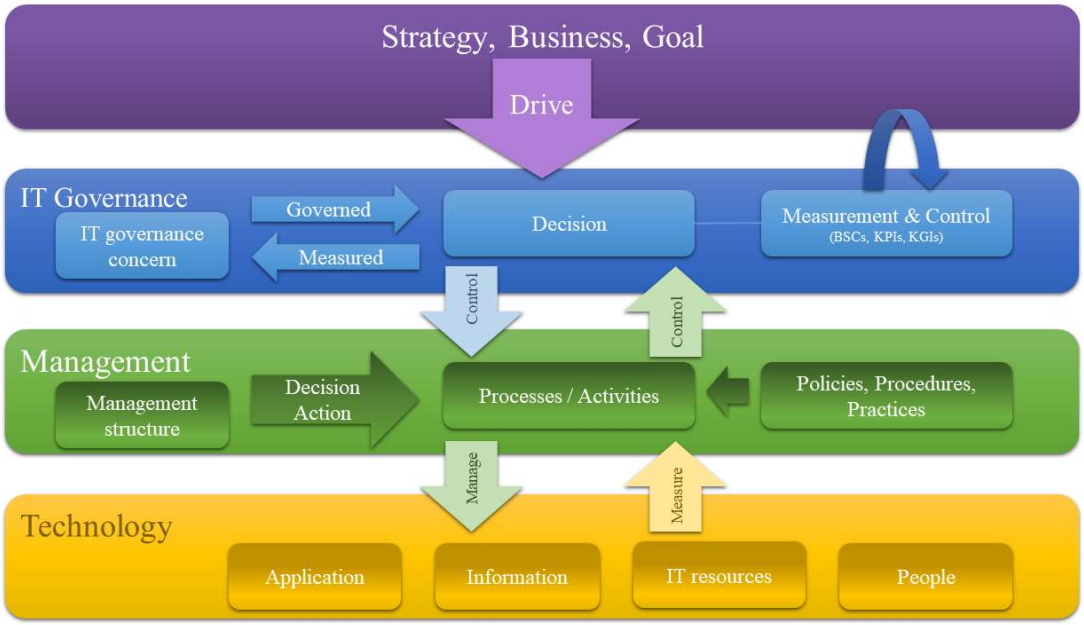


**Figure 2.3 – Governance, management and operational processes in Gómez et al. (2017) [adapted from Mueller et al. (2008)]**

Organizations that follow this third model have already differentiated the four organizational levels: corporate governance, IT governance, IT management and IT operation; in addition to (whether formal) alignment and communication processes for direction and control. It should be noted that these roles can be performed by different structures, in different organizations and countries. Thus, the concept of separate business and IT domains is disappearing, so there is still greater integration than in previous models. Likewise, the decision scope and the direction and control flows are clear. However, it is not so clear how to implement these flows, i.e., differentiated best practices for governance, management and operation that affect IT activities are not required in this model, e.g., IT projects portfolio prioritization (Juiz et al., 2012).

In Figure 2.4, a global perspective of the organization's corporate governance is shown. According to this view, IT resources should be governed like physical assets, human resources, intellectual property resources, relationships (marketing, commercial, advertising, etc.) and financial resources. They should be governed using the same instruments used to govern other assets, i.e., defining strategic plans and controlling the desirable behavior of IT through measurable indicators of progress (e.g., Key

Performance Indicators, KPIs). The responsibility for the implementation of these direction and control activities falls on the top management members (executive managers) who govern the organization, i.e., those structures that have authority and responsibility towards stakeholders. Those governance structures will be held accountable and responsible for IT assets, which are becoming increasingly important and are creating more value to organizations than other traditional assets.

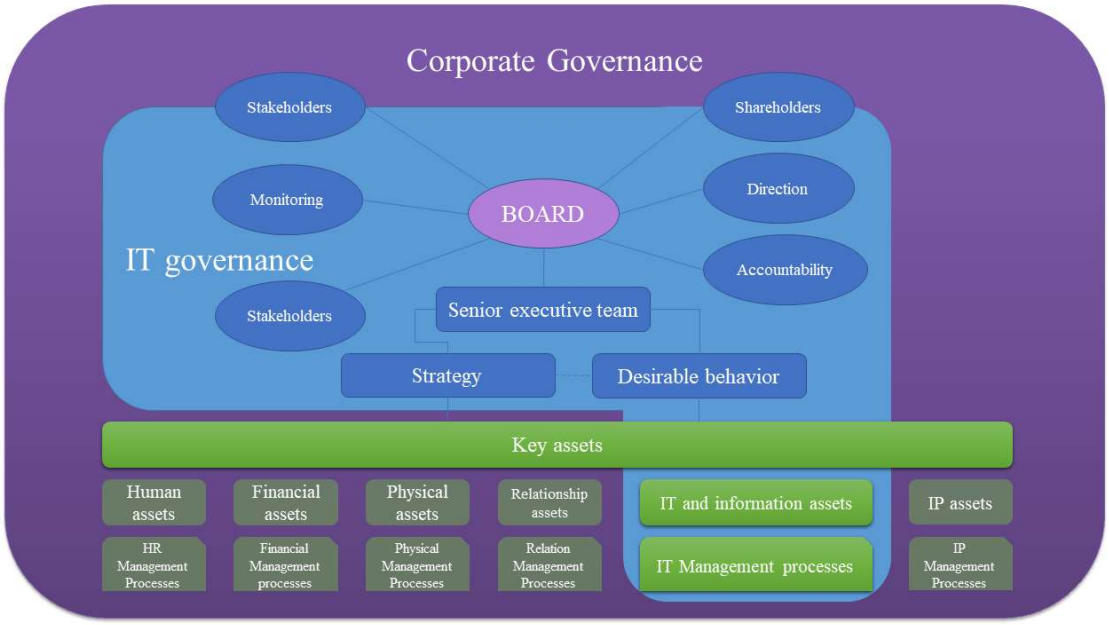


**Figure 2.4 – Framework linking corporate and key asset governance, particularly IT governance in Juiz & Toomey (2015) [adapted from Weill & Ross (2004)]**

One of the main challenges of evolving toward a more mature IT governance approach is the resistance to change within organizations, particularly in public organizations. IT governance involves structural and cultural changes in the daily life of organizations. Therefore, it is essential that the IT organization has the desire to be governed before attempting to implement techniques, tools, methods, or frameworks to govern IT.

Figure 2.5 shows a layered view of the organization that governs IT (C. M. Fernández & Piattini, 2012). As in Figure 2.3, there are two vertical flows between the different layers: a direction flow and a control flow. To operate these communication flows, a clear definition of those layers and their scope within the overall goals of IT governance should be provided and clarified to all stakeholders.

In this layered model of organizational governance, each layer communicates with its lower and upper neighboring levels through direction (downward) and control (upward), but the result of these processes, i.e., what is delivered and returned in response is undefined. In fact, throughout the evolution of IT governance within the organization, communication within the layers of the organization was considered more relevant than the methods of this communication. However, the method of communication between layers is crucial for the proper alignment of IT, business units, executive teams, and the board. The communication between the organization's layers must be represented in a more accurate way to determine the method of direction and control. The scope of IT governance is closely related to strategic, tactical, and operational alignment, as it is essential to understand to what extent the delegation of authority, functions or any type of activity belongs to a certain layer and not to another. It is important to know the

functional aspect of a certain layer, as well as the services provided by the lower and upper layers within the IT governance framework. Transparent and fluid communication is a key issue in the success or failure of IT governance within an organization.

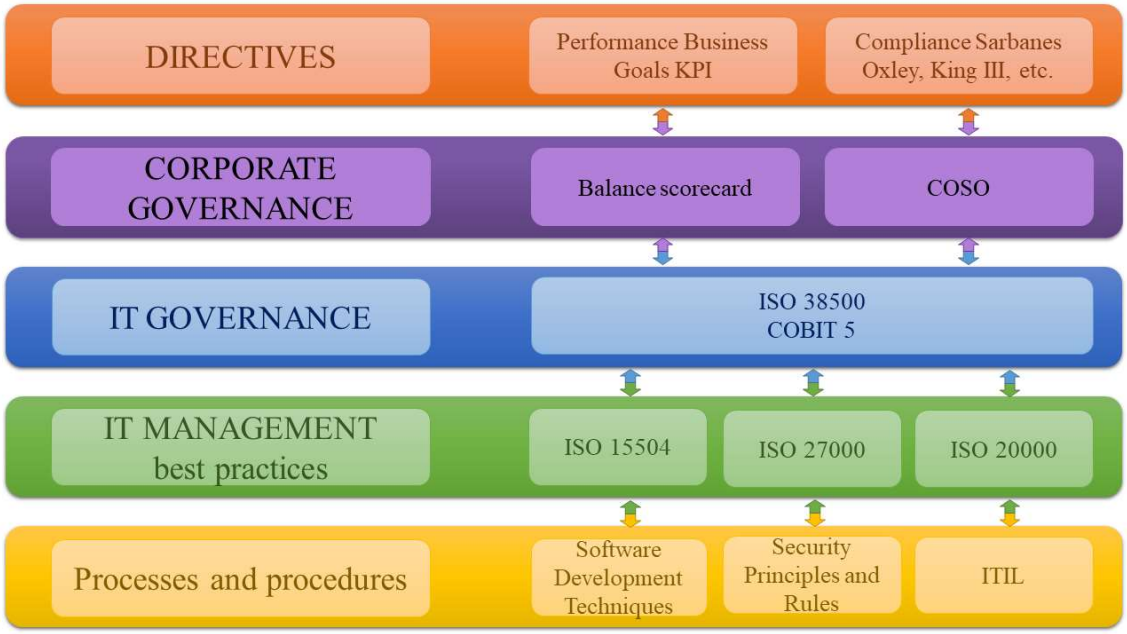


**Figure 2.5 – ISO / IEC 38500: 2008 as a link between corporate governance and management in Gómez et al. (2017) [adapted from C. M. Fernández & Piattini (2012)]**

Just as the concept of IT governance has evolved, so has its definition when trying to include those new visions and models previously explained. The concept of IT governance is not new as it has been arousing interest since the sixties, although it was in the late nineties when it began to be known by this name (Sambamurthy & Zmud, 1999). However, defining IT governance is usually complicated because there is no consensus on the terms to be used or their interpretation, as it is a subject dealt with by experts from different fields: auditing, strategic planning, systems management, security, risks, etc. (Piattini & Ruiz, 2020). Table 2.1 presents a short list of IT governance definitions.

**Table 2.1 – IT governance definitions**

| Authors | Definitions |
|---|---|
| (Henderson & Venkatraman, 1993) | IT Governance is the selection and use of mechanisms, e.g., joint ventures with vendors, strategic alliances, joint R&D for new IT capabilities, etc. for obtaining the required IT competences. All of this is analogous to ***business governance*** which involves 'make-versus-buy' choices in ***business strategy***. Such choices cover a complex array of ***inter-firm relationships***, such as: strategic alliances, joint ventures, marketing exchange, joint R&D, and technology licensing. |
| (Sambamurthy & Zmud, 1999) | IT governance arrangements refers to the ***patterns of authority for key IT activities*** in business firms, including IT infrastructure, IT use, and project management. Modes of IT governance: centralized, decentralized, and the federal mode. They do not provide an IT governance definition; they assume the concept is known by the lector. |
| (Luftman, 2000) | How the ***authority*** for resources, risk, conflict resolution, and responsibility for IT is ***shared*** among business partners, IT management, and service providers. Project selection and prioritization issues are also included here. Ensuring that the appropriate business and IT participants formally ***discuss and*** |

| Authors | Definitions |
|---|---|
| | ***review the priorities and allocation of IT resources*** is among the most important enablers/inhibitors of ***alignment***. This decision-making authority needs to be clearly defined. |
| (Kearns & Lederer, 2003) | The source of competitive advantage is superior management processes and knowledge, not technology per se. Knowledge sharing enhances organizational knowledge. Thus, CIOs engagement in business planning and focus on the ***optimal matching of IT resources*** will better ***support business strategies*** and ensure that business strategies properly reflect IT role. CEOs engagement in IT planning will ensure the ***maximum return from IT*** and realize its ***strategic value***. |
| (Dahlberg & Kivijärvi, 2006; ITGI, 2003) | IT governance is the ***responsibility of the board of directors and executive management***. It is an ***integral part of enterprise governance*** and consists of the ***leadership*** and organizational ***structures*** and ***processes*** that ensure that the organization's IT sustains and extends the organization's strategies and objectives. |
| (Peterson, 2004) | IT Governance describes (a) the ***distribution of IT decision-making rights and responsibilities*** among different stakeholders in the organization, and (b) the rules and procedures for making and ***monitoring decisions on strategic IT concerns***. IT Governance thus specifies the ***structure and processes*** through which the ***organization's IT objectives are set***, and the means of attaining those objectives and monitoring performance. |
| (Weill & Ross, 2004) | IT governance is the framework for the ***specification of decision rights and responsibilities*** to promote ***desirable behavior in the use of IT***. |
| (Calder, 2005) | IT governance is a framework for ***leadership, organizational structures and business processes***, standards, and compliance with these standards, which ensures that the organization's IT ***supports and enables*** it to achieve its ***strategies and objectives***. |
| (Nolan & McFarlan, 2005) | IT governance is the ***responsibility of boards*** who set structures like IT committees to ***make IT decisions***, assign duties, develop policies considering organization's operational and ***strategic needs***, ***avoiding risks***, and ***improving its competitive position***. |
| (Sledgianowski & Luftman, 2005) | IT governance is the choice organizations make when ***allocating decision rights*** for IT activities such as selecting and prioritizing projects, ***assuming ownership*** of technology, and ***controlling budgets and IT investments***. |
| (Webb et al., 2006) | IT Governance is the ***strategic alignment of IT with the business*** such that maximum ***business value is achieved*** through the development and maintenance of ***effective IT control*** and accountability, performance management and risk management. |
| (Silvius, 2007) | The IT governance criteria should include ***business strategic planning***, ***IT strategic planning***, ***reporting*** to organization ***structures***, ***budgetary control***, IT investment management, steering committee(s), and prioritization processes. |
| (Simonsson & Johnson, 2008) | Effective IT governance provides ***mechanisms*** that enable IS/IT management to develop integrated ***business and IT plans***, allocate ***responsibilities***, and prioritize IT initiatives |
| (Van Grembergen & De Haes, 2009) | Enterprise Governance of IT is an ***integral part of corporate governance*** and addresses the definition and implementation of ***processes***, ***structures*** and ***relational mechanisms*** in the organization that enable both business and IT people to execute their responsibilities in support of ***business-IT alignment*** and the creation of ***business value from IT-enabled business investments***. |
| (Prasad et al., 2012) | IT governance essentially places structure around how organizations IT strategy aligns with business strategy. This ***IT-business alignment*** will ensure that organizations continue to |

| Authors | Definitions |
|---|---|
| | ***achieve their strategies*** and goals and implementing ways to ***evaluate its performance***. One special aspect of IT governance is that it considers ***interests of all stakeholders*** and ensures that processes provide measurable results |
| (Saetang & Haider, 2012) | IT governance provides better IT support to organization robustly in ***achieving business objectives***, optimizing business in IT investment, managing opportunities, mitigating IT-related risks. |
| (Zarvić et al., 2012) | IT governance steers the use of IT within a company. IT governance is about ***controlling the strategic impact of IT*** and its ***value delivery*** to the business. |
| (Vogt & Hales, 2013) | IT governance in public organizations is the responsibility of political or public representatives, executive managers, and IT managers of these institutions or political structures. It is an integrated part of their responsibility towards the society and political directives to ensure the ***reasonable, effective, and efficient use of IT to support public goals and interests***. |
| (Juiz & Toomey, 2015) | IT governance is a ***board and top-executive responsibility*** focusing on ***business performance and capability***, not on technology details. A ***principles-based approach*** to IT governance, as described in the ISO/IEC 38500 standard, is consistent with broader models for guidance of the governance of organizations and accessible to business leaders without specific technology skills. |
| (Selig, 2016) | IT governance formalizes and clarifies the ***allocation of responsibilities and decision rights*** for a wide range of IT strategy, integration, resource, and control activities. It is a collection of review policies, practices, and management, planning and performance processes with associated decision rights, which establish authority, sponsorship, controls, a baseline and performance metrics on investments, plans, budget, commitments, services, major changes, security, privacy, business continuity, risk assessment, and compliance with laws and organizational policies. |
| (ISO/IEC 38500, 2015) | IT governance is the system by which the ***current and future use of IT is directed and controlled***. |
| (Cervone, 2017) | IT governance is a repeatable, rational process to collect ideas, select projects and prioritize the implementation of these ideas and projects. |
| COBIT 2019 (ISACA, 2018) | IT governance is interested in the ***delivery of value*** derived from digital transformation and the ***mitigation of the business damage*** that results from such digital transformation. |
| (Parry & Lind, 2018) | IT governance is the process organizations utilize to prudently organize their ***IT investments*** in a way to guarantee that funding of programs, projects or operations is ***accomplished in the most efficient manner***. IT governance deals with IT investments as well as ***who decides on these investments*** in an organization. |

According to Table 2.1 definitions, and its respective authors, IT governance means different things to different experts, e.g., locus of authority, business-IT alignment, IT support business strategy, maximum return from IT and business value creator, decision rights, risks control, prioritization and justification of IT investments, accounting, performance evaluation, etc. In fact, definitions highlight different aspects depending on the researcher's profile, e.g., business, IT, information systems (IS), risks, audit, etc., but most of them are more focused on processes, structure, and strategy than the behavioral part of good governance (Juiz & Toomey, 2015). Nonetheless, IT governance has three mechanisms widely accepted in the literature: decision-making structures, alignment

processes, and communication and relation approaches (Van Grembergen et al., 2004; Weill & Ross, 2004), considering not only exclusive IT scope elements, but also elements shared with other assets (e.g., the financing approval process).

### 2.2.2. IT governance mechanisms

Several authors have proposed various elements to be considered in IT governance. For example, Luftman (2000) indicated that IT governance should consider seven elements, namely: business strategic planning, IT strategic planning, reporting to the organization structure, budgetary control, IT investment management, steering committee(s), and prioritization processes. Guldentops (2002) and ITGI (2003) posed that IT governance is concerned about two aspects: IT delivers value to the business and IT risks are mitigated. Thus, for them IT governance should cover the following scopes: IT strategic alignment, IT value delivery, performance measurement, risk management, and IT resources management. However, these classifications include elements of management at the tactical and operational level that could induce confusion in the IT governance concept. It should be noted, however, the study of Keyes-Pearce (2002) where she assessed how organizations understood the IT governance concept pivoting from structures and processes with the following scale: organizational structure, structure with administrative and control mechanisms, structure with coordinating or integrating mechanisms, process as sustainable capability, process as continuous activity. Notwithstanding, the three IT governance mechanisms widely accepted by both researchers and practitioners (Peterson, 2004; Van Grembergen et al., 2004; Weill & Ross, 2004) are:

- Decision-making structures: organizational units and roles responsible for making decisions, e.g., committees, executive teams, directors of relationships between business and IT, etc.
- Alignment processes: formal processes to ensure that daily behavior is consistent with the policies and that they provide the necessary inputs for decision-making, e.g., evaluation and prioritization of investment processes, project control processes, cost accounting processes, service catalog processes, etc.
- Communication and relational approaches: elements that facilitate communication between various stakeholders, and especially between the business and IT, e.g., announcements, channels, training efforts to disseminate governance principles and policies, etc.

After an exhaustive review of the literature, recurring aspects and themes appeared within the three IT governance mechanisms, which are detailed below.

**Decision-making structures**

Decision-making structures, are understood as organizational units in which to place the locus of authority and responsibilities (Peterson, 2004; Sambamurthy & Zmud, 1999; Van Grembergen et al., 2004; Van Grembergen & De Haes, 2009; Venkatraman et al., 1993; Weill & Ross, 2004). Generally, they include aspects regarding IT decisions, roles and responsibilities, chief information officer (CIO) role/profile, locus of authority and archetypes, IT committees, and business-IT relationship roles:

***IT decisions.*** The main objective of decision-making structures is to direct the business strategy and control the IT performance and proposals of investment (Dahlberg & Kivijärvi, 2006; Rau, 2004; Xue et al., 2008), thus determining IT activities. Such activities primarily include definition and decisions about IT principles, infrastructure,

use, project management, architecture, business applications needs, and investment prioritization (B. Gómez et al., 2017; Rahimi et al., 2016; Sambamurthy & Zmud, 1999; Sledgianowski & Luftman, 2005; Weill & Ross, 2005, 2004).

***Roles and responsibilities.*** Originally, these decisions were made by the IT department, whether it was the CIO, chief technical officer (CTO), or any other IT manager, often lacking a strategic business view (Ionita, 2009). In fact, according to Keyes-Pearce (2002), perceptions from practitioners in her study were that decision-makers were not well stated, therefore, neither were their competencies, functions, or responsibilities. The line between both layers—strategical and tactical—was blurred, and thus nobody knew who must do what. In their work, Gómez et al. (2017) also found that there were no structures to communicate the strategy, CIO and CTO roles were not clarified, and tactical and operational IT activities were not aligned with business needs. This lack of structure could be owing to the board of directors' uncomfortable feeling about IT decisions and subsequent abdication of their responsibilities in IT people (L. Liu & Yin, 2009; Peterson, 2004; Ross & Weill, 2002). Instead, responsibility should be shared and viewed as such by establishing well-defined decision-making structures (Ko & Fink, 2010; Kuruzovich et al., 2012; Lwakatare et al., 2015; Van Grembergen et al., 2004; Zarvić et al., 2012) using a shared language, as far as possible (Bradley et al., 2012).

Therefore, roles and responsibilities are set to allow everyone involved to know who decides what, as well as who should participate, who should advise, and who should provide the information as inputs for making those decisions (Cervone, 2017; Weill & Ross, 2005, 2004). Regarding the communication among governance, management and operational layers, governance people can decide about IT with the advice and help of IT management people who are aware of IT features, risks, impact, etc. In addition to establishing roles and responsibilities, the board must also communicate them and ensure that everybody involved is aware of and understands them, from board to operations through the communication interface (Butler & Butler, 2010; Van Grembergen & De Haes, 2009).

***CIO role/profile***. The CIO can adopt several roles depending on the perception the board has on him (Peppard, 2010; Rau, 2004). Because board members should share the IT responsibility by directing policies, monitoring, and controlling IT aspects, they should also promote a culture of IT governance assuring alignment (Butler & Butler, 2010). According to Bradley et al. (2012), CIO structural power will positively influence the quality of IT governance as he/she will be part of the strategic decision-making for IT interacting with the board. Nolan and McFarlan (2005) also explained which should be the CIO profile and his attitudes, highlighting a broad view of the business, positivity on new opportunities, and use of an easy language. Thus, CIO reporting level, CIO on board, and mutual understanding between business and IT could improve the communication aspects in IT governance implementations (Bradley et al., 2012). Regarding public organizations, Pang (2014) stated that if the CIO's position and duties are established formally by legislation, it positively influences the stronger association between IT spending and cost efficiency, in searching business value.

Alternatively, regarding the tactical level, the CIO should follow the policies and align the IT plan to the business plan (Venkatraman et al., 1993), cascading them to the lower layers and managing IT regarding performance and risks. Furthermore, the CIO should be on board to report them directly, ensuring that other departments that use IT are aligned, which "translates" from business to IT and vice versa (Butler & Butler, 2010;

Nolan & McFarlan, 2005). Finally, regarding the operational level, the CIO should maintain a good relationship with the CTO, whose tasks are IT resources management, efficiency in processes and activities, use of metrics to measure risks, and performance, among others (Butler & Butler, 2010). In this regard, De Jong et al (2010) provided a long list of roles with its description belonging to the three layers (strategical, tactical and operational), how each role communicates, and who should they report to.

***Locus of authority/archetypes.*** Several works focused on patterns concerning where to allocate the authority—ranging from centralized to decentralized versions—through intermediate combinations involving top management or corporate center, business units, and IT specialists, explaining its advantages and disadvantages (Dahlberg & Kivijärvi, 2006; Ko & Fink, 2010; Prasad et al., 2009; Robb & Parent, 2009; Sambamurthy & Zmud, 1999; Warkentin & Johnston, 2008; Weill & Ross, 2005, 2004; Xue et al., 2008). Concretely, Weill & Ross (2004) proposed several political archetypes to identify those involved in decision-making about IT, still used today:

- Business monarchy: the top management of the organization, a business group, or individual executives (CxO) that may include the CIO.
- IT monarchy: IT executives.
- Feudal: Business unit leaders or process owners.
- Federal: C-level executives and business groups, may include IT executives.
- IT duopoly: IT executives and another group, whether CxOs or business unit leaders.
- Anarchy: each individual user or small groups.

Depending on the selected archetype, the communication, and the exchange of information between corporate governance, IT governance, IT management and operational layers will be affected, in addition to its relationship with the board and business units. In any case, a federal archetype is probably the most preferred by practitioners according to the empirical works of Van Grembergen et al. (2004) and Weill and Ross (2004), (2005). Sledgianowski and Luftman (2005) showed several advantages of federal archetypes while Peterson (2004) selected federal as the best of both worlds as it allows implementing standardized IT solutions, considering the flexibility to changes needed by business units regarding what is no longer just an IT decision.

***IT committees***. Different committees or other similar structures should be formally stated with a combination of people from both IT and business sides, overlapping in accountabilities and responsibilities of their functions (Ko & Fink, 2010; Nolan & McFarlan, 2005; Rahimi et al., 2016; Rau, 2004; Sledgianowski & Luftman, 2005). Their activities are primarily to direct the business-IT strategic plan, control the IT performance, define metrics and key performance indicators (KPIs), and select proposals or projects for investment (Rau, 2004; Sledgianowski & Luftman, 2005). They also commonly establish reporting level, frequency, and formality of meetings (Rahimi et al., 2016; Sledgianowski & Luftman, 2005).

One of the committees that appears most in the literature is the IT strategy committee, also known as IT steering committee, audit committee, or control committee (Nolan & McFarlan, 2005; Van Grembergen et al., 2004; Weill & Ross, 2004). According to Nolan and McFarlan (2005), an IT strategy committee assists the board to improve decision making with the objective of competency advantage (mainly controlling risks) when the organization has an offensive behavior. Conversely, in a defensive behavior,

organizations normally prioritize controlling and assuring operational excellence, slightly checking how to compete with new IT. Other researchers also stated that an IT steering committee is a structural mechanism that supports the development and evolution of the IT management capability, in line with strategic goals and objectives (Harguem et al., 2014; Prasad et al., 2009). According to Van Grembergen (2004), as IT governance is an integral part of corporate governance, the Steering Committee should appoint the IT strategic committee to carry out the tasks related to IT governance, and to ensure that senior management has the necessary information to comply with their objectives. In addition, there would be several IT steering committees with specific responsibilities for monitoring projects, cost management, location of resources, etc. In any case, such committees should be comprised of representatives of multiple divisions or functions and charged with addressing business-IT strategy. They have the responsibility of ensuring the alignment of enterprise-level and operational-level IT-related activities over time, setting strategic direction, building policies, discussing IT direction, evaluating, prioritizing and approving projects, reviewing performance, determining resource levels, and promoting communication amongst all parties (Huang et al., 2010; Juiz et al., 2017; Prasad et al., 2010).

There are also other important committees that act in line with the IT steering committee (Butler & Butler, 2010). On the one hand, because the IT steering committee acts at the strategic layer and improves the communication between corporate governance and IT governance, the IT advisory/technical committee acts at the management layer, according to Juiz et al (2017). The CIO should participate in both committees, acting as a bridge to fill the communication gap, understanding the needs and integration of the IT governance decision. They also stated that both committees should be formally established with frequent meetings and involving motivated people willing to develop an IT governance framework. In addition, Almeida et al. (2013) and Maes et al. (2012) performed a systematic literature review on IT governance mechanisms and identified multiple structures, e.g., IT strategy committee, IT steering committee, CIO on board, IT councils, IT leadership councils, E-business advisory board, IT project steering committee, IT audit committee, IT expertise committee, IT investment committee, value management office, project management office, etc. On the other hand, Prasad et al. (2012) studied several structures for collaborative organizational alliances, highlighting communication among layers, regarding the ownership of IT resources and new investments that benefit everyone in the alliance. According to Pang (2014), in public organizations an IT-related legislative committee positively influences the stronger association between IT spending and cost efficiency in searching business value. Such committee is exclusively devoted to IT management, overseeing, monitoring, and controlling it regarding legislative issues. Cervone (2017) went one step further and stated that a previous committee should be established to assess the current situation of IT governance (if any) as an initial step. The committee would review what structures are in place, who participates in those structures, what processes of alignment and prioritization of IT investments and projects are, and if it is well communicated to all stakeholders.

***Business-IT relationship roles***. Researchers have studied IT outsourcing with special attention (Beulen, 2004; De Jong et al., 2010; Gewald & Helbig, 2006). Beulen (2004) stated that a new structure/role should be created to act as a bridge between the business units in the firm and the IT team in the subcontracted firm to better align business needs with the offered IT. In this line, Gewald and Helbig (2006) provided a list of

responsibilities classified into the three layers (operational, tactical, and strategic), indicating who should be responsible and what should be decided. De Jong et al. (2010) also described roles and responsibilities and the necessary reporting and decision structure when handling outsourced firms. These classifications of responsibilities and descriptions can better guide those organizations having a customer-provider relationship with their internal IT team instead of a business partner relationship. Similarly, Zarvić et al. (2012) posed the importance to establish new roles or to assign new responsibilities regarding inter-organizational relationships to direct and control IT issues, aiming to provide value to the businesses, collaborating, cooperating, and coordinating among organizations. Similarly, Bouraad (2010) presented the *operator manager* as an emerging role, a person in charge of the IT project portfolio, its capabilities and responsibilities, and what activities should be conducted.

In addition, various organizations are struggling nowadays with the incorporation of emerging technologies and the changes they cause at a strategic level, even modifying business models. All this phenomenon called *digital transformation*, accentuated, and accelerated by the current pandemic situation, cries out for steering and control mechanisms that govern such new digital assets. Thus, new emerging roles are taking some of the CIO responsibilities, like the Chief Digital Officer (CDO) with activities focused on the management of communication with customers and the best acknowledgment of their needs (Singh & Hess, 2017). On the contrary, authors like Gerth and Peppard (2016) claim that a new figure is not necessary if the responsibility that corresponds to the CIO were actually given to him and he was who led the change. In addition to a specific figure, new structures, and committees, specifically designed to drive change, also emerge. According to Azhari et al. (2014), multiple digital strategies and involved stakeholders should be identified in the company. Established guidelines and steering committees are an integral part of this, who could holistically control those digital activities by defining new KPIs to measure the success of the digital strategy. However, the most notorious aspect to be considered is the leadership against the digital transformation, promoted by the CIO, by the new CDO and even by the top management members who truly believe in the change and mitigate the resistance to such change among the rest of employees, participants, and stakeholders.

**Alignment processes**

Strategic alignment is the ability organizations have in linking business and IT strategies when making investments to realize business value from IT (Leonard & Seddon, 2012; Venkatraman et al., 1993). According to Weill & Ross (2004), alignment is produced owing to the management processes that support decision-making. Generally, alignment processes include aspects regarding business-IT alignment and IT investments prioritization among other alignment mechanisms.

***Business-IT alignment***. Perhaps the first authors to arouse interest in the strategic business-IT alignment were Venkatraman et al. (1993). They presented a strategic alignment model (SAM) identifying the business domain and the IT domain, explaining four dominant alignment perspectives: strategy execution, technology potential, competitive potential, and service level. Following them, numerous authors have based their studies on strategic alignment and general IT governance, using their SAM and the Luftman's (2000) extension. In his study, Luftman (2000) provided a strategic alignment maturity assessment to show which level organizations currently are regarding business-

IT alignment and how they can improve it with this information. Thus, several authors have based their empirical studies on both works, assessing the strategic alignment maturity level in organizations (Gewald & Helbig, 2006; Hiekkanen et al., 2015; Ko & Fink, 2010; L. Liu & Yin, 2009; Raymond et al., 2019; Silvius, 2007; Sledgianowski & Luftman, 2005; Van Grembergen et al., 2004; Van Grembergen & De Haes, 2009).

According to Kearns and Lederer (2003) alignment is produced in two ways: *business reflected in IT* means business objectives and goals are included in IT plans; *IT reflected in business* means features and specific IT is considered when planning the business IT use. Thus, specific expectations are indicated in advance to be obtained by measuring IT performance. However, Silvius (2007) stated that there are differences in the definition of alignment, as some authors see it as IT adapting to business and others see it as both adapting and influencing each other. For example, Simonsson et al. (2010) understood business-IT alignment from the perspective of measuring IT governance performance. For them, IT governance performance is the quality of services the IT organization delivers, from a business perspective (i.e., cost-effective use of IT and effective use of IT for asset utilization, growth, and business flexibility). Kearns and Lederer (2003), however, understood business-IT alignment as a dynamic capability that enables knowledge sharing among managers in an organizational, rather than operational, way.

Researchers are focusing on different but related aspects when they define or study the business-IT alignment, i.e. business-IT goals (Ionita, 2009; Van Grembergen & De Haes, 2009), business-IT activities (Buchwald et al., 2014), business-IT strategies (Rahimi et al., 2016), business-IT processes (Rahimi et al., 2016), and business objectives-strategy (Medeiros et al., 2017). Another issue regarding alignment is the perspective of most authors as a journey or process of transition instead of a state. Silvius (2007) studied how IT people and businesspeople understand business-IT alignment. Similarly, Hiekkanen et al. (2015) first measured the alignment practices in a large organization by asking whether they have that practice before assessing its maturity. They involved people from IT in the case study in the three layers—strategical, tactical, and operational—as well as businesspeople, to assess the maturity of the business-IT alignment.

Business-IT alignment seems to be affected by contingency factors, as Dahlberg and Kivijärvi (2006) found in their empirical study, such as competitive strategy and business objectives, beliefs about IT, business practices, and organizational and performance measurement culture. However, aligning business with IT seems to have positive effects on organizations, as they gain better decision making in investments and saving on the budget (Saetang & Haider, 2012). Thus, good alignment of IT resources with organizational objectives will also positively affect the firm's performance, which is seen as generating business value (Phiri & Weiguo, 2013). In fact, Lepak et al. (2007) explain not only the process by which value is created, but also the mechanisms that allow the creator of value to capture such value. Those concepts are very important for IT to define what value creation is for business and how to enhance it.

To achieve business-IT alignment, rules and standards should be set and followed in applying any alignment process (Peterson, 2004). These alignment processes will provide input back to decisions; thus, organization's behavior should be consistent with such rules, standards, and IT policies (Weill & Ross, 2005, 2004). According to Weill and Ross (2004), there are five IT decisions that should be made in the IT governance layer: IT principles, architecture, infrastructure, business application needs, and investment and prioritization. Although the person or group responsible for each decision will depend on

the archetype selected, IT architecture and IT infrastructure are allegedly closely related to IT management execution, while the other three decisions have a more strategical approach. However, to assess IT fitness for the business needs some alignment actions among both layers (IT governance and IT management) should be made. Thus, principles, business needs, and prioritization of investments are decided by IT and non-IT people, normally in IT governance plans. Therefore, this facilitates knowledge sharing and generation of new ideas by IT management (and operational level) to apply in the business (Luftman, 2000). The CIO can decide whether the infrastructure and architecture that the IT staff has implemented respond to business initiatives and, furthermore, ensure the operations regarding value, not in technical terms, which is in turn the responsibility of the IT operation and management layers (De Jong et al., 2010; Juiz, 2011).

***IT investment prioritization.*** Some popular alignment actions are as follows: processes to identify business cases for IT decisions (Peterson, 2004), formally tracking business value delivered by IT (Weill & Ross, 2005, 2004), evaluation and prioritization of IT investments (Peterson, 2004; Weill & Ross, 2005, 2004), and monitoring the IT implementation and projects, its performance (arranging metrics), and resources consumed (Juiz et al., 2017; Ko & Fink, 2010; Parry & Lind, 2018; Peterson, 2004; Weill & Ross, 2005, 2004). Specifically, evaluation and prioritization of IT investments is an activity that highly involves the IT management layer as it categorizes, prioritizes, selects, and initiates the right projects and programs to ensuring the most optimized use of an organization's IT investment (Juiz, 2011; Kamogawa, 2010; Saetang & Haider, 2012), as well as the meeting with the strategic goals (Juiz et al., 2017; Parry & Lind, 2018).

Supposedly, organizations' behavior toward prioritizing IT investments has different patterns. According to Karhade et al. (2015), if they behave as strategical conservatives, they tend to formalize methods in communicating the needed information for the decision-making process, to maintain high mechanisms of consistency in applying the decisions, and to place great focus on risk assessment and mitigation. Conversely, if they behave as strategical innovators, they have more flexible and low-moderate communicability and consistency, as their focus is on exploring new opportunities. In fact, prioritizing projects in public organizations must have a different approach than those in for-profits. Vogt and Hales (2013) explained that alignment in public organizations should follow the value expected by community and political goals instead of financial aspects of growth. Public organizations should highlight the transparency in decision-making processes, prioritizing projects, and investments by objective aspects, rather than subjective estimations.

Normally, researchers refer to project portfolio when they address IT investment evaluation and prioritization, e.g. De Jong et al. (2010), Juiz et al. (2017), Kamogawa (2010), Karhade et al. (2015), Medeiros et al. (2017), and Parry and Lind (2018), among others. Drake and Byrd (2006) stated that an IT project portfolio is an element of business-IT alignment because it is used to ensure that policy is followed in the whole organization by monitoring and controlling IT performance, goals, metrics, costs, etc. Lankhorst et al. (2010) presented four stages when governing and managing the IT project portfolio: 1) strategy planning, 2) project evaluation, 3) portfolio selection, and 4) portfolio monitoring. One example of a project portfolio process following these stages is the proposed by Juiz et al. (Juiz et al., 2012). First, the CIO should establish the strategic objectives with the tactical goals supported by each project. Next, the CIO should show the portfolio to the board, and then they jointly evaluate, select, and prioritize the projects

to decide which will be planned, subjected to availability, or unplanned. One factor highlighted here is the figure of a sponsor (mandatory for each project) belonging to the board, thus, the board is involved in the selection process and the project is better aligned with the strategy of the company. In fact, in their empirical study, Marshall and McKay (2004) showed how companies aligned business and IT by selecting projects to invest in. For those firms, projects were never seen as IT projects again, but as business projects, utilizing new IT solutions. Sirisomboonsuk et al. (2018) also highlighted the need to state a "portfolio direction" in the whole IT project portfolio process—but especially in the evaluation and selection stages—to have a coherent, well managed, and governed portfolio, that provides value and improves performance. With this stated "direction," IT projects—and thus its portfolio—are better aligned with business objectives and linked with strategy. Furthermore, Lwakatare et al. (2015) presented some aspects that may influence the decision to select a project, e.g. the previous experience, input information, and willingness or trust in IT. Jordan (2005) highlighted the importance of include risks identification in the project proposals; thus, risks are considered when evaluating and selecting projects. Finally, after post-selection of projects, monitoring and controlling the portfolio ensure alignment is achieved with what was evaluated such risks, benefits, outcomes, etc. (Lwakatare et al., 2015). In this sense, Lankhorst et al. (2010) stated that a portfolio can be viewed from both sides: the future investments on IT and the current use of IT. Regarding the current use of IT, authors highlighted that organizations should ensure continuing maintenance, improving quality, extending functionality, or replacing the application/service. In fact, the IT service portfolio (or catalogue) should be transparent to the whole organization and readjusted in case their activity has deviated from the strategy and business objectives (Buchwald et al., 2014; Juiz et al., 2017).

Accordingly, IT project portfolio prioritization is not solely an IT concern but a process of business-IT alignment involving all the organization (Phiri & Weiguo, 2013). The responsibilities of each layer and the communication between them have been highlighted, as each layer is requesting and providing different aspects (Juiz et al., 2012). In fact, reporting must be considered in the whole process, as everyone involved should have the right information in the right moment for optimum decision-making. On the contrary, reluctance to report contributes to project failure (Sirisomboonsuk et al., 2018).

In sum, this activity is a clear example of communication between IT governance and IT management layers as it assures that objectives are aligned with strategic and organizational objectives (Medeiros et al., 2017). As Juiz et al. (2017) noted, prioritizing IT investments should be done by both committees (the IT steering committee and the IT advisory/technical committee) to ensure that communication mechanisms between layers are in place. In the end, the value of the IT portfolio relates to how IT projects and applications support the organization's strategic goals and requirements (Lankhorst et al., 2010).

In addition to tracking the resources consumed by monitoring the IT project portfolio, some other alignment mechanisms should be considered. Such alignment mechanisms provide input back to decisions and ensure the whole organization's behavior is consistent with IT policies. One of the most popular mechanisms is the balance scorecard (BSC), first proposed by Kaplan and Norton (1996) and adapted to IT by Van Grembergen and De Haes (2005). They defined the business-IT alignment as those processes related to IT decision-making and monitoring by using IT BSCs to align both strategies and measure the outcomes regarding the specific objectives and goals (Van Grembergen et al., 2004;

Van Grembergen & De Haes, 2009). On the other hand, service level agreement (SLA) is another alignment mechanism to measure whether the service delivers the expected value to the business (Gewald & Helbig, 2006; Weill & Ross, 2005, 2004). There is a vast literature that delves into both BSCs and SLAs, as well as other alignment mechanisms, which are beyond the scope of this study.

**Communication approaches**

The main aim of communication approaches, also known as relational mechanisms, is to disseminate IT governance principles, policies, and outcomes of IT decision-making processes among all stakeholders (Weill & Ross, 2004). Mechanisms that improve the social business-IT alignment are included under this aspect. They usually are divided in formal and informal integration mechanisms. Regarding the formal, some examples are IT represented on the executive board, the existence of a liaison unit/function for business-IT communication, and the existence of regular joint meetings to control change processes and identify business process improvements. Regarding the informal, some other examples are 'board support for business IT collaboration' and 'statement of several incentives for business-IT interaction' (Schlosser et al., 2015). In general, communication approaches include cooperation aspects between business and IT as well as strategic and tactical layers. Generally, communication approaches include stakeholders' understanding and engagement on IT governance, negotiation, participation, dissemination, and trust and behavior.

***Stakeholders' understanding and engagement***. Mutual understanding among business and IT stakeholders in both directions is a key factor to improving communication and, thus, assessing the business-IT alignment (Luftman, 2000; Rau, 2004). This relationship is essential to have a clear and shared understanding of their responsibilities, activities, and what strategic objectives drive business decisions (Juiz et al., 2017; Ko & Fink, 2010; Salle & Di-Vitantonio, 2006). Furthermore, communication among layers (strategic, tactical, and operational) is also highlighted as a good practice of transparency but also of engagement, as involved people are aware and understand the outcomes, needed improvements, achieved objectives, etc. (Juiz et al., 2017).

If there is a lack of communication, it is difficult to design a collaborative strategy that places IT in line with business needs (Luftman, 2000). If there is also a lack of integration, IT management does not understand the business and problems arise, e.g., bad prioritization of business projects, wasted IT investments, and no realization of business value by IT, among others. These conflicts between business and IT management cause resistance to business changes enabled by the IT as the board does not assume its responsibility and distrusts IT assets and staff (De Maere & De Haes, 2017); thus, the IT management team and department is always under suspicion (B. Gómez et al., 2017; Peterson, 2004).

Therefore, organizations should define and maintain both direction and control communication flows among strategic, tactical, and operational layers (B. Gómez et al., 2017). The directional flow cascades principles and policies to translate business strategy into IT strategy, while the controlling flow provides the requesting information to assess and realize business value (Coertze & Von Solms, 2015; B. Gómez et al., 2017). Organizations should consider that people belonging to each layer might have a different vision of the use, importance, and impact of IT; thus, they will speak a different language. People trying to communicate to the upper or lower layers should translate their concepts,

directives, and policies into a language understood by the receptor. Each layer must know its responsibilities and functions, what expectations there are from the next layers, and what must be communicated to them as input and output information (B. Gómez et al., 2017). They should establish in advance a context to face not only the interpretation of the receptor, but also what information is useful for the receptor to avoid reporting useless data, or filtered data, and correctly reinterpret the policies or strategy into IT strategy (Coertze & Von Solms, 2015). The communication between layers is crucial, rather than the methods of this communication, as it should be achieved in a transparent and fluid way (B. Gómez et al., 2017).

This communication flow becomes a never-ending cycle in both directions because it is also important for the business to understand how technology is managed and maintained to support the business (Luftman, 2000). Improving the communication engages not just board of directors, but also IT management and IT operations to ensure the performance and conformance of IT products, operations, and services (Juiz, 2011). Hence, the CIO is instrumental in the communication flow, both cascading and providing the needed information. According to Saetang and Haider (2012), the communication and relation between CIO and CTO should improve to better align objectives and strategy and to better communicate proposals and new technology that could fit the business. Concerning upper layers, the CIO should inform them of how IT supports the business processes and how the strategy is being developed (Kuruzovich et al., 2012). In fact, the CIO reporting directly to the CEO or having a position on the board is a good IT governance mechanism that captures evidence of relationships and/or collaboration among the board and the IT group (Buchwald et al., 2014; Kuruzovich et al., 2012; Schlosser et al., 2015).

***IT decision negotiation***. Mutual awareness of responsibilities and activities is an essential aspect to improve the communication among layers and stakeholders as well as reducing the resistance to change. However, the communication and relational approaches should include mechanisms of problem-solving and negotiation among parties, not only to achieve mutual understanding but also to ensure that evaluations, assessments, and agreements are as expected (Gewald & Helbig, 2006; Peterson, 2004; Weill & Ross, 2004). For example, on the one hand, Medeiros et al. (2017) highlighted a negotiation stage to improve decision-making regarding project portfolio prioritization and investments. On the other hand, Y. J. Kim et al. (2013) promoted behavior and trust in IT outsourcing relationships to solve problems in reciprocal exchanges, facilitating the fulfillment of obligations and responsibilities. Therefore, this negotiation aspect should be included in any IT decision affecting the business process of the organization (Weill & Ross, 2004).

***Stakeholders' participation.*** According to Sledgianowski and Luftman (2005) and Van Grembergen et al. (2004), the relational mechanisms promote better communication and include business/IT participation and partnership to achieve jointly goals. Those communication methods are part of the synergic feature of IT governance implementations, including coordination and orientation among corporate executives, IT management, and business management and their relations to achieve common goals (Ionita, 2009; Ko & Fink, 2010; Van Grembergen & De Haes, 2009). Apart from cooperation issues, Schlosser et al. (2015) highlighted some examples of integration mechanisms such as joint IT planning with business staff or training led by IT for business staff about IT use.

Researchers have given special attention to coordination aspects regarding alliances and outsourcers. Prasad et al. (2012) and Zarvić et al. (2012) proposed specific ways of communication for collaborative organizational alliances, such as inter-organizational communication systems, partnership and alliance-based communication, and collaboration tools. Similarly, Dahlberg (2015) described mechanisms to enhance the communication among organizations to improve IT governance implementations and results. The idea concerns how to share decision-making mechanisms to invest jointly and share the IT infrastructure. Dahlberg (2015) also highlighted the stakeholders' behavior and willingness to collaborate as well as how people from each layer are aware and understand the benefits. The specific focus of Y. J. Kim et al. (2013), on the other hand, was on promoting communication to improve the relationship with the outsourcers where involved parties share responsibilities, obligations, and outcome expectations, enhancing quality.

***IT plans and decisions dissemination***. Organizations should communicate IT governance principles, mission, vision, policies, plans, objectives, and outcomes of IT decision-making processes. However, they should also disseminate and promote them by using board announcements, channels, advocates, and education efforts (Huang et al., 2010; Salle & Di-Vitantonio, 2006; Van Grembergen & De Haes, 2009; Weill & Ross, 2005, 2004). Before the decision-making process, the strategy should be also disseminated among all the involved people to be more aligned regarding activities and investments (Gewald & Helbig, 2006). Furthermore, the dissemination of the strategy across the layers improves the selection process of IT projects as the correct input information is shared and reported among stakeholders (Lwakatare et al., 2015). Hence, announcing strategy and principles and directing plans and policies are as important as promoting the decisions taken and disseminating the results obtained after applying them (Huang et al., 2010; Kuruzovich et al., 2012). This is not only a good practice to promote transparency, but it also helps include all stakeholders, celebrating the achievements and becoming involved in the efforts for improvement (Juiz et al., 2017).

***Trust on IT and behavior in its use***. Defining communication approaches and improving their mechanisms will also transmit trust in IT (De Maere & De Haes, 2017). Promoting good behavior regarding IT use can contribute positively to share strategic perspectives, cooperation, project quality, and several aspects of performance improvement (Y. J. Kim et al., 2013). Hence, transparent and fluid communication is a key issue in among the four abovementioned layers, i.e., corporate governance, IT governance, IT management and operations (B. Gómez et al., 2017), thereby improving stakeholders' awareness and understanding (Dahlberg, 2015).

### 2.2.3. IT governance principles and actions

Weill and Ross (2004) posed that among IT governance practices there should be controlling behavior, activities, and processes which create control mechanisms; definition of roles and responsibilities as well as rights and obligations; and establishment of rules and policies. In fact, one of the fundamental roles of governance in organizations is oversight of management, guiding it in terms of decisions and monitoring its performance (Toomey, 2009). For that purpose, effective governance addresses three questions: 1) What decisions must be made? 2) Who should make these decisions? And 3) How will we execute and monitor these decisions?

Regarding the first one, Weill and Ross (2004) highlighted the following five IT decisions:

- IT principles: high-level business statements regarding the use of IT.
- IT architecture: an organizing logic that encompasses data, applications, and infrastructure within a set of policies, relationships, and technical choices to achieve the desired business and technical standardization and integration.
- IT infrastructure: centrally coordinated, shared IT services that provide the foundation for IT capability on a firm-wide basis.
- Business application needs: the business need for purchased or internally developed IT applications.
- IT investment and prioritization: decisions regarding IT investments, including project approvals and justification techniques.

Weill and Ross (2004) provided a framework to show how these five decisions interconnect with each other (Table 2.2). IT principles rank high because all other decisions depend on them. IT principles are strategic statements, preferably aligned with business principles that indicate how IT is used in the business. Once the IT principles are defined, three fundamental pillars are necessary to support these principles: IT architecture, IT infrastructure and IT investment and prioritization. IT architecture provides an organizing and standardized logic for data, applications, and infrastructure. It translates IT principles into requirements for integration, leading to technical choices to achieve the desired business. IT investment and prioritization decisions transform resources into systems with the aim of materializing IT principles aligned with the business. Note that, according to Weill and Ross (2004), infrastructure decisions and business applications needs are directly related. Infrastructure decisions will follow the criteria of principles, architecture, and investments to provide the IT capabilities available throughout the business as well as the reliable services shared and used by multiple applications. Therefore, infrastructure decisions will flow towards business opportunities and needs that will identify the necessary applications, indicating new infrastructure requirements. In fact, investment decisions will select and fund those projects and infrastructures that support initiatives on new applications, which will implement an architecture designed so that IT principles, and therefore business principles, become a reality.

**Table 2.2 – Key IT governance decisions, from Weill and Ross (2004)**

<table>
<tr><td colspan="3">IT principles decisions<br>Statements about IT used in business</td></tr>
<tr><td rowspan="2">IT architecture decisions<br>Organized and standardized logic</td><td>IT infrastructure decisions<br>Coordinated and shared IT services</td><td rowspan="2">IT investment and prioritization decisions<br>How much and where to invest in IT</td></tr>
<tr><td>Business applications needs decisions<br>Purchased or internally developed IT apps</td></tr>
</table>

Although these five decisions have been widely accepted both in the literature and among practitioners, and thus adopted in numerous frameworks, the confusion between government and management also grew as their boundaries were so blurred. Decisions on principles, business applications and investments could be identified at the strategic layer, while aspects on architecture and infrastructure could well belong to IT managers.

Nonetheless, this gives rise to the second governance question, who should make these decisions based on the layer they belong.

Thus, regarding the second governance question, the previous section already described several structures in which to place the locus of authority and responsibility. Weill and Ross (2004) identified six archetypes, i.e., business monarchy, IT monarchy, feudal, federal, duopoly, and anarchy, and they recommended that organizations should identify which archetype made each decision, specifying in turn which archetype provided the necessary information to be able to make that decision (Table 2.3). In this way, various patterns were identified among the surveyed organizations, reflecting the *federal* system as the one mostly selected by companies in providing the input needed information, and deciding on *business application needs* and *IT investments*. *IT monarchy*, though, was the most common decision pattern to decide on *architecture* and *infrastructure*, while *duopoly* to decide on *IT principles*. Therefore, the location of decision making, and responsibility helps lighten the border between government and management. Currently, those patterns are less important than separate governance from management, as the standard below addresses.

**Table 2.3 – How enterprises govern, from Weill and Ross (2004)**

| Decision | IT principles | | IT architecture | | IT infrastructure | | Business applications needs | | IT investment | |
|---|---|---|---|---|---|---|---|---|---|---|
| Archetype | Input | Decision | Input | Decision | Input | Decision | Input | Decision | Input | Decision |
| Business Monarchy | | | | | | | | | | X |
| IT Monarchy | | | | X | | X | | | | |
| Feudal | | | | | | | | | | |
| Federal | X | | X | | X | | X | X | X | O |
| Duopoly | | X | O | | | | | O | | X |
| Anarchy | | | | | | | | | | |

X: most common pattern; O: second most common pattern; Blue: input; Green: decision.

As for the third governance question on how we will execute and monitor these decisions, it should be noted that each organization must define its own mechanisms of monitoring and control, because each organization should define its business model, strategy, vision, and mission. Nonetheless, several best practices models and frameworks rose and thus organizations can partially or totally adopt them to implement and assess IT governance. However, due to the vast number of plans, guidelines, advices, and learnt lessons, the need of standardize IT governance emerged (Toomey, 2009).

### 2.2.4. The ISO/IEC 38500 standard

The IT governance standard, ISO/IEC 38500, was the first standard to provide differentiated guidance for IT governance. The standard was launched in 2008 based on the Australian standard AS8015 from 2005 (Toomey, 2009), later revised in 2015, and currently ISO is planning to prepare the third edition in next years. The standard was not born as an evolution of the Weill and Ross framework, nor any other renowned IT governance authors and researchers. Its philosophy lies in the need to standardize good practices and good IT governance behavior, governing the current and future use of IT in any organization, regardless of what mechanisms or frameworks they have adopted. In fact, *use* is the keyword in the sentence since a lot of emphasis had been placed on technical and financial aspects of IT and little on the widespread use of IT throughout the business.

Diverse organizations may adopt different approaches conforming to the ISO/ IEC 38500 standard, and thus governance frameworks may differ in their design between different organizations (Juiz, 2011). In fact, for a long time, some organizations have confused IT governance with IT management. This error may be because the boundaries between governance and management are blurred and thus have caused that some de facto IT management standards tried to include some governance mechanisms (Toomey, 2009). The conceptual model of IT governance is shown in Figure 2.6.

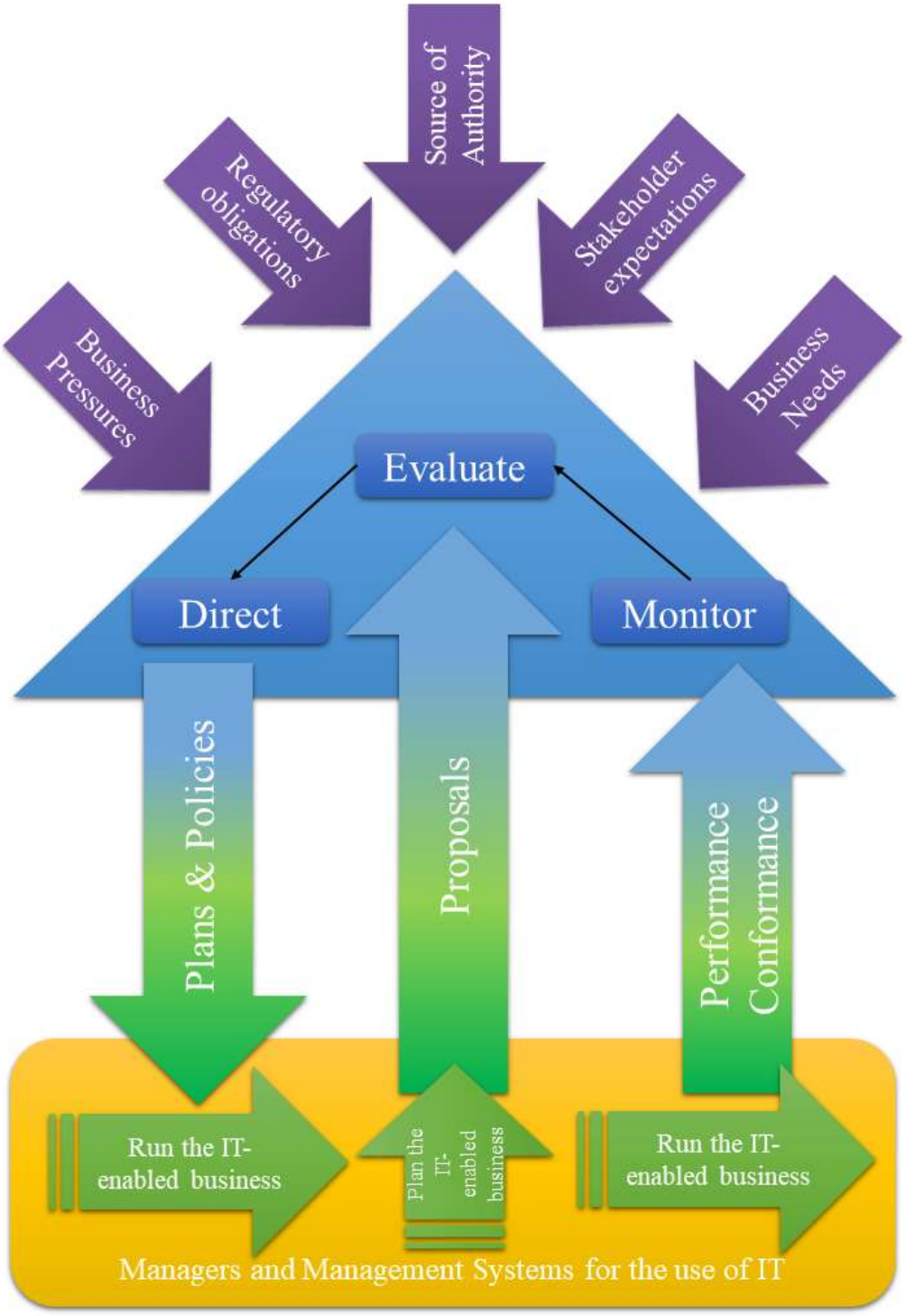


**Figure 2.6 – IT Governance model, based on the ISO/IEC 38500 standard [adapted from Juiz and Toomey (2015)]**

Therefore, the ISO/IEC 38500 standard provides good governance practices, providing a fluid and transparent communication structure between governance and management. These best practices are based on three main tasks (Toomey, 2009):

- Evaluate: to examine and judge the present and future use of IT, including strategies, proposals, and supply agreements (internal and external).
- Direct: directing the preparation and implementation of plans and policies and assigning responsibilities to the purpose. Ensure the correct transition of projects to production, considering the impacts on the operation, business, and infrastructure. Promote a culture of good governance of IT in the organization.
- Monitor: through measurement systems, monitoring the performance of IT, ensuring that is adjusted to plans.

One might come to think that these tasks are the exclusive job of the board of directors. Actually, what the ISO/IEC 38500 standard intends is to show the communication flow that is formed between these IT governance and management layers when applying these three tasks. In fact, directors should direct and monitor IT management regarding the organization's use of IT, by setting policy and strategy and by monitoring management performance and conformance with law and regulations (Juiz & Toomey, 2015; Toomey, 2009). However, several aspects of these tasks are delegated to IT managers, while the board supervises that responsibility is properly assigned and reserves some aspects, such as the evaluation and approval of the strategy and investment decisions, the definition of policies on the use of IT, and its formal monitoring assuring that sufficient and reliable information is available. Thus, the standard is addressed not only to directors but also to managers as well as other internal and external involved individuals. This interaction among layers may be better understood by following the communication flow through the ISO/IEC 38500 standard model (A. Fernández et al., 2018):

- Governance structures, e.g., the board of directors, withstand business pressures, regulatory obligations, stakeholder expectations, and are tasked with holding the company accountable.
- IT managers and technical staff, e.g., IT services department, must ensure the successful development of projects and that subsequent operations will maintain the service quality of business processes.
- These IT projects are driven by the strategic plan and policies coming from the board of directors, of which the CIO should be a member, to improve communication between business units and technical staff.
- In this way, business units and IT staff must work together and propose new projects and improvements in operations that the CIO, and other IT governance structures, must evaluate to include them, among others, in the portfolio of projects that implement IT strategy, policies and operations.
- To close the cycle, once IT projects are finished, they become operations, which are used to execute the IT business, infrastructure, or architecture processes. Performance indicators must be monitored, and IT compliance with laws, standards and rules must be verified, as well as a technological surveillance of the market and business evolution, thanks to IT.
- The CIO and other structures with competencies in the governance of IT, must control the previous indicators to know the current situation of IT and thus have

evaluation criteria on the new proposals that are received from the management layer and thus, redirect IT accordingly.

As shown in Figure 2.6, the model of IT governance proposed by the ISO/IEC 38500 includes the three activities mentioned above. The IT governance layer and IT management layer are also distinguished. These two layers are connected by plan and policy direction and proposal and performance measures, thus fulfilling the direction and control flows. The governance layer provides principles and policies to the management layer, which is responsible for returning solutions to meet the established objectives. In addition, performance measures for IT activity within the enterprise reach the layer of governance.

This bond between the layers of management and governance demonstrates that they should be aligned, so that IT meets the objectives of the organization. Communication conflicts should be resolved, so bridges between management and IT governance should be built, and these bridges must be provided by the organization. Governing is about making decisions but also communicating them. Thus, this standard brings about more effective communication by creating bridges within the organization.

Moreover, the ISO/IEC 38500 standard defines six general principles of good IT governance, which express desirable behavior that should guide IT decision-making. These six summarized principles are as follows:

1. ***Responsibility***: all members of the organization must understand and accept their responsibilities in both the supply of and demand for IT. Responsibility for actions carries with it the authority to implement those actions.
2. ***Strategy***: the business strategy of the organization considers the current and future capabilities of IT. IT strategic plans meet current and projected needs derived from the business strategy.
3. ***Acquisition***: IT acquisitions are made for valid reasons based on an appropriate and ongoing analysis, with clear and transparent decisions. There is an appropriate balance among benefits, opportunities, costs, and risks in both the short and long term.
4. ***Performance***: IT is dimensioned to support the organization, providing services with adequate quality to meet current and future needs.
5. ***Conformance***: IT function complies with all applicable laws and regulations. Policies and practices in this regard are clearly defined, implemented, and required.
6. ***Human behavior***: IT policies, practices and decisions demonstrate respect for human behavior, including the current and emerging needs of all people involved.

In this way, the three main IT governance tasks outlined in the standard: direct, evaluate and monitor, should be carried out following the six principles. These tasks and principles guide IT governance, as a behavior improvement, rather than something purely procedural or automatic:

- Stakeholders delegate responsibility and control to the board of directors and, in return, expect the board to take responsibility for the activities necessary to meet the expectations of those stakeholders.
- The board sets a direction for the executive managers of the entire organization and holds them accountable for its performance through control processes.
- The board of directors plays a governing role, in the traditional sense of taking responsibility for the management of something entrusted to its care.

By following the three tasks and the six principles the standard is applicable to each organization, i.e., the standard was conceived so that it could be adopted by any organization regardless of its type or size. For that reason, it does not offer guidance on specific tasks or processes that must be executed, controls that must be implemented, or structures or roles that must be defined. Thus, the standard offers both an opportunity and a burden; the opportunity to freely apply what best suits each organization, assuming that there are mechanisms that will facilitate IT governance if organizations follow them, and the burden of designing and defining a specific IT governance approach for each organization.

In this sense, the activity of the governing body to direct and control IT activities and to build a decision-making model, combined with the activity of the IT management structures to develop and support IT systems, processes and procedures, result in the development of an IT governance framework (Holt, 2013). Practitioners and researchers alike have tried to link both IT governance and management layers in several ways (e.g., Mueller et al. (2008) previously explained in section 2.2.1, Holt (2013), ISACA with COBIT from version 5 onwards, etc.). But, as stated above, the line that separates IT governance and IT management is blurred, resulting in several concepts actually sharing dimensions. In fact, who (in the organization) is the main responsible of a particular action is not clear, being also blurred the separation between IT governance and IT management. On the one hand, IT governance is concerned with directing and controlling IT-related activities across an organization and oversight of all IT-issues (Juiz, 2011). On the other hand, from the IT governance viewpoint, the IT management is mainly concerned with the implementation of policies, processes, and procedures, building projects, and maintaining services (Juiz et al., 2018).

But the IT management activities in building and supporting IT assets are based on the process-based method, popularized by Deming, i.e., Plan-Do-Check-Act (PDCA) cycle. Therefore, the management standards and good practices are defined based on this iteration, executing the cycle repeatedly which further extends the knowledge of management. In fact, repeating the PDCA cycle can bring IT managers to continuously improving IT operation and IT outputs, e.g., either in IT projects and IT services or in non-functional activities as information security, business continuation, software asset management, etc. Consequently, the very well-known PDCA cycle is leveraged by IT managers to constantly strive to improve processes.

However, the IT governance activities are different because the governing body is responsible and accountable for the strategic direction (*Direct*), the evaluation of business-IT oriented proposals (*Evaluate*) and the performance and conformance control (*Monitor*) of the organization, following the six general IT governance principles (ISO/IEC 38500, 2015). In the standard ISO/IEC 38500, there is an implicit expectation that the governing body will require IT management to set policies, processes, procedures to plan, build, and run the IT-enabled organization, and executing actions following the governing body direction but, at the same time, being controlled by the governance body. This implicitness of the relationship between IT governance and IT management in the standardization may provoke some misunderstandings about “who is on charge of what” and “why”. According to Holt (Holt, 2013), the relationship between governance and management of IT appears in two connecting cycles, although part of the connections is not aligned with the standard. She connected *Direct* with *Plan*, and *Check* with *Monitor*. Instead, we prefer to represent this relationship connecting the PDCA with the EDM

(*Evaluate*, *Direct*, and *Monitor*) activities as shown in Figure 2.7, thus being completely compatible with the ISO/IEC 38500 standard.

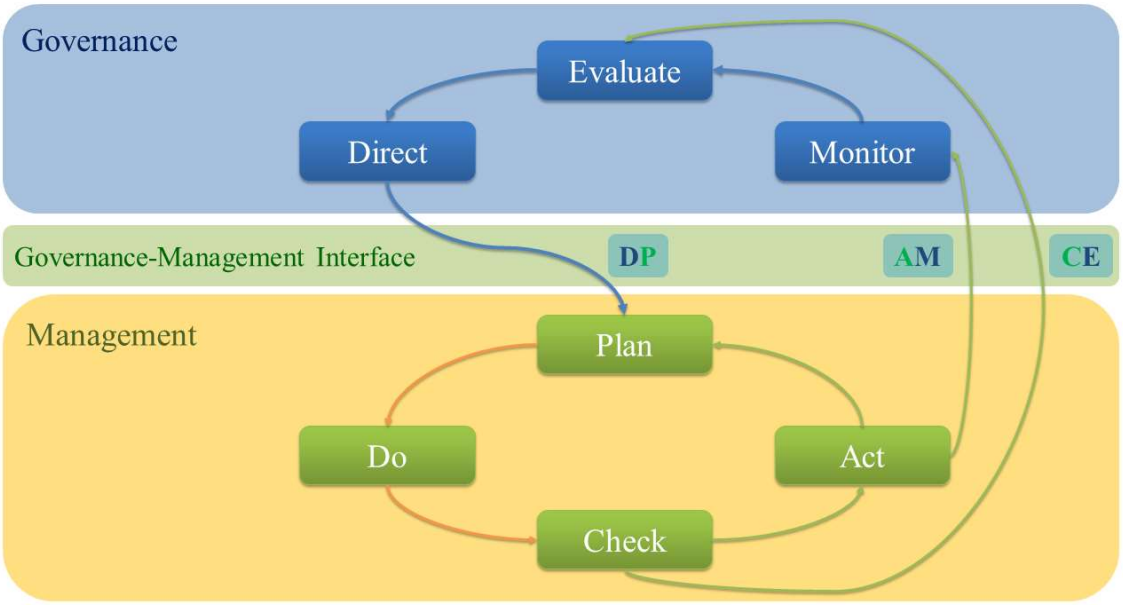


**Figure 2.7 – Governance-management communication interface proposal, modified from Holt (2013)**

In this communication interface, the major difference between governance and management is that the governing body "*does*" nothing, which means that it does not perform operational or management activities. Therefore, there is no connection between *Do*, at PDCA cycle, and any governance activity (EDM) because there is no corresponding activity in the governance cycle. However, the rest of the Deming's cycle activities are connected to the EDM governance activities in a precise way: *Direct* is connected to *Plan*, *Check* is connected to *Evaluate*, and *Act* is connected to *Monitor* (see corresponding directed arcs in Figure 2.7). Thus, the established policies and plans *directed* by the governance body are connected as input of the *Plan* activity, regarding IT activities or projects. After the execution (*do*) of such plan, *checking* procedures are applied, which will be *evaluated* as new proposals or projects, while preventive, corrective, or improvement *actions* will be *monitored* to ensure that IT achieves the objectives set in the initially *directed* policies. Thus, Figure 2.7 illustrates the relationship between governance (what we do) with management (how we do it).

Similarly, ISACA in COBIT indicates that governance tasks are *Evaluate*, *Direct*, and *Monitor* (EDM), while management responds to the acronym PBRM, i.e., *Plan*, *Build*, *Run*, and *Monitor*. Specifically, COBIT 5 introduced the *Principle 5: Separate Governance from Management*, clearly distinguishing between the two layers, as they encompass different types of activities, require different organizational structures, and serve different purposes. Therefore, the communication interface between the IT governance and management layers for COBIT is as follows:

> *Governance ensures that the stakeholders' needs, conditions, and options are evaluated to determine that the balanced and agreed corporate goals are achieved; setting direction through prioritization and decision making; and measuring performance and compliance with the agreed direction and goals.*

*Management plans, builds, executes, and controls aligned activities following the direction established by the governing body to achieve business goals.*

COBIT 5 (ISACA, 2012b)

Thus, if we accept that the governance tasks are EDM from the ISO/IEC 38500 standard, and management tasks are Deming's PDCA cycle, then the natural link would be Holt's (2013), or our version aligned to the standard, even though it is not widely presented in the literature. In fact, the use of COBIT's Principle 5 is much more widespread in those organizations that adopt the framework to govern their IT.

It should be noted that the commission that oversees the ISO/IEC 38500 standard has been concerned with this aspect, deploying various standards under the 38500 family. Specifically, the revised ISO/IEC 38503 draft specifies that once organizations apply the six principles to the three tasks of IT governance, they must be able to demonstrate that they truly do so. In fact, they must be able to ensure that they can show evidence of good governance of IT, including its communication interface among layers. Once the evidence is shown, organizations should ask themselves if everything defined under IT governance really serves and is useful and effective for them. On the other hand, revised ISO/IEC 38504 draft also argues that if the organization has governance principles, they should be applied in a way that aligns IT with such principles. The aligned governance principles should result in management that is in conformance with IT governance, resulting in IT producing the expected results from the alignment perspective. Based on these elements, IT becomes a business enabler and strategical asset, as it has certain principles and metrics associated with such governance principles.

## 2.3. IT governance frameworks

Accordingly, decision-making structures, alignment processes, and communication approaches should be defined, and researchers highly recommend developing and deploying an IT governance framework. A framework is a system of rules, ideas, or beliefs designed to support and decide on all the IT governance and management aspects, including its mechanisms. Thus, implementing a framework will help to the IT governance implantation in the organization. As stated above, to govern IT is not simply linking the strategic plans of the organization with IT staff but connect corporate governance with IT management and the operation of IT with business units. Therefore, to govern IT the organization should design and construct a framework of IT *self-*governance, following the ISO/IEC 38500 standard adapted to their specific situation. For that purpose, several guidelines regarding the design of IT governance frameworks emerged and should be acknowledged (Piattini & Ruiz, 2020).

### 2.3.1. IT governance implantation and framework design

According to Holt (2013), directors do not need to fully understand all the aspects regarding IT to govern it. Instead, they should ask the right questions at the right time to take control and avoid risks. Furthermore, other organization's stakeholders such as IT executives, managers, operators, and technicians need to know how their contribution ensures successful IT for the organization. In fact, there is no single IT governance tool that fits all, but rather the implementation of an IT governance framework will depend on

the culture, objectives, and characteristics of each organization. As highlighted in the ISO/IEC 38500 standard, the main challenge is to communicate the governance and management layers. By following the standard, organizations have a very clear idea of what should be required, monitored, and reported, and how the management tools for monitoring and measuring governance activities at the management layers will display information and results at the governance layer, which will be meaningful and useful to make better decisions.

However, IT governance implantation does not follow a single pattern. Several authors propose guidelines and recommendations for the implantation and implementation of IT governance in an organization, while others focus such implementation through the design of an IT governance framework. Therefore, for example, to implement IT governance in an organization, ITGI (2003) proposed an implementation plan whose steps were:

- Establish an organizational governance framework.
- Align IT strategy with business objectives.
- Understand / define risks.
- Define the target areas.
- Analyze current capabilities and identify gaps.
- Develop improvement strategies.
- Measure the results.
- Repeat the above steps regularly.

Thus, various aspects of IT governance explained above are reflected in the plan, such as strategic alignment, risk control, monitoring, etc. Two steps stand out, the first indicating the creation of a governance framework at the organizational level, and the last one that closes the cycle of continuous improvement reflecting IT governance as a journey and not a state.

Weill and Ross also point out various aspects of IT governance in their acclaimed book, cataloguing the lessons learned from various leaders into top ten leadership principles of IT governance:

1. Actively design IT governance around the enterprise's objectives and performance goals.
2. Know when to redesign; as learning takes time, IT governance redesign should be infrequent. They recommend applying changes when organizations require a change in behavior.
3. Involve senior managers; in addition to the CIO, other senior managers must participate in committees, evaluation and approval processes, and performance and conformance monitoring.
4. Make choices; resolve conflicting goals as it is not possible to address all of them at once.
5. Clarify the exception-handling process; allowing certain IT changes proposed by business units that add value to the business through transparent processes not only formalizes organizational learning about technology but also releases business pressures.
6. Provide the right incentives aligning IT governance behavior with organizational goals.

7. Assign ownership and accountability for IT governance, trying not to fall on a single person, but a group of people and involving the board.
8. Design governance at multiple organizational levels, prioritizing enterprise-wide IT governance, but starting at the business unit level instead if not possible can be practical.
9. Provide transparency and education, focusing on communicating IT governance decisions and training those who do not fully understand IT governance to involve them in all activities and processes.
10. Implement common mechanisms across the six key assets: human, financial, physical, intellectual property (IP), information and IT, and relationship assets, taking advantage of existing mechanisms that improve the relationship among assets instead of creating new and isolated mechanisms.

In fact, they emphasized focusing on the less effective governance mechanisms, the better. They also highlighted that a few clear business principles can better handle goal conflicts, also stating a few IT principles aligned with those.

Cantor and Sanders (2007), however, maintain the vision of continuous improvement with their four-phase proposal for IT governance:

1. Planning, where the organization's governance needs, compliance needs, policies, business value or service level compliance are captured. In this phase, financial responsibilities are determined, and effectiveness measures and objectives are designed.
2. Implementation, where decision rights, automated support and tools are specified. The governance solution is also deployed in stages to be monitored measured and adjusted if needed.
3. Management, stage that executes the governance solution to obtain a baseline of experience.
4. Assessment, where the effectiveness measures are collected, it is determined if the solution satisfies the objectives, and the necessary adjustments are made. All of this will provide input to the planning phase of the next iteration.

The iterative life cycle of IT governance is thus reflected. Likewise, ISACA (2016) also proposed an IT governance implementation guide with six steps to create a plan for IT governance which includes the design of an IT governance framework:

- Form a project team that has the appropriate level of knowledge, experience, authority, and credibility.
- Determine the current state of IT governance by examining process flows, control activities and frameworks, existing controls, policies, procedures, and processes.
- Set the desired state of the organization and conduct a gap analysis.
- Develop a roadmap and plan using good project management methodology.
- Understand the resources and processes required and available to ensure that risks are properly managed and that resources are used effectively.
- Select the relevant content of a governance framework by examining the requirements of the stakeholders as stated in the business case and in the project plan, validating and adapting the contents of the governance framework based on their relevance.

We must also not forget the seven principles to operationalize IT governance proposed by IBM (Cantor & Sanders, 2007).

- Process principle: governance is a process that is itself applied to processes to be governed.
- Artifact Lifecycle principle: the governed process artifact lifecycles guide the governance solution.
- Risk principle: measures and controls must be adjusted according to the level of risk.
- Suitability principle: the needs of the organization determine how the level and style of governance will be tailored.
- Behavior principle: the governance solution drives the organizational behavior.
- Deployment principle: the governance solution must be implemented incrementally.
- Automation principle: technology makes the governance solution empowering and unobtrusive.

As we can see, there are several proposals for the implantation of IT governance in organizations, and the design of IT governance frameworks that are quite similar and highlight almost the same aspects of a good and effective IT governance. If we focus not only on the implementation, but specifically on the design of IT governance frameworks, there are several researchers and practitioners offering their framework design, guidelines, recommendations and own solutions (Buchwald et al., 2014; Neirotti & Paolucci, 2007; Weill & Ross, 2004). Specifically, Neirotti and Paolucci (2007) assessed several organizations and extracted positive aspects of having IT governance processes and practices contained in a model or framework as well as the negative aspects of not having them. As positive aspects, organizations improved their business activities through IT, as they were applying compliance processes to assess the IT spending and accountability measurement. As negative issues, organizations failed in aligning business development and IT planning; they did not focus on consolidation investments—e.g., IT portfolio control and reviews—and they suffered from path dependency and constraints by business transformations, i.e., some technology they were inheriting complicated making changes or sustaining the business activity.

Researchers also provided their own IT governance design solutions depending on the specific situation, perceptions, or needs of the organizations under study (Bin-Abbas & Bakry, 2014; Dahlberg & Kivijärvi, 2006; De Jong et al., 2010; S. Kim, 2007; Selig, 2016; Smits & Van Hillegersberg, 2014). For example, Dahlberg and Kivijärvi (2006) proposed a way of developing a framework considering business IT alignment, monitoring of IT management aspects (resources, risks and performance), and evaluation of benefits-costs and opportunities-risks. It is worth noting the Dahlberg and Kivijarvi's interest in the perception of IT governance by all the stakeholders of the organization with their last phase named *feedback*. Another simplified way of design an IT governance framework is the one provided by Bin-Abbas and Bakry (2014). Their framework assesses IT governance development in organizations focusing on the human aspect regarding knowledge management principles that are directly associated with human behavior. Their framework has some basic principles including continuous development to respond to changes, simplification, emphasizing human involvement, and supporting knowledge sharing. Similarly, Smits and Van Hillegersberg (2014) provided a maturity

model of IT governance considering soft, hard, and context aspects of ITG. Soft aspects focused on behavior and collaboration, hard aspects focused on structures and processes, and context aspects focused on culture and the sector. Another interesting example is the IT governance-management mix framework by Selig (2016), which provided a list of activities/actions and a list of outcomes, as well as how to start implementing IT governance depending on the organization's behavior. If the behavior is cost driven, then asset management could be the first action; if it is customer driven, then portfolio management could be a priority. It is worth mentioning how Kim (2007) focused on security aspects and provided a framework to govern the corporate security regarding IT, clearly differentiating governance from management and indicating how they relate and communicate. Finally, the focus of De Jong et al. (2010) was on IT outsourcing. They provided a framework to govern IT outsourcing from the perspective of the tactical level, which translates the strategy in executable actions and divides the resources over the organization.

Notwithstanding, Austin et al. (2008) pointed out that any IT governance framework should consider:

- Minimalist design: the framework does not have to be overly expensive in terms of bureaucracy.
- Leadership: the framework must be led by someone that has governing authority. Without the participation of the board, IT governance fails. If the board believes that IT is not part of corporate governance, IT will be externalized.
- Implication: within the organization, a senior executive must be involved and engaged in IT governance.
- Generalization: the governance framework is not a particular aspect of IT; it is necessary to clarify that the whole institution is part of the framework.
- Discipline: once the framework is implemented, the organization should be consistent with discipline so that behavior is in line with strategy. In addition, exceptions should be detected and accommodated within the framework.
- Objectives: before implementing the framework, objectives of the framework should be known and what is expected from them.
- Evolution: the implementation of the framework does not have to be a revolution within the organization but an evolution of the current environment. As a result, employees and senior management are motivated to play a role in cultural change.

As a recap, there is an extensive literature that proposes guidelines and recommendations for the implementation of IT governance in organizations, some that include the design of frameworks, others that do not specify it, and others posing that the design of the framework is the way to implement IT governance. Since there were so many differentiated versions, the new version of the ISO/IEC 38503 standard will include principles, definitions, and a model of IT governance maturity level, so that the governing bodies can use it when evaluating, directing, and monitoring the use of IT in their organizations. Until it comes, organizations should consider the Holt's proposition of core elements to implement an IT governance framework, before they start executing any plan:

- *A version of the 38500 principles, tailored to the organization and signed off by the governing body.*
- *Systems for carrying out the IT and information transfer functions in a way that supports the principles.*

- *A supported and maintained infrastructure capable of hosting the systems above.*
- *Process and policy to enable all staff to align activities to the principles.*
- *A charter to state business expectations from IT and information management and vice versa.*
- *An organizational chart that reflects new responsibilities and authorities required to carry out the principles.*
- *A test strategy that sets out an approach based on the risk profile and quality goals.*
- *A training strategy to ensure that all stakeholders are confident in using the new framework, and that they understand any new responsibilities they have.*

Holt (2013, pp. 80–81)

### 2.3.2. Assessment frameworks and maturity models

IT governance models or frameworks serve to monitor and assess whether the IT governance mechanisms are working as expected, and needed people are quite involved (Peterson, 2004). The aim is to measure the IT governance performance (not just IT performance) after developing and implementing it in organizations (Simonsson et al., 2010; Weill & Ross, 2005), including the outcomes of each decision that has been made (Cervone, 2017). For that purpose, it is necessary to develop an assessment framework that includes the definition of decision-making structures, alignment processes, and relational mechanisms, considering internal and external factors (Van Grembergen et al., 2004). Furthermore, IT governance frameworks include maturity models in their design and development owing to the continuous improvement aim and the idea that implementing IT governance is a journey, not a state (Ionita, 2009; Simonsson et al., 2010; Smits & Van Hillegersberg, 2014; Van Grembergen et al., 2004).

According to Bharadwaj (2000), maturity is a measurement of the ability of an organization for continuous improvement in a particular discipline. The higher the maturity, the higher will be the chances that incidents or errors will lead to improvements either in the quality or in the use of the resources by the organization. Thus, a higher level of maturity means that they better achieve their purpose and goals. ITGI proposes a six-tier generic model for IT governance:

***0: Non-existent**, total lack of a recognizable process.*

***1: Initial / ad-hoc**, the need to address IT governance issues is recognized, but there are no standardized processes.*

***2: Repeatable but intuitive**, regular governance practices such as review meetings, performance reports, etc. are available; with the voluntary participation of some business stakeholders, but without formal communication of the procedures or definition of responsibilities.*

***3: Defined process**, an organizational and process framework is defined for the management of IT activities.*

***4: Managed and measurable**, IT process improvement measures and goals are developed and well understood. The results are communicated to the board through BSCs. The objective is to maximize the value of IT and risk management.*

> ***5: Optimized,*** *IT governance practices are developed through sophisticated approaches using effective and efficient techniques. There is true transparency of IT activities, and the IT strategy is controlled.*
>
> ITGI (2007)

Luftman (2000) also illustrated a strategic alignment maturity assessment including five levels, i.e., initial/ad-hoc process, committed process, established focused process, improved/managed process, and optimized process, in six IT-business alignment criteria, i.e., communications maturity, competency / value measurement maturity, governance maturity, partnership maturity, scope and architecture maturity, and skills maturity.

Researchers and organizations are measuring different but similar things, depending on what they understand as value. For example, in its ***IT g****overnance* ***a****ssessment* ***p****rocess* (IGAP) model, Peterson (2004) measured IT drivers, the obtained IT value, IT governance capability regarding the three mechanisms, and the IT governance complexity, under the perceptions of corporate executives, business executives and IT executives. In their proposal, Weill and Ross (2005) highlighted four objectives: cost-effectiveness, asset utilization, business growth, and business flexibility. Other perspective is the one provided by Simonsson and Johnson (2008) as a simplification of COBIT, also based on processes and activities (with a different meaning and granularity), input and output documents as a way of interchange and communication among layers, and several metrics to monitor the progress and maturity of IT governance implementation. In fact, for Simonsson et al. (2010) IT governance performance is understood as the quality of services that the IT organization delivers from a business perspective.

Nevertheless, there are many solutions and frameworks on the literature regarding IT governance. However, most researchers focused their work on existing models or frameworks, thus modifying them according to their needs. That is the case of Bounagui et al. (2019), Ernest and Nisavic (2007), Pereira and da Silva (2012), and Simonsson and Johnson (2008) who focused on COBIT and ITIL solutions, while Gómez et al. (2017), Juiz (2011), and Juiz et al. (2017) focused on ISO/IEC 38500 (2015) standard. On the one hand, Ernest and Nisavic (2007) based their framework, the Component Business Model for the Business of IT (CBMBoIT), on COBIT and ITIL as a matrix of several components classified by kind of activities and layers. Simonsson and Johnson (2008) provided their ***IT O****rganization* ***M****odeling and* ***A****ssessment* ***T****ool* (ITOMAT), based mainly on COBIT. Apparently, ITOMAT is a simplification of COBIT trying to improve its flexibility and implementation. Pereira and da Silva (2012) also provided a framework matching IT governance and IT management main aspects, based on a simplification of COBIT. On the other hand, Juiz (2011) provided his ***d****etailed* ***F****ramework* ***of g****overnance for* ***I****nformation* ***T****echnology* (dFogIT). He adapted the ISO/IEC 38500 (2015) model, adding the operational layer at the bottom and the corporate governance layer at the top. Extended versions of dFogIT can also be found on Juiz et al. (2014) work which includes a maturity model with six levels, on Gómez et al. (2017) work as an extension intended for public organizations and on Juiz et al. (2017) work, where a minimum set of good practices in each IT governance mechanism is presented, and some examples of applicability in the healthcare sector are provided.

Of course, there are numerous frameworks and solutions in the literature, but the intent of this thesis was not to exclusively study IT governance frameworks. Mainly, regarding

the articles included in this literature review, researchers used the following frameworks in their studies: COBIT 3 (Damianides, 2005; Ernest & Nisavic, 2007; Guldentops, 2002; Simonsson & Johnson, 2008; Van Grembergen et al., 2004), COBIT 4 (Simonsson et al., 2010; Van Grembergen & De Haes, 2009), COBIT 5 (R. Pereira & da Silva, 2012), Val-IT (ITGI, 2008a) (Cervone, 2017; Van Grembergen & De Haes, 2009), ISO/IEC 38500 (B. Gómez et al., 2017; Juiz, 2011; Juiz et al., 2017; Racz et al., 2010), COSO (2013) (Damianides, 2005), and the recommendations of the Third King Report on Governance for South Africa (King III) (Butler & Butler, 2010). Furthermore, Kim (2007) provided a list of frameworks with features and disadvantages that he then used to develop his own framework to govern the corporate security of IT.

### 2.3.3. Main IT governance standards and frameworks

The literature usually refers to ISO/IEC 38500 as the de jure IT governance standard, and COBIT as the de facto standard or framework. The ISO/IEC 38500 standard is detailed in previous sections but as it is continually being revised, improved, and expanded, the following is a list of the ISO / IEC 38500 standard family. COBIT has also evolved from its launch to the present, so we have included below a brief explanation of the latest version (COBIT 2019) highlighting its main aspects.

**The ISO/IEC 38500 standard family**

The standards in the ISO / IEC 38500 family are the most important for IT governance. It should be highlighted, however, that ISO/IEC JTC1/SC40 group collaborated with ISACA and itSMF so the standard would work as an umbrella standard of their guidance frameworks (Holt, 2013). Thus, they developed several standards in this field:

ISO/IEC 38500, *Governance of IT for the organization* (2015), as stated above provides principles, definitions, and a model that governance organisms can use to assess, direct, and monitor the use of IT in their organizations.

ISO/IEC TS 38501, *Governance of IT – Implementation guide* (2015), addresses the implementation of IT governance.

ISO/IEC TR 38502, *Governance of IT – Framework and model* (2017), further develops the model distinguishing between governance and management.

ISO/IEC TR 38503, *Governance of IT – Assessment of the governance of IT* (under development), provides a framework for IT governance assessment.

ISO/IEC TR 38504, Governance of IT – *Guidance for principles-based standards in the governance of information technology* (2016), provides guidance on the information required for principles-based standards in IT governance and management.

ISO/IEC 38505-1, *Governance of IT – Part 1: The application of ISO/IEC 38500 to the governance of data* (2017), applies the ISO/IEC 38500 model to data governance.

ISO/IEC TR 38505-2, *Governance of IT – Part 2: Implications of 38505-1 for data management* (2018), addresses the implications of the above standard for data management.

ISO/IEC 38505-3 *Information technology — Governance of data — Part 3: Guidelines for data classification* (under development).

ISO/IEC 38506, *Governance of IT – Application of ISO/IEC 38500 to the governance of IT enabled investments* (2020), provides guidance for the governance of IT-enabled investments, both public and private.

ISO/IEC 38507, *Governance of IT – Governance implications of the use of Artificial Intelligence by organizations* (under development), provides guidance for the governance of organizations that are using systems or tools that incorporate artificial intelligence.

As the ISO/IEC 38500 standard has been explained in previous sections, below, the main aspects of the others are summarized.

***ISO/IEC TS 38501***. This technical specification provides guidance on how to implement plans for effective IT governance. To do this, it identifies the key activities, clarifying the roles and responsibilities of the main stakeholders. The implementation of IT governance should be based on a cyclical approach considering the framework of ISO/IEC 38500 (Figure 2.6). The first cycle of activities involves the establishment of the initial implementation, with subsequent cycles of activities that are used to support and improve the implementation of IT governance through continuous improvements (Figure 2.8).

The execution cycle includes the following main activities:

- Establish and maintain an enabling environment: to start governing, an adequate space for it is needed. Execution and improvement of governance activities will typically require changes in terms of organizational culture and IT behavior in addition to requiring new or improved processes. Such execution and improvement should ensure that all stakeholders are properly identified and aware of their roles and responsibilities. All of this must be controlled in each cycle as stakeholders can change and responsibilities can mature over time.
- Govern IT: the process for evaluating, directing, and monitoring activities to carry out IT governance must be considered. These governance activities should be considered as a cycle, thus considering the three activities and how they relate rather than seen as isolated activities.
- Continuous improvement: a first implementation cycle should be started to establish a baseline for IT governance. As time goes by, it should be reviewed to determine if the expected objectives are being achieved. If not, a new entry in the implementation cycle must be started to make the relevant changes, thus ensuring that the expected results are achieved.

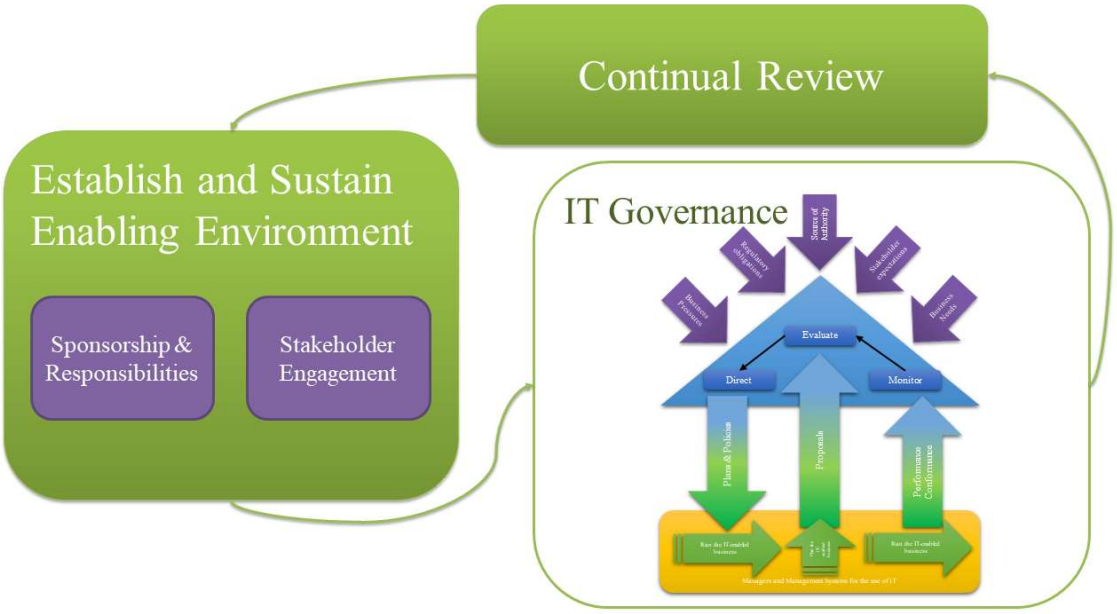


**Figure 2.8 – IT governance implementation approach, from ISO/IEC 38501 (2012, p.2)**

***ISO/IEC TR 38502.*** This technical report has been developed to clarify the distinction between the concepts of IT governance and management. For that purpose, it provides a model that illustrates the relationship between governance and management (those shaded), and identifies the responsibilities associated with each (Figure 2.9).

- Principles for good IT governance. The governance framework should be based on the principles of good IT governance, as explained in the ISO/IEC 38500 standard. The principles should guide organizations on how to establish governance mechanisms for the use of IT.
- Business planning for IT. Business planning processes must consider current and future IT capabilities to ensure that strategic plans for IT meet the current and ongoing needs of the organization's business strategy.
- Responsibilities. The mechanisms through which responsibilities are established must be defined and agreed. This can include ongoing evaluation of the performance of IT strategies, plans, and business units throughout the organization.
- Risk management. Initially it seems that risk management only corresponds to management, but the truth is that the governance framework for IT must include sound risk management practices in all activities and decision making that involve the use of IT.
- Strategies and policies for the use of IT. The strategies and policies are established and communicated to the organization by the board of directors, as mentioned above, and should address the specific requirements of the organization. Therefore, it can be said that the results of strategies and policies must be defined, communicated, and monitored to assure that the established objectives are actually achieved.

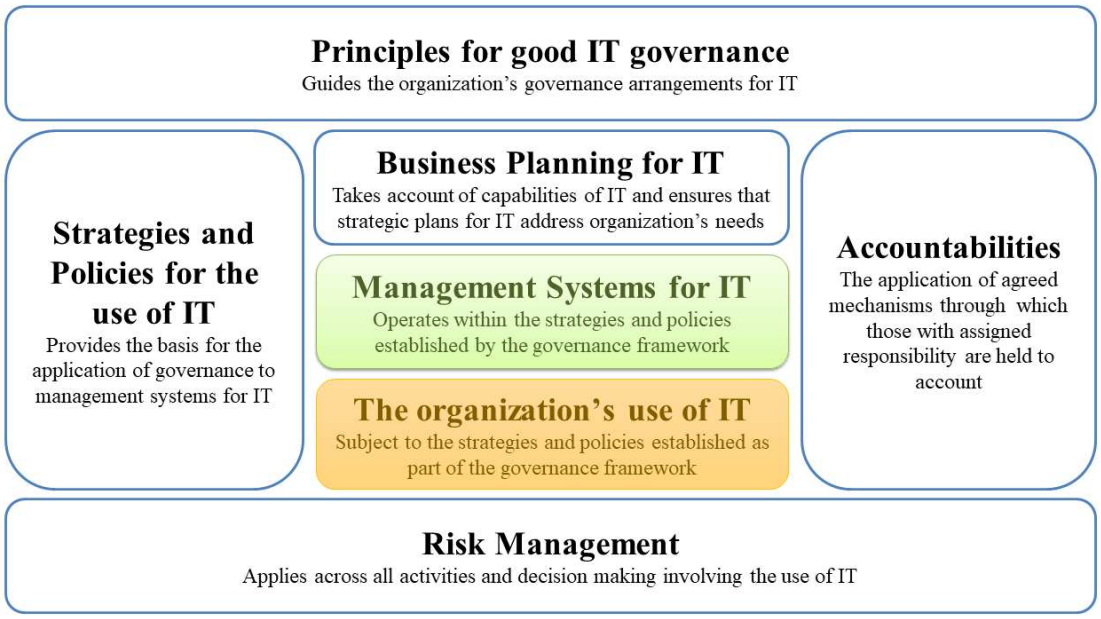


**Figure 2.9 – IT governance framework key elements, from ISO/IEC 38502 (2013, p.8)**

***ISO/IEC 38503.*** This guide is intended for auditors and evaluators in charge of ensuring, to the governing body, that adequate IT governance mechanisms exist and are working properly, as well as IT risks are being adequately managed so that IT is delivered in a timely, controlled and well executed way. This guide has been recently revised and thus a new version of it is near to its publication.

***ISO/IEC TR 38504.*** This guide can be used to describe the principles of IT governance. It highlights, among other things, that governance standards should be based on OECD principles. It considers IT governance as a subset of organizational governance, and thus such principles should conform to the *Evaluate-Direct-Monitor* model of the ISO/IEC 38500 standard and distinguish responsibilities and accountability for governing body as well as managers and directors.

***ISO/IEC 38505-1.*** This standard provides guidance for applying the principles-based approach of the ISO/IEC 38500 standard to data, increasing its value while reducing the risks of data. It highlights how organizations with good data governance will:

- Be trustworthy in doing business and able to provide reliable data.
- Protect intellectual property and other values derived from data.
- Detect hackers and fraudulent activities.
- Be better prepared to minimize the impact of data breaches.
- Be aware of when and how data can be reused.
- Be able to demonstrate good data handling practices.

***ISO/IEC TR 38505-2.*** This standard uses the framework of the previous one to examine its implications for data management, the board's data strategy, and how the strategy can inform policies, processes, and controls relating to data.

***ISO/IEC 38506.*** This standard defines the accountability of the governing bodies regarding the investments that IT enable, and the risks and opportunities for the delegation of responsibilities in the management team.

***ISO/IEC 38507.*** This standard addresses the implications for the governance of artificial intelligence mechanisms, in the sense of considering the opportunities, risks and additional responsibilities that a technology like this can bring with it.

**COBIT: Comprehensive framework for IT governance and management**

The COBIT (***C****ontrol* ***OB****jectives for* ***I****nformation and related* ***T****echnology*) framework has its origin in the audit and control of IT; however, it has undergone major changes throughout its path that reflect its evolution.

***History and evolution***. IT auditing dates to 1967 when a group of professionals in the US responsible for internal control in different organizations began to realize the criticality of computers for the operation of their companies. For this reason, they decided to share knowledge on this subject and in 1969 the EDPAA (*Electronic Data Processing Auditors Association*) was founded, which in 1994 changed its name to ISACA (*Information Systems Audit and Control Association*). ISACA is currently an association that addresses issues beyond audit and control, and which brings together almost 150,000 professionals in 75 countries. In 1998 ISACA formed ITGI (*IT Governance Institute*) to address aspects of IT governance.

Under the scope of ITGI and ISACA, the first edition of *Control Objectives* was published in 1977, which constitute the initial reference of practices for control and auditing. In 1966 the first version of the COBIT framework was born, with 32 processes and 271 control objectives (Figure 2.10). In 1998, the second version of COBIT was published, COBIT 2, which contains 34 processes and 302 control objectives. In 2000, COBIT 3 was published, which contains 318 detailed control objectives and incorporates more elements for management, including a maturity assessment framework, metrics, and critical success factors, which serve as guidelines for management. In 2005, the COBIT 4.0 edition was published that addresses the governance of IT (215 control objectives), supplemented with a framework for value management (Val-IT) in 2006. In 2007, the COBIT 4.1 version was published with 210 control objectives, being complemented with a framework for risk management (Risk-IT) in 2009. In 2012, a version 5 of COBIT was published that integrates all these frameworks in addition to several international standards such as ISO/IEC 38500. COBIT 5 incorporates 15 governance practices and 195 management practices, being completed to date with new contributions. At the end of 2018, ISACA proposed a new version, COBIT 2019, which differentiates between the *Governance Framework* and the *Governance System* and adds some new elements, framing the government and management within the digital transformation that organizations are experiencing.

It should be considered that previously, ITGI considered that the organizational governance of IT consisted of corporate governance (legal and regulatory compliance), governance of entities (regarding all business functions), and governance of assets (services, resources, infrastructures, etc.). For them, *business governance* would address the issue of IT alignment with the organization's strategy (it would be the demand side), while *functional governance* would be the provider side, ensuring that the IT function operates effectively and efficiently to deliver information services. For that reason, COBIT, up to and including version 4.1, focused on a more functional governance, while Val-IT was more about business governance; integrating both levels from COBIT 5 onwards (Piattini & Ruiz, 2020).

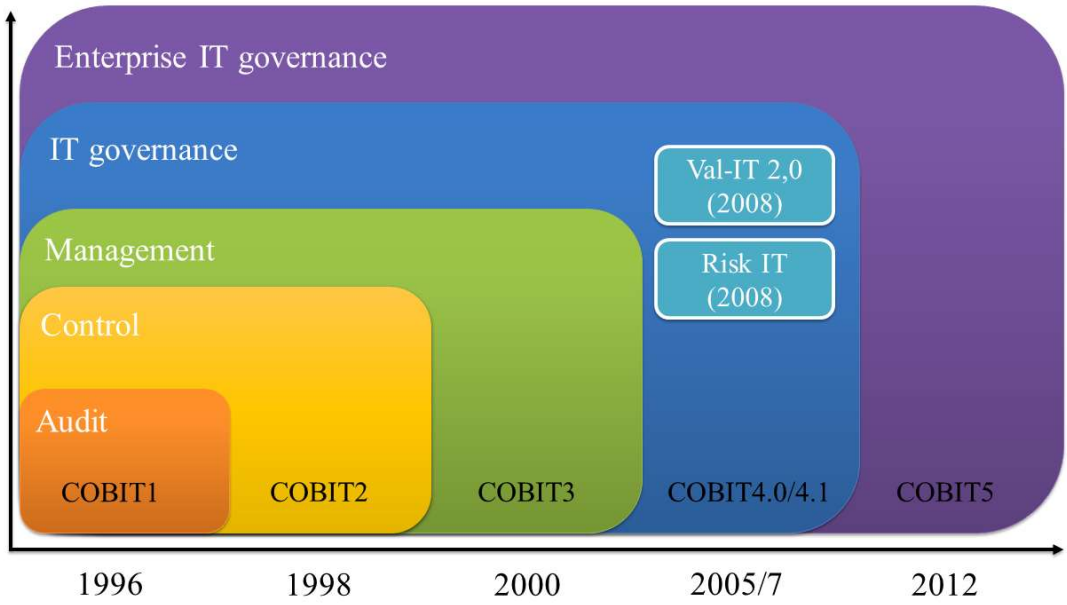


**Figure 2.10 – COBIT evolution, from Piattini and Ruiz (2020)**

The COBIT framework proposes four key questions to determine IT governance, which are the essence of the framework:

- Are we doing the right things? i.e., are we undertaking the correct initiatives? it is related to strategy and alignment.
- Are we doing things the right way? i.e., are we undertaking the initiatives correctly? it is related to architecture and integration.
- Are we doing things right? i.e., are we executing the initiatives efficiently? it corresponds to the delivery and efficiency to comply with change management, support and provision of services, and availability of resources.
- Are we obtaining the desired benefits? It is related to value, clear benefits, responsibilities, and definition of metrics.

***Structure***. The COBIT 5 family of frameworks is comprised of the COBIT 5 framework, enabler guides, and professional guides that include: COBIT implementation, COBIT for information security, COBIT for assurance, COBIT for risk, and the security model. process evaluation (evaluation guides and self-evaluation guide). As De Haes et al. (2013) point out, COBIT 5 is more of a framework than a standard. COBIT 5 is designed to be adapted by organizations that adopt it, although it is not known which components must remain for the adoption to be effective.

Similarly, the COBIT 2019 family of frameworks is comprised of the COBIT 2019 framework (introduction and methodology), the governance and management objectives, the design guide (to design a solution for IT governance), and the implementation and optimization guide for an IT governance solution. This last framework is the one developed in the next sections.

***Principles***. According to COBIT 2019 (2018, p.17), it was "developed based on two sets of principles: principles that describe the core requirements of a *governance system* for enterprise information and technology, and principles for a *governance framework* that can be used to build a governance system for the enterprise."

**Six Principles for a Governance System**

1. Provide stakeholder value: to satisfy stakeholders needs and to generate value from the use of IT. Value reflects a balance among benefits, risk and resources, and enterprises need an actionable strategy and governance system to realize this value.
2. Holistic approach: built from a number of components that can be of different types and that work together in a holistic way.
3. Dynamic governance system: each time one or more of the design factors are changed (e.g., a change in strategy or technology), the impact of these changes on the governance system must be considered.
4. Governance distinct from Management: clearly distinguish between governance and management activities and structures.
5. Tailored to enterprise needs: a set of design factors as parameters to customize and prioritize the governance system components.
6. End-to-end governance system: focusing not only on the IT function but on all technology and information processing the enterprise puts in place to achieve its goals, regardless of where the processing is located in the enterprise.

**Three principles for a Governance Framework**

1. Based on conceptual model: identifying the key components and relationships among components, to maximize consistency and allow automation.
2. Open and flexible: it should allow the addition of new content and the ability to address new issues in the most flexible way, while maintaining integrity and consistency.
3. Aligned to major standards, frameworks, and regulations.

COBIT 2019 (ISACA, 2018)

***Objectives***. In the COBIT 2019 framework, an objective, governance objective or management objective, is always related to a process, with a similar name, and with a set of related components that allow achieving such objective. The framework states that Boards and executive management are typically accountable for governance processes, while management processes are the domain of senior and middle management. The objectives are grouped into five different domains as shown in Figure 2.11. The governance objectives are grouped in the domain of evaluation, direction, and monitoring (EDM). Management objectives are grouped into four domains:

- APO: Align, Plan, and Organize; addresses the overall organization, strategy and supporting activities for IT.
- BAI: Build, Acquire, and Implement; treats the definition, acquisition, and implementation of IT solutions and their integration in business processes.
- DSS: Deliver, Service, and Support; addresses the operational delivery and support of I&T services, including security.
- MEA: Monitor, Evaluate, and Assess; addresses performance monitoring and conformance of I&T with internal performance targets, internal control objectives and external requirements.

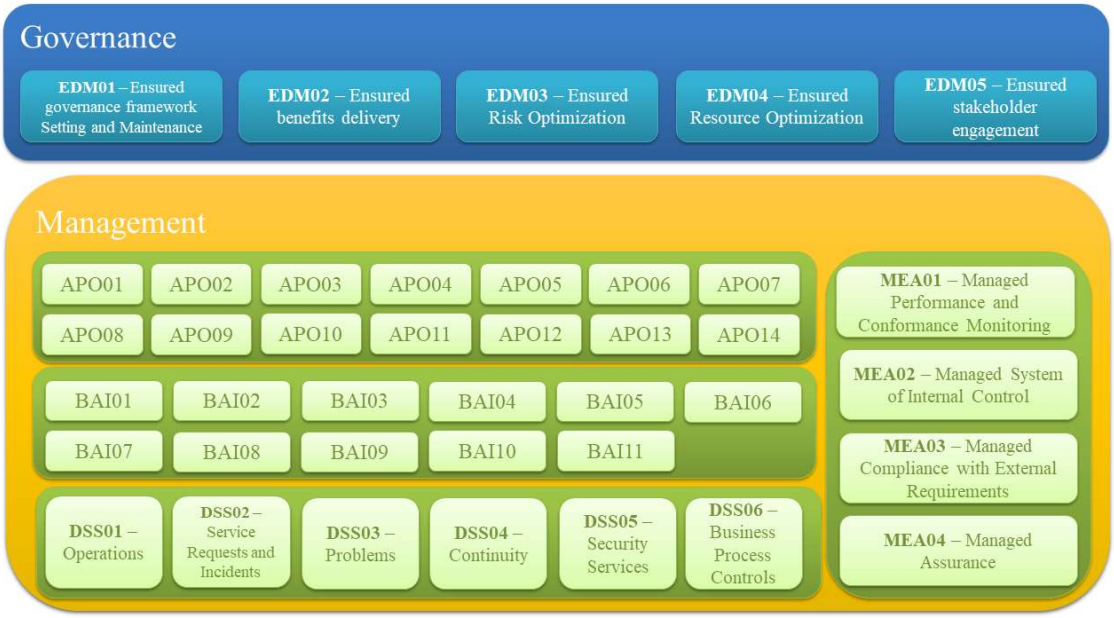


**Figure 2.11 – COBIT core model, from COBIT 2019 (2018, p.21)**

***Governance System components***. According to ISACA (2018), each organization should establish and sustain several components that form a governance system:

> **Processes**: describe an organized set of practices and activities to achieve certain objectives and produce a set of outputs that support achievement of overall IT-related goals.
>
> **Organizational structures**: are the key decision-making entities in an enterprise.
>
> **Principles, policies, and frameworks**: translate desired behavior into practical guidance for day-to-day management.
>
> **Information**: produced and used by the enterprise. COBIT focuses on information required for the effective functioning of the governance system of the enterprise.
>
> **Culture, ethics, and behavior**: of individuals and of the enterprise are often underestimated as factors in the success of governance and management activities.
>
> **People, skills, and competencies**: required for good decisions, execution of corrective action and successful completion of all activities.
>
> **Services, infrastructure, and applications**: include the infrastructure, technology and applications that provide the enterprise with the governance system for I&T processing.
>
> COBIT 2019 (ISACA, 2018)

***Governance System design factors***. The framework features several design factors that will vary depending on the IT needs and usage of each organization. The proposed design factors include a combination of the following:

- Organizational strategy, pointing out four archetypes: growth/acquisition, innovation/differentiation, cost leadership, and client service/stability.
- Enterprise goals defined following the dimensions of the BSC.
- Risk profile regarding the organization and issues related with IT.
- Thread landscape under which the organization operates, can be normal or high.

- Compliance requirements classified by low, normal, or high.
- Role of IT in the organization classified by support, factory, turnaround, and strategic.
- Sourcing model for IT adopted by the organization classified by outsourcing, cloud, insourced, and hybrid.
- IT implementation methods classified by agile, DevOps, traditional, and hybrid.
- Technology adoption strategy classified by first mover, follower, and slow adopter.
- Enterprise size categorized as large organizations (more than 250 full-time employees), and SME.

***Governance system design workflow***. The framework provides a workflow consisting of four stages with several activities each (Figure 2.12).

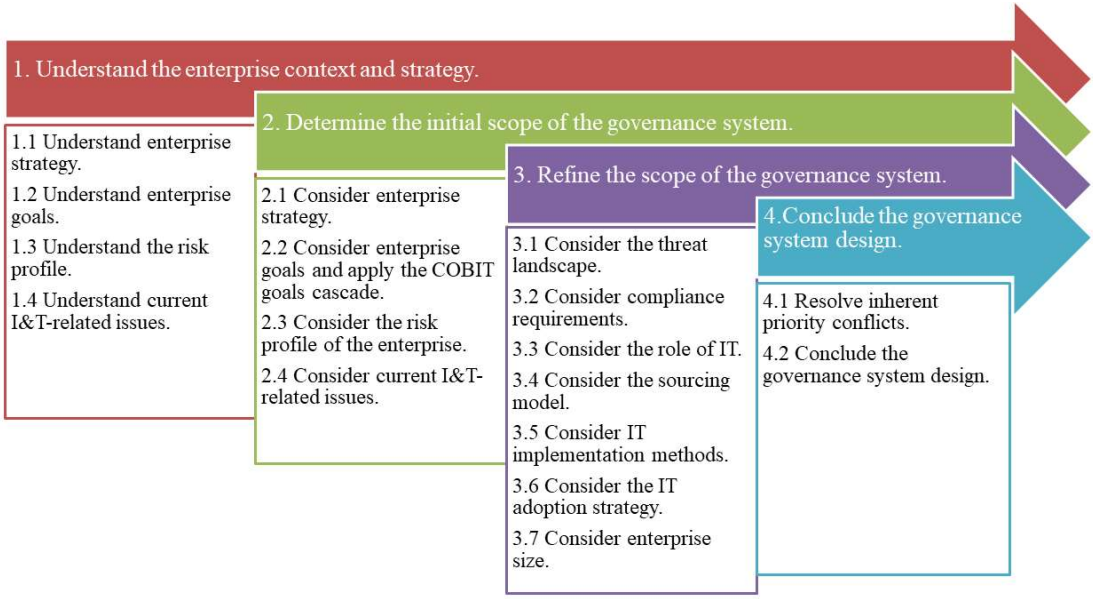


**Figure 2.12 – Governance system design workflow, from COBIT 2019 (2018, p.47)**

***Governance system implementation***. The framework proposes a guide for the implementation and optimization of the governance system. This guide indicates that the implementation of the organizational governance of IT takes place in different conditions such as the ethics and culture of the community; laws, regulations and policies; international standards, industrial practices, the economic and competitive environment; the advancements and evolution of technology, the threat landscape; the mission, objectives, values, governance policies and practices, management style and culture, role models and responsibilities, business plans and strategic purposes, and the operational model and maturity level of the organization.

COBIT 5 introduced a life cycle of continuous improvement that has been maintained in COBIT 2019. This cycle considers that there are three interrelated components as shown in Figure 2.13: the core of the life cycle of continuous improvement of IT governance, the intermediate ring that includes the facilitation of change, and the outer circle that reflects the management of the program. In Figure 2.13, the initiatives are presented as continuous life cycles emphasizing the fact that they are not exceptional activities but are part of the implementation and improvement process that will become "habitual".

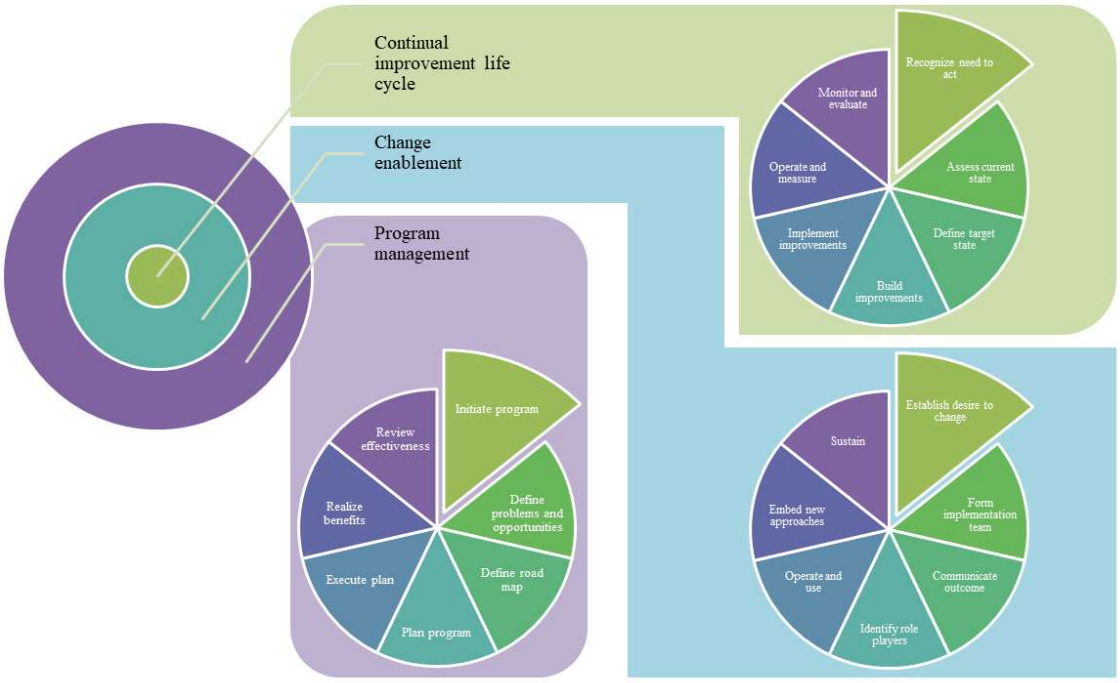


**Figure 2.13 – COBIT implementation road map [adapted from COBIT 2019 (2018, p.50)]**

## 2.4. IT governance in higher education institutions

The higher education sector has not been the pioneer in implementing IT governance solutions. Although the first signs of interest in IT governance could be dated back to the strategic alignment model of Henderson and Venkatraman (1993), the use of IT in universities was increasing but their concern was mainly focused on achieving an efficient management of their technological resources as a fundamental support for the rest of the university services.

### 2.4.1. History of IT governance in HEIs

Moving into the 2000s, IT governance systems were successfully implemented in other sectors (banking, insurance, industry, etc.) reaching a maturity of 2.67 out of 5 on the scale proposed by the IT Governance Institute (ITGI, 2008b). Universities from all over the world were also joining IT governance, and according to Yanosky and Borreson Caruso (2008) they reached a maturity of 2.30 out of 5, which means that universities were still in a situation incipient and in the process of maturing. Only a few university institutions reported being at a high level of maturity and the remaining majority were at an acceptable level of IT governance, but room for improvement. For this reason, EDUCAUSE (Golden et al., 2007) presented a list of proposals that may serve universities and higher education institutions (HEIs) as recommendations to improve the implementation of IT governance in their universities:

- Facilitate collaboration between universities in the field of IT governance.
- Develop specific IT governance models for universities.
- Collect and disseminate case studies and good practices and develop IT governance maturity assessment tools.
- Provide opportunities to promote the curriculum of university IT professionals in aspects related to IT governance.

Therefore, in general, universities carried out IT governance implementation initiatives on their own. For example, some American universities used COBIT to implement an IT governance model, such as South Louisiana Community College (Council, 2006). Other universities designed their own IT governance models based on the literature. Thus, University of California included in its IT Strategic Plan elements of an IT governance model (University of California, 2008); Ridley (2006) proposed an IT governance model for the University of Guelph based on Weill and Ross (2004); and in South Africa, Pretorius (2006) designed a model for Petroria University. In Canada, the University of Calgary (2007) designed their own model which only applied to the administration area and included the design of an architecture based on the creation of several committees, the assignment of responsibilities and roles related to IT, risk management, and the use of an excellent methodology for project management. In U.K. Coen and Kelly (2007) designed a benchmark model (JISC, 2007b) and a self-assessment toolkit (JISC, 2007a) that helped universities to clarify the complex tangle of governance-related elements of their information systems. In fact, the JISC model inspired the ITG4U model applied in Spanish universities (A. Fernández, 2009; A. Fernández et al., 2011, 2012; A. Fernández & Llorens, 2009; Llorens & Fernández, 2008). It is worth highlighting the Australian higher education institutions, where several of them have implemented IT corporate governance systems (Bhattacharjya & Chang, 2006, 2007).

Meanwhile, McCredie (2006) proposed starting IT governance implementations by promoting the IT manager (CIO). The CIO had to move from dealing only with technical issues to gaining presence in the strategic planning of the institution. He also stated that if the university did not have an IT manager, they had to create one, and if they did have one already, but did not deal with strategic issues, they had to redefine such role to do so. Furthermore, according to Yanosky and McCredie (2007) and Yanosky and Borreson Caruso (2008) studies, two-thirds of universities had created a high-level committee (IT Steering Committee) that oversaw the organization's IT policies and initiatives, but only 22% of universities had a subcommittee of the Steering Committee dedicated to designing IT strategy and policies.

Since then and to date, numerous studies have focused on the concept of IT governance applied to the university and higher education sector, highlighting various aspects, e.g., security issues (Kwon, 2008; C. W. Liu et al., 2020), business-IT alignment (Martins et al., 2009; Seman & Salim, 2013; Wilmore, 2014) through IT project portfolio (Juiz, 2011; Juiz et al., 2012; Ngqondi & Mauwa, 2020; Valverde-Alulema & Llorens-Largo, 2019) or using BSCs (Herdiansyah et al., 2014; Jairak & Praneetpolgrang, 2013), best practices guidelines and processes (Caetano Borges & Sanches Miani, 2018; Hicks et al., 2010; Juiz, 2014; Knahl, 2013), theory-practice gaps (Ko & Fink, 2010), methods and maturity models (Bianchi & Sousa, 2015; Hontoria et al., 2011; Kosasi et al., 2017; Montenegro & Flores, 2015; C. Pereira et al., 2018; Putri & Surendro, 2015; Subsermsri et al., 2015; Torres Bermúdez et al., 2014; Valencia-García et al., 2013), standard and frameworks adoption (Erfurth & Erfurth, 2014; Gerl et al., 2021; B. Gómez et al., 2017; Juiz et al., 2014; Khther & Othman, 2013; Musa et al., 2014; Nugroho, 2014; Nugroho & Surendro, 2013; Rijati et al., 2017; Sabatini et al., 2017; Seyal et al., 2016; Valencia-García et al., 2014; Valverde-Alulema, Mejia-Madrid, et al., 2017; Valverde-Alulema & Llorens-Largo, 2016), and its mechanisms (Bianchi et al., 2021; Bianchi, Sousa, & Pereira, 2017; Bianchi, Sousa, Pereira, et al., 2017), among others. Furthermore, several systematic

literature reviews (SLRs) were developed focusing on some of the abovementioned aspects applied to HEIs (Table 2.4).

**Table 2.4 – SLRs about IT governance in HEIs**

| Authors | Study period | Sample Size | Focus and findings |
|---|---|---|---|
| (Khther & Othman, 2013) | 2003-2009 | 3 | COBIT framework and the importance of its adoption in academic institutions. |
| (Al-Hosaini & Sofian, 2015) | 2009-2014 | 29 | Use of BSCs in HEIs. |
| (M.-A. Oñate-Andino & Mauricio-Sánchez, 2015) | 2010-2015 | 11 | Aspects of interest about IT governance in the context of universities. |
| (Bianchi & Sousa, 2016) | 2000-2016 | 20 | Case studies about IT governance mechanisms implemented by HEIs. |
| (Mukhlas et al., 2017) | 2010-2018 | 7 | State of IT governance in Malaysian HEIs. |
| (Tjong et al., 2017) | 2010-2016 | 11 | Benefits HEIs obtained by implementing IT governance. |
| (Valverde-Alulema, Meza-Bolanos, et al., 2017) | 2000-2017 | 146 + 87 grey | IT corporative governance in HEIs focusing on the IT project portfolio as a best practice. |
| (Yudatama, Nazief, Hidayanto, et al., 2017) | 2012-2016 | 22 | Factors influencing the awareness and attitude in the implementation of IT governance focusing on HEIs. |
| (Khouja et al., 2018) | - | 49 | State of the art of IT governance in HEIs. |
| (Liew et al., 2018) | - | 4 | Case studies of HEIs implementing IT governance. |
| (Waheed et al., 2018) | - | 7 | Influence of IT leaders' leadership behavior on IT governance performance in HEIs context. |
| (A. Oñate-Andino et al., 2019) | 1992-2015 | 101 | Comparative analysis of IT governance models in HEIs. |
| (Valverde-Alulema & Llorens-Largo, 2019) | 2000-2017 | 23+28 grey | Strategic IT project portfolio at universities. |
| (Kajo-Meçe et al., 2020) | - | 40 | IT governance frameworks in HEIs. |
| (Bianchi et al., 2021) | - | 34 | IT governance practices for the university sector. |

Two studies should be highlighted as they are relevant for this thesis. On the one hand, Khouja et al. (2018) provided an overview of the state of the art of IT governance in HEIs. They analyzed 49 studies about IT governance implementations from 23 countries, were Australia, Indonesia, Malaysia, Thailand, U.S., and Canada presented the most results. The literature review showed differences among the IT governance situations: several countries had the support of the top-level government with regulatory frameworks and laws about introducing IT governance in higher education institutions, such as Ecuador, South Africa, or the U.K.; others focused on the spread of IT governance culture, e.g., the U.S., Australia, or Malaysia. The study also showed non consensus on the IT governance framework or standard used as the institutions implemented solutions based on COBIT, ISO/IEC 38500, or their own framework. However, what they had in common as best practices were establishing a committee structure for IT assets, establishing effective communication among IT, the business, and the involved stakeholders, achieving institution-IT strategy alignment, and using balanced scorecard as a monitoring and measuring model.

On the other hand, Kajo-Meçe et al. (2020) investigated the overall adoption of IT governance frameworks in HEIs, providing a deep insight into the level of integration of IT governance in universities worldwide. They analyzed 40 studies from 23 countries

were Australia and Malaysia presented the most results. They noticed that the adoption of IT governance frameworks was still scarce as most universities were evaluating their IT governance maturity level before proposing a framework adoption, while others were facing challenges in implementing them, such as resistance to change and communication issues among parties. Although COBIT was the most adopted framework by the analyzed HEIs, most of them preferred to build their own framework. Nevertheless, the benefits reported were improved quality of service and user satisfaction, and better alignment of IT investments with the university business goals.

Regarding the general state of IT governance in universities worldwide, we paid special attention to those belonging to developing and emerging countries. According to Buchwald et al. (2014) practitioners have difficulties in understanding IT governance and thus managers resist to be governed. Such situation gets worse in developing countries as they are facing several challenges implementing IT solutions. Because they are less mature in IT aspects, they are also less mature regarding IT governance concepts and importance, while they are struggling to be competitive in the higher education sector (Aasi et al., 2017, p. 14). As explained before, to provide a unique definition of IT governance is difficult due to the differences in perceptions of IT governance objectives, properties, and responsibilities. The available IT governance recommendations and guidelines are diversified and, in some cases, based on lengthy and complicated methods (Bin-Abbas & Bakry, 2014). For this reason, among others, specific models in emerging countries have been developed, instead of directly adopting the existing ones. For example, in Thailand, Jairak and Praneetpolgrang (2011) studied the state of IT governance in Thai HEIs revealing their universities were in an initial stage and their IT executives were not familiar with the IT governance principles. Afterwards, they implemented several initiatives to improve their IT governance situation by using BSCs (Jairak & Praneetpolgrang, 2013), and a set of IT governance best practices based on the ISO/IEC 38500 standard (Subsermsri et al., 2015). Similarly, in Malaysia, Seman and Salim (2013) developed a business-IT alignment model for their public universities, while Ahlan et al. provided an IT governance decision-making support framework (Ahlan et al., 2014; Arshad et al., 2014). Furthermore, Musa et al. (2014) presented their own IT governance framework applied to a Malaysian HEI, while Anthony Jnr et al. (2015) focused on risk mitigation. More recently, Mukhlas et al. (2017) studied the IT governance maturity in Malaysian HEIs to identify and address areas of improvement, and Liew et al. (2018) identified challenges and barriers faced on IT governance implementations such as lacking IT governance awareness and support from the board. In Brazil, Bianchi and Sousa proposed an IT governance model and IT governance frameworks adapted to HEIs (Bianchi & Sousa, 2015, 2018), a study about IT governance structures archetypes appropriacy for HEIs (Bianchi, Sousa, Pereira, et al., 2017), and how culture affects IT governance mechanisms in HEIs (Bianchi et al., 2019). Zaneti-Putz et al. (2017) provided an overview of the IT governance in Brazilian HEIs focusing on its strategic alignment and its developed actions identifying threads and opportunities. Caetano Borges & Sanches Miani (2018) identified IT governance best practices implemented in Brazilian HEIs while several authors assessed its state showing a lack of business-IT alignment (R. S. Almeida & de Souza, 2019), IT services portfolio not supporting the business (Ceratti et al., 2019), and lack of adoption and communication absence between IT and the organizational management (Franklin Frogeri et al., 2020). Otherwise, in Ecuador, researchers and practitioners focused on IT governance models

and frameworks, including its assessment, based on COBIT and the ISO/IEC 38500 standard (Espinoza-Aguirre & Pillo-Guanoluisa, 2018; Montenegro & Flores, 2015; Valverde-Alulema, Mejia-Madrid, et al., 2017; Valverde-Alulema & Llorens-Largo, 2016; Zambrano-Vera & Molina-Sabando, 2017), while in Indonesia, researchers assessed their IT governance state using the ISO/IEC 38500 standard (Putri & Surendro, 2015) and COBIT (Kosasi et al., 2017, 2019; Sabatini et al., 2017; Wijayanti et al., 2017), and provided strategy alignment models based on BSCs (Herdiansyah et al., 2014) and on both the ISO/IEC 38500 standard and COBIT (Rijati et al., 2017). Some efforts of alignment and COBIT implementation were developed in Morocco (Ahriz, Benmoussa, et al., 2018; Ahriz, El Yamami, et al., 2018), in Egypt (El-Morshedy et al., 2014), and in Brunei (Seyal et al., 2016). Furthermore, studies about the IT governance situation were developed in Colombia (Marulanda Echeverry et al., 2017), Ghana (Yaokumah et al., 2015), and Mexico (Castañeda De Leon et al., 2018). Although interest in IT governance in developing countries' HEIs is growing, the state of their practices and frameworks is still in incipient phases, as highlighted by Kajo-Meçe et al. (2020) in their systematic mapping review.

### 2.4.2. IT governance frameworks for HEIs

Various frameworks have been proposed to implement IT governance in universities. As stated above, there are not a single solution that fits all. Instead, each organization or institution design, develop, and deploy its own solution based on IT governance concepts and several recommendations for frameworks development, already explained on the previous section. The most relevant frameworks for universities are explained below.

***dFogIT* (detailed Framework of Governance for IT)**

The *dFogIT* framework is an IT governance implementation based on the ISO/IEC 38500 standard (Juiz et al., 2014). The core of the framework considers the three IT governance activities, i.e., direct, evaluate, and monitor, and reinforces the six ISO/IEC 38500 standard's principles. This framework was implemented after experiencing several experiences such as lack of IT governance structures, outsized authority of IT management in IT decision-making, CIO and CTO roles not clarified, absence of reporting, control, and accountability, lack of confidence in IT assets and IT staff from the board, lack of an IT strategy and thus lack of an IT investments prioritization, etc. (B. Gómez et al., 2017). The framework consists of four layers, the *IT governance* and *IT management* layers from the ISO/IEC 38500 standard, plus two more layers, one added on top (the *corporate governance* layer), and the other at the bottom (the *IT operation* layer), included to involve the entire organization in the IT governance journey (Figure 2.14).

Thus, the model represents an organizational hierarchy with a layered separation of concerns about IT. The layer of *corporate governance* demands tangible results, that is, applications (IT solutions) that add value to the organization. The *IT governance* layer produces a direction from evaluating the monitoring of the lower layers. The *IT management* layer develops projects that enable business processes through ulterior operations or services. In the *IT operation* layer, commodities are transformed into assets through the training and motivation of IT personnel. Therefore, from the point of view of IT governance, the operational layer is viewed as a collection of resources that build technology assets. Furthermore, every layer is connected to their neighbors in the model. *Corporate governance* has the responsibility of developing strategic goals and plans.

Then, the *IT governance* ensures that *IT management* goals are aligned with corporate strategy, and proposals from business processes and IT staff are considered for inclusion in portfolios dedicated to future projects and investments (vertical arrows in Figure 2.14). Additionally, *corporate governance* also expects a series of progress indicators for IT services, i.e., the daily value of IT activities in the form of operations and services within the enterprise.

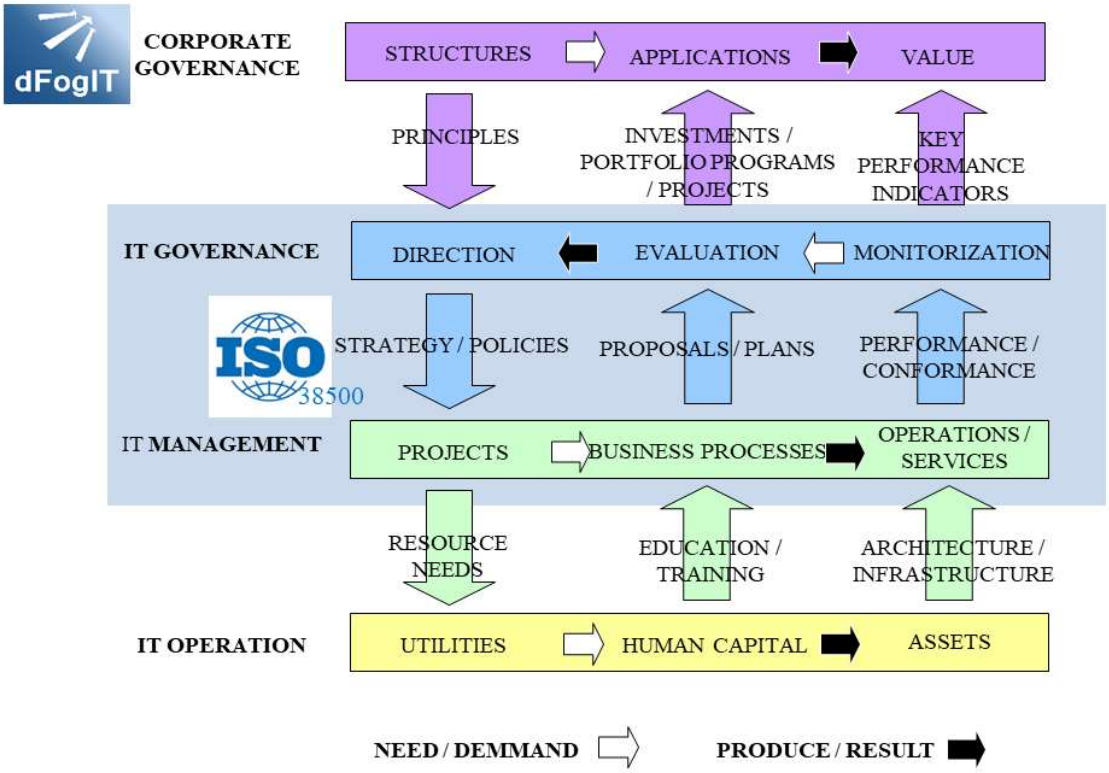


**Figure 2.14 – dFogIT: detailed Framework of Governance for IT, from Gómez et al. (2017)**

Thus, the *dFogIT* framework provides several advantages. First, it provides visibility of the IT governance mechanisms, i.e., structures, strategic alignment, and communication approaches among the different layers of the institution. Second, decision-making process is shared in different layers, i.e., more technical decisions are made by lower layers while strategic decisions by higher layers. Finally, *dFogIT* is based on the ISO/IEC 38500 standard thus facilitating its understanding, implementation, and acceptance.

**ITG4U (IT governance for universities)**

The ITG4U framework is a designed and validated IT governance model for universities within the scope of the Spanish University System (SUE for its acronym in Spanish). The ITG4U model is based on the JISC (Joint Information Systems Committee (JISC, 2007a, 2007b)) model and made up of three levels (Figure 2.15). The first level is based on the ISO/IEC 38500 standard containing its six principles. The second level includes seventeen IT goals and their relationship with each of the ISO principles. It acts as a maturity model, used to determine the level of the IT governance maturity in each university. The third level includes three types of metrics, i.e., maturity indicators, qualitative evidence indicators, and quantitative evidence indicators, used to measure whether IT goals have been achieved (A. Fernández et al., 2011).

Besides the model, the ITG4U framework includes a several toolkits designed to facilitate the implementation of the framework in each university: a maturity model, a self-assessment toolkit, a best practices guidance to help plan improvement actions, and a benchmark analysis under the Spanish scope to publish annual reports which help universities to understand the global maturity of IT governance in Spanish HEIs.

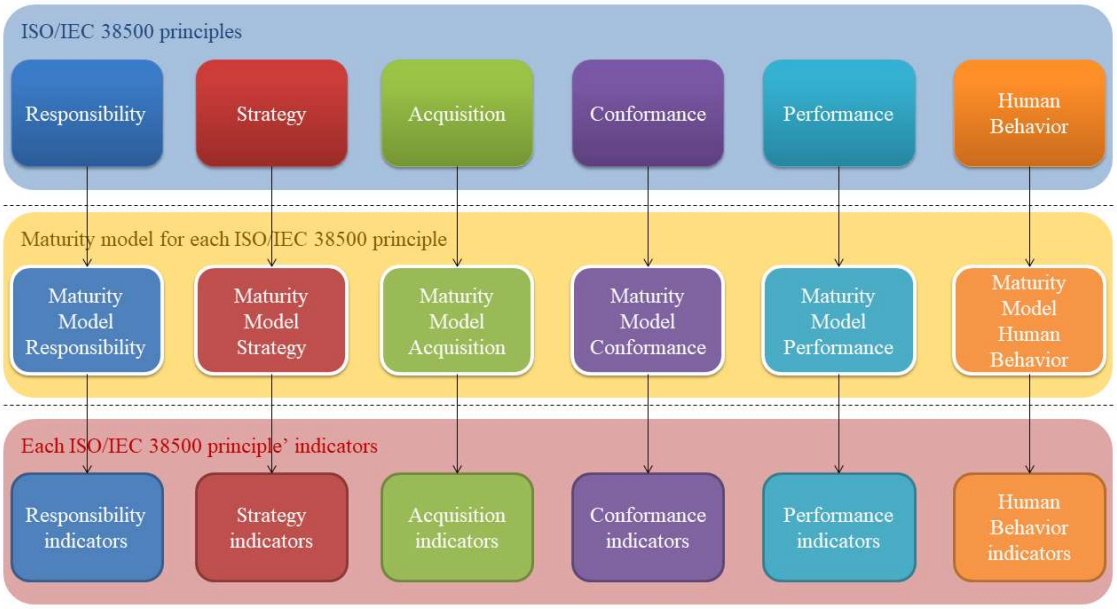


**Figure 2.15 – ITG4U framework model [adapted from A. Fernández et al. (2011)]**

## GUTI (University Governance of Information Technologies)

The GUTI model starts from a top-down approach from the corporate level to the strategic technological levels. Carlos H. Gómez (2013) conceives the university as an integrated whole and considers the following organizational facilitators: strategic approach, people, university processes, research and innovation, environment or social environment, self-evaluation and self-regulation, institutional culture and well-being, organization and administration, infrastructure and support resources academic, financial resources, and information/knowledge. This model comprises three dimensions driven by business value: GUTI structures, IT governance processes, and IT performance metrics. The structure is aimed at achieving IT alignment with the university and includes mechanisms for decision-making, directing, and policies in place. The IT governance process is driven by incorporating accountability into the organization; while the third dimension evaluates the other two dimensions to determine if the expected results have been achieved.

These models and frameworks as well as the aspects to which they address are applicable to both private and public universities. However, IT governance in the public sector is often viewed as the provision of IT services to citizens. Concretely, Elpez and Fink (2006) characterized IT governance in the public sector as a service provided to citizens through the execution of power by the authorities and aimed at satisfying public needs and interests. Hotzel et al. (2016) explained the role of the CIO in German universities. Juiz et al. (2014) compared a general framework of good governance in the public sector with their *dfogIT* framework, which was developed in a public Spanish university, and included an extended version focusing on public aspects as society and

citizens (B. Gómez et al., 2017). Similarly, the ITG4U model was specially adapted to public universities (A. Fernández & Llorens, 2011) and then results after its implementation in ten Spanish universities were analyzed (A. Fernández et al., 2014). The work of Al Qassimi and Rusu (2015) includes case studies on public governance and IT governance in developing countries. Other authors such as Souza et al. (2016) study topics related to IT governance and some aspects of IT management such as IT risks and IT security. The book *Information Technology Governance in Public Organizations. Theory and Practice* (Rusu & Viscusi, 2017) should be highlighted since it compiles different works that delve into issues related to the management and models for the IT governance in public organizations (universities in several cases).

There are other works, such as Sethibe et al. (2007) or Khalfan and Gough (2002), focusing on the differences between the private and public sectors. Moore (2000) and Hackler and Saxton (2007) differentiate IT management carried out in for-profit and non-profit organizations. The most obvious difference is that in non-profit organizations, economic results are only a means to achieve an end that has a social nature, i.e., the objective of IT in non-profit organizations is to create public value. Hackler and Saxton (2007) established as an important difference the fact that non-profit organizations usually need to develop their collaborations with other institutions much more than private institutions to be able to carry out an efficient governance of their IT. According to Coen and Kelly (2007) the complexity of IT governance in universities has increased intractably. They posed that IT managers at universities face difficulties to develop and implement IT investment plans. In fact, according to Weill and Ross (2004), "one frustration of managers of non-profit organizations [such as universities] is that most of the reference frameworks and measurement criteria have been designed to improve for-profit organizations [companies in general]. Where the measures of profit performance, stakeholder value and value of the company to society are clear, leaders of non-profit organizations need a different governance model that help them in their strategies." Thus, all those aspects should be considered when developing IT governance frameworks for public universities and higher education institutions, to assure that corporate public governance, IT governance, IT management, and IT operation connects with the main stakeholders, i.e., students, professors, and administrators of the university.

## Summary

In this chapter I defined the main aspects regarding IT governance, starting from corporate governance, and including its evolution and definition. I developed the three IT governance mechanisms, i.e., decision-making structures, alignment processes, and communication approaches. I deepened on the six principles and the three governance actions under the ISO/IEC 38500 standard explaining how the standard is based on IT governance good behavior. Accordingly, I summarized the evolution of the most important IT governance frameworks and the standard to present the need for organizations to design their own IT governance framework adapted to their specific situation. I presented the ISO/IEC 38500 standard family and the COBIT framework focusing on its 2019 version. To narrow our scope, I have focused on universities and higher education institutions. Those institutions belong to a sector in which, despite the importance explained, the implementation of IT governance is still scarce although several case studies emerge in Asia and Latin America. By way of conclusion, I cite the

fundamental elements in which many of the academic and professional discussions coincide. First, IT governance is the responsibility of the members of the board and the senior executives of the organization. This is an important issue, which derives from the inclusion of IT governance within corporate governance, and which suggests that we are not talking about the management of an IT department or the simple provision of IT services in organizations. Second, the main objective of IT governance is to achieve alignment between business strategy and IT strategy. This process is essential for IT governance to fulfill its primary function of generating value for stakeholders, minimizing risks. Third, IT governance includes strategies, policies, responsibilities, structures, and processes for the current and future use of IT in an organization. The inclusion of operational elements and strategic elements is an essential aspect of IT governance and guides the development of management and operational tasks. Governance and management should not be confused, because the former establishes the systems and policies that guide and control the latter. Finally, one aspect to highlight is that IT governance applies to any type of organization, regardless of its size, age, location, purpose, or its public or private nature. Thus, the application of IT governance to the university sector becomes not only a possibility, but also a necessity, as a mechanism to generate value for the entire university community and the society in which its action is framed.

# 3. Methodology

This chapter describes the methodology, i.e., assumptions and theoretical foundations, chosen to respond to the formulated problem, following a strategy that links the research questions (goals and objectives) with the selected research methods and techniques (Cecez-Kecmanovic & Kennan, 2013). As introduced in the first chapter, this thesis is addressed to increase the adoption of IT governance in developing countries. For that purpose, I propose a metamodel for the design, development, and deployment of an IT governance framework for Higher Education Institutions (HEIs) in developing countries. For this reason, a study of and an intervention on the methods and processes followed for the design and deployment of IT governance frameworks for the specified context will be undertaken.

According to Dresch et al. (2015, p. 1120), "after research gaps are identified in literature and the questions of the study are developed, the researcher analyzes possible approaches, selecting the one that is most appropriate, useful, and effective to address this study question or, in other words, a method that addresses it to proper/direct solutions." The focus of this study is the understanding of IT governance (the direction and control of the IT use) as an ongoing set of organizational best practices under a model, regarding formal frameworks, methods, tools, and techniques. Thus, this thesis is under a Design-science Research (DSR) approach as it aims to build an artifact that will be useful to a particular stakeholder community (HEIs in developing countries) (Weber, 2013). As stated by Dresch et al. (2015, p. 1124), "in management, in general, and in administration, in particular, Design-science research proved adequate because it contributed directly to reducing the gap between theory and practice, since this method addressed problems both on the interest of professionals in organizations and academic interests." However, the methodological strategy is also practice, participatory and observational oriented, with an intense use of the Action Research (AR) paradigm, aimed to produce specific outcomes for the institutions (IT governance frameworks), where researchers will be working in a close relationship with the destination IT Management team. Therefore, I need a research method that combines the benefits of both methods (Baskerville et al., 2009; Goldkuhl, 2013; Iivari & Venable, 2009; Sein et al., 2011). The selected research method and techniques, and their application to this study will be briefly described below.

## 3.1. Research methods

The Action Design Research (ADR) method, first named by Iivari (2007) is an integration of Action Research and Design Science Research proposed by Sein et al. (2011). According to them,

> "*ADR is a research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting. It deals with two seemingly disparate challenges: (1) addressing a problem situation encountered in a specific organizational setting by intervening and evaluating; and (2) constructing and evaluating an IT artifact that addresses the class of problems typified by the encountered situation. The responses demanded by these two challenges result in a method that focuses on the building, intervention, and evaluation of an*

*artifact that reflects not only the theoretical precursors and intent of the researchers but also the influence of users and ongoing use in context*." (p. 40).

Therefore, ADR was born from the need to unite the benefits of both methods and fill the gaps they have separately, applied to a specific context of use. To better understand ADR, before going into its details, AR and DSR will be described.

### 3.1.1. Action Research method

Action Research (AR) is a qualitative research method whose aim is to solve the immediate problem arisen during a particular time. It bridges the gap between educational theory and professional practice. AR formulates a new approach or intervention to carry out in the organization, through one cycle or several. Its purpose is to learn through action leading to personal or professional development. In this case, researchers suggest appropriate lines of action, and investigate the actual effect of such actions. It deals with individuals or groups with a common purpose of improving practice. In fact, participants "must feel a sense of ownership over the process" (Williamson, 2013, p. 190), and "findings and new recommended actions cannot be imposed" (Wadsworth, 1991, p. 44). Generally, AR is conducted in organizations where the practitioner will observe what happens and then identify an issue or problem that they need to address.

It is worth highlighting the difference between AR and the Case Study (CS) research method in that the aim of the latter is the in-depth study of an individual or group of individuals and its interpretation, without the researcher taking part. CS focuses on the description or exploration of a particular phenomenon over which the investigator has little or no control, rather than identifying the cause and effect (Yin, 1994). AR, contrarily, deal with organizational challenges (Dresch et al., 2015) and is highly context dependent while attempting to address the specific organization' concerns (Iivari & Venable, 2009).

Thus, AR promotes change through action, aiming for an improvement, and learning through reflection (both researcher and organization stakeholders) (Iivari & Venable, 2009). Mainly, its phases or steps follows the Lewin's action research spiral consisting of diagnosis (identifying a problem or creating an idea), action planning, action taking, reflecting on the processes and outcomes (including evaluation and local learning), and replanning, re-implementing, and reflecting again and so on (Williamson, 2013; who cited Lewin, 1948).

### 3.1.2. Design-science Research method

Design-science Research (DSR) aims to develop an artifact or prescribe a solution (Dresch et al., 2015). Such innovative artifacts create new reality, rather than exploring reality or helping to make sense of it (Iivari & Venable, 2009). DSR allows the researcher to not only explore, describe, or explain a given phenomenon, but also to design or prescribe solutions to a given problem. Its aim is to solve problems or achieving improvement and provide utility to its users. The nature of artifacts is not entirely agreed upon in the literature, but can generally take one of the following four forms:

| | |
|---|---|
| Constructs: | A construct is a conceptual object that researchers create as a means of describing and representing some type of phenomena in the world, such as classes of things, subclasses of things, components of things properties of things, states of things, events that occur to things, and processes that things undergo. |

| | |
|---|---|
| Models: | A model is a conceptual object that comprises constructs and associations among these constructs to describe and represent some subset of real-world phenomena. |
| Methods: | A method is a set of actions (often ordered) that is used to achieve some outcome (a product or a service). |
| Instantiations: | An instantiation is a hardware/software system that researchers produce using some method to implement a construct or model. |

(Weber, 2013, pp. 247–248)

The DSR method phases will vary slightly depending on the chosen artifact, but mainly consist of problem analysis, building (including demonstration) and evaluation (Goldkuhl, 2013; Weber, 2013).

### 3.1.3. The Action Design Research method integration

Researchers have been studying the similarities and differences of AR and DSR highlighting overlaps in their activities (Baskerville et al., 2009; Iivari & Venable, 2009), analyzing, comparing, and integrating them (Dresch et al., 2015; Goldkuhl, 2013), even theorizing the inductive and deductive approaches to DSR (Gregory & Muntermann, 2011). Järvinen (2007) and Goldkuhl (2013) studied the combination and application of AR in some DSR phases, and presented similar characteristics described as follows: 1) striving for utility, 2) production of useful knowledge, 3) combination of building/acting and evaluation, 4) collaboration between researchers and practitioners, 5) aiming for development and improvement, 6) intervention in a local practice and 7) knowledge creation and testing during the process. Lindgren et al. (2004) presented an integrative model of competence management using a design-oriented AR in a 30-month project with 6 organizations. In fact, Sein et al. (2011) used one of those organizations, as a real case, from the Lindgren et al. (2004) study, to illustrate their ADR method, adapting the AR data to their ADR. Table 3.1 shows the justification of the need for this method and its contribution.

**Table 3.1 – ADR method contribution**

| Authors | Justification |
|---|---|
| (Lindgren et al., 2004, p. 467) | "*The development of design principles is not simply about operationalizing theory into neat principles for normative action, but it involves also an assessment of available tools and situated conditions such that these principles render to technically and organizationally feasible solutions*." |
| (Lindgren et al., 2004, p. 468) | "*In design-oriented action research, the practical challenges of handling the socio-technical challenges of prototype deployment must be balanced with the scientific process of operationalizing theory into design principles (action planning), converting design principles into IT artifacts (action taking), and inferring use data back to theory (evaluating/specifying learning).*" |
| (Sein et al., 2011, p. 52) | "*First, the analysis revealed the role of concurrent evaluation in the way the artifact emerged from the interplay between design ideas contributed by the researchers and social/organizational forces in the environment. Second, the analysis clarified the ensemble nature of the artifact because of not only the development by the ADR team but also its shaping by individual and organizational practices. Third, the analysis highlighted the artifact as an instance of a class of artifacts, namely CMS, and identified design principles for this class, thus generalizing the findings.*" |
| (Sein et al., 2011, p. 53) | "*ADR is useful for open-ended IS research problems that require repeated intervention in organizations to establish the in-depth understanding of the* |

| | |
|---|---|
| | *artifact–context relationship needed to develop a socio-technical design agenda for a specific class of problems.*" |
| (Dresch et al., 2015, p. 1130) | "*It can be argued that action research, when applied under the paradigm of Design Science, can contribute to the building of artifacts. This can be useful in cases in which the artifact's development depends on the interaction of those involved in the research, or in which the evaluation can only be performed in the context of the organization and with the participation of people from the environment that is being investigated*." |

The Action Design Research method explicitly recognizes IT artifacts as "ensembles" that emerge from "design, use and ongoing refinement" in an organization context, "shaped by the interests, values, and assumptions of developers, investors, users" (Orlikowski & Iacono, 2001). Since its publication, this approach has been applied in IS and even IT research projects, particularly when the object of the research is to refine or develop new practice-oriented models or methods (Table 3.2).

**Table 3.2 – ADR method application to different contexts**

| Author | ADR method application |
|---|---|
| (Sein et al., 2011) | They are using the Volvo case from Lindgren et al., (2004) to illustrate their ADR with a real case, adapting AR data to their ADR, designing several principles that a *competence management system* (IT solution) should comply. |
| (Bilandzic & Venable, 2011) | They explain why social sciences (ethnographic) research alone cannot be adequate to design artifacts with the technological implications in society. The same on reverse, IT methods alone are not suited for [their] research as they are focused on designing, building, and testing, but lacking the effective and efficient use of IT by people. They pose the need for a soft + hard science discipline tool. They proposed a "participatory ADR", an adapted AD+DSR to their context, instead of adapting soft-DSR or the Sein et al.'s (2011) ADR. |
| (Marjanovic, 2013) | He presented a combined DSR and AR project in HEI context (in classroom) aimed to organizational design of innovative education. He highlights the definition of different roles among all the participants and a set of interaction (coordination) patterns to facilitate knowledge co-creation among these roles. |
| (Pluijmert et al., 2013) | Their research about Enterprise Engineering combines a positivist approach during literature study with an interpretivist approach during AR. They explain positivist vs interpretivist in IS research considering social impact in organizations. They highlight the figure of the *project manager* so that the AR or ADR "change project" is successful in the organization, being not the sole responsibility of the external agent, but rather that there is an internal agent involved. |
| (Sherer, 2014) | She is advocating the use of ADR in the healthcare sector research. She is explaining why ADR can be so beneficial, which risks can be mitigated, and showing some examples where other researchers already used ADR under the healthcare context. For her, ADR may help to acknowledge the value delivered by IT in the organization. |
| (Maccani et al., 2014) | They explain why ADR should be useful in their context (smart cities and its IT), and why AR and DR alone lack some needed properties. They present a practical example in the context of smart cities using Sein et al.'s (2011) table of principles matching the specific issue regarding its context. |
| (Coenen et al., 2015) | Similarly, they presented an ADR method adapted to Living Labs from a DSR perspective. |
| (Mullarkey & Hevner, 2015) | They presented an ADR extended from Sein et al. (2011), as they were lacking an existing IS. They were creating their prototype from the scratch. To formulate a "problem", sufficiently interesting and important to IT and practice, they created a new "stage" with the participants' intervention. For them, evaluation and intervention activities occur after each stage. For this reason, the BIE stage is named just *build*. Similarly, the "publication" stage could be after each of the other stages. |

| | |
|---|---|
| (Schacht et al., 2015) | They conducted an ADR project implementing and joining multiple cycles aiming for knowledge-reuse management in projects (in organizations). They highlighted as an advantage of performing ADR an "opportunity to not only build a technical software-based artifact, but also a social organizational artifact to design a knowledge management system project. |
| (Nunamaker et al., 2015) | They agree with the previous authors and claim that researchers, after performing a DSR, should apply their knowledge in a real context, proving the artifact in three stages in the field: proof of concept (functional feasibility of a solution), proof of value (whether a solution can create value across a variety of conditions), and proof of use (complex issues of operational feasibility). |
| (Niemi & Laine, 2016) | They applied ADR in one organization aiming to build an IT product to solve their knowledge management problem. They also improved the way the organization managed employees' competences regarding technologies that imply organizational changes. |
| (Drechsler et al., 2016) | They applied DSR but highlighted the artifact relevance. They describe *artifact resonance* as the impact the artifact has on practitioners and the importance of the communication phase to the right audience to improve such impact. |
| (Keijzer-Broers et al., 2016) | They applied ADR to the healthcare sector. They included a first cycle to design and describe a prototype. |
| (Mullarkey & Hevner, 2019) | They modified their previously presented ADR. They included all the stages in the cycle as they claim that the outputs of the learning phase could be inputs of the problem statement phase. |

Given the diverse application of Sein et al.'s method in different contexts with some deviations or modifications, I believe that the application of such a method adapted to our context is adequate. Therefore, I include in this section the different stages that form this method, including its activities, principles, and construction cycles. In the next section, I will describe the application of the method to our context with its deviations and modifications to adapt it to the needs of our research project.

### 3.1.4. The Action Design Research method stages

The ADR method consists of four stages (Figure 3.1): problem formulation, BIE (building, intervention, and evaluation), reflection and learning, and formalization of learning. Each stage has various tasks and principles that together form the research method strategy (Table 3.3).

**Table 3.3 – ADR method: stages and activities, from Sein et al. (2011)**

| ADR Method |
|---|
| 1) Problem formulation:<br>(1) Identify and conceptualize the research opportunity.<br>(2) Formulate initial research questions.<br>(3) Cast the problem as an instance of a class of problems.<br>(4) Identify contributing theoretical bases and prior technology advances.<br>(5) Secure long-term organizational commitment.<br>(6) Set up roles and responsibilities. |
| 2) BIE (building, intervention, evaluation):<br>(1) Discover initial knowledge-creation target.<br>(2) Select or customize BIE form.<br>(3) Execute BIE cycle(s).<br>(4) Assess need for additional cycles, repeat. |
| 3) Reflection and Learning:<br>(1) Reflect on the design and redesign during the project.<br>(2) Evaluate adherence to principles.<br>(3) Analyze intervention results according to stated goals. |

4) Formalization of Learning
   (1) Abstract the learning into concepts for a class of field problems.
   (2) Share outcomes and assessment with practitioners.
   (3) Articulate outcomes as design principles.
   (4) Articulate learning considering theories selected.
   (5) Formalize results for dissemination.

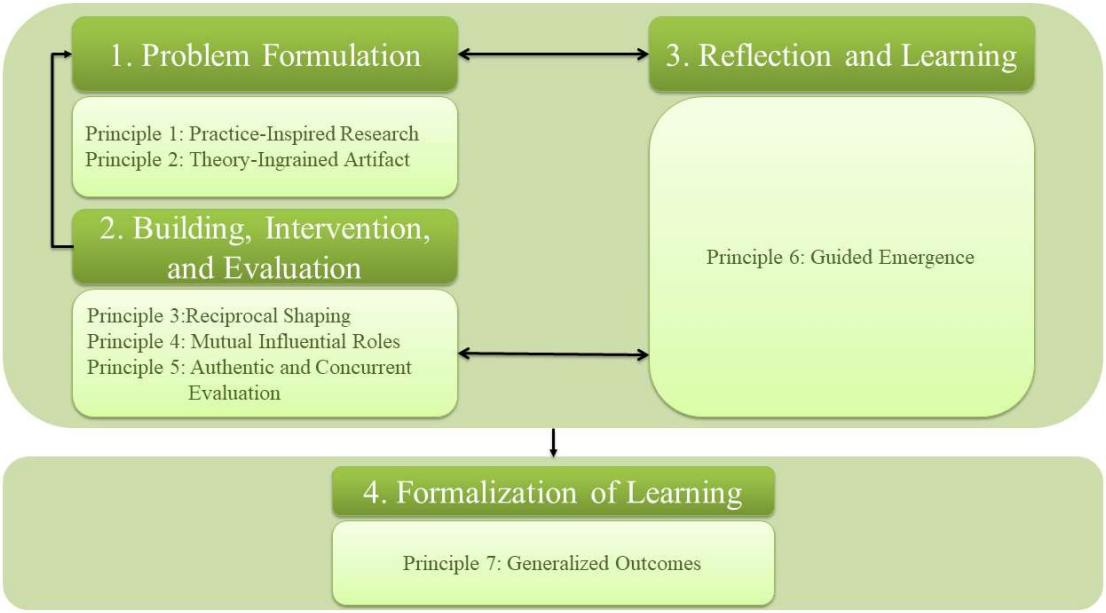


**Figure 3.1 – ADR method: stages and principles, from Sein et al. (2011)**

Furthermore, Sein et al. (2011) identify three main actors who will actively participate, especially in the second and third stages: researcher(s), practitioners, and end-users. They distinguish two ways of approaching the construction of the artifact: IT-dominant, whose effort is to emphasize the design of the technological solution, or organization-dominant, whose effort is to emphasize the organizational intervention for the design of the innovative solution (Figure 3.2).

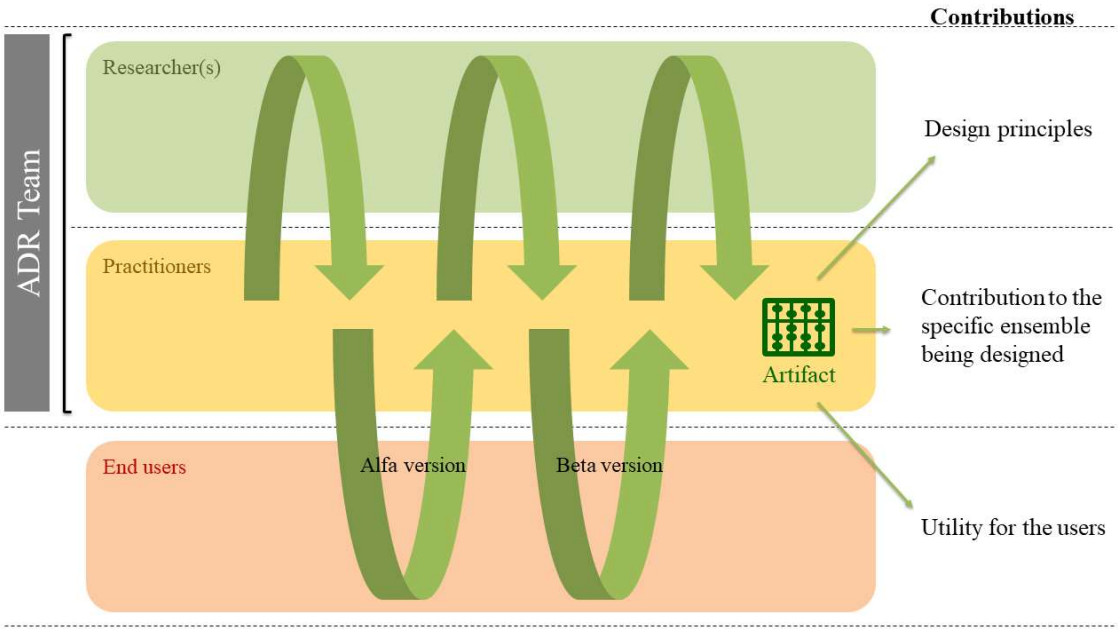


**Figure 3.2 – Generic schema for Organization-dominant BIE, from Sein et al. (2011)**

The iterative cycles are repeated as many times as necessary until the result of the expected artifact is reached, according to the intervention of the end users and the needed evaluation phases.

## 3.2. Adapting Action Design Research to our context

Our goal is to build a model (artifact) that helps and facilitates HEIs and universities to better govern their IT. Therefore, our research seeks to define the phases and principles that such a model should contain so that they can develop and deploy an IT governance framework, adapted to its specific context, evaluating it from time to time in a cycle of continuous improvement. With this we intend that they not only understand and assimilate the importance of good IT governance in their institutions, but also that they reach a good level of maturity in the efficient and effective use (current and future) of their IT, aligned with the strategy of their institutions. For this reason, I needed a method that integrated the design of an artifact (model) with the adaptation to a specific context where the participants not only interacted in the creation of their (IT governance) frameworks but also learned the relevance, importance, implications, and concepts of the good governance of IT. Our artifact is a metamodel because it is a model that helps build IT governance frameworks (which in turn are models for directing and controlling IT). Therefore, I followed the four stages of Sein et al.'s (2011) ADR approach as far as possible, adapting the research method to our specific situation.

### 3.2.1. Stage 1: Problem formulation

As introduced in the first chapter, in a world as rapidly changing as the current one, IT plays a very important role in the organization. The use of IT in day-to-day activities is widespread in practically the entire world. In fact, most core business processes tend to be primarily IT-based or IT-dependent. In addition, emerging technologies are causing changes in the business, not only at an operational level, but also at a strategic level. Therefore, the importance and need to govern in addition to managing IT correctly is no longer in doubt (Juiz & Toomey, 2015). In the university sector, specifically, IT is proving to be a crucial asset. Universities and HEIs, like organizations in any other sector, seek to stand out from their competitors to attract the attention of future students and trained lecturers. Depending on how well or poorly the HEIs align their IT to their corporate strategy will result in competitive advantage and differentiation in the market or in hindrances and difficulties (Toomey, 2009; Weill & Ross, 2004). Many researchers and institutions have approached IT governance by offering a wide range of solutions in different ways, such as standards, frameworks, models, guides, concepts, and mechanisms, as detailed above in the second chapter *Theoretical background*. However, the focus of these recommendations and suggestions has been conceived in developed countries and mainly in private organizations. In the case of developing countries, universities are incorporating technological solutions at a faster pace to try to catch up with their competitors in developed countries, and not lose local students. However, the use of IT is not so widespread, so they still have difficulties to manage it correctly (Aasi et al., 2017, p. 14). Therefore, they are not mature enough to govern them, that is, to direct and control the current and future correct use of their IT, aligning IT investments with their business strategies. Many organizations have shown great interest in the implementation of IT governance frameworks based on the abovementioned existing solutions; however, they find it difficult to decide what to do and how to do it, even to

know their initial situation because it depends on the characteristics and needs of each organization. Among the obstacles to IT governance implementation in developing countries, we highlight the lack of clear IT governance principles, limited budget, and the lack of a method to select an adequate IT governance framework. Furthermore, some considerations should be covered in those public contexts (most of the universities included in this study are public) whose primary objective is the impact on society beyond financial growth. For this reason, this thesis focuses on the design of a model to build IT governance frameworks in novice contexts and with certain difficulties in implementing IT governance, specifically HEIs from developing countries.

The main objective of this research is to design a model that describes a method for the correct implementation of an IT governance framework. In such a way that, following a series of techniques and guidelines, not only the current state of each entity is estimated but also, based on such estimated level, identify which activities, adapted to the needs and characteristics of each institution, are appropriate to improve the maturity level of IT governance and how to carry them out. Therefore, as introduced before, the specific goals in the application of the ADR method to our context are:

I. To review the state of the art of IT governance literature, with a special focus on the HEI sector in the context of developing countries, to identify existing theories or models that may be applicable on the analysis of this case.
   - What different standards, models, and techniques exist in the literature regarding IT governance? Are they adapted to the university context, to developing countries, or to both?
   - What are the basic characteristics and best practices that an IT governance framework should contain? What are the key evaluation parameters of IT governance in the organization? How can they be classified according to the level of maturity reached?

II. To teach and disseminate knowledge about IT governance concepts in general and specifically the design and implementation of IT governance frameworks.
   - What modules should be performed to ensure learning and understanding of IT governance concepts? What are the minimum definitions and aspects of IT governance to ensure and establish a common language and vocabulary?
   - Who is the HEI target audience for the training? How can such knowledge be spread to an audience beyond the university?
   - What other learning techniques can be applied, in addition to the master class, to ensure the assimilation of such knowledge?

III. To actively take part, to document and to examine in a structured way the design and execution of the IT governance framework at universities from developing countries, to validate and discuss the application of the former constructs and to point out their differences.
   - What are the characteristics and needs of the destination HEIs? What are their specific context and environment?
   - How can be adapted and adopted the existing IT governance frameworks to their specific situation? How can be adapted and adopted the existing maturity models?

- How can the initial state of HEIs regarding IT governance be assessed? How can they self-assess their own maturity? What activities should they carry out to reach the next level of maturity?

IV. To propose a metamodel based on the literature review and the outcomes of the field research and intervention, which can explain and prescribe improved IT governance strategies and improvement actions in HEIs, with a special interest on developing countries.
    - What are the steps or set of actions to design, develop, and deploy an IT governance framework for HEIs in the context of developing countries?
    - How can they self-assess and include their own framework in the continuous improvement cycle?
    - How can they sustain their frameworks in the future, and spread such best practices to other sectors in their countries?

Several stakeholders were involved in this research because, in addition to designing an artifact, it took actively participatory actions (Action Design Research paradigm); Furthermore, each stakeholder obtained a specific artifact as an output. Besides, we took certain measures to secure the long-term organizational commitment. The three stakeholders involved in this research are identified below, as well as the artifacts obtained.

- Researchers: we, E.U. partners from three different countries (Spain, Norway, and Germany), coordinated by the ACSIC research group at University of Balearic Islands, conceived the research project and its consortium. We defined the research questions, aims and objectives, selected the destination partners, and distributed the responsibilities and activities to achieve such aims. We wondered whether to define a generic metamodel that would help the creation of specific IT governance frameworks in the context of developing countries was feasible. We chose the university and HEI sector as a facilitator for the dissemination of IT governance concepts to other public and private business sectors. Our objective covered not only modernizing the governance processes of the HEIs, but of the region, planting the seed in the universities and their students, which will create future engineers who will end up working in organizations of various kinds. Thus, our outputs are the definition of a model-creating metamodel (a model *creator* of IT governance frameworks), the description of its phases in a cycle of continuous improvement, and the identification of the basic principles that each phase must cover, considering the three dimensions of IT governance and its best practices that must be respected. Such outputs are detailed in the fourth chapter while the fifth chapter describes the instantiation of the model in each of the participating universities.
- Practitioners: Tunisian universities and Albanian universities partners were the destination HEIs in developing countries with which we designed their IT governance frameworks. We studied the lines of research interest in both regions coinciding with the improvement in governance processes. In addition to the systematic search described in the second chapter, the partners showed us the advancement of IT governance in their region. The works found were scarce and almost unknown under the academic scope. The outputs of the practitioners are the

learning and training about IT governance concepts, the method of construction and adaptation of IT governance frameworks, and their sustainability.

- End users: stakeholders at each destination HEI including rectors, directors, presidents, vice-rectors, deputies (whoever belongs to the university board), IT managers, and any other important person who can make decisions about IT in their HEIs. They are who finally are going to use the framework day by day, deploying and improving it in a never-ending cycle. Therefore, their outputs are the IT governance framework adapted to its specific situation, the awareness and acknowledgement about its importance, and the improvements that are transferred to their governance processes.

To secure the long-term organizational commitment, we performed this research under the scope of two three-year projects: the first project from 2015 to 2018 with four Tunisian universities and the second project from 2017 to 2020 with four Albanian universities, both with the same EU researchers and UIB coordination. Both projects were covered by various agreements signed by all participants, where the roles and responsibilities of each partner, the work plan and schedule, the activities to be carried out, and the outputs to be produced were defined and detailed. All this assured us a commitment from all partners during the three years of the project. In addition, researchers and practitioners defined and developed sustainability plans to maintain IT governance frameworks and improve maturity beyond the project. It should be highlighted that without a project, to carry out such a research project of this magnitude would have been very difficult, considering the organizations' strategic level to which it was aimed. However, it was not exempt from difficulties and resistance to change, as profoundly detailed in the discussion chapter.

### 3.2.2. Stage 2: BIE (building, intervention, evaluation)

Representatives from both researchers and practitioners group formed the ADR team. According to the problems found in the previous stage and the list of selected objectives I decided to explore new horizons. I extracted from the literature the steps to design an IT governance implementation plan (Figure 3.3 and Figure 3.4), in addition to the recommendations of Holt (2013) and Austin et al. (2008) on creating frameworks, already mentioned above in the second chapter, because there are not specific HEIs framewors that fited our context.

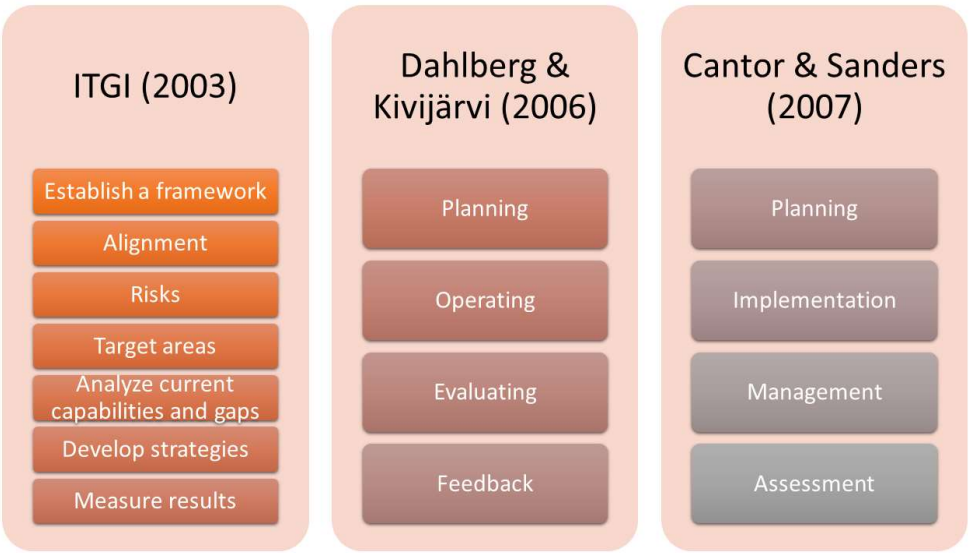


**Figure 3.3 – IT governance implementation plan, from several researchers**

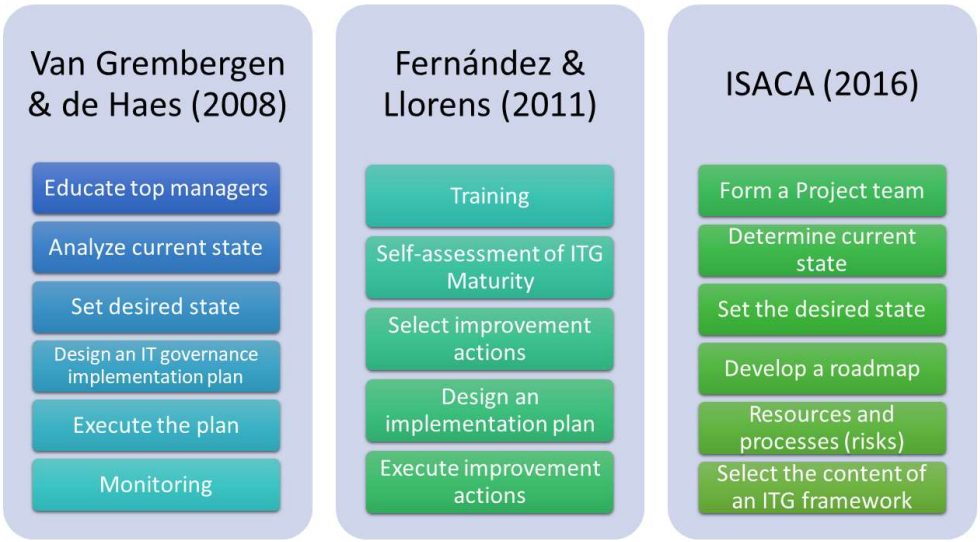


**Figure 3.4 – IT governance implementation plan (continuation)**

Indeed, it should be noted that these proposals form a cycle of continuous improvement. All these authors highlighted that after the last step (monitoring, measurement, assessment), the model was run again from the beginning, from the first or second step depending on the case, after a selected time, i.e., the framework should be reviewed after, for example, a year and the plan should contain as input those measures obtained in the monitoring step.

Therefore, I combined and matched the common steps and proposed a first version of our metamodel (Figure 3.6), which contained four phases: training, development, deployment, and monitoring. Furthermore, I established the following elements as dimensions that should be considered in the implementation of an IT governance framework: the six principles of IT governance according to the ISO/IEC 38500 standard, i.e., responsibility, strategy, acquisition, performance, conformance, and human behavior; the three governance activities, i.e., direct, evaluate, and monitoring; and the three IT governance mechanisms, i.e., decision-making structures, alignment processes, and communication approaches (Figure 3.5). In each phase of the metamodel, these three dimensions must be present and considered.

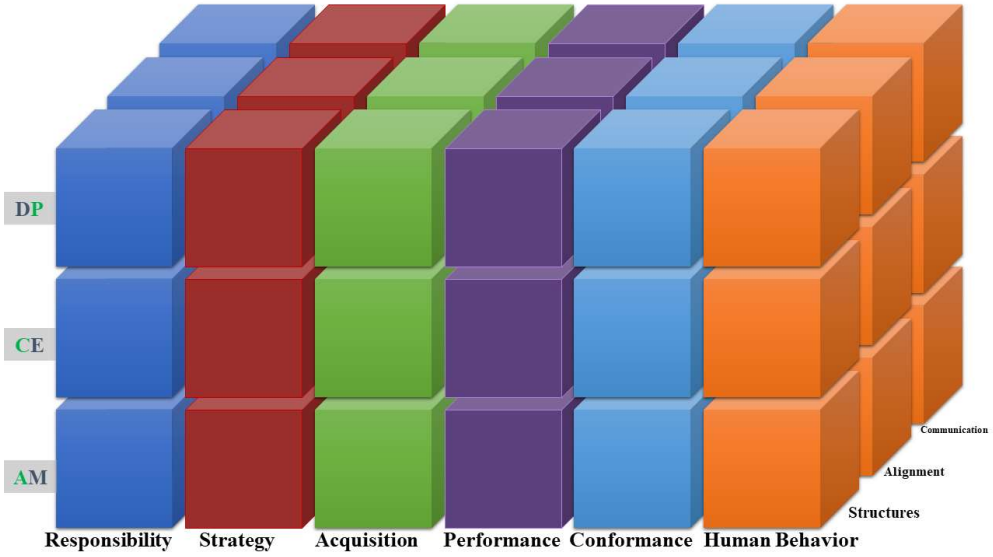


**Figure 3.5 – The three IT governance dimensions**

Therefore, each instantiation of the dimensions will indicate several best practices assigned either to the governance team or to the management team. The definition of such best practices facilitates the understanding of IT governance concepts, the evaluation of the current state, the design of improvement actions, and the monitoring of the results if they are in accordance with the established objectives.

Thus, regarding the training phase, we prepared two different trainings addressed to two attendees' profiles: researchers and managers. The reasons for carrying out both trainings were to establish a minimum common language among the members of the ADR group and to provide the basis for lecturers and researchers who wish to create new subjects on IT governance in their study plans to train future students. After the trainings, we used online surveys to assess the quality of both trainings (Tanner, 2013, p. 164). Therefore, attendees learned the basic concepts about IT governance, but the practitioners expressed their desire to deepen with more practical aspects of IT governance and not so theoretical. Therefore, we reinforced the training phase with two more activities: the study of IT governance practices and frameworks established in other universities worldwide, and visits to each of the European universities belonging to the consortium. With all this, practitioners consolidated the knowledge acquired about IT governance by showing them solutions implemented in real organizations, based on the basic concepts learned in both trainings. This first phase of the project lasted almost the first year.

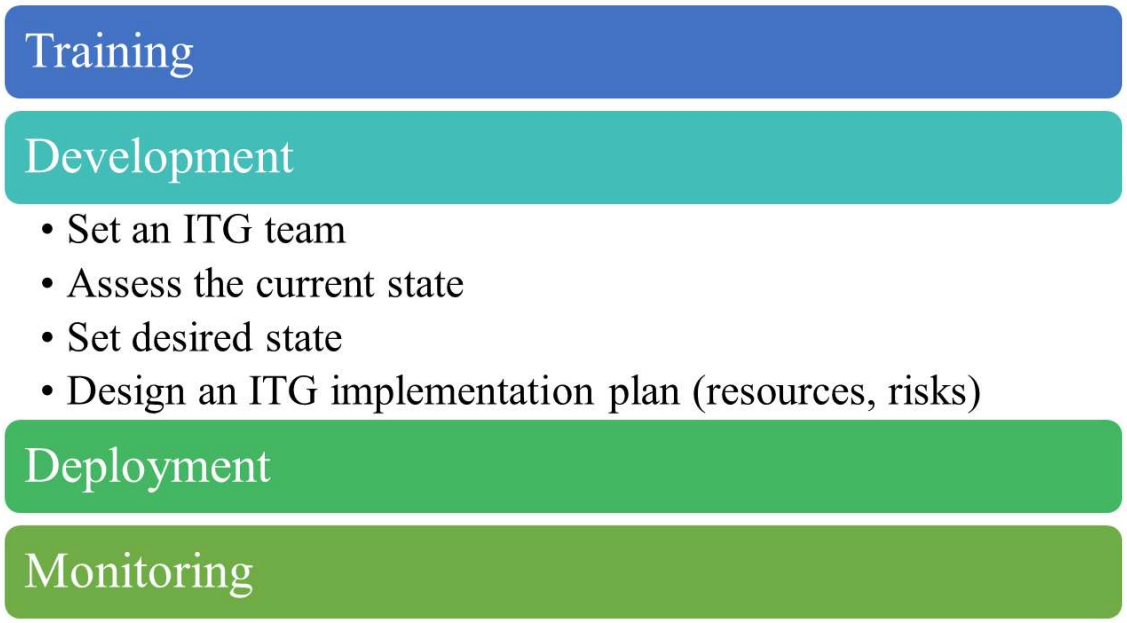


**Figure 3.6 – IT governance for developing countries universities metamodel**

At the beginning of the second phase, both practitioners and end users understood the basic vocabulary about IT governance, therefore we could start the development phase of their IT governance framework. We asked them to create an IT governance group who would be the ones to develop, deploy, and monitor such framework. The group should be made up of training attendees and staff occupying IT decision-making positions in the institution. Then, we assessed their current IT governance state to establish a starting point. For this we organized several workshops and visited each university to interview the IT governance group. Practitioners acknowledged their IT governance situation and wondered how to improve it. In the assessment workshops we used questionnaires based on IT governance best practices from several researchers as explained in the second

chapter, including COBIT, and cataloged by the six principles belonging to the ISO/IEC 38500 standard. We requested practitioners to select a best practices catalog adapted to their specific situation that would form the basis of their framework. We reviewed such catalog for coherence and correctness and asked them to use it to self-assess and set their current state. Similarly, we asked them to assess their IT governance maturity and to adapt the maturity model to their situation. Such maturity model was also categorized under the six principles of the ISO/IEC 38500 standard and the three IT governance activities, i.e., direct, evaluate, and monitor. Then, practitioners determined their current state and selected the desired state considering resources and risks. We also reviewed it for approval and sent them development plan guidelines. Practitioners used the guidelines to design and develop an IT governance implementation plan that should contain the adapted best practices catalog, the approved maturity model including their current and desired state, a list of improvement actions to achieve such desired state, the definition of several monitoring and control metrics to assure that such desired state is achieved, a risk analysis, and a communication plan to involve all the stakeholders in each organization. Then, we reviewed the whole IT governance development plan and approved it for its execution. This second phase of the project lasted about 16 months.

In the next phase, the practitioners deployed the plan and carried out the improvement actions, measuring the results and collecting as much evidence as possible. At the end of the project, approximately ten months after the previous phase, we monitored and reviewed their results, assessing whether they achieved their desired state. For that purpose, we organized face-to-face and online workshops and meetings. In chapter five, I detail how the entire process was in each of the eight participating universities.

Therefore, in this BIE stage executed in several cycles, each ADR team member obtained the outputs described above (Figure 3.7). For end users and practitioners, specific details of frameworks, improvement plans, sustainability, and trainings can be found in chapter five. In our case, that of the researchers, our outputs are detailed in chapter four, after executing the stage 4 of this research method according to Sein et al. (2011).

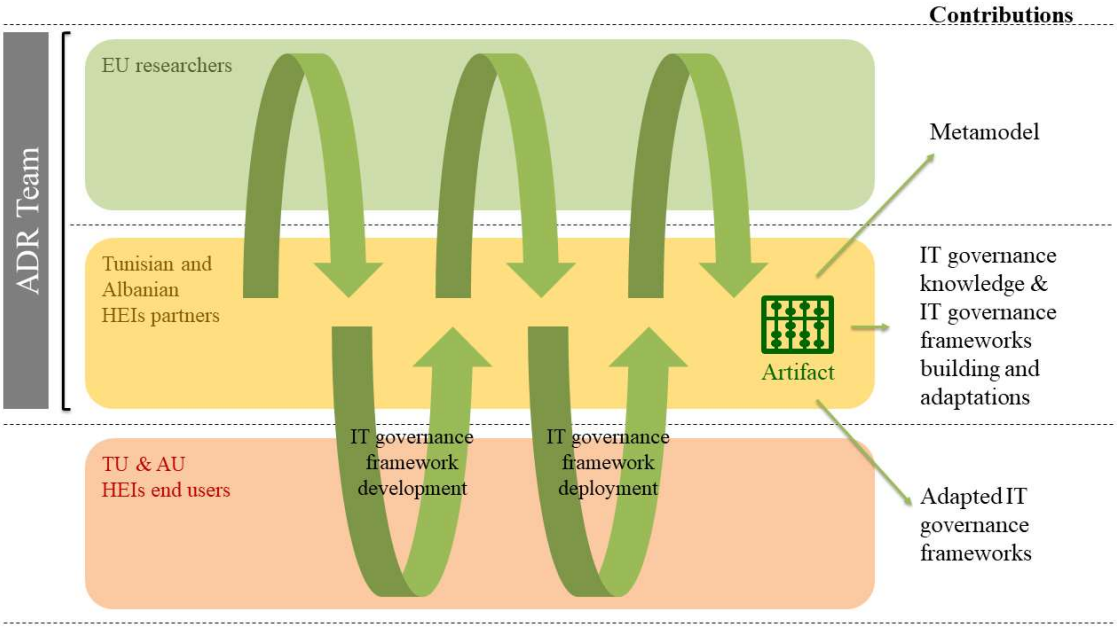


**Figure 3.7 – Our BIE form with its cycles and the outputs (adapting Figure 3.2)**

### 3.2.3. Stage 3: Reflection and Learning

This stage was performed in parallel with the other two first stages in a continued way. According to Sein et al. (2011) the tasks are (1) reflect on the design and redesign during the project, (2) evaluate adherence to principles, and (3) analyze intervention results according to stated goals. As mentioned in the previous stage, there were several concerns that we acknowledged while building, intervening, and evaluating our artifact. Following Van Grembergen and De Haes (2008), Coen and Kelly (2007), and Fernández and Llorens (2011) implementation plan proposals, we included a training phase in our metamodel. When we identified the research opportunity in developing countries, we detected a low level of knowledge and understanding about IT governance as the above-mentioned authors realized in their studies. Thus, we included the training phase for the stakeholders in this research, i.e., practitioners and end-users, to be able to build the artifact and obtain the outputs according to our selected objectives. Without such trainings, practitioners would not have been able to build their IT governance framework and all that it entails with their end-users. Then, as mentioned above, we included visits to the European universities and a study of best practices outside the consortium to fill the theory-practice gap that practitioners felt after the trainings. Regarding the framework development, we studied solutions implemented in other countries and other kind of organizations to adapt them to the HEI context and to the destination country. We learnt about other requirements in such countries never considered without having performed this project with them. In addition, we had to adjust the objectives making them less ambitious due to various internal problems of educational management in each country that made them difficult to implement in the stipulated time (three years). Similarly, several improvement actions were postponed beyond the project, particularly in the second project with Albanian universities, due to the COVID-19 pandemic and its quarantine periods. In addition, some institutions showed strong resistance to change, which forced the members of the IT governance group to take precautionary measures to guarantee the sustainability of the framework. All these aspects are detailed in chapter five, including the design and phases of both projects, the objectives and activities of each phase and the specific instantiation of each university together with its results.

### 3.2.4. Stage 4: Formalization of Learning

According to Sein et al. (2011) in the last stage of the ADR research method I should formalize the results for learning and dissemination considering the outcomes and assessment shared with practitioners, and the knowledge obtained under the theories selected. Through this research, I have developed a metamodel that helps and facilitates the creation of IT governance frameworks in university contexts in developing countries. For this purpose, I followed the indications in the literature about an IT governance implementation plan. Regarding the specific context of HEIs in developing countries, I adapted those indications and presented a metamodel consisting of four phases: training, development, deployment, and monitoring. As we participated jointly with the stakeholders involved in the destination organization, the design of these phases was outlined and adjusted in each cycle. Similarly, we adapted the conception and categorization of best practices under the three dimensions of IT governance. Best practices are not fixed elements that belong to a single ISO/IEC 38500 principle or that contemplate a single mechanism since the line that separates them is diffuse. However, we found that for practitioners with a low level of maturity this was very confusing.

Therefore, we decided to assign them in a single slot to simplify the process of creating their framework. The final version of the metamodel and the conception of the three dimensions of IT governance in each phase are detailed in the next chapter, i.e., our artifact as a description of the contribution of this thesis.

## Summary

In this chapter, I defined the methodology and the selected research method to carry out our research study. This thesis focuses on the design of a metamodel which serves to build IT governance frameworks in IT governance non experts or novice contexts, with certain difficulties in implementing IT governance, specifically higher education institutions or universities from developing countries. I explained why a Design-science Research approach mixed with an Action Research approach is suitable for conducting our research. The Action Design Research (ADR) combines the advantages and characteristics of both Action Research and Design-science Research methods and thus I adapted each phase to our specific situation and context. The ADR team formed by researchers (EU institutions' members), practitioners and end users (those belonging to the participant HEIs) worked together and obtained different outputs aimed to the same goal: to enhance the governance of their current and future IT assets. The researchers' output is the *IT governance frameworks builder-metamodel* described in the next chapter four, including the *IT governance cube* as a descriptor of the three IT governance dimensions to be considered at each phase of the metamodel. The practitioners' and end users' outputs are each *IT governance framework adapted* to their specific situation, internal issues, rules and regulations, and educational context, which details are described in chapter five.

# 4. The IT governance metamodel: researchers' outcomes

In chapter three I described the whole process of creating our metamodel, i.e., how I outlined the phases that compose it by using ADR through the participation of work teams. As I previously explained, we designed our metamodel through generic abstraction starting from the initial specifications and considering the concretization of each exposed case. Thus, in this chapter I describe the output itself, its characteristics, phases, and components of which our metamodel is formed (see Annexes, Figure A.2).

## 4.1. The IT governance framework builder-metamodel

Our metamodel, the *IT governance frameworks builder for developing countries universities* metamodel, helps and facilitates the creation of IT governance frameworks (also known as model) in university contexts in developing countries. Thus, this thesis presents a metamodel builder of models (IT governance framewors). The metamodel describes five steps for such universities to design and implement their own IT governance framework adapted to their needs. Its purpose is to provide an element (the framework) to direct and control the current and future use of their IT by learning about the IT governance main concepts, including its three mechanisms, guidelines, and recommendations from the literature, under the scope of the ISO/IEC 38500 standard.

Our metamodel is the result of applying the ADR research method that follows an iterative, recursive, and repetitive process. As explained in chapter three, I used the ADR research method to build a flexible metamodel because it can be used similarly in different contexts, adapting each phase to its dynamic aspects, e.g., involved stakeholders, business changes, or regulations. In other words, as each case has specific characteristics, the instantiation of the metamodel should be adapted, i.e., the creation and design of the IT governance framework for a specific university should be adapted to their context by following our metamodel as an implementation guideline. In fact, such adaptation should consider the three IT governance dimensions explained above: the six ISO/IEC 38500 principles, the three IT governance mechanisms, and the three governance activities. The ITGFB4dcU consists of the following phases (Figure 4.1) detailed below.

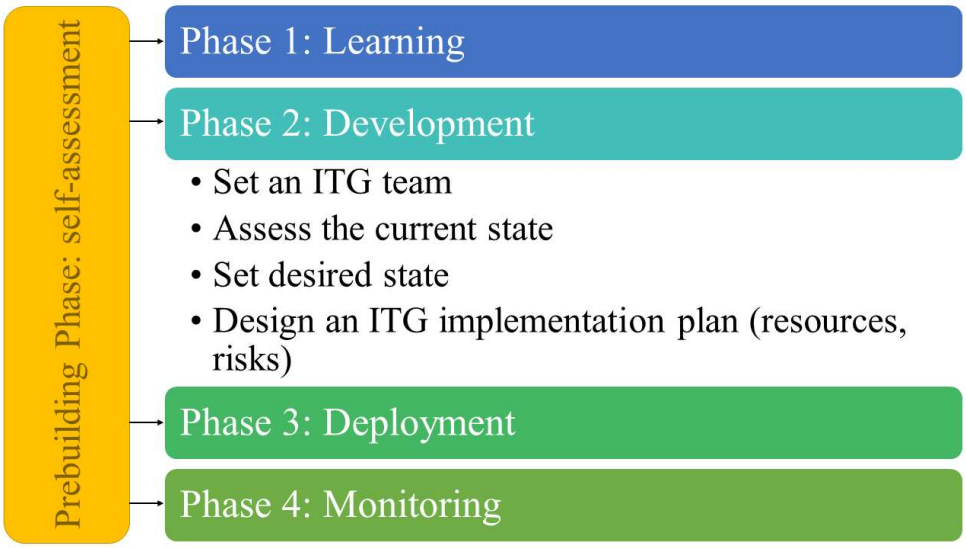


**Figure 4.1 – IT governance frameworks builder metamodel phases**

### 4.1.1. Metamodel Prebuilding Phase: self-assessment

This pre-phase marks the starting point before beginning any design and creation activity of IT governance frameworks. We had not considered this phase at first, but as we progressed with practitioners in the creation of their frameworks, we realized that it would have been of great help. For this reason, we have included it as a pre-phase.

This pre-phase purpose is to find out what is the state of the art, the knowledge and attitude organizations have towards IT governance (Table 4.1). Generally, organizations already apply certain governance and management (mostly the latter) practices and protocols regardless of whether they know the concepts of IT governance. On the one hand, knowing the initial state regarding IT governance that the organization has will help to better define the rest of the phases, i.e., how basic, or intense the training should be, how complex or simple it will be for them to design their own framework, as well as their available resources to deploy and monitor it. On the other hand, the attitude determines the way organizations are willing to behave or act, i.e., based on the knowledge they have about IT governance, if they are willing to learn the concepts, if they know the concepts slightly but do not want to act, or if they are willing to expand their knowledge and act accordingly. Knowing their attitude beforehand, predictions about the enablers and the barriers towards the creation and implementation of the framework can be adjusted. Enablers can be used to boost the design and creation of the framework, betting on behavior change that will affect the entire organization in terms of adopting best practices. Barriers, on the other hand, can help define the risks they will face and define mitigation measures against resistance to change, for example.

**Table 4.1 – Metamodel Prebuilding Phase descriptor**

| Prebuilding Phase: self-assessment | |
|---|---|
| Aim | To know the initial state and the attitude |
| Instruments | Questionnaire, interview using basic questions |
| Actors | The board, CIO, ITG expert/s |
| Expected outputs | State, awareness, knowledge, and attitude |

This phase should be led by an IT governance expert who will be able to ask basic but more precise questions through a questionnaire or an interview. Questions should be put to the board, preferably to the CIO and some other member who have shown interest in implementing IT governance solutions and / or who may get to know the answers. The questionnaire or interview should contain simple but flexible questions, so that if the interviewee demonstrates notions of IT governance, the interview can be streamlined or deepened, or on the contrary, maintain a more basic level. In addition, the interviewer should keep the three dimensions of IT governance in mind when developing the questions.

The purpose of this phase is not to specify the number of questions that the questionnaire or interview should contain, nor what are the most appropriate questions. The IT governance expert interviewer will estimate what he considers most appropriate in terms of quantity and content. What I do encourage the IT governance expert is to determine what organizational structures the organization has in place, which will indicate how responsibilities and strategy are established and controlled; what alignment mechanisms they use to direct and control strategy, acquisitions, and investments; what monitoring elements they apply to control performance and conformance; and what

communication mechanisms they have adopted to broadcast decisions and results, and to direct and monitor the allocation of responsibilities and behavior towards the use of IT.

Thus, by answering such questions, the initial state about and attitude towards IT governance is determined. This information will modify the content of the next four phases, without eliminating any, i.e., as mentioned above, the training will be basic or complex, it will contain more or fewer modules, it will require more containment measures to face the risks... It should be highlighted that this phase is different from the "*determine current state*" activity in Phase 2: *Development*, despite its similarity. The purpose of this phase is to know roughly the state of IT governance as well as the attitude towards it, while the purpose of the Phase 2 activity is for practitioners to determine their current state once they have already acquired the necessary knowledge and vocabulary about IT governance (by Phase 1: *Learning*) and are willing to design an IT governance framework implementation plan after establishing an IT governance team to lead it. Finally, this initial Prebuilding Phase of contact should include the identification of the stakeholders that will participate in the design of the framework, the description of the roles and responsibilities that they will be assigned, and the measures to be taken to ensure the long-term organizational commitment.

### 4.1.2. Metamodel Phase 1: Learning

The purpose of the Phase 1: *Learning* is to transmit and teach knowledge about IT governance ensuring the understanding and learning of its concepts (Table 4.2). Attendees must be trained in such a way that they are self-sufficient and capable of applying the knowledge acquired in the future. Thus, this phase addresses the second goal of our metamodel:

*To teach and disseminate knowledge about IT governance concepts in general and specifically the design and implementation of IT governance frameworks.*

This phase should consider the results obtained in the Prebuilding Phase to adjust the depth of the concepts to be transmitted, the selection of the appropriate audience, and the choice of learning and teaching techniques that are best suited. Thus, to address the goal this phase has the following aims:

- Ensure learning and understanding of IT governance concepts.
- Establish a common language and vocabulary to stakeholders.
- Spread IT governance knowledge beyond the scope of the university.

The way to achieve the objectives and the instruments to be used are many and varied. Researchers should adjust them according to their needs, the context, and the results obtained from the Prebuilding Phase. In our specific case, we first focused on the target audience. We designed training courses addressed to managers and members belonging to the university board to engage them in the next development phase in designing their own framework. However, we also targeted lecturers/researchers with the intention of training future trainers, so that they could include a new subject in their studies aimed at students or industry staff (e.g., a new degree or master subject, seminars, or conferences with industry, etc.). In this way we promoted the spreading of IT governance knowledge beyond the university. Therefore, the instruments to be used should be designed so that trainees achieve a minimum of competencies, and to ensure that they achieve them through some type of evaluation. For example, we realized that after the training courses

the trainees had many doubts about how to put the theoretical concepts of IT governance into practice. Thus, lecturers/researchers were proposed to perform a study about best practices implemented in universities outside the consortium. Managers, on the other hand, were proposed to visit European universities inside the consortium to show them first-hand real cases of IT governance solutions in progress.

**Table 4.2 – Metamodel Phase 1 descriptor**

| Phase 1: Learning | |
|---|---|
| Aim/s | Ensure learning and understanding of IT governance concepts. |
| | Establish a common language and vocabulary to stakeholders. |
| | Spread IT governance knowledge beyond the scope of the university. |
| Instruments | Theoretical and practical modules, e.g., courses, master classes, workshops, physical and digital materials, case studies, visits to practitioners… |
| | Learning-teaching techniques. |
| Actors | ITG expert/s, target audience (researchers/lecturers, managers, students, external audience e.g., industry). |
| Expected outputs | Trained audience sharing vocabulary regarding IT governance. |

### 4.1.3. Metamodel Phase 2: Development

The purpose of the Phase 2: *Development* is to design and develop the IT governance framework with the practitioners' commitment and participation (Table 4.3). For that purpose, they should analyze their current state regarding IT governance, determine their desired state, and design a plan whose actions achieve such desired state. This phase, together with the following ones, address the third goal:

*To actively take part, to document and to examine in a structured way the design and execution of the IT governance framework at universities from developing countries, to validate and discuss the application of the former constructs and to point out their differences.*

Similar to the previous Phase 1: *Learning*, this phase should consider the results from the Prebuilding Phase regarding the organization's state and attitude towards IT governance, because the IT governance framework design and development should be adapted to their specific situation. After the Phase 1: *Learning*, both IT governance experts and practitioners should be able to communicate and understand each other using the same vocabulary and jargon, facilitating the whole process. Thus, to address the goal, this phase consists of the following aims:

- Ensure the engagement, commitment, and dedication of senior management throughout the whole process of the IT governance framework design, creation, and implementation.
- Analyze the current state regarding IT governance.
- Select the desired IT governance state.
- Design and develop an IT governance implementation plan.

I highly recommend the creation of an IT governance steering group in the organization because they will be responsible for leading the implementation of the IT governance framework. To ensure its sustainability over time, this group should be formally created as an internal structure of the organization, or, if the creation of such a structure is very difficult, an existing structure should be assigned with the responsibilities of this group. Therefore, the CIO or the IT director should belong to the IT governance

steering group, but also other executive members because the IT governance responsibility should not just fall to the CIO (Toomey, 2009). The group does not need to be very large, but it does need to define the frequency of meeting and reporting to the board. They should also define their roles and responsibility towards the IT governance implementation and sustainability over time.

**Table 4.3 – Metamodel Phase 2 descriptor**

| Phase 2: Development | |
|---|---|
| Aim/s | Ensure senior management engagement, commitment, and dedication. |
| | Analyze the current state regarding IT governance. |
| | Select the desired IT governance state. |
| | Design and develop an IT governance implementation plan. |
| Instruments | E.g., questionnaires, interviews, workshops, SWOT. |
| | Researchers' and practitioners' active participation. |
| Actors | ITG expert/s, ITG steering group, stakeholders |
| Expected outputs | Organization's commitment for IT governance, IT governance steering group formation, IT governance current situation, IT governance desired state, IT governance implementation plan. |

Once the group is stablished, the IT governance current state should be assessed. IT governance experts and researchers should guide the IT governance steering group through the assessment. They can organize workshops, prepare questionnaires, or use existing guides considering the three IT governance dimensions. The IT governance steering group may know their specific context and environment, their organization's characteristics, and needs, and should have been trained in IT governance concepts, thus the assessment can be more in deep and specific. For example, we used an existing framework that contained a list of best practices cataloged in the six principles of the ISO/IEC 38500 standard. Practitioners adopted and adapted such catalogue to assess themselves and determine their IT governance current state. This whole process was elaborated through several workshops placed in their organizations, and online and face-to-face meetings. In this way, they not only learned to evaluate themselves knowing what to ask, but they also learned by practicing and designing their own assessment tool. Next, the IT governance steering group should select their desired state regarding IT governance. They should consider the organization's attitude towards IT governance, their current state, and their available resources to appoint a realistic goal. Similarly, we used an existing IT governance maturity model by which practitioners learned how to self-assess their maturity and select an appropriate goal by adapting it to their needs. Finally, the IT governance steering group should design an IT governance implementation plan, considering what they have obtained through their self-assessment, the definition of their current situation, the selection of their desired state and their organization's attitude, resources, and specific situation. Besides, the IT governance implementation plan should contain a list of realistic actions whose aim is to achieve the desired goal. In specific cases, self-assessment results could be disappointing, therefore IT governance experts should guide them in prioritizing and defining actions adapted and appropriate to their situation, assigning suitable runtime periods and including a risk analysis. Once the IT governance implementation plan is defined and its feasibility validated, the IT governance group should establish communication mechanisms for such plan to engage all the involved stakeholders and promote the decision-making transparency.

### 4.1.4. Metamodel Phase 3: Deployment

The purpose of the Phase 3: *Deployment* is to execute the IT governance implementation plan defined in the previous phase. For that purpose, they should implement the improvement activities included in the plan and ensure they achieve the expected results. This phase, together with the previous and the following ones, address the third goal:

*To actively take part, to document and to examine in a structured way the design and execution of the IT governance framework at universities from developing countries, to validate and discuss the application of the former constructs and to point out their differences.*

Thus, to address the goal, this phase consists of the following aims:

- Execute the IT governance implementation plan.
- Ensure that the expected results are achieved.

The IT governance implementation plan should contain a set of activities and tasks arranged in a schedule specifying the person/s in charge and the expected completion date. The IT governance steering group should have defined indicators or metrics for each activity and task to ensure that the results reach the expected level of quality. In addition, each activity should have defined evidence to show that the desired goal was truly achieved. The IT governance steering group should periodically review the progress of the plan and apply the corrective measures they deem appropriate if necessary.

**Table 4.4 – Metamodel Phase 3 descriptor**

| Phase 3: Deployment | |
|---|---|
| Aim/s | Execute the IT governance implementation plan. |
| | Ensure the expected results are achieved. |
| Instruments | Defined metrics, the IT governance implementation plan schedule, the risks analysis including its corrective measures, etc. |
| Actors | ITG steering group, stakeholders |
| Expected outputs | Any evidence showing that there is some IT governance development (e.g., formal documents containing the new IT governance strategy, the CIO appointment, the acquisition, and prioritization IT projects process, etc.). |

### 4.1.5. Metamodel Phase 4: Monitoring

The purpose of the Phase 4: *Monitoring* is to control that the IT governance implementation has been developed and deployed according to plan, and to ensure that practitioners are self-sufficient enough to run the cycle again (Table 4.5). For that purpose, IT governance experts should guide the IT governance steering group throughout the monitoring and control aspects, checking, and validating evidence and correctives measures if any. This phase, together with the previous two ones, address the third goal:

*To actively take part, to document and to examine in a structured way the design and execution of the IT governance framework at universities from developing countries, to validate and discuss the application of the former constructs and to point out their differences.*

Thus, to address the goal, this phase consists of the following aims:

- Monitor and review the executed plan.
- Ensure the IT governance implementation sustainability.

Together, both groups, the IT governance experts, and the IT governance steering group, should review the evidence and metrics collected during execution and check them against the objectives and expected results defined in the plan. They should detect deviations, whether there were corrective measures and if so, if they took effect, and if new corrective measures are necessary. In addition, deviations reinforce practitioners' learning, because they indicate how adjusted the plan was to their reality and what factors were not considered. Deviations also help them act on the organization's attitude towards IT governance and set the stage for the next cycle of improvement in directing and controlling their IT use. IT governance experts should maintain the motivation of the IT governance steering group regardless of the results to ensure the sustainability of the IT governance implementation.

**Table 4.5 – Metamodel Phase 4 descriptor**

| Phase 4: Monitoring | |
|---|---|
| Aim/s | Monitor and review the executed plan. |
| | Ensure the IT governance sustainability. |
| Instruments | IT governance implementation plan, defined metrics, results, and evidence. |
| | Online and face-to-face meetings, interviews, workshops, etc. |
| Actors | ITG steering group, ITG expert/s. |
| Expected outputs | Continuous improvement cycle, measured IT governance benefits, sustainability. |

Finally, the IT governance experts and researchers should always keep in mind that the ITGFB4dcU metamodel is flexible. Even though the five phases can be applied to any organization, each organization is different and thus assessment results, maturity results, awareness, attitude, internal philosophy and culture, strategy, etc. are different in each case. Therefore, considering each specific situation and context, the metamodel should be used in a way that permits profile each case setting actions flexibly going beyond and ensuring continuity.

## 4.2. The three IT governance dimensions: the cube

The scope of IT governance in our research is what I refer to as the cube, formed by three dimensions. Figure 4.2 shows how the three dimensions form the IT governance cube.

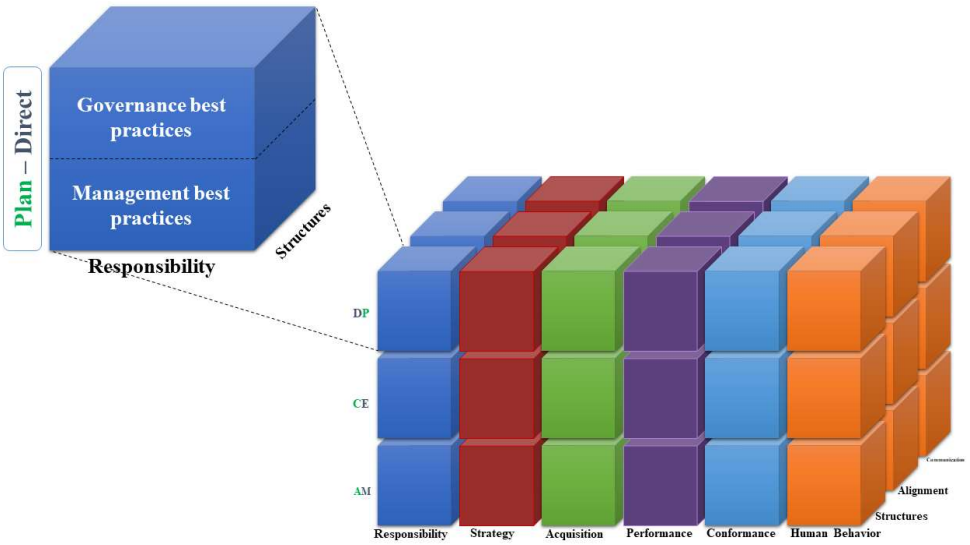


**Figure 4.2 – Detail of the three IT governance dimensions**

Each dimension corresponds to the following concepts, already explained in detail in chapter 2:

- The six principles for good IT governance: responsibility, strategy, acquisition, performance, conformance, and human behavior (ISO/IEC 38500, 2015; Toomey, 2009).
- The three governance activities: direct, evaluate, and monitor (ISO/IEC 38500, 2015; Toomey, 2009).
- The three IT governance mechanisms: decision-making structures, alignment processes, and communication approaches (Peterson, 2004; Van Grembergen et al., 2004; Weill & Ross, 2004).

The ISO/IEC 38500 standard explains that the first two dimensions, the six principles and the three governance activities, are related through the best practices required to implement the principles. The standard does not detail or list all the best practices, but rather gives a first *sketch* as a suggested guide of what practices are expected in each two-dimensional box, where one dimension is a principle, and the other is an activity. According to the ISO/IEC 38500 standard, principles are preferred behavior representation in what should guide decision making regarding good IT governance. Following such statement, we chose principles and best practices instead of processes because processes tend to be closed and inflexible while principles and best practices mark an expected behavior on what should happen, without indicating how, why or by whom should be implemented. All these aspects depend on the characteristics and context of each organization, aspects that highly influenced our research regarding HEIs and universities from developing countries. Therefore, governing bodies should require and ensure that principles are applied, using the three governance activities. Table 4.6 shows the ISO/IEC 38500 standard recommendations, just an excerpt as an example.

**Table 4.6 – Example of best practices, from the ISO/IEC 38500 standard recommendations**

| 6 Principles | Evaluate | Direct | Monitor |
|---|---|---|---|
| Responsibility | • Governing bodies should evaluate the options for assigning responsibilities in respect of the organization's current and future use of IT.<br>• Governing bodies should seek to ensure effective, efficient, and acceptable use of IT in support of current and future business objectives. | […] | […] |
| Strategy | • Governing bodies should evaluate developments in IT and business processes to ensure that IT will provide support for future business needs.<br>• Governing bodies should ensure that the use of IT is subject to appropriate risk assessment and evaluation. | […] | […] |
| Acquisition | […] | […] | […] |
| Performance | […] | […] | […] |
| Conformance | […] | […] | […] |
| Human Behavior | […] | […] | […] |

However, I considered, and after experimentation with the practitioners we ascertained, that all our metamodel phases should include a third dimension, the three IT governance mechanisms. Decision-making structures is a mechanism that refers to formal positions and roles who are appointed to direct, control, and make decisions regarding IT. They have the responsibility and duty to coordinate the current and future use of IT, which affects the whole company at strategical, tactical, and operational level. Alignment

processes are mechanisms that represent the formalization and institutionalization of IT decisions or IT monitoring procedures. They focus on the alignment between the corporate strategy and the IT strategy. Communication approaches are mechanisms that represent the active participation of, and the collaborative relationship among different stakeholders to broadcast and inform about decisions, clarify differences, solve problems, integrate solutions, and share knowledge. Therefore, I included the three mechanisms as a third dimension because best practices, in addition to ensuring the application of the six principles, should also consider the aims of each mechanism. In fact, a fourth differentiation could be added, i.e., we could separate those best practices belonging to governance bodies from those belonging to management staff, to strengthen the difference between both roles with practical exemplifications of what is expected of each role. In fact, according to the ISO/IEC 38500 (2015, p11):

"*It is the responsibility of each organization, individually, to identify the specific actions required to implement the principles, giving due consideration to the nature of the organization, and appropriate analysis of the risks and opportunities of the use of IT.*"

Indeed, the BIE stage from the ADR research method applied to our research followed such statement. From the list that I present below, each partner made their modifications to adapt them to their situation and context. In addition, we gave them a more simplified list to avoid misunderstandings detected after the Phase 1: *Learning*, for those cases that the previous IT governance knowledge was low.

Therefore, next I detail the list of best practices that resulted from the execution of stages 2 (building, intervention, evaluation) and 3 (reflection and learning) from the ADR research method. The following best practices are examples assigned to a unique principle, but they are not oriented to a single principle. ISO/IEC 38500 principles are disjoint, but their practices are not, because they could belong to more than one principle. Although the differentiation between governance and management is clear, and even the differentiation between direct and control is also clear, i.e., a best practice belonging to governance, does not belong to management, and similarly, a best practice belonging to direct activity does not belong to control (evaluate/monitor) activities. However, best practices can belong to more than one principle because they are behavioral representations and therefore, they could represent more than one principle at a time. Therefore, we decided to present a simpler list of best practices limited by the following difficulties encountered:

- Lack of maturity of practitioners in terms of knowledge about IT governance.
- Difficulty in representing best practices in all the principles to which they could belong, for space and clarity.
- Streamline the reading of best practices in their three dimensions, in addition to the differentiation of their belonging to governance or management.

Nevertheless, the following sections exemplify a list of best practices categorized by each principle and governance activity, differentiating the mechanism as well as the role of governance and management. I represented the governance and management roles matching the three governance activities with the PDCA cycle, using our governance-management communication interface proposal explained in section 2.2.2, thus connecting *Check* to *Evaluate*, *Direct* to *Plan*, and *Act* to *Monitor* (see corresponding directed arcs in Figure 2.7, section 2.2.2).

### Responsibility – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p12) "*governing bodies should evaluate the options for assigning responsibilities in respect of the organization's current and future use of IT. In evaluating options, governing bodies should seek to ensure effective, efficient, and acceptable use of IT in support of current and future business objectives*". Furthermore, they should "*evaluate the competence of those given responsibility to make decisions regarding IT. Generally, these people should be business managers who are also responsible for the organization's business objectives and performance, assisted by IT specialists who understand business values and processes*." Thus, IT committees and other formal structures should be held accountable for that responsibility and set several alignment processes by which to evaluate plans, proposals, and projects that they will receive from the tactical and operational levels regarding IT. Table 4.7 shows a set of best practices aimed at such purpose.

**Table 4.7 – Best practices in Responsibility – Evaluate**

| Responsibility – Check/Evaluate (CE) | Mechanism/Via | References |
|---|---|---|
| Governing body evaluates the information that they need to meet their responsibilities and accountability. | Structures | ISO/IEC 38503 draft (old version) |
| Governing body reviews the IT decisions, responsibilities and provision of information related to IT governance. | Structures | COBIT ITG4U model |
| Governing body evaluates that the business strategy makes the most effective use of IT to achieve business objectives. | Alignment | ISO/IEC 38504 |
| Governing body regularly reviews which IT assets should be monitored by the board or should be delegated. | Alignment | ISO/IEC 38504 |
| Governing body evaluates key aspects of organization related to IT assessments and decisions regarding business goals and strategy, risk appetite, performance, IT culture, IT maturity, training and competence, innovative use of IT, assurance reporting, key business processes IT supported and partner engagement. | Alignment | ISO/IEC 38501 |
| Management has a process for checking competency of the assigned responsibility. | Structures | ISO/IEC 38503 draft (old version) |
| Management has a process for checking effectiveness, efficiency, and acceptable use and delivery of IT in support of current and future business objectives. | Alignment | ISO/IEC 38503 draft (old version) |

### Responsibility – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p12), "*governing bodies should direct plans to be carried out according to the assigned IT responsibilities*" by directing "*that they receive the information that they need to meet their responsibilities and accountability*." Thus, IT committees and formal structures should direct strategy, plans and proposals assigning appropriate responsibilities and duties and communicating them. Table 4.8 shows a set of best practices aimed at such purpose.

**Table 4.8 – Best practices in Responsibility – Direct**

| Responsibility – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body provides leadership in developing strategies. | Structures | ISO/IEC 38504 |
| Governing body identifies the roles and responsibilities related to IT governance and strategy. | Structures | COBIT ITG4U model |
| Governing body assigns the responsibility of directing and controlling IT assets to the CIO structure. | Structures | COBIT ITG4U model |
| Governing body allocates responsibility, delegation of authority and accountability for IT related decisions including principles, | Structures | ISO/IEC 38501 |

| Responsibility – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| architecture, infrastructure and sourcing, solutions, and investments. | | |
| Governing body sets up a strategy structures (committees) to design the IT governance and strategy. | Structures | COBIT ITG4U model |
| Governing body establishes a framework model for IT-related decisions, responsibilities and provision of information related to IT governance. | Structures | COBIT ITG4U model |
| Governing body directs plans to be carried out according to the assigned IT responsibilities. | Structures | ISO/IEC 38503 draft (old version) |
| Governing body aligns broader governance criteria for organization shaping the use of IT, regarding business strategy and reliance on IT, risk, compliance, and decision-making model. | Alignment | ISO/IEC 38501 |
| Governing body directs IT change organizational programs considering resources and skills, stakeholder involvement and responsibilities, budget and schedule, dependencies with business and prioritization of initiatives. | Alignment | ISO/IEC 38501 |
| Governing body promotes communication to disseminate the importance of IT governance. | Communication | ISO/IEC 38504 |
| Management has a process for formulating current and future business objectives related to use of IT (including IT infrastructure, IT services and IT delivery). | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for assigning accountability and delegation of competencies related to establishing the organization's performance indicators. | Structures, Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for the delegation of authority from governing body into management. | ST, Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for directing and communicating the need to meet the responsibilities and accountabilities. | Structures, Alignment, Communication | ISO/IEC 38503 draft (old version) |

### Responsibility – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p12), "*governing bodies should monitor that appropriate IT mechanisms for governance of IT are established*" and thus "*that those given responsibility acknowledge and understand their responsibilities*." Therefore, IT committees and formal structures should monitor the performance of those given responsibility regarding IT governance. Table 4.9 shows a set of best practices aimed at such purpose.

**Table 4.9 – Best practices in Responsibility – Monitor**

| Responsibility – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body monitors that appropriate IT mechanisms for governance of IT are established. | Structures, Alignment, Communication | ISO/IEC 38503 draft (old version) |
| Governing body monitors that those given responsibility acknowledge and understand their responsibilities. | Structures, Communication | ISO/IEC 38503 draft (old version) |
| Governing body monitors the performance of those given responsibility in the governance of IT. | Structures, Alignment | ISO/IEC 38503 draft (old version) |
| Governing body asks for reporting of key performance indicators related to IT assets and strategy. | Alignment | ISO/IEC 38504 |
| Governing body monitors for obtaining value from the use of IT. | Alignment | COBIT ITG4U model |
| Governing body monitors appropriate and timely reporting on the evidence of success and change management. | Alignment, Communication | ISO/IEC 38501 |
| Management has a process for building a Balanced Score Card for IT assets. | Alignment | COBIT ITG4U model |

| Responsibility – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Management has a process for building a catalogue of indicators to act on IT assets. | Alignment | COBIT ITG4U model |
| Management has a process for obtaining relevant information, properly sourced, collected, and analyzed to be presented to the Governing body. | Alignment, Communication | ISO/IEC 38501 |

### Strategy – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p13), "*governing bodies should evaluate developments in IT and business processes to ensure that IT will provide support for future business needs*" and thus "*that the use of IT is subject to appropriate risk assessment and evaluation.*" Therefore, IT committees and formal structures should evaluate the use of IT and IT activities to ensure they align with the organization's objectives and satisfy key legitimate stakeholder requirements, considering plans, policies, and best practices. Table 4.10 shows a set of best practices aimed at such purpose.

**Table 4.10 – Best practices in Strategy – Evaluate**

| Strategy – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Governing body considers the implications of the strategy for achieving business objectives. | Alignment | ISO/IEC 38504 |
| Governing body determines if there is a need to review and when appropriate, revise the strategy for IT and associate policies. | Alignment | ISO/IEC 38504 |
| Governing body ensures that policies are developed to guide organizational behavior. | Alignment | ISO/IEC 38504 |
| Governing body ensures that there are mechanisms to clarify and interpret objectives, strategies and policies as emergent issues arise. | Structures, Alignment, Communication | COBIT ITG4U model |
| Governing body reviews the IT strategy plan. | Alignment | COBIT ITG4U model |
| Governing body evaluates the satisfaction of stakeholders with IT policies and strategy. | Alignment, CA | COBIT ITG4U model |
| Governing body reviews the long-term program of IT development. | Alignment | COBIT ITG4U model |
| Governing body reviews the financial resources to ensure IT innovation. | Alignment | COBIT ITG4U model |
| Governing body evaluates IT systems to ensure long-term business strategy. | Alignment | COBIT ITG4U model |
| Governing body reviews the acquisition policy, plans and relationships with suppliers and third parties. | Alignment, CA | COBIT ITG4U model |
| Governing body reviews benefits and risks of externalization of services. | Alignment | COBIT ITG4U model |
| Governing body evaluates IT projects, programs, and portfolios methodology. | Alignment | COBIT ITG4U model |
| Governing body selects and prioritizes IT projects, programs, and portfolios. | Alignment | COBIT ITG4U model |
| Governing body ensures its appraisal of external factors that may drive business opportunities and risk thereby mandating IT relate business change responses. | Alignment | ISO/IEC 38501 |
| Governing body evaluates the effectiveness of the IT Strategy in support of the Business Strategy. | Alignment | ISO/IEC 38503 draft (old version) |
| Management checks emerging IT in the technological and business markets. | Alignment | COBIT ITG4U model |
| Management checks IT plans and policies to align with the organization's objectives in required timeframes and using allocated resources. | Alignment | ISO/IEC 38503 draft (old version) |

| Strategy – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Management has a process for environmental reviews for preparing strategic plans for approval by the governing body including regulatory environment, technological advances, generational trends, skills availability, competitive forces, market development, stakeholder requirements and external threats. | Alignment, Communication | ISO/IEC 38501 |
| Management ensures reasonable developments of IT assets by analyzing related parties' requirements making strategies which conform to the goals of IT resources, implementing and evaluating strategies as well as improving strategic management capability of IT. | Structures, Alignment, Communication | ISO/IEC 22564 draft |
| Management has a process for carrying out project control in terms of scope, schedule, quality, and cost based on the strategic targets of IT to ensure effective implementation of project and execution of strategic targets. | Structures, Alignment | ISO/IEC 22564 draft |

### Strategy – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p13), "*governing bodies should direct the preparation and use of strategies and policies that ensure the organization does benefit from developments in IT*". Therefore, IT committees and formal structures should "*encourage the submission of proposals for innovative uses of IT that enable the organization to respond to new opportunities or challenges, undertake new businesses or improve processes*." Table 4.11 shows a set of best practices aimed at such purpose.

**Table 4.11 – Best practices in Strategy – Direct**

| Strategy – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body approves the organization's business strategy for IT. | Structures, Alignment | ISO/IEC 38504 |
| Governing body designs a set of IT policies aligned with the business strategy. | Alignment | COBIT ITG4U model |
| Governing body promotes proper communication of IT policies. | Communication | COBIT ITG4U model |
| Governing body designs a long-term program for implementing IT development. | Alignment | COBIT ITG4U model |
| Governing body asks for infrastructure and architecture plans to prevent obsolescence. | Alignment, Communication | COBIT ITG4U model |
| Governing body designs IT innovation policy. | Alignment | COBIT ITG4U model |
| Governing body sets the responsibilities for evaluate emerging IT. | Structures, Alignment | COBIT ITG4U model |
| Governing body promotes training plan for IT usage. | Communication | COBIT ITG4U model |
| Governing body builds an IT governance framework considering stakeholders' interests. | Alignment, Communication | COBIT ITG4U model |
| Governing body establishes an IT governance framework considering board expectations. | Structures, Alignment, Communication | COBIT ITG4U model |
| Management has a process for strategic alignment with governing body directions. | Alignment | ISO/IEC 38504 |
| Management has a process to create new value by use of IT aligning the organizational strategy. | Alignment | ISO/IEC 38501 |
| Management has a process for encouraging submission of proposal for innovative uses of IT. | Alignment, Communication | ISO/IEC 38503 draft (old version) |
| Management has a process for measuring acknowledgement and understanding of IT policies. | Alignment | COBIT ITG4U model |
| Management has a process of formulating the capacity planning strategy for IT assets. | Alignment | ISO/IEC 38501 |

### Strategy – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p13), "*governing bodies should monitor the progress of approved IT proposals to ensure that they are achieving objectives in required timeframes using allocated resources*". Thus, IT committees and formal structures should "*monitor the use of IT to ensure that it is achieving its intended benefits*." Table 4.12 shows a set of best practices aimed at such purpose.

**Table 4.12 – Best practices in Strategy – Monitor**

| Strategy – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body considers any associated risk that might arise from strategy. | Alignment | ISO/IEC 38504 |
| Governing body ensures that the organization's external and internal environment are regularly monitored and analyzed. | Alignment | ISO/IEC 38504 |
| Governing body monitors infrastructure and architecture obsolescence. | Alignment | COBIT<br>ITG4U model |
| Management has a process for assessing and evaluating risks of the current IT strategy. | Alignment | ISO/IEC 38503 draft (old version) |
| Management formulates the capacity planning strategy for IT assets. | Alignment | ISO/IEC 38503 draft (old version) |

### Acquisition – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p14), "*governing bodies evaluate options for providing IT to realize approved proposals, balancing risks and value for money of proposed investments*". Therefore, IT committees and formal structures should evaluate and prioritize IT investments aimed to achieve business objectives. Table 4.13 shows a set of best practices aimed at such purpose.

**Table 4.13 – Best practices in Acquisition – Evaluate**

| Acquisition – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Governing body evaluates appropriate costs for IT strategy. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates IT services against to realize approved proposals, balancing risks, and value for money of proposed investments. | Structures, Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates the residual risk level is within risk appetite of the organization. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates options for providing IT. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for selecting, evaluating, and monitoring the IT acquisitions organization and suppliers. | Alignment | ISO/IEC 38503 draft (old version) |
| Management measures accurately IT spending. | Alignment | COBIT<br>ITG4U model |
| Management has a process for evaluating, selecting, and prioritizing IT projects. | Alignment | COBIT<br>ITG4U model |
| Management acquires IT complying with standards and adapted to current and future use. | Alignment | COBIT<br>ITG4U model |
| Management has a process for improving fund application benefit and ROI (return on investment) via the management of budget and business accounting of IT assets in the case of financial compliance. | Alignment | ISO/IEC 22564 draft |
| Management has a process for normalizing supplier managements, ensure suppliers provide superior external technology resources and supports for IT assets. | Alignment | ISO/IEC 22564 draft |

### Acquisition – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p14), "*governing bodies should direct that IT assets are acquired in an appropriate manner, including the preparation of suitable documentation, while ensuring that required capabilities are provided.*" Therefore, IT committees and formal structures should direct that supply arrangements, both internal and external, "*support the business needs of the organization*." Table 4.14 shows a set of best practices aimed at such purpose.

**Table 4.14 – Best practices in Acquisition – Direct**

| Acquisition – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body asks for IT acquisition planning. | Alignment, Communication | COBIT ITG4U model |
| Governing body designs an acquisition policy. | Alignment | COBIT ITG4U model |
| Governing body designs a supplier relationship guide. | Alignment | COBIT ITG4U model |
| Governing body establishes an IT projects, programs, and portfolios methodology for planning acquisitions. | Alignment | COBIT ITG4U model |
| Governing body publishes a set of criteria for evaluating, selecting, and prioritizing IT projects. | Alignment | COBIT ITG4U model |
| Governing body publishes an IT acquisition protocol including responsibilities for supplying information and decision-making. | Structures, Alignment | COBIT ITG4U model |
| Governing body designs a policy for IT projects and IT services benchmarking. | Alignment | COBIT ITG4U model |
| Management plans acquisitions following directions from Governing body. | Alignment | ISO/IEC 38501 |
| Management defines and controls service and infrastructure components, maintain histories, plans and present states of service and infrastructure, keep integrity and stability of IT assets. | Alignment, Communication | ISO/IEC 22564 draft |

### Acquisition – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p14), "*governing bodies should monitor IT investments to ensure that they provide the required capabilities*." Therefore, IT committees and formal structures should "*monitor the extent to which their organization and suppliers maintain the shared understanding of the organization's intent in making any IT acquisition*." Table 4.15 shows a set of best practices aimed at such purpose.

**Table 4.15 – Best practices in Acquisition – Monitor**

| Acquisition – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body monitors IT investments plan and acquisition. | Structures, Alignment | ISO/IEC 38503 draft (old version) |
| Governing body monitors alliances and collaborations with other organizations for data governance. | Communication | COBIT ITG4U model |
| Governing body monitors IT projects current development and major drawbacks. | Alignment | COBIT ITG4U model |
| Management gathers business requirements and deciding IT service level. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for alignment between IT assets and IT capabilities. | Alignment | ISO/IEC 38503 draft (old version) |
| Management runs the capacity planning strategy for IT assets. | ST, Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for SLA establishment for suppliers and third parties. | Alignment, Communication | ISO/IEC 38503 draft (old version) |

| Acquisition – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Management has a process for monitoring continuously IT projects and IT services in operation for cost control and financial performance. | Alignment | COBIT ITG4U model |
| Management measures IT projects and IT services results. | Alignment | COBIT ITG4U model |
| Management publishes the benefits of IT projects and IT services. | Alignment | COBIT ITG4U model |
| Management analyses satisfaction of stakeholders with IT projects and IT services. | Alignment, Communication | COBIT ITG4U model |

### Performance – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p15), "*governing bodies should evaluate the plans proposed by the managers to ensure that IT will support business processes with the required capability and capacity*", which "*should address the continuing normal operation of the business and the treatment of risk associated with the use of IT.*" Therefore, IT committees and formal structures should evaluate risks to continued operation of the business, and to the integrity of the information and its protection. Table 4.16 shows a set of best practices aimed at such purpose.

**Table 4.16 – Best practices in Performance – Evaluate**

| Performance – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Governing body understands the business readiness for any major changes proposed as part of the business strategy. | Structures, Communication | ISO/IEC 38504 |
| Governing body evaluates that IT support achieving business objectives and risk appetite. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body analyses to what extent IT contributes to the strategic goals of business units. | Alignment | COBIT ITG4U model |
| Governing body determines what information must receive to take decisions about IT performance. | Alignment, Communication | COBIT ITG4U model |
| Governing body reviews security measures in place to maintain the integrity and quality of information. | Alignment | COBIT ITG4U model |
| Governing body regularly analyses the requirements of stakeholders. | Alignment | COBIT ITG4U model |
| Governing body evaluates business strategy, business portfolios, risk awareness and business performance related to IT. | Alignment | COBIT ITG4U model |
| Governing body evaluates gaps that require changes to achieve desired outcomes for the organization based on assessment criteria to evidence success/failure. | Alignment | ISO/IEC 38501 |
| Management keeps track change management of strategic IT innovation. | Alignment | COBIT ITG4U model |
| Management evaluates integrity of information and protection of IT intellectual property. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for implementing lifecycle management for architecture and technology, such as data, applications, and infrastructure, achieving balance between income and the risk introduced by the architecture and technology. | Alignment | ISO/IEC 22564 draft |
| Management has a process for managing all kinds of change activities, control change risks, reduce impact of changes on production operation, and ensure safety and stable operation of IT assets. | Alignment, Communication | ISO/IEC 22564 draft |
| Management ensures that availabilities of IT service meet demands of business operation and continue to optimize. | Alignment | ISO/IEC 22564 draft |

| Performance – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Management ensures that IT infrastructures and IT services can be restored within specific time after a disaster to support the overall business continuity requirements. | Alignment | ISO/IEC 22564 draft |
| Management has a process for continuously improving and promoting service capability through the IT service identification of support business process and implementation of improvement. | Alignment, Communication | ISO/IEC 22564 draft |
| Management ensures that the outputs of every level of organizations and IT staff are in accordance with the targets of IT assets, drive realization of strategy targets via improving work performance of organizations and IT staff. | Alignment, Communication | ISO/IEC 22564 draft |

### Performance – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p15), "*governing bodies should ensure allocation of sufficient resources so that IT meets the needs of the organization, according to the agreed priorities and budgetary constraints.*" Therefore, IT committees and formal structures should "*direct those responsible to ensure that IT supports the business, when required for business reasons, with correct and up-to-date data that is protected from loss or misuse.*" Table 4.17 shows a set of best practices aimed at such purpose.

**Table 4.17 – Best practices in Performance – Direct**

| Performance – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body designs a performance policy for business IT based. | Structures, Alignment | COBIT ITG4U model |
| Governing body ensures enough resources for maintain quality and performance of IT services. | Alignment | COBIT ITG4U model |
| Governing body establishes responsibilities of information structure and the intelligent analysis thereof from a strategic standpoint. | Structures, Communication | COBIT ITG4U model |
| Governing body builds an IT governance framework considering IT and business market performance directions. | Structures, Alignment, Communication | COBIT ITG4U model |
| Management has a process for determining service catalogue and the agreed service level agreements with related parties, ensure service capabilities meet requirements of related parties and are measurable. | Alignment | ISO/IEC 22564 draft |

### Performance – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p15), "*governing bodies should monitor the extent to which IT supports the business*" i.e., "*the extent to which allocated resources and budgets are prioritized according to business objectives.*" Therefore, IT committees and formal structures should "*monitor the extent to which the policies, such as for data accuracy and the efficient use of IT, are followed properly.*" Table 4.18 shows a set of best practices aimed at such purpose.

**Table 4.18 – Best practices in Performance – Monitor**

| Performance – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body ensures that the organization has the IT related capabilities required to support and sustain the business operations. | Alignment, Communication | ISO/IEC 38504 |
| Governing body ensures that there is a commitment and capability within the organization to undertake required changes. | Communication | ISO/IEC 38504 |

| Performance – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body monitors whether the inefficient use of IT affects its performance and communicate stakeholders about how to correct it. | Alignment, Communication | COBIT ITG4U model |
| Governing body asks for a report of performance of IT regularly. | Communication | COBIT ITG4U model |
| Governing body asks for an internal audit of IT services. | Communication | COBIT ITG4U model |
| Governing body asks for an external audit of IT services. | Communication | COBIT ITG4U model |
| Governing body asks for reporting about risks and security problems that may affect the continuity of services so that they can decide on risk awareness and risk appetite. | Communication | ISO/IEC 38501 |
| Governing body asks for a Business Continuity Plan (BCP). | Alignment, Communication | COBIT ITG4U model |
| Governing body asks for a contingency plan for recovery IT services in the shortest time possible after a serious incident. | Alignment, Communication | COBIT ITG4U model |
| Governing body ensures that service level agreements been set up with all IT service users. | Alignment, Communication | COBIT ITG4U model |
| Governing body monitors if there are deviations in service level agreements and corrective measures adopted. | Alignment, Communication | COBIT ITG4U model |
| Governing body analyses the satisfaction of stakeholders with relation to IT-based services in operations. | Communication | COBIT ITG4U model |
| Governing body monitors the achievement of beneficial outcomes related to key aspects of IT deployment and use including business engagement, strategic alignment, business case realization, IT service delivery, service level and support, information security, risk, education, and training. | Structures, Alignment, Communication | ISO/IEC 38501 |
| Management reports on IT Service Management, Project Management, Quality Management, Resource Management, supplier management process, IT Change Management, IT Incident Management, and IT Cost management. | Communication | ISO/IEC 38503 draft (old version) |
| Management evaluates IT capabilities and capacity management. | Alignment, Communication | ISO/IEC 38503 draft (old version) |
| Management has a process for assessing the risks associated with the use of IT during disaster recovery to address the continuing normal operations of business. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for monitoring of IT budget and resources prioritization. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process to achieve real-time control of operation situation, and detect and solve abnormal operations via collection, classification and solving of application and operating information of IT infrastructures. | Alignment | ISO/IEC 22564 draft |
| Management provides channels to receive user requests and standard services, provide users and customers with information and handling matters. | Communication | ISO/IEC 22564 draft |
| Management has a process for restoring normal service operation within the shortest time, minimize the negative impact of business operations, and ensure to keep service quality and availability level. | Alignment | ISO/IEC 22564 draft |
| Management has a process for taking actions to eliminate deep causes to prevent recurrence of incidents or problems, reduce the impacts of repeatable incidents, and improve service quality and stability of IT assets. | Alignment, Communication | ISO/IEC 22564 draft |
| Management reduces or avoids deploy risks, decrease the number of incidents caused by the improper deploy of IT services. | Alignment | ISO/IEC 22564 draft |

### Conformance – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p16), "*governing bodies should evaluate the extent to which IT satisfies obligations, internal policies, standards and professional guidelines*." Therefore, IT committees and formal structures should "*regularly evaluate the organization's internal conformance to its framework for IT governance*." Table 4.19 shows a set of best practices aimed at such purpose.

**Table 4.19 – Best practices in Conformance – Evaluate**

| Conformance – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Governing body reviews updated reference catalogue as compilation of IT-related regulations and laws that affect organization. | Structures | COBIT ITG4U model |
| Governing body evaluates whether IT governance processes are properly carried out in the organization. | Alignment | COBIT ITG4U model |
| Governing body evaluates whether IT projects and IT services consider IT-related external regulations and laws and policies and internal procedures. | Alignment | COBIT ITG4U model |
| Governing body evaluates reports with the results of the internal and external audits, which clearly express the level of the organization's level of compliance with regulations and the risks that those entail. | Alignment, Communication | COBIT ITG4U model |
| Governing body evaluates security reports and remediation of possible information leakage. | Communication | COBIT ITG4U model |
| Governing body evaluates security reports and remediation of not conformance with regulations. | Communication | COBIT ITG4U model |
| Governing body evaluates that organizational use of IT complies with relevant laws, regulations. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates whether the organization conforms to its system (organizational policies and guidelines) regarding IT governance. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates business satisfaction in relation to the use of IT. | Alignment, Communication | ISO/IEC 38503 draft (old version) |
| Management has a process for checking IT assets life cycle policies and processes. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for internal audits to check whether IT projects and IT services comply with IT-related external laws and regulations and internal policies and procedures. | Alignment | COBIT ITG4U model |
| Management has a process for external audits to check whether IT projects and IT services comply with IT-related external laws and regulations and internal policies and procedures. | Alignment | COBIT ITG4U model |
| Management builds an updated reference catalogue that contains the IT-related standards applicable or already applied in the organization. | Alignment | COBIT ITG4U model |
| Management has a process for updating IT management information based on standards. | Alignment | COBIT ITG4U model |
| Management has a process for updating IT governance information based on standards. | Alignment | COBIT ITG4U model |
| Management has a process for take corresponding actions to improve effects of risk responses through measuring uncertainty and the influence on the targets. | Alignment, Communication | ISO/IEC 22564 draft |

### Conformance – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p16), "*governing bodies should direct those responsible to establish regular and routine mechanisms for ensuring that the use of IT complies with relevant obligations internal policies, standards and guidelines*" and thus "*that policies are established and enforced to enable the organization to meet its internal*

*obligations in its use of IT*." Therefore, IT committees and formal structures should direct that "*IT staff follow relevant guidelines for professional behavior and development, and whose actions relating to IT are ethical*." Table 4.20 shows a set of best practices aimed at such purpose.

**Table 4.20 – Best practices in Conformance – Direct**

| Conformance – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body assigns the responsibility of being aware of IT-related legislation, norms, and standards. | Structures | COBIT ITG4U model |
| Governing body defines and publishes a catalogue with all kinds of IT-related policies to guide the organization about IT implementation. | Communication | COBIT ITG4U model |
| Governing body directs the design and publication of a set of internal procedures and regulations that implement the previously defined IT policies. | Communication | COBIT ITG4U model |
| Governing body assigns responsibility of understanding the IT-related standards. | Structures | COBIT ITG4U model |
| Governing body designs and disseminates a policy that promotes the general use of IT-related professional standards and best practices within the organization. | Communication | COBIT ITG4U model |
| Governing body designs an IT governance framework considering laws and regulations. | Structures, Alignment, Communication | COBIT ITG4U model |
| Management has a process for communicating IT-related internal policies and regulations to facilitate their dissemination in the organization. | Communication | COBIT ITG4U model |
| Management plans information security strategies and measures to reduce risk information assets face in the operation environments to acceptable level, to ensure availability, confidentiality, and integrity of information. | Alignment | ISO/IEC 22564 draft |
| Management plans audit of IT assets to control potential risks of operation management. | Alignment | ISO/IEC 22564 draft |

## Conformance – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p16), "*governing bodies should monitor IT compliance and conformance through appropriate reporting and audit practices, ensuring that reviews are timely, comprehensive, and suitable for the evaluation of the extent of satisfaction of the business*." Therefore, IT committees and formal structures should "*monitor IT activities, including disposal of assets and data, to ensure that environmental, privacy, strategic knowledge management, preservation of organizational memory and other relevant obligations are met*." Table 4.21 shows a set of best practices aimed at such purpose.

**Table 4.21 – Best practices in Conformance – Monitor**

| Conformance – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body monitors level of uptake of IT management and IT governance standards. | Alignment | COBIT ITG4U model |
| Governing body monitors risk IT management reporting. | Alignment, Communication | COBIT ITG4U model |
| Governing body monitors conformance reporting. | Alignment, Communication | COBIT ITG4U model |
| Governing body monitors the level of knowledge concerning IT policies and laws in the organization. | Alignment | COBIT ITG4U model |
| Management has a process for regular compliance assessment of IT use with relevant obligations, standards, and guidelines. | Alignment | ISO/IEC 38503 draft (old version) |

| Conformance – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Management has a process for monitoring of disposal of assets and data. | Alignment | ISO/IEC 38503 draft (old version) |
| Management has a process for training related to the compliance of internal procedures with external laws and policies. | Alignment, Communication | COBIT ITG4U model |
| Management has a process for synchronizing business strategy and risk awareness of organization. | Alignment | COBIT ITG4U model |
| Management has a process for establishing review mechanism for significant incidents, control risks in advance, reduce operation risks of IT assets. | Alignment | ISO/IEC 22564 draft |
| Management has a process for identify necessity of external laws and regulations as well as monitoring requirements for IT assets management, reasonably plan and implement to control potential risks. | Alignment | ISO/IEC 22564 draft |

## Human Behavior – Check/Evaluate (EC)

According to the ISO/IEC 38500 (2015, p17), "*governing bodies should evaluate IT activities to ensure that human behaviors are identified and appropriately considered*." Therefore, IT committees and formal structures should evaluate "*whether human resources are available to undertake IT initiatives*." Table 4.22 shows a set of best practices aimed at such purpose.

**Table 4.22 – Best practices in Human Behavior – Evaluate**

| Human Behavior – Check/Evaluate (EC) | Mechanism/Via | References |
|---|---|---|
| Governing body reviews stakeholders' participation in IT innovation. | Communication | COBIT ITG4U model |
| Governing body evaluates the segmentation of stakeholders for IT change processes. | Structures, Alignment | COBIT ITG4U model |
| Governing body evaluates the consistency of Human Behavior in relation to IT activities. | Alignment | ISO/IEC 38503 draft (old version) |
| Governing body evaluates whether enough human resources are available to undertake new IT initiatives, avoiding overloads. | Alignment | COBIT ITG4U model |
| Governing body evaluates that value core of IT assets, create excellent cultural environments for the sound developments, and provide powerful ideological and behavior guarantee by of combing, implanting and continuously constructing organization culture. | Alignment, Communication | ISO/IEC 22564 draft |
| Management checks work practices to ensure consistence with the use of IT. | Communication | ISO/IEC 38503 draft (old version) |
| Management has a process for becoming aware of the IT-related needs and concerns of stakeholders. | Communication | COBIT ITG4U model |
| Management has a process for identifying and analyzing risk factors arising from resistance to change or lack of commitment of stakeholders. | Alignment, Communication | COBIT ITG4U model |
| Management has a process for including activities to mitigate risk related to a lack of commitment in IT projects. | Alignment, Communication | COBIT ITG4U model |
| Management has a process for reducing stakeholders' resistance to an IT-based change process. | Communication | COBIT ITG4U model |
| Management has a process for training stakeholders in IT projects and services. | Communication | COBIT ITG4U model |
| Management checks the level of IT skills of stakeholders. | Communication | COBIT ITG4U model |

### Human Behavior – Direct/Plan (DP)

According to the ISO/IEC 38500 (2015, p17), "*governing bodies should direct that IT activities are consistent with identified human behavior.*" Therefore, IT committees and formal structures should direct "*that risks, opportunities, issues, and concerns may be identified and reported by anyone at any time, i.e., such risks are managed in accordance with published policies and procedures and escalated to the relevant decision makers*." Table 4.23 shows a set of best practices aimed at such purpose.

**Table 4.23 – Best practices in Human Behavior – Direct**

| Human Behavior – Direct/Plan (DP) | Mechanism/Via | References |
|---|---|---|
| Governing body creates structure (committee) for developing IT strategy and IT policy. | Structures | COBIT ITG4U model |
| Governing body creates architecture committee. | Structures | COBIT ITG4U model |
| Governing body creates outsourcing, out provisioning, etc. and other externalization policies committee. | Structures | COBIT ITG4U model |
| Governing body creates risk policy committee. | Structures | COBIT ITG4U model |
| Governing body creates IT audit committee. | Structures | COBIT ITG4U model |
| Governing body nominate special governance structures including Governance Steering Group, Risk Committee and Audit Committee. | Structures | ISO/IEC 38501 |
| Governing body delegates decisions in a transparent and effective manner. | Structures | ISO/IEC 38501 |
| Management has a process for delegating decisions ensuring that the governing body can take final accountability. | Structures, Alignment | ISO/IEC 38501 |
| Management creates valuable results to improve continuously value of IT assets via new ideas and technologies. | Alignment, Communication | ISO/IEC 22564 draft |
| Management has a process for making Health, Safety and Environmental (HSE) management strategies for physical environments, implement treatment measures, realize guarantee in terms of personnel, environments etc., and avoid significant injury accidents of environments or personnel. | Alignment, Communication | ISO/IEC 22564 draft |
| Management formulates Human Behavior Policy and Plan. | Communication | ISO/IEC 38503 draft (old version) |
| Management designs a professional career structure reflecting promotions based on the acquisition of IT skills and on successes obtained during change processes. | Communication | COBIT ITG4U model |

### Human Behavior – Act/Monitor (AM)

According to the ISO/IEC 38500 (2015, p17), "*governing bodies should monitor IT activities to ensure that identified human behaviors remain relevant and that proper attention is given to them*." Therefore, IT committees and formal structures should "*monitor work practices to ensure that they are consistent with the appropriate use of IT*." Table 4.24 shows a set of best practices aimed at such purpose.

**Table 4.24 – Best practices in Human Behavior – Monitor**

| Human Behavior – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Governing body monitors that IT risks identified related to Human Behaviour are managed. | Alignment, Communication | ISO/IEC 38503 draft (old version) |
| Management ensures accumulation and inheritance of IT assets during the period of service lifecycle via creation, sharing and application of knowledge. | Alignment, Communication | ISO/IEC 22564 draft |

| Human Behavior – Act/Monitor (AM) | Mechanism/Via | References |
|---|---|---|
| Management has a process for normalizing IT human resource management of recruitment, training, appointment and retaining, ensure staffs meet the requirements IT assets while before, during and after appointment. | Structures, Alignment, Communication | ISO/IEC 22564 draft |
| Management ensures well-organized duty works as well as safe and stable operations of IT via standardizing responsibilities, working discipline and behaviors of duty work. | Alignment, Communication | ISO/IEC 22564 draft |
| Management ensures that documents are in the condition of effective management through normalizing every activity during life cycle. | Communication | ISO/IEC 22564 draft |
| Management ensures the effective implementation of each IT staff function and management targets via set of organization structure and job responsibility. | Structures, Communication | ISO/IEC 22564 draft |
| Management ensures that IT activities are consistent with identified Human Behaviors. | Structures, Communication | ISO/IEC 38503 draft (old version) |
| Management has a process for managing risks in accordance with policies and procedures, escalated to relevant decision makers. | Alignment | ISO/IEC 38503 draft (old version) |
| Management measures workload in IT projects and evaluating if appropriate. | Alignment, Communication | COBIT ITG4U model |
| Management reinforces communication and relationship maintenance between IT staff and the related parties, like customers, regulators or parent bodies, partners, suppliers, governments etc. to obtain mutual benefits. | Communication | ISO/IEC 22564 draft |

## Summary

By applying the ADR method, I obtained an IT governance frameworks builder-metamodel. Our metamodel consists of five phases: *Prebuilding Phase*, to detect the initial organization's state and attitude towards IT governance; Phase 1: *Learning*, to train the identified audience in IT governance concepts, vocabulary and jargon; Phase 2: *Development*, to assess the current organization's IT governance state, to select the desired state, and to design an IT governance implementation plan; Phase 3: *Deployment*, to carry out the designed plan; and Phase 4: *Monitoring*, to monitor the outcomes, results, and outputs after the deployment of the plan whether they are aligned with the defined objectives and aims. Our metamodel was bounded under the context of newbies or non-expert organizations regarding IT governance aspects, specifically HEIs and universities from developing countries who deal with particular difficulties and restrictions. Our metamodel focuses on the contribution of the continuous flexibility in all its phases, and thus, it should be considered as a flexible *mold* that builds adapted IT governance frameworks. In addition, our metamodel considers the *IT governance cube*, i.e., the three IT governance dimensions in all its phases. The cube is based on good behavior principles regarding IT governance and presents best practices categorized in its three dimensions. For the sake of simplicity, and for the practitioners to understand us better, we catalogued best practices under a single principle. The simple catalog helped practitioners clarify concepts, better understand the ISO / IEC 38500 standard, and implement IT governance in the short time that projects took.

# 5. Empirical Results: participants' outcomes

## 5.1. General design

Under the scope of both European projects Erasmus+ KA2 granted by the European Education and Culture Executive Agency (EACEA), *IT Governance for Tunisian Universities (ITG4TU)* (2015-2018) and *IT Governance for Albanian Universities (ITG4AU)* (2017-2020), four European universities from three different countries (Spain, Germany, and Norway) adopted and adapted the ITG4U Spanish framework to four Tunisian and four Albanian universities, respectively (B. Gómez et al., 2018; B. Gómez & Juiz, 2019). After several trainings to set a minimum knowledge on IT governance in general, and specifically applied to universities, IT governance frameworks definition, development, and deployment for Tunisian and Albanian HEIs and its monitoring results were performed.

### 5.1.1. Antecedents

IT governance applies to any type of organization, regardless of its size, age, location, purpose, or its public or private nature (ISO/IEC 38500, 2015). Thus, the application of IT governance to the university environment becomes not only a possibility, but a necessity, as a mechanism to generate value for the entire university community and the society in which its activity is framed. However, according to Weill and Ross (2004), the managers of non-profit organizations, such as universities and higher education institutions (HEIs), had difficulties when they tried to implement existing frameworks. Those frameworks had been designed to improve organizations with the intention of profit, companies in general, where the measures of performance, and both the value of the stakeholders involved and of the company were clear. Thus, non-profit organizations leaders needed a different governance implementation than the model suggested by the ISO/IEC 38500 standard to better suit their specific situation.

In 2007, the EDUCAUSE Center for Analysis and Research (ECAR) promoted the *IT Governance Study 2007*, which was based on general concepts of IT governance, but surveyed at the university level. 438 IT managers from universities around the world participated in the study (Yanosky & Borreson Caruso, 2008; Yanosky & McCredie, 2007). The respondents stated that the reasons for implementing a formal IT governance system at the university are first, business-IT strategy alignment (73.5%), second, promoting the existence of an institutional vision of IT (50.5%), and third, promoting and collecting common information (38.1%). It should be noted that the reduction in costs and the increase in efficiency ranked fifth out of nine, with 25.1% of the responses. In contrast, the IT governance implementation barriers at the university (Yanosky & McCredie, 2007) were informal/decentralized culture (41.6%), lack of participation of the necessary agents and their subsequent support (40.4%), insufficient government coordination (30.8%), and lack of adequate funding (28.3%).

As discussed in the second chapter, some universities used COBIT to implement an IT governance model, such as South Louisiana Community College (Council, 2006). Other universities designed their own IT governance frameworks and models based on IT governance concepts. Thus, for example: the University of California included an IT Strategic Plan using an IT governance model (University of California, 2008); Pretorius

(2006) designed for the University of Petroria its own model; Ridley (2006) proposed for the University of Guelph an IT governance model based on Weill and Ross (2004) aspects; and the University of Calgary (2007) designed a model including the creation of several committees, the assignment of responsibilities and roles related to IT, risk management, and a methodology for project management. Perhaps the university reference framework was the work of Coen and Kelly (2007) who designed the JISC model (JISC, 2007b) with their self-assessment toolkit that helped universities to clarify the complex tangle of elements related to IT governance. All these past experiences served as a reference for the design of an own solution that was adjusted to the needs of Spanish universities.

The IT governance situation in Spanish universities was not clear because there was no institutional role to support it. In 2003, the CRUE (Spanish acronym for *Spanish Universities Rectors Conference*) established the commission CRUE-TIC (Spanish acronym for the *Sectoral Commission for Information and Communications Technologies*) led by a rector, which was born from a working group within the CRUE, concerned and sensitized about the role that these technologies were already playing in the Spanish institutions. In 2008 and 2009, CRUE-TIC surveyed the Spanish universities regarding its IT governance situation whose results were a low IT governance maturity in the Spanish HEIs (A. Fernández, 2008; Llorens & Fernández, 2008). Thus, to improve the situation they supported the implementation of the *IT governance for universities* (ITG4U) model, which was crucial to get the participation of the universities.

The ITG4U model is based on and fully respects the IT governance model proposed by the ISO/IEC 38500 standard. Furthermore, it provides several tools to easily implement it in a university environment. The final goal would be that the university that implements the ITG4U model will also, in the future, easily become certified with the ISO/IEC 38500 standard (A. Fernández, 2009; Martín & Fernández, 2010). Between the years 2010-2014, CRUE-TIC promoted the implementation of an IT governance system in Spanish universities. Specifically, 10 IT governance pilot projects were carried out. As a result of this process and based on the obtained experience, CRUE-TIC was able to identify which were the IT governance best practices that these universities satisfied and establish the aspects to consider when determining the desired level of IT governance in universities. Furthermore, they detailed how the participant universities were at an incipient level of maturity, although with a firm commitment to improve in the short term, which served to encourage other universities to participate (A. Fernández et al., 2014; Hontoria, 2014).

In parallel to the implementation of the pilot projects, other Spanish universities were also implementing their own frameworks, e.g., dFogIT: detailed Framework of Governance for Information Technology. dFogIT is an IT governance framework that has also been implemented based on an ISO/IEC 38500 standard model extension (B. Gómez et al., 2017; Juiz, 2011). The framework is a layered model, as known as transformation layers, connected by interlayer connection instruments. The IT governance framework has four layers, the two central layers represent Management and Governance and are equivalent to the standard, and two others have been added: one above, Institutional Strategy, and another below, Operation. In fact, dFogIT enables smooth and gradual adoption, without major disruptions to the company's business culture, but solving communication problems and the common lack of IT governance maturity.

One of the aspects highlighted by both the ITG4U and dFogIT models is that IT governance is the responsibility of the board members and top executives of the organization. This is an important issue, stemming from the inclusion of IT governance within corporate governance, and which suggests that the management of an IT department or the simple provision of IT services in organizations is not being discussed here (Céspedes, 2010). Although JISC (2007b) was one of the first to implement an IT governance model for British universities, they started the project from middle management and failed to move from pilot projects (in their study) as they lacked the support from senior management. Because in studies by Weill and Ross (2004), (Van Grembergen and De Haes (2009), Nolan and McFarlan (2005), among others, they agree on the importance of gaining top management support, in the ITG4U and dFogIT frameworks the focus is top-down, rather than bottom-up (as it was in the British case). For this reason, the introduction system of these frameworks in Spain was first training senior managers (rector and vice rectors involved) in the importance and need of having a good IT governance system, so that the support was transmitted to the next layers and a culture of good governance and better fight against change resistance could be promoted. Furthermore, the fact that both frameworks are based on ISO/IEC 38500 shows that the standard is being used as a reference (A. Fernández et al., 2012).

The knowledge and experience obtained during this period through the pilot projects and the external experiences, were the precursor of joining forces to the design, development, and subsequent implementation of specific IT governance frameworks for universities and higher education institutions in developing countries.

### 5.1.2. The ITG4-U projects

The IT Governance for Universities (ITG4-U) project was aimed to gather a set of researchers from four European universities with a wide experience in developing and deploying IT governance activities, best practices, and framework models from three different countries (Spain, Germany, and Norway) to develop, adapt and test a new IT governance framework to be implemented in eight HEIs in developing countries. In previous and recent studies like, for instance Subsermsri et al. (2015), the three main obstacles to implementing IT governance in universities are: 1) lack of clear IT governance principles, 2) budget limitations and 3) lack of method for selecting the IT governance framework. Thus, this project aimed to tackle the three obstacles by providing a set of experts from HEIs with previous experience on the topic, to jointly develop the framework with the destination country consortium.

Expected results of these projects included: i) a better governance model for IT in developing countries' HEIs, ii) an overall modernization of the governance processes for HEIs, and iii) a contribution of the cooperation between Europe and each destination country.

Because projects were aimed at HEIs, the main target addressed was IT staff, managerial staff, and governance board at partners HEIs. To improve the IT governance in HEIs, all the direct stakeholders should know the existing standards, methods, techniques, and tools to implement IT governance frameworks. Another primary target were the professors on related issues (Information Systems, Enterprise Management, Business Administration, etc.) to launch a new discipline in their subjects for future training and research for master students and young researchers. A secondary target group / beneficiaries included industry stakeholders who are faced with the dilemma of

maximizing IT resources usage based on efficiency solutions, and increasing productivity based on IT governance best practices, thus organizations which lack research expertise that were based in partners' communities. Graduate students looking for expertise in a new area were also included. Therefore, specific objectives of the project were:

i. Perform specialized training modules for building IT governance models in developing countries universities. This training targeted three types of stakeholders of universities: professors, students, and administrators/managers. Of course, the main target was the intermediate management and board executives of universities, as well as functional IT departments that could take this opportunity to better align their IT strategies.
ii. Perform training to employers in IT sector, mainly mid-size, and large companies both public and private. IT governance has been shown as a facilitator to produce higher ROI of enterprises, coming from further development of IT assets. This training resulted in a greater connection between universities and the surrounding economic and social stakeholders. It also provided project sustainability, since once trainees (professors) of local universities were accredited, they may continue providing specific training to local businesses.
iii. Build IT governance frameworks, adaptable to each institution, for project participants. As a result of initial and advanced training in IT governance, developing countries HEIs, in collaboration with their European partners, had to be able to implement their own IT governance framework and their corresponding instruments.
iv. Build the skills and tools to ensure the sustainability of IT governance development beyond the project.
v. Set the value chain of IT in HEIs and its Key Performance Indicators (KPI). The achievement of this aim had to change how IT governance is discussed as well as the strategic focus of this asset and its importance for the HEI.

The innovation of the project was based on the implementation of an IT governance framework based on previous efforts, but also specifically designed for developing countries universities. Developing a specific framework for these universities was, itself, a pioneering task. This was a new development that also led way to the development of new research lines in the field among developing countries HEIs. An introduction of such framework was an innovation not only to the specific developing country but also to the entire region. For more information regarding the project, please access the following links:

- IT governance for Tunisian Universities (ITG4TU): https://itg4tu.uib.eu/
- IT governance for Albanian Universities (ITG4AU): https://itg4au.uib.eu/

### 5.1.3. Projects phases

To achieve the above-mentioned objectives, the projects were divided into three different phases during a three-year period and a parallel phase addressed to project dissemination, each one with the necessary activities for its completion (Figure 5.1):

A. The first phase consisted of imparting IT governance training to HEIs partners. Specifically, training was prepared for future trainers (mainly professors and lecturers), for IT managers and administrators, and for future researchers and professionals.

B. The second phase consisted of the definition of an IT governance framework for each HEI and its future implementation.

C. The third phase consisted of the previously planned IT governance framework deployment and monitoring its results.

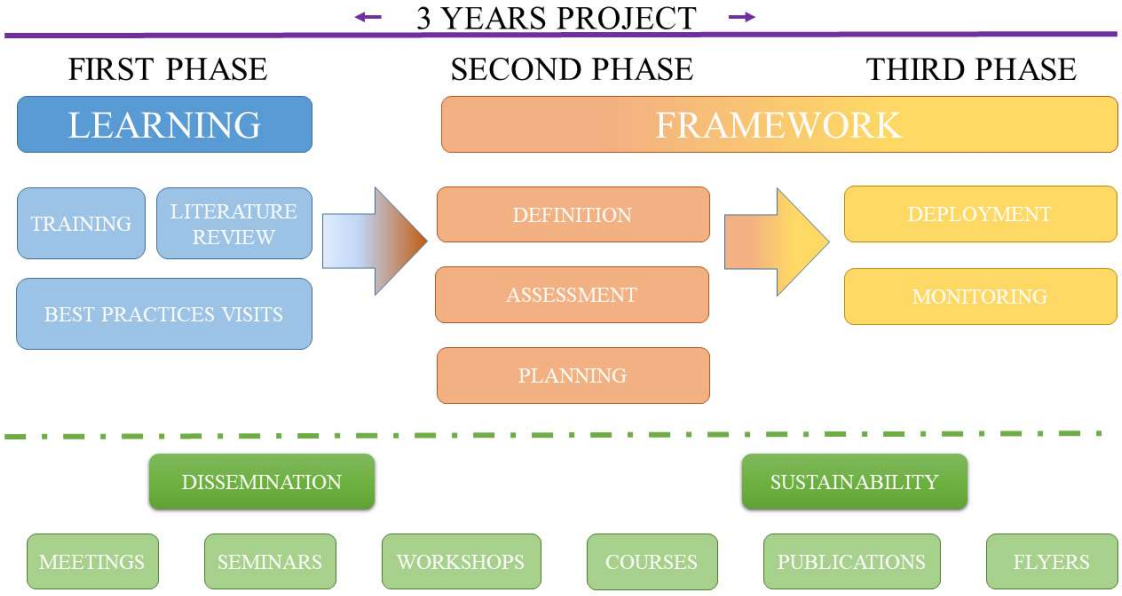


**Figure 5.1 – ITG4-U Projects' phases**

Finally, dissemination and sustainability of both, the project itself and IT governance concepts and the achievement of its results were grouped in a parallel phase, as it was not executed sequentially like the previous three. Thus, throughout the duration of the project and beyond it, some dissemination and sustainability activities were and are being performed to sustain the IT governance implementation in time.

## A. First phase – Learning about IT governance

*A.1 Definition and purpose*

Although IT governance is a subject already widely known by both researchers and practitioners, in the specific case of HEIs belonging to developing countries they were still not aware of these concepts. Thus, setting the knowledge about the elements of an IT governance system, determining its importance for universities, and presenting in detail the ISO/IEC 38500 standard, IT governance frameworks, models and tools were necessary. This phase was aimed to developing countries partners to:

OA1. Achieve competences and skills to play a leading role in the IT governance discipline and improve IT efficiency use in respect with strategy of their HEI and the communities that each one serves.

OA2. Set a minimum, common and special vocabulary, and jargon regarding IT governance concepts to facilitate and speed up the understanding between the HEIs under study and the EU experts in the execution of the following phases and actions.

OA3. Study about already implemented practices and solutions from the European experts inside the consortium.

OA4. Study about practices and solutions from other institutions outside the consortium of the project focusing on relevant adaptations.

OA5. Train future trainers and give them the tools to be able to implement IT governance courses in their study plans and spread the IT governance knowledge beyond the university, i.e., external collaborators, industry, and society.

OA6. Cultivate an interest in directing and controlling IT-related aspects in university managers.

The academic portfolio was focused to promote IT governance principles to all stakeholders and was designed to be reused in the future. In that sense, the objective of this phase was mainly to perform specialized training modules and activities for building IT governance models in developing countries universities. Thus, this phase addressed the following abovementioned project objectives:

i. Perform specialized training modules for building IT governance models in developing countries universities.
ii. Perform training to employers in IT sector, mainly mid-size, and large companies both public and private.

*A.2 Actions and activities design*

Therefore, we designed three main activities applying to this phase: 1) several training sessions were held for both academics and administrative staff from the partners universities; 2) partners researchers involved in the project conducted a literature review to know what other practices and frameworks were being used and implemented in universities in other countries; 3) several visits to European universities were scheduled to show the best practices about IT governance already in use.

***Training.*** European partners performed two on-site trainings to set competences and skills to play a leading role in the IT governance discipline and IT assets. Both trainings were aimed to promote an efficient use of IT regarding the strategy of each HEI. In addition to explaining the basic concepts of IT governance and the differentiation between IT governance and IT management, it served to share terms, aspects, and, above all, the need any organization has for good IT governance whose business core processes depend on IT (B. Gómez et al., 2018). Additionally, the academic resources may be used to train future business leaders and postgraduate students in the role of governing IT assets. Thus, this activity addressed the objectives OA1, OA2, OA5, and OA6.

The first training, named *Initial Training Researchers*, were conducted by representatives of European universities to set a minimum level of competency among researchers. This training has also been an initial contact with IT governance procedures in developing countries universities. The objective of this training was to perform specialized modules for building IT governance models in partners' universities. The training was composed by several initial modules and sessions, i.e., systematic, and strategic thinking, and competences – knowledge, skills, and attitudes – required to meet challenges in governance of IT assets and efficiency issues related to the particularities of each partner HEI. The core of the sessions was the main aspects of IT Governance, i.e. structures, standards, business strategy, value of IT, and the presentation of two IT governance frameworks as case studies: dFogIT (B. Gómez et al., 2017; Juiz, 2011) and ITG4U (A. Fernández & Llorens, 2009). Furthermore, the last session deepened in the alignment of IT with business strategy aspect, highlighting the CIO role, and the importance of achieving this alignment regarding the added value of IT.

The second training, named *Initial Training Managers*, were performed to set a minimum level of competency among managers in HEIs at partner countries. This has

been also useful to set an initial state level of IT governance procedures in each university. The objective of the second training was to perform training to employers in IT sector, mainly mid-size, and large companies both public and private. The primary target in this training were the intermediate management and board executives of universities, as well as functional IT departments that can give their support to the project better aligning their IT strategies. Similar to the previous one, representatives of European universities have conducted this course. After a summary of the main aspects of IT governance, the course was divided in several working sessions with a brief explanation but mainly consisted of IT governance workshops where attendees had to work first individually, second in groups formed by each partner university and finally with the whole group of participants. The trainers explained their own experience in implementing an IT governance framework in several Spanish universities. They depicted the processes done to apply IT governance best practices based on the six principles referred in the ISO/IEC 38500 standard. Thus, they showed the results of that implementation and then worked in a similar way with the attendees exploring each principle in each working session, so they can achieve the same or better results.

***Literature review.*** Once reached this point, they were able to consider that IT is a strategic tool for universities and that IT governance in HEIs is critical due to the strategic aspect of IT (Bianchi & Sousa, 2016). As the main objective of IT governance is to align business strategy with IT strategy (Henderson & Venkatraman, 1993; Weill & Ross, 2004), it is important that IT governance includes strategies, policies, responsibilities, structures and processes for using IT within a HEI. Searching the literature to identify best practices in this domain and thus implementing a more efficient IT governance system for their HEIs was important. Thus, they performed a study and overview of the state of the art about IT governance in HEIs outside the consortium of the project. Many situations, experiences, and resolutions from different places like their situation were studied and they could verify that they could adapt a framework to their specific needs. Thus, developing countries HEIs partners were able to build their own framework adapted to their specific situation. This activity addressed the objectives OA1, and OA4.

***Best practices visits.*** After the trainings and in parallel with the literature review, developing countries partners visited the European universities to learn about best practices implemented there. They were able to select and decide about various aspects already implemented that can be imitated by their institution. Furthermore, they identified some other aspects difficult to replicate due to regulations issues and behavioral situations in their countries. Thus, this activity addressed the objectives OA1, OA2, OA3, and OA6.

As a summary, Table 5.1 indicates the project's objectives addressed by phase A, the sub-objectives belonging to this phase, the planned activities addressing the sub-objectives, the expected outcomes and the defined KPIs by actions.

**Table 5.1 – Phase A objectives, actions, and KPIs**

| **Phase: A** | **Addressed project objectives: i, ii** | | |
|---|---|---|---|
| Definition of phase A objectives | Actions | Outcomes | KPIs |
| OA1. Achieve competences and skills.<br>OA2. Set a minimum and common language regarding IT governance concepts. | 1) Training OA1, OA2, OA5, OA6 | Training sessions and materials. | Profile of attendees to training sessions.<br>*Researchers* from areas of computer science mainly<br>*Managers* from the institution hierarchy |

| | | | |
|---|---|---|---|
| OA3. Study about practices from EU institutions.<br>OA4. Study about practices outside consortium.<br>OA5. Train future trainers spread the IT governance knowledge beyond the HEI.<br>OA6. Cultivate an interest in ITG among managers. | 2) SLR<br>OA1, OA4 | Research output. | Publishable research output: i.e., literature review, mapping review, or alike to be published in a journal or conference. |
| | 3) Research visits<br>OA1, OA2, OA3, OA6 | Report on experiences in visits. | Profile of attendees to the visits, preferable managers.<br>List of lessons learnt by the attendees, including aspects to imitate and aspects difficult to replicate. |

## B. Second phase – Determining and improving the situation

*B.1 Definition and purpose*

The second phase of the project consisted of the development and validation of a specific IT governance framework for each developing country university. After both trainings, partners and involved stakeholders were able to use specific common language related to IT governance. Although most of the workload performed in this phase fell on the developing countries partners, the role of the European experts was crucial. We established a cyclical communication process whereby partners developed their IT governance framework with the supervision and support of the European partners. Through this synergy, we established several milestones for reviewing results delivered by partners who had worked with material and guides previously provided by the European experts (see Figures 5.3 to 5.7 which detail this synergy and the Figure A.1 in Annex A for the whole process). This phase was aimed to:

OB1. Detect learning capacity, change will, and motivation among partners.
OB2. Engage board directors in the whole IT governance implementation process.
OB3. Determine their current situation or state by consensus.
OB4. Be able to self-assess and motivate themselves to enhance their IT governance state.
OB5. Select improvement actions based on their assessment results and needs.
OB6. Design of an IT governance implementation plan adaptable to each participant institution in the project.

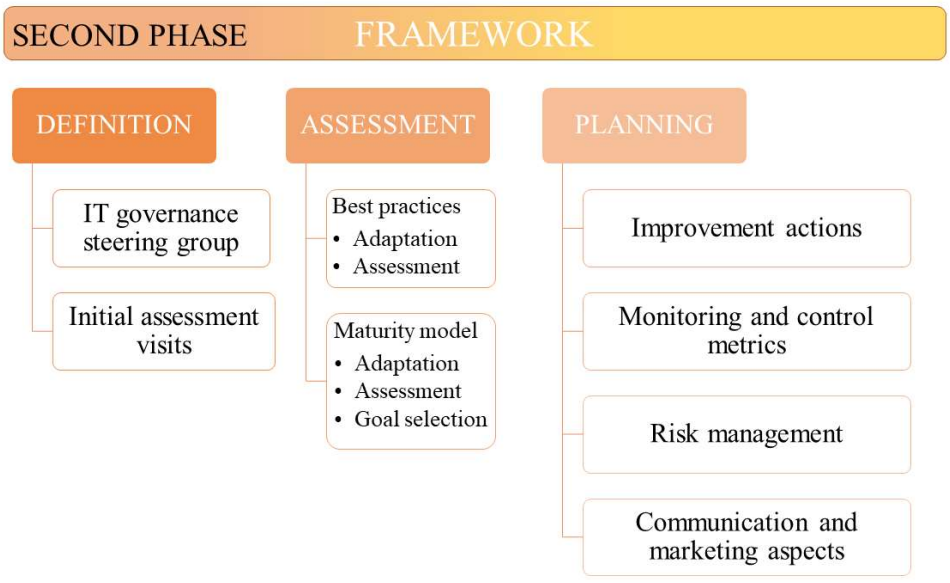


**Figure 5.2 – ITG4-U Projects' second phase detail**

The major milestone in this phase was for each institution to build its own IT governance framework using the competences and skills previously learnt. For this reason, we defined several instruments and tools needed to achieve these objectives, i.e., visits, interviews, meetings, workshops, and a document exchange and review system. Furthermore, we defined measurable indicators to monitor the progress of this phase, i.e., people involved in the project, managerial and IT staff integration indicators, overall positive feedback from internal users, among others. Thus, this phase considered the abovementioned project objectives to ensure the sustainability of the project:

iii. Build university governance frameworks, adaptable to each institution.
iv. Build the skills and tools to ensure the sustainability of IT governance implementation beyond.

*B.2 Actions and activities design*

To advance towards this second phase, European partners performed *Initial assessment visits*, which helped to know the current situation of each developing country partner. Based on the results of this assessment, they were able to create, with the European partners' support and guide, their own IT governance framework adapted to their characteristics, needs and situation. Afterward, the European partners validated the new framework so that it was in line with the best practices already taught in the training, and the plan to deploy it was acceptable in terms of the project.

The IT governance framework definition activity initiated the development of instruments and tools necessary to govern the IT assets in HEIs, using the competences and skills learnt in the previous courses. These outcomes covered both staff development and manager leadership in the IT governance framework construction. The following incremental evolution methodology were performed to implement an IT governance framework. The consortium of the project defined a set of steps to develop the IT governance framework tailored to the specific needs of the universities:

1. IT governance enabling environment: definition of the IT governance steering group and initial assessment visit.
2. IT governance best practices: adaptations of the IT governance framework best practices, a self-assessment of the organizational IT governance maturity level in best practices and the review of their organizational IT governance maturity level in best practices.
3. IT governance maturity model: adaptations on IT governance framework maturity model, the review of the adaptation of the maturity model to their organization, the maturity level current situation and the maturity goal selection.
4. IT governance improvement plan: design and assessment of a plan and the viability of the activities, considering the resources, involved people and calendar.

***IT governance environment definition.*** To advance to this second phase, European partners performed *Initial assessment visits* to developing countries HEIs to set an initial state of IT governance in these universities and thus better understand their needs. A total of eight assessment visits took place in each university belonging to both projects. The objectives of this initial assessment were to set the achievement of the knowledge gained in the two initial trainings through several surveys designed by European partners, to achieve an initial level of IT governance in the partner universities, and to establish a group of people, that truly believe and support the IT governance concepts, who lead the

IT governance framework design and monitoring. Thus, this activity addressed the objectives OB1, OB2, and OB3.

For these purposes, this activity was previously prepared in advance before the visits took place. Developing partners universities were asked to establish an *IT governance steering group* that was constant throughout the implementation of the IT governance framework. This was particularly important because the sustainability of the project as well as the IT governance implementation once the project was finalized depended on it. For this reason, it was necessary to involve staff in charge of IT in the organization such as the IT director or the CIO, but also someone belonging to the executive board of the organization. As mentioned by Toomey (2009), the responsibility of IT in an organization in terms of investments and risks should not fall solely on the CIO but should be a joint responsibility with the board. Thus, those who hold positions in business management/administration participated in this initial assessment showing their involvement in the project, a very important action for achieving its goals.

Once partners had established their IT governance steering group, they were requested to submit a survey running the following procedure:

a) They were provided with a document containing an ordered and classified set of best practices (see next section for more detail). They had to meet with their *IT governance steering group* and select yes (Y) or no (N) to each best practice whether they have them implemented already in their institutions. They had to do it individually and gather all the answer together.
b) Once all answered, they had to organize a consensus meeting to discuss the best practices with no answer or with no consensus and decide all together with a consensus for each best practice.
c) The project leader in each developing country institution had to take notes of the problems faced by members of the group about how to answer the questions and furthermore, doubts about the meaning of any best practices not really understood.

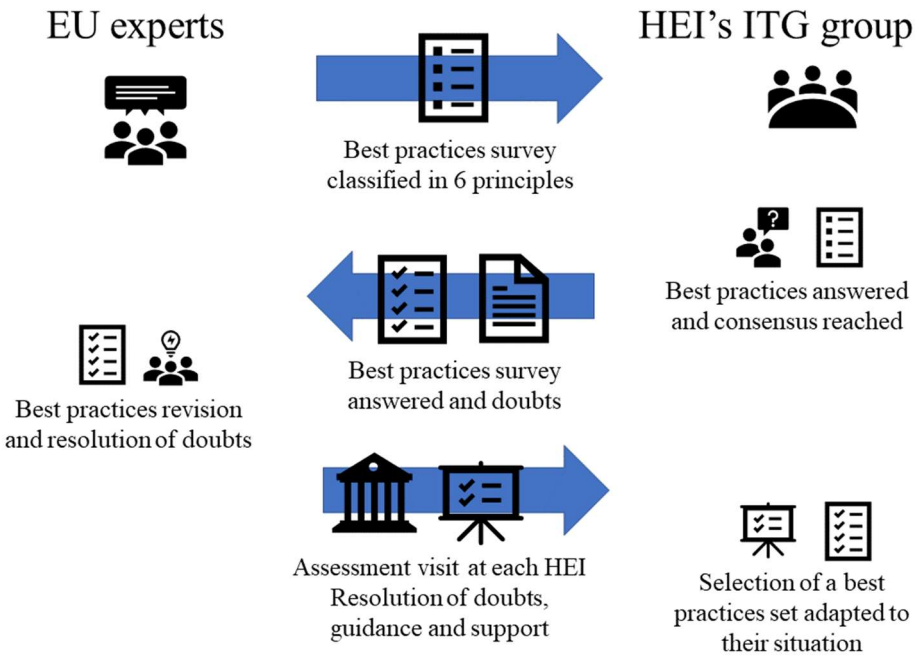


**Figure 5.3 – IT governance environment definition and assessment**

All this procedure was very important for the project as it was the first step in creating their IT governance framework. European representatives reviewed all the documents before their on-site visits in each country. Once at each assessment visit, they worked hand in hand with each *IT governance steering group*, reviewing the survey, explaining the results, and stopping in those that had not reached a consensus. The notes taken in the third step regarding problems and doubts were revised during each visit, resulting very useful to guide them clearing all the doubts that had aroused. These visits were organized in each partner institution during a whole week period. In the end, each *IT governance steering group* had to report consensus values for all the best practices.

***IT governance best practices adaptation***. The ITG4-U framework is based on the ISO/IEC 38500 standard and therefore their best practices are classified by its six principles namely *Responsibility*, *Strategy*, *Acquisition*, *Performance*, *Conformance*, and *Human Behavior*. According to Fernández & Llorens (2009), the first component in the ITG4-U framework itself is the study of best practices included in the framework. This includes three main steps. The first is the set of adaptations that must be made to this global framework before adopting it in each institution. Second, it is aimed to conduct a self-assessment of the current organizational level regarding the adapted best practices. Finally, and as a step to be taken by developing countries HEIs, it is aimed to assess both the adaptations and the self-assessment. Thus, this activity addressed the objectives OB3, and OB4.

In both projects we used a set of best practices extracted from the one described in the previous Section 4.2. Furthermore, we classified each practice by one principle solely. This decision had two reasons: for the sake of simplicity and so that the participants became familiar with the terms and the working methodology. This helped the participants to better understand the ISO/IEC 38500 standard, not get confused with the new concepts, implement their framework in the short time the project lasted, and be compared with the Spanish universities as a benchmark (Hontoria, 2014). In addition, participants could assess whether the early-stage framework was suited to the special structural characteristics of their own institutions.

This set of best practices was the one used as surveys in the *Initial assessment visit* activity. After the visit, once all the problems and doubts were cleared, participants had to select, and adapt the set of best practices to their specific situation and needs. They could add, delete, or modify each best practice whether needed to better fit their institution's features, thus proposing its own version. As an output, they were requested to provide its own best practices catalog and to use it for self-assessment. The self-assessment helped them see which principles were covered, at their discretion, and which ones required attention. This marked them a starting point that was later used in the elaboration of the plan. Finally, with the results of their self-assessment, we knew their current situation and we were able to compare it with that obtained by Spanish universities.

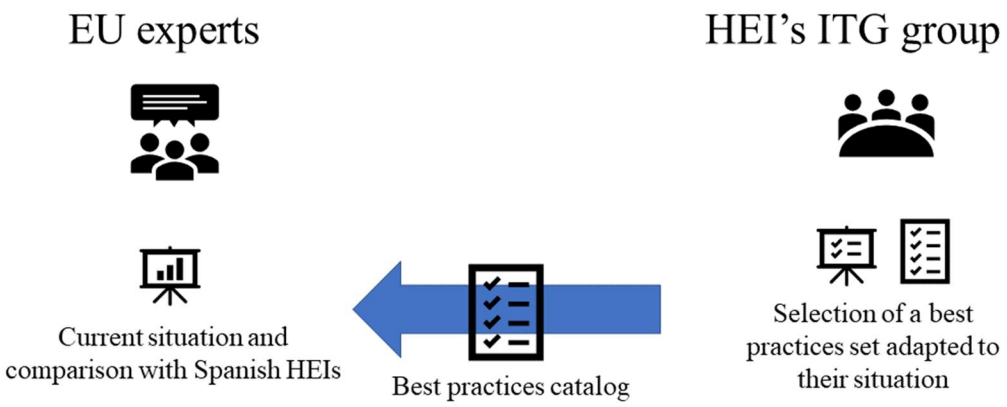


**Figure 5.4 – IT governance best practices adaptation and building set**

***IT governance maturity model adaptation***. In the previous step, it was defined the set of best practices aimed to be covered by the final framework, reaching, because of that coverage, a certain maturity level regarding best practices achievement. In this step, the second big aspect of the framework was analyzed: their IT governance maturity level.

As best practices were classified under the six ISO/IEC 38500 standard's principles and the ISO/IEC 38503 standard was still under development, the selected maturity model established a level between 1 and 5 in each principle based on the governance activities: direct, evaluate and monitor (A. Fernández et al., 2011). In order to measure the maturity level, the indicators were classified into three categories: i) maturity indicators, to set each institution's current maturity level; ii) qualitative evidence indicators, to clarify whether the institution had already implemented the best practice in question; iii) and quantitative evidence indicators, related to qualitative indicators and specifying how often, how many times, etc. (A. Fernández & Llorens, 2009). Thus, this activity addressed the objective OB4.

Based on this maturity model provided by the European partners, the developing countries partners were asked to adapt it so that they could adopt it in their institutions. Thus, working similarly to the previous step, participants reviewed the maturity model and proposed changes regarding their specific situation. After that, all the proposals were discussed and like before, a common final version of the model was created.

As in the previous step, they were asked to self-assess with the maturity model they had just designed. Thus, each institution presented their current IT governance maturity level. Furthermore, they selected the goal maturity level that each university wished to be achieved. This was another output needed to develop their IT governance improvement plan.

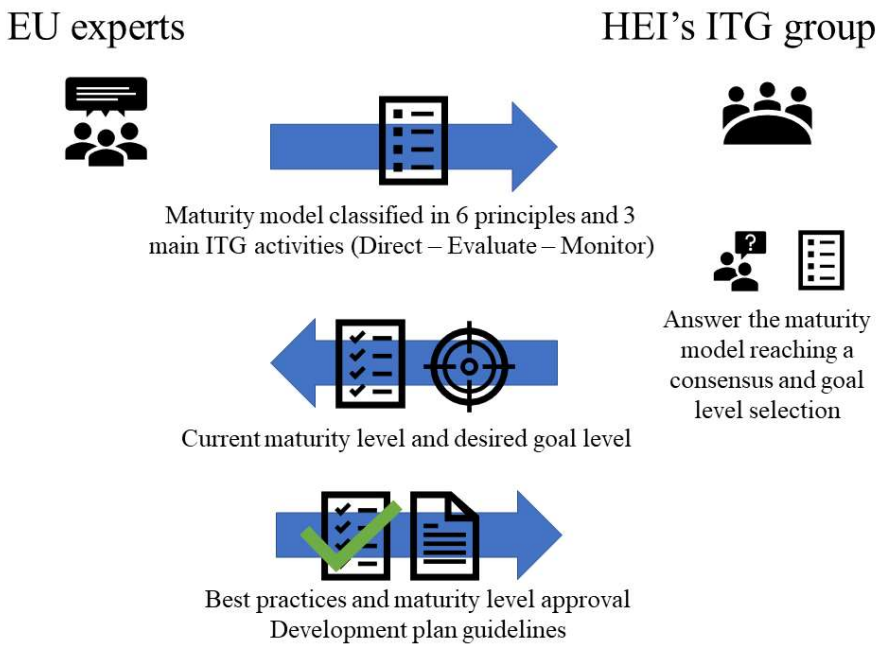


**Figure 5.5 – IT governance maturity model determination**

***IT governance improvement plan design and assessment***. Once the initial situation was known and the state to be achieved was established, it was possible to design an IT governance plan to improve the current situation. In the fourth step, developing countries partners designed an *IT governance improvement plan*. The plan included all the necessary best practices each institution had to implement to achieve the IT governance maturity level proposed previously. Each university selected areas to improve based on their own available resources and made a realistic *IT governance improvement plan* considering people, resources, and time. To select these areas, based on the previous review, each partner institution had to assure they have structures, alignment and communication tools following the recommendations learnt in the trainings.

The IT governance plan was structured in six sections. *Initiating* was the first section to involve the organization's leaders in their IT governance framework development and deployment. The second section provided a plan with the specification of purposes, goals and outcomes, deliverables, stakeholders, risks, and team. Furthermore, a Gantt diagram was provided, indicating who was responsible of which tasks, and its outcomes ordered in a chronogram. In the third section, *Execution*, several actions classified by each principle were described indicating their starting and ending date, and their state. The fourth section explained the *Monitoring and Controlling* phase, specifying a list of evidence and its KPIs by each action in each principle. All the fifth section was devoted to *Risk Management* providing the identification of risks, their impact, probability, prioritization, monitoring and control actions. Finally, as a sixth section, a *Communication and marketing plan* was provided identifying several targeted stakeholders and deliverables. Thus, this activity addressed the objectives OB5, and OB6.

It is worth noting that at the time of drawing up the plan, the remaining time of the project was considered to develop realistic activities on time and aligned with the needs and selected goals by each institution. It was very important the active involvement and participation of the European partners along the project. Neither should the recommendations, suggestions, and constant support of the four European universities

throughout the development of the framework be forgotten. After each stage, there was an evaluation phase regarding the current situation, the selected best practices, the level of maturity and the chosen goals. There was also a monitoring phase once the plan was established following the indicated guidelines to ensure that the activities were in fact carried out.

Although the previous steps were performed mainly by the developing countries partners, they were guided during each activity by the European partners. In fact, at the end of this step, European partners assessed the proposed *IT governance improvement plan* and studied the viability in each specific situation. As indicated above, the action plan for the implementation of an IT governance framework in developing countries HEIs followed the methodology of incremental evolution, i.e., continuous improvements were made to each of the elements until it was reached the optimal level according to the characteristics and needs of the entity and midterm goals established previously. Thus, it was necessary to follow the evolution of each one so that through the information obtained, it was possible to take the most successful actions to the level reached. For this reason, each step was leaded and assessed by the European partners.

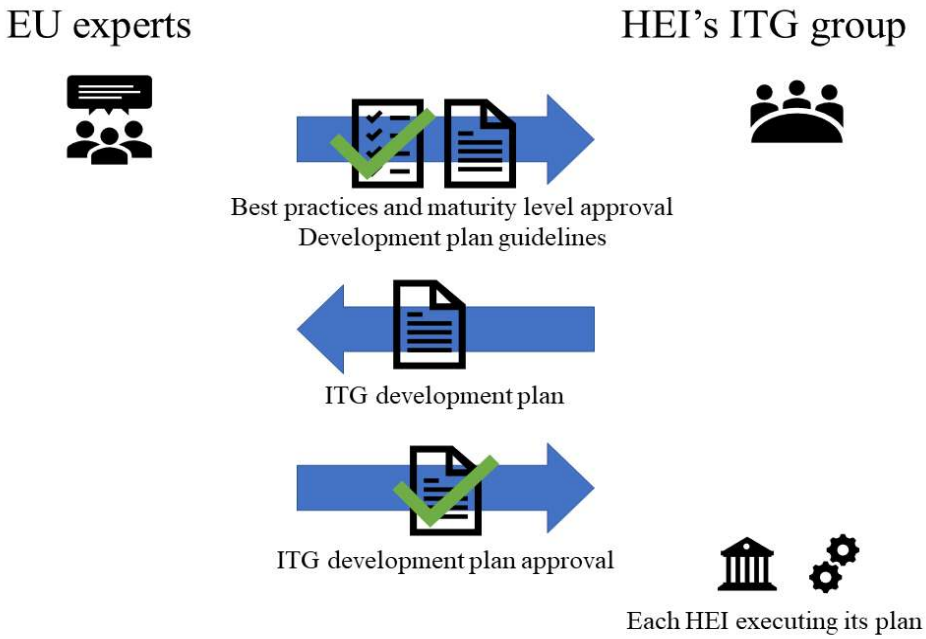


**Figure 5.6 – IT governance improvement plan design and assessment**

As a summary, Table 5.2 indicates the project's objectives addressed by phase B, the sub-objectives belonging to this phase, the planned activities addressing the sub-objectives, the expected outcomes and the defined KPIs by actions.

**Table 5.2 – Phase B objectives, actions, and KPIs**

| **Phase: B** | **Addressed project objectives: iii, iv** | | |
|---|---|---|---|
| Definition of phase B objectives | Actions | Outcomes | KPIs |
| OB1. Detect learning capacity, change will, and motivation among partners. | 1) ITG definition. OB1, OB2, OB3 | Framework definition. Board engagement. | ITG group formation. Presence of authorities, CIO.<br>Initial assessment visit attendees.<br>The ITG group mainly. |

| | | | |
|---|---|---|---|
| OB2. Engage board directors in the whole IT governance implementation process.<br>OB3. Determine their current situation or state by consensus.<br>OB4. Be able to self-assess and motivate themselves to enhance their IT governance state.<br>OB5. Select improvement actions based on their assessment results and needs.<br>OB6. Design of an IT governance implementation plan adaptable to each participant institution. | 2) Best practices.<br>OB3, OB4 | Adaptation.<br>Self-assessment. | Best practices adapted to their situation.<br>BP included/excluded.<br>BP deviations. |
| | 3) Maturity model.<br>OB4 | Adaptation.<br>Self-assessment.<br>Goal selection. | Adapted Maturity model.<br>MM deviations.<br>MM achieved vs MM goals.<br>Distance.<br>Selected actions regarding the goal. |
| | 4) Planning.<br>OB5, OB6 | List of actions.<br>Plan. | Schedule of actions considering remaining resources.<br>Risk management included in the plan.<br>Dissemination purposes included in plan. |

## C. Third phase – Deploying and monitoring its results

*C.1 Definition and purpose*

In the last phase of the project the above-mentioned IT governance framework is deployed in each developing country university following their plan. This phase was performed recursively, following the quality assurance procedure by the improvement cycle (Deming's cycle, 1989). The participation of both the HEIs partners, concretely their *IT governance steering group*, and the European experts was crucial. By this phase, we aimed to achieve the following objectives:

OC1. The selected actions included in the *IT governance improvement plan* are executed on time.

OC2. Results from actions are as expected by the plan.

OC3. KPIs are defined to stress the value obtained by IT and show its strategic focus aligned with the HEI's strategy.

OC4. Perform monitoring actions in which partners and experts maintain an improvement cycle until the outcomes are as desired.

OC5. Achieve competences regarding the design and monitor of key performance indicators (KPIs) to be able to self-monitor in the future and thus assure sustainability of the IT governance framework.

Regarding the overall project, this phase addressed the following abovementioned project objectives:

v. Set the value chain of IT in each HEI and their Key Performance Indicators.

*C.2 Actions and activities design*

The execution of the *IT governance improvement plan* previously established strongly depended on the involvement of top management and the board in developing countries HEIs. Although several seminars and workshops were performed to explain the aims of the project, the benefits, and the future positive impact of IT governance on the

organization, the project was also designed for the identification of possible risks, including the absence of top management commitment. Thus, we defined the following actions to achieve the objectives of this phase:

1. Preparation and provision of evidence documentation by each action. Developing countries partners had to select the adequate documentation that evidence the accomplished action. For those accomplished actions, they had to provide with the promised documents. For those unfinished/delayed/rescheduled actions, they had to indicate which evidence documentation will provide once the activity is accomplished. Thus, this activity addressed the objectives OC1, and OC2.
2. Define KPIs for each action setting its value. Developing countries partners had to define monitoring and control indicators for each action to be able to assess the quality of each accomplished action in the future. Each KPI should be defined according to the maturity goal they selected to achieve considering their attitude towards IT governance, their willingness of change and their remaining resources. Thus, this activity addressed the objective OC3.
3. Check evidence, adaptability, appropriateness, quality, and formality. European experts had to monitor not only the correct completion of actions, but also the appropriateness of each evidence, and the formality of the new processes adopted by each institution. Furthermore, they had to inquiry the reasons for the delay of actions, assess the new selected dates, and give advice to better readjust deadlines in the future. Thus, this activity addressed the objective OC4.
4. Review selection of KPIs, give suggestions, and recommendations. European experts had to assess the adequacy and quality of the selected KPIs regarding each action. Furthermore, they suggested and recommended new KPIs, indicating how to assign its expected value, so that partners can measure themselves more accurately in the future. Thus, this activity addressed the objectives OC4, and OC5.

Once the IT governance improvement plan was developed and reviewed it was time to deploy it. There was some readjustment depending on resources, committees, and deadlines in the plan to be performed in each institution. It is important to point out that the available time for the full project was three years, which implies that the second and third phase, including all steps, were lasting one year and half approximately. Thus, in these final phases, some structures were set, some activities were initiated and documentation of all of them was properly recorded.

Again, following the methodology of incremental evolution, European and developing countries partners, all together, were monitoring the executed plan after these steps were performed. For this reason, having documented properly all the steps done was very important, not only in terms of transparency and IT governance best practices, but also was of significant help for the continuous improvement of the framework and the sustainability of the project. The correct assignment of evidence and KPIs for each action provided the HEIs partners with tools to continue with the improvement drive. In this way, they will be able to determine their own formal processes, evidence documents and KPIs adjusted to their own needs and characteristics.

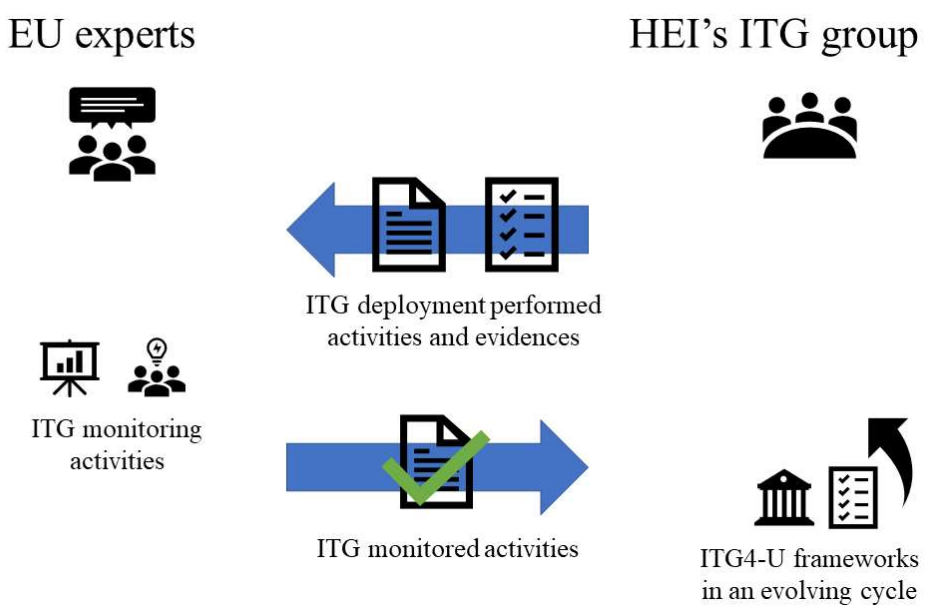


**Figure 5.7 – IT governance deployed activities monitoring**

As a summary, Table 5.3 indicates the project's objectives addressed by phase C, the objectives belonging to this phase, the planned activities addressing such objectives, the expected outcomes and the defined KPIs by actions.

**Table 5.3 – Phase C objectives, actions, and KPIs**

| **Phase: C** | **Addressed project objectives: v** | | |
|---|---|---|---|
| Definition of phase C objectives | Actions | Outcomes | KPIs |
| OC1. Selected actions are executed on time.<br>OC2. Results from actions are as expected by the plan.<br>OC3. KPIs are defined to give value to IT.<br>OC4. Cyclical monitoring.<br>OC5. Learn how to self-monitor. | 1) Provide evidence by each action.<br>OC1, OC2 | List of evidence documentation (formal documents). | State of each action.<br>Start and end dates inside the period of the project.<br>Number of states: ideal just one, accomplished (ongoing, rescheduled, not started, delayed…).<br>List of evidence documentation coherent with the action. |
| | 2) Define KPIs by each action to self-asses in the future<br>OC3 | KPIs defined by each action. | Suitableness of selected KPIs to each action. |
| | 3) Check evidence, adaptability, appropriateness, quality, formality.<br>OC4 | Monitoring report. | Number of monitoring sessions.<br>Amendments on the reports |
| | 4) Review selection of KPIs, give advice, suggestions, and recommendations<br>OC4, OC5 | Monitoring report. | Number of monitoring sessions.<br>Amendments on the reports. |

**P. Dissemination, exploitation, and sustainability activities**

*P.1 Definition and purpose*

Dahlberg & Kivijärvi (2006) proposed an IT governance framework containing four phases: planning, operating, evaluation and feedback. The fourth phase is especially important as they assessed the IT governance perceived state. Similarly, because the implementation of an IT governance framework affects all stakeholders, regardless of the organizational layer to which they belong, we included in both projects several dissemination and sustainability activities.

This phase, unlike the previous ones, was not executed sequentially after the third phase, but was executed in parallel while the other phases were underway. The reason for this was to obtain both plans as soon as possible and to be able to execute them during the duration of the project, with the European partners' support, supervision, and consultancy. Thus, by this phase we aimed to cover the following objectives:

OP1. Disseminate the concepts of IT governance among the internal stakeholders of the institution. In this way, we wanted to involve all those affected in the changes caused by actions on IT governance.

OP2. Disseminate IT governance concepts to external stakeholders, collaborating with both government entities and the private sector.

OP3. Establish mechanisms for the sustainability of the results of the IT governance plan deployment, beyond the project.

One of the objectives of the project was to spread the IT governance knowledge and aspects, not only at the university scope but also in the region and community to which they belong. Thus, this phased considered the abovementioned project objectives:

ii. Perform training to employers in IT sector, mainly mid-size, and large companies both public and private.

iv. Build the skills and tools to ensure the sustainability of IT governance implementation beyond.

*P.2 Actions and activities design*

We then defined several actions to give continuity to the results of the project, as well as to spread the philosophy of IT governance in environments outside the universities. For that purpose, partners were requested to develop and exploit a *Dissemination plan* and a *Sustainability plan*. European partners define and design both templates guiding partner institutions in which aspects, actions and activities should contain

Regarding the *Dissemination plan*, first participants had to identify the stakeholders they wanted to reach and which kind of message they wanted to send them. Because IT governance does not only affect the university environment, but it was also intended to spread its best practices in all sectors through the university. Afterward, they had to select several actions to reach the identified stakeholders. Subsequently, they had to classify activities including its resources and dates by each action. The plan also included monitoring and evaluation sections as mechanisms of control. Thus, this activity addressed the objectives OP1, and OP2.

Regarding the *Sustainability plan*, first participants had to identify the sustainability objectives for their specific institution and situation, focusing on maximizing the impact of the project results over time optimizing their value. Afterward, they had to identify the

stakeholders who should be involved in the plan. Finally, they had to classify several actions belonging to each objective and how the identified stakeholders should be affected. Thus, this activity addressed the objective OP3.

Among the activities the participants had selected, seminars and pilot courses were highlighted. To conduct these activities, partners developed training materials e.g., documents, flyers, presentations and pamphlets with the support and guidance of European institutions. Pilot courses were mainly addressed to master and PhD students, while seminars were addressed to employers in the IT sector.

As a summary, Table 5.4 indicates the project's objectives addressed by phase P, the objectives belonging to this phase, the planned activities addressing such objectives, the expected outcomes and the defined KPIs by actions.

**Table 5.4 – Phase P objectives, actions, and KPIs**

| **Phase: P** | **Addressed project objectives: ii, iv** | | |
|---|---|---|---|
| Definition of phase P objectives | Actions | Outcomes | KPIs |
| OP1. Disseminate the concepts of IT governance among the internal stakeholders of the institution.<br>OP2. Disseminate IT governance concepts to external stakeholders.<br>OP3. Establish mechanisms for the sustainability of the results of the IT governance plan deployment, beyond the project. | 1) Define, develop, and execute a Dissemination Plan.<br>OP1, OP2 | Dissemination Plan.<br>Pilot courses.<br>Training materials.<br>Seminars and Workshops. | List of stakeholders addressed.<br>List of actions by stakeholders.<br>Prioritization of the actions.<br>Resources assigned to each action. |
| | 2) Define, develop, and execute a Sustainability Plan.<br>OP3. | Sustainability Plan.<br>Seminars and workshops. | Identified stakeholders affected by the plan.<br>List of actions by stakeholder. |

## 5.2. Practitioners

### 5.2.1. Study subjects

We selected Tunisia and Albania as developing countries to apply the IT governance framework for two reasons. First, because there is hardly any literature on this subject applied to these two regions. We searched IT governance and Tunisia on the Web of Sciences and we did not find any article addressing the design or implementation of IT governance in universities in this region. We did the same search but in the Albania region and obtained just one result, an article about IT governance in the Albanian public sector, but not in universities (Kurti et al., 2014). Second, because applying IT governance in the universities was a priority topic in both regions as well as in the Erasmus + KA2 program, in their respective years of application. This gave us the opportunity to design both projects to develop IT governance frameworks adapted to the specifications of each university in both regions.

As indicated in the next sections, the first phase of the project was common to all the organizations in both projects; thus, the results are quite similar. From second phase onwards, each university has its own particularities, objectives, strategy, resources,

willingness, and interests which influenced the selected goals, how ambitious was their plans and, subsequently, the obtained results.

### 5.2.2. Tunisian Universities and HEIs

Four Tunisian universities participated in the project: Université de Gabès, Université de la Manouba, Université de Tunis El Manar and Université de Sfax. Two of them are in Tunis, the capital of Tunisia, being Université de Tunis El Manar the biggest public university and Université de la Manouba a private institution. The universities of Sfax and Gabès are public institutions, belonging to the east and southeast districts of Tunisia, respectively. These aspects played an important role in the IT governance frameworks implementation, influencing the attitude of the universities towards the adoption of best practices, the available resources, and the support obtained by the different stakeholders.

**Université de Gabès**

The Université de Gabès (UGB) was founded on 2003 in the southeastern District of Tunisia, accounting 15 higher education institutions, i.e., one faculty, one School of Engineering, and 13 colleges. The courses offered are included in the LMD (French acronym for Bachelor, Master, and Doctorate) regime since 2006. At the beginning of the project, the number of students at the Université de Gabès reached 21,000, and the number of lecturers and researchers amounted 1,620. The university offered 36 applied bachelors and 26 fundamental bachelors regarding science and engineering science, computer science, economics, law and management, humanities, and social sciences. It also offered 16 masters, 25 professional engineering masters with four specialties, and 6 doctorate programs. The territory's economy is diversified among varied agriculture (oasis, irrigation, fishing, etc.), industries (chemical, manufacturing, useful materials, food production, etc.), highly developed tourism (Djerba – Zarzis in the coastal area, and incursions into the Sahara Desert in the rest of the region) and services sector increasingly developing. The main strategic objectives of the Université de Gabès were to develop the spirit of entrepreneurship, to enhance the employability of graduates and to facilitate their integration, strengthening the interface university – business sector.

#### A. First phase – Learning about IT governance

*Training*. As mentioned above, we performed two different training sessions addressed at two different targets: researchers and managers. Researchers from the Institut Supérieur d'Informatique et de Multimédia de Gabès (ISIMG), including its Director, attended the first *Initial training Researchers*, held at the Universitat de les Illes Balears (Spain). The profile of the participants was related to computer science, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects and train future young researchers was fulfilled. In addition, the participation of the Director of the Institute in the training sessions was crucial to obtain the engagement of this university in the project.

The second training, *Initial training Managers*, was meant to be held in Tunisia, because it was addressed to intermediate managers and board executives of the university. However, due to security issues in Tunisia, European partners were demanded not to travel to Tunisia, following recommendations from their respective ministries. For this reason, the training was held at the Universidad de Almería (Spain), thus the expected number of attendees decreased. As a result, researchers

from the ISIMG, including its Director, General Secretary and Chief of Administration, attended this second training, which is far from the expected profile.

*Literature review*. Researchers from the four Tunisian universities participating in the project performed this activity jointly. They conducted a literature review to learn different lessons from several case studies that were found. As a result, they obtained an extensive list of places, from Australia, Brazil, Portugal, Poland, UK, US, and Canada as well as Bangladesh, Egypt, Indonesia, South Africa, and Thailand, among others. In this way, they realized that IT governance is widespread not only in developed countries but also in developing countries, and furthermore, not only in private or public organizations but also in the specific case of universities. In fact, this study was formatted as a paper and published in the International Journal of Human Capital and Information Technology Professionals (Khouja et al., 2018).

*Best practices visits*. The visits were organized throughout the project, rather than at the beginning, due to security and financial issues. The visits were held at the Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), Høgskolen I Østfold (Norway), and Universitat de les Illes Balears (Spain) in this order. Hosts presented their activities and practices; thus, attendees could take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

The lessons learnt by the Université de Gabès attendees were:

- Top management commitment to IT governance is needed. Rector, directors, and deans must be aware of the importance of IT governance in the university.
- IT must be governed like other resources in the university such as financial and human resources.
- Responsibility should be assigned to the right person, and a communication protocol must be stablished among all the stakeholders in the university, i.e., the Governance Team, the Strategy and Steering Committee, and management and operational staff.
- The CIO is a key person in the IT governance implementation and implantation.

Among the aspects the Université de Gabès wanted to imitate were included:

- Identify roles and responsibilities related to IT governance by establishing the Strategy Committee and the Steering Committee.
- Select a CIO that must belong to both committees and the Governance Team.
- Establish a methodology to select and prioritize IT projects.
- Design an IT strategy aligned with the university strategy.

Among the aspects the Université de Gabès had difficulties to replicate were included:

- Create the CIO position, due to regulation issues. A solution could be assigning this responsibility to an existing position that could fit with the CIO features. A training phase is necessary before choosing the CIO and other staff dedicated to IT governance.
- Select and define the source of Authority /Legitimacy in the institution.
- Stablish dedicated budget for IT.

In general terms Université de Gabès attendees were selected considering their profiles. The team selected for the first visit was composed of various profiles representing different levels of the institution hierarchy to convince them about the importance of IT governance and to have the commitment of top managers. This trend decreased in the following visits that took place in the second half of the project, since the participation and engagement obtained was sufficient for them. Thus, those attending the other visits were mainly researchers belonging to the Institut Supérieur d'Informatique et de Multimédia de Gabès.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. As mentioned above, we performed several *Initial assessment visits* to each Tunisian university to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Institut Supérieur d'Informatique et de Multimédia de Gabès (ISIMG), belonging to the Université de Gabès. During the visit we were welcomed by the members of their *IT governance steering group*, who had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Université de Gabès were as shown in Table 5.5:

**Table 5.5 – IT governance assessment at the Université de Gabès**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 1 | 29 | 3% | 31% |
| Strategy | 2 | 16 | 13% | 31% |
| Acquisition | 9 | 34 | 26% | 28% |
| Performance | 1 | 16 | 6% | 29% |
| Conformance | 4 | 19 | 21% | 18% |
| Human Behavior | 4 | 14 | 29% | 21% |

Blue: near or above average; Orange: under average

In comparison with ten Spanish universities average (A. Fernández & Llorens, 2011), the Université de Gabès presented three principles in a similar situation and the other three well below average. They were in a better initial level at *Human behavior*, and *Conformance* principles, but in a worse level in *Responsibility*, *Strategy* and *Performance*. *Acquisition* principle was almost the same as the average. These results did mean that the Université de Gabès, was in an initial level of IT governance maturity and thus, its activities should involve mainly *Responsibility* and *Strategy* principles, to set new structures which, create new policies and plans aligning IT with business. These results are better shown in Figure 5.8, where activities related to *Human Behavior* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility* and *Performance* in the first place.

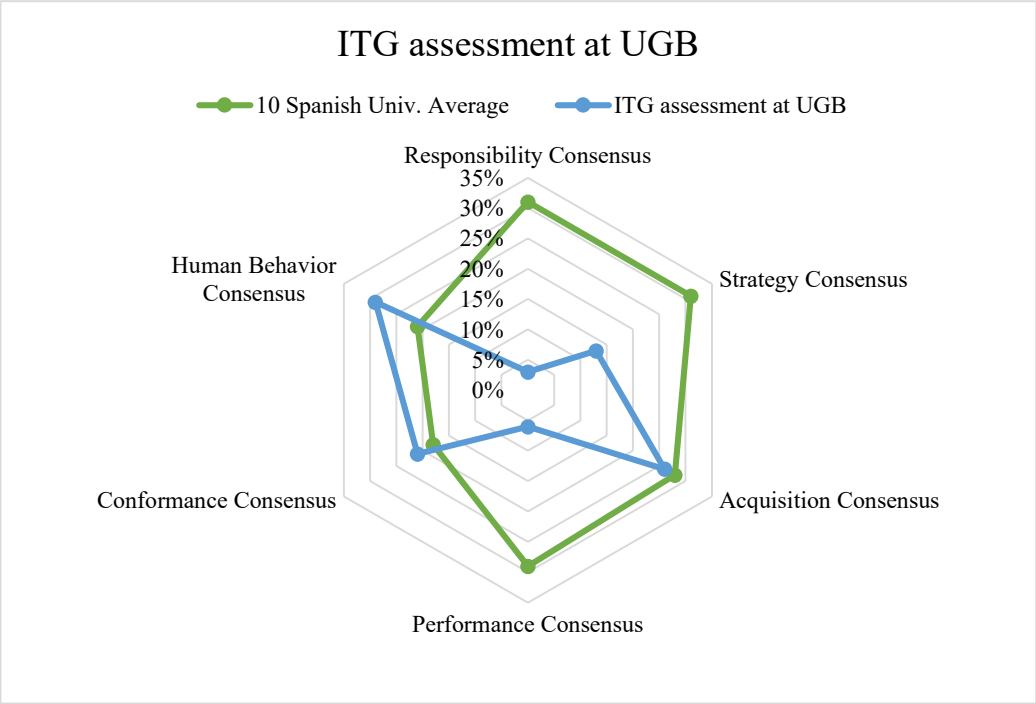


**Figure 5.8 – IT governance assessment at the Université de Gabès**

Based on these results, at the end of the visit we gave them some recommendations on which principle they should focus on first. Furthermore, we requested Université de Gabès partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities would like to perform first.

Regarding the Université de Gabès' *IT governance steering group*, it consisted of the following members:

- Director of ISIMG, member of ISIMG advisory Board
- Director of Studies and career center, member of ISIMG advisory Board
- IT manager
- Financial Officer
- Purchasing manager
- General Secretary / Chief of staff
- Head of Computer science and multimedia department, member of ISIMG
- advisory Board
- Head of Web and multimedia department, member of ISIMG advisory Board
- Head of industrial computer science department, member of ISIMG advisory Board
- Head of Electronic and Telecommunications department, member of ISIMG advisory Board
- Head of e-learning department, member of ISIMG advisory Board
- Two researchers belonging to ISIMG.

By this list, it is reflected that the Université de Gabès obtained the engagement and participation of members who occupied crucial positions thus supporting the IT governance framework development and deployment. However, all of them belonged to the institute, and did not occupy general positions of the university. This is worth

mentioning because in Tunisia faculties and institutes were formed long before the universities and therefore have more authority of decision. Specifically, the participants from the Université de Gabès focused on the institute, and therefore, the framework was developed and implemented in this area.

*IT governance best practices adaptation*. According to the ITG4U framework, the organization should adopt and adapt the best practices that best suit their needs (A. Fernández & Llorens, 2009). This activity consisted of the IT governance best practices adaptation, a self-assessment of the organizational IT governance maturity level in best practices and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Université de Gabès' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Université de Gabès IT governance framework best practices catalog can be found in the Annex A. Then, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.6:

**Table 5.6 – Initial situation of existing best practices at the Université de Gabès**

| | |
|---|---|
| Responsibility (4 existing best practices) | |
| 1. | The GT is aware of the importance of IT Governance |
| 2. | IT Governance is the responsibility of the GT and not of IT experts and professionals |
| 3. | The GT have a clear vision of the responsibility of third parties in relation to the university's IT objectives |
| 4. | The university have an IT balanced scorecard |
| Strategy (1 existing best practice) | |
| 1. | The GT plan IT acquisitions in a timely manner and are they included in the next Year's budget |
| Acquisition (8 existing best practices) | |
| 1. | The GT has designed and published a policy that provides guidance on different types of acquisitions |
| 2. | Service level agreements have been set up with all IT suppliers |
| 3. | Reports are submitted to the GT that monitor the service levels agreed with suppliers |
| 4. | The cost of an IT project includes the costs required to maintain the continuity of an IT-based service |
| 5. | When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university |
| 6. | The GT has designed and published an IT acquisition approval protocol that details all the people responsible for supplying information and making decisions |
| 7. | The GT has the ultimate responsibility for IT projects that are going to be implemented (both those that are centralized and delegated) and decide their priorities in such a way that a large portion of resources are channeled to the most important projects |
| 8. | The GT supports initiatives aimed at exchanging experiences and collaborating with other universities |
| Performance (2 existing best practices) | |
| 1. | The GT has devoted enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services |
| 2. | The GT regularly analyses the requirements of users (for example, employees and students) |
| Conformance (5 existing best practices) | |
| 1. | Training processes are carried out related to the compliance of internal procedures with external laws and policies. |
| 2. | Those in charge of IT services and projects are encouraged to consider IT-related external regulations and laws and policies and internal procedures. |

| | |
|---|---|
| 3. | Internal audits are carried out to check whether IT projects and services comply with IT-related external laws and regulations and internal policies and procedure. |
| 4. | External audits are carried out to check whether IT projects and services comply with IT related external laws and regulations and internal policies and procedures. |
| 5. | Reports are submitted to the GT with the results of the internal and external audits, which clearly express the level of the university's level of compliance with regulations and the risks that this entail. |
| | Human Behavior (3 existing best practices) |
| 1. | IT project planning includes a stage to train stakeholders on the change that is going to take place in the university service affected by the IT initiative. |
| 2. | There is a procedure established to measure the level of skills (especially those related to IT) of individuals in different interest groups. |
| 3. | The GT knows what human resources are available, what occupational roles are established, and what human potential is available to undertake new IT initiatives, avoiding overloads. |

Figure 5.9 and Table 5.7 below show the percentages of best practices satisfied after the self-assessment. This information was crucial to adapt the maturity model (next activity) as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.7 – Percentage of best practices satisfied by the Université de Gabès**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 14% | Performance Consensus | 13% |
| Strategy Consensus | 6% | Conformance Consensus | 26% |
| Acquisition Consensus | 24% | Human Behavior Consensus | 29% |

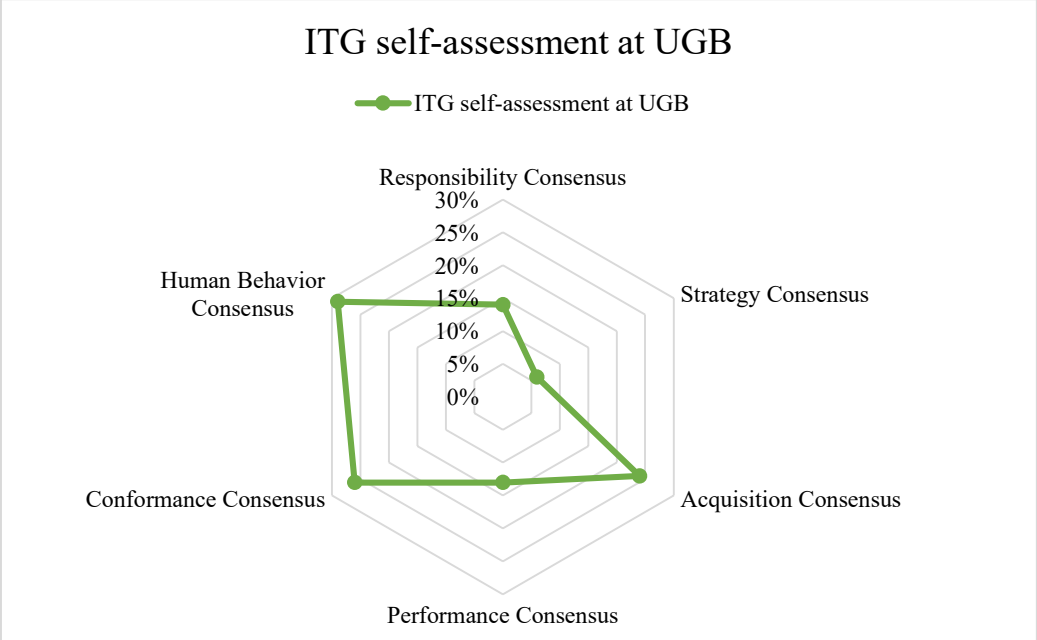


**Figure 5.9 – IT governance self-assessment at the Université de Gabès**

*IT governance maturity model adaptation*. In the previous activity, Université de Gabès partners defined the set of best practices aimed to be covered by their IT governance framework. This activity consisted of the adaptations on the proposed IT governance maturity model, provided by the European partners, the review of the maturity model adaptations to their organization, the maturity level current situation and the maturity goal selection. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Université de Gabès' *IT*

*governance steering group* adopted it with no significant changes and then used it to self-assess their maturity level regarding IT governance. Their results can be found in Table 5.8 below. To achieve the next level, the three IT governance activities should have the same level. That is why *Responsibility* is in the level 1 even though *Monitor* had level 3. *Evaluate* and *Direct* must also be at level 3 for the *Responsibility* principle to reach level 3. Otherwise, it will remain at the level of the lowest score obtained.

**Table 5.8 – IT governance maturity level at the Université de Gabès**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management. |
| | Direct | 1 | The directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 3 | The directors carry out an informal monitoring of responsibilities related to IT management.<br>The directors check whether the responsibilities allocated are understood.<br>The directors check whether the person who is allocated the responsibility understands it.<br>The directors do not check whether all the responsibilities related to IT governance are allocated. |
| Strategy (1) | Evaluate | 1 | The directors monitor IT activity but not in a way that is aligned with the university's strategic objectives |
| | Direct | 1 | The directors plan investments in IT for the coming year.<br>There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 3 | The directors monitor the projects at a superficial level for the purposes of justifying their expenditure. |
| Acquisition (0) | Evaluate | 1 | The directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level. |
| | Direct | 1 | The reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 0 | The directors know what IT assets the university currently has available |
| Performance (0) | Evaluate | 1 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective.<br>Key decisions concerning the performance level of the services will be taken by IT managers.<br>The directors analyze and find out about the needs of IT service users. |
| | Direct | 0 | IT managers normally have an excessive workload. |
| | Monitor | 1 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets. |
| Conformance (0) | Evaluate | 0 | No aspects are covered. |
| | Direct | 0 | No aspects are covered. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| | Monitor | 0 | No aspects are covered. |
| Human Behavior (1) | Evaluate | 2 | The directors are concerned to determine which people should be involved and those who are affected by IT activities |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved.<br>The directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |
| | Monitor | 1 | The directors monitor the projects, basing their analysis solely on technical indicators. |

The *IT governance steering group* selected a maturity goal based on the results and the principles they wanted to improve. Concretely, they focused on *Responsibility*, *Strategy* and *Acquisition*, from their initial position to level 2, and *Performance* and *Conformance* to level 1. For each principle, they planned the actions shown in Table 5.9 to achieve their goal maturity level.

**Table 5.9 – Selected actions to achieve Université de Gabès' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | An ITG Committee (An IT Strategic Committee and an IT Steering Committee) should be set up. |
| | The importance of IT Governance in the GT should be promoted. |
| | Create a role of CIO |
| Strategy | The Governance Team should direct the strategic planning of IT. |
| | The GT should design a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs. |
| | The GT should design a set of IT policies, aligned with the university's strategy, that are a reference to guide those who must make IT-related decisions in the university. |
| Acquisition | Define the relationship with IT providers. |
| Performance | Create and measure catalogue of IT indicators about operations and management. |
| Conformance | The GT should officially assign the responsibility of being aware of IT related legislation and the responsibility of understanding IT-related standards to a person or a group of people. |
| | A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the university, and this should be kept up to date. |
| | A reference catalogue should be created that contains the IT-related standards applicable or already applied in the university and this should be kept up to date. |
| Human Behavior | No actions must be taken. |

It should be noted that the selection of these actions was influenced by several factors. First, the *IT governance steering group* formation. The interest in IT governance and the support of the group members in the project is reflected in the selection of the goal maturity level. In this case they were not very ambitious, and they bet on the principles that they considered most important in their situation. Second, the time available. This phase of the project was performed after the middle, so they had less than a year and a half to prepare the plan and carry out the actions. For these reasons they presented a realistic plan tailored to their situation, stakeholder support, and the remaining time and resources of the project.

*IT governance improvement plan design and assessment*. Once the main elements of the framework are defined (best practices, maturity goal and improvement actions), to draw a deployment plan tailored to organizational circumstances is needed. The Université de Gabès' IT governance improvement plan followed the PMI project management standard. This plan was structured in the following six phases:

- Initiating: by this phase, Université de Gabès' partners aimed to engage their leaders to the awareness and realization that the framework was going to be deployed. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (by the last two activities), ii) goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.
- Planning: the main deliverables of this phase was i) a project charter which was accepted from all relevant stakeholders, and ii) a work breakdown structure that includes all the needed tasks.
- Execution: this phase was meant to present the implementation actions, its factors and metrics and its different steps.
- Monitoring and Controlling: the main deliverable of this phase was a defined and implemented controlling system for the aspects included in the framework that allowed a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Université de Gabès partners presented several evidence documentations and KPIs.
- Risk Management: in this phase risk management procedures were defined and formalized to be followed during and after the implementation of the framework. The aim of this phase was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Université de Gabès partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: Université de Gabès partners defined a communication plan, which indicated the intensity of communication as well as the stakeholders involved. A list of actions depending on the target groups were also defined, e.g., organization of info days, workshops, seminars, addressed to students, internal staff, and/or the industry.

The Université de Gabès' IT governance improvement plan can be found in Annex A.

**C. Third phase – Deploying and monitoring its results**

In the third phase of the project, Université de Gabès partners deployed their *IT governance improvement plan*. This phase consisted of a continuous improvement cycle in which European experts monitored the state of the planned actions. Table 5.10 shows the state of the actions at the end of the project, in October 2018. We requested Université de Gabès partners to indicate the planning dates for each action,

start and end, as well as their state. As it can be seen, the actions had four different states: accomplished, ongoing, rescheduled, and not started. Those accomplished actions were done as planned, while the ongoing actions were being carried out according to the programmed calendar. However, several actions were rescheduled due to internal issues. The main barrier that Université de Gabès partners faced was the reelection of a new rector. This led to structural and managerial changes who had not previously worked on the project and were not aware of the importance of IT governance. Support from top management was crucial to the development of the framework, and this situation weakened that support. The partners should have anticipated this change so close to the end of the project and the development of certain activities and should have developed various mitigating measures. Although belatedly, Université de Gabès partners reacted to this unforeseen event by lengthening action two, as can be seen in Table 5.10. In this way they devoted more time to promoting the importance of IT governance in the *IT governance steering group* to obtain the engagement of the new board again. Thus, actions belonging to *Strategy*, *Performance* and *Conformance* principles were rescheduled.

**Table 5.10 – State of Université de Gabès' improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| An ITG Committee should be set up. (IT Strategic Committee and an IT Steering Committee). | January 2018 | February 2018 | Accomplished Jan 2018 |
| The importance of IT Governance in the GT should be promoted. | March 2018 | March 2019 | Ongoing action |
| Create a role of CIO. | March 2018 | March 2018 | Accomplished March 2018 |
| **Strategy** | | | |
| Actions | Start | End | State |
| The Governance Team should direct the strategic planning of IT. | March 2018 | May 2018 | Rescheduled to start on Oct 2018 |
| The GT should design a long-term programme that has the aim of implementing all the IT developments that the university needs to meet its users' needs. | March 2018 | June 2018 | Rescheduled to start on Oct 2018 |
| The GT should design a set of IT policies, aligned with the university's strategy, that are a reference to guide those who must make IT-related decisions in the university. | May 2018 | July 2018 | Rescheduled to start on Oct 2018 |
| **Acquisition** | | | |
| Actions | Start | End | State |
| Define the relationship with IT providers. | September 2018 | December 2018 | Rescheduled to start on Oct 2018 |
| **Performance** | | | |
| Actions | Start | End | State |
| Create and measure catalogue of IT indicators about operations and management. | May 2018 | July 2018 | Rescheduled to start on Oct 2018 |
| **Conformance** | | | |
| Actions | Start | End | State |

| | | | |
|---|---|---|---|
| The GT should officially assign the responsibility of being aware of IT-related legislation and the responsibility of understanding IT-related standards to a person or a group of people. | September 2018 | October 2018 | Rescheduled to start on Oct 2018 |
| A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the university, and this should be kept up to date. | November 2018 | January 2019 | Not started |
| A reference catalogue should be created that contains the IT-related standards applicable or already applied in the university and this should be kept up to date. | December 2019 | February 2019 | Not started |

Regarding those accomplished actions, Université de Gabès partners provided the documentation indicated in Table 5.11 as evidence. They also included two KPIs as control measures to assure those actions had a continuity. Université de Gabès' evidence documentation can be found in Annex A.

**Table 5.11 – Evidenced finished actions at the Université de Gabès**

| Actions | Evidence | KPIs |
|---|---|---|
| An IT Strategic Committee and an IT Steering Committee should be set up. | IT Steering Committee members and roles | Number of meetings of the steering committee n_meeting = 3 |
| Create a role of CIO | Formal nomination of the CIO | Number of dissemination events n_event = 2 |
| The importance of IT Governance in the GT should be promoted. | List of dissemination actions taken to promote ITG | |

The ongoing and rescheduled actions have no evidence, except the minutes of the dissemination events. However, Université de Gabès partners could have established KPIs in actions belonging to *Strategy*, *Acquisition*, *Performance*, and *Conformance* principles, even though they were rescheduled, for future monitoring and control. In any case, Université de Gabès partners selected several actions considering their resources and possibilities in correctly performing those activities. Furthermore, they proposed dates beyond the project to maintain the IT governance base in the future.

In general terms, Université de Gabès team provided several documents showing their implication in the project and the engagement of the leaders of their institution. Attached to each deliverable, they included several evidence documentations indicating the progress of their activities. It is worth noting the evolution of the Université de Gabès institution regarding IT governance, in some cases from nothing to some controlled processes. However, it is true that in most of the principles they started from the lowest level, thus, maybe the improvements are still in its beginnings.

Regarding the IT governance framework specifically, Université de Gabès partners presented a selection and adaptations of the Spanish ITG4U framework to their specific reality. They included a full, detailed, and completed plan of actions based on their self-assessment and their desire to improve principle by principle, considering their resources, their involved stakeholders, and a strong risk management. From the point of view of the project, it was a successful story because of the implication of the people occupying high positions in their faculty whose participation was constant along the lifetime of the project.

**Université de la Manouba**

Founded in 2000, the Université de la Manouba (UMA) has a privileged position in the Tunisian academic landscape thanks to the many rich and unique resources of its 14 institutions. It is a private institution located in La Manouba sector belonging to the Tunisia capital. At the beginning of the project, the university included 1,569 lecturers and professors in 14 institutions, 21,497 students, 841 technicians, and administrative workers, 13 research units, and 14 recognized research laboratories. The Université de la Manouba offered 36 bachelors including 19 core bachelors, 16 professional bachelors, 40 masters including 14 research masters and 26 professional masters, and 11 doctoral degrees. The strategic objectives of the Université de la Manouba were to support innovation in all institutions, and to train experienced researchers with international scientific reputation in various fields.

**A. First phase – Learning about IT governance**

*Training*. Two different training sessions were performed addressed to researchers on the one hand, and to managers on the other hand. Researchers from Institut Supérieur des Arts Multimédia de la Manouba (ISAMM), including their Studies and Internship Director, attended the first *Initial training Researchers*, held at the Universitat de les Illes Balears (Spain). As before, the profile of the participants was related to computer science, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects and train future young researchers was fulfilled. In addition, the participation of the Director of the Institute in the training sessions was crucial to obtain the engagement of this university in the project.

As explained before, the second training, *Initial training Managers*, was meant to be held in Tunisia, but finally it was rescheduled at the Universidad de Almería (Spain), thus decreasing the expected number of attendees. However, the Université de la Manouba managed to obtain the involvement and engagement of several managers: the IT governance responsible in the university, the IT governance responsible at the level of the Crystal Research Laboratory, and a member of the Scientific Committee at the École Nationale des Sciences de l'Informatique (ENSI). This had a positive impact on the achievement of the project objectives and specifically on the IT governance framework development by this university, as reflected in the following sections.

*Literature review*. As explained above, researchers from the four Tunisian universities participating in the project performed this activity jointly. They conducted a literature review to learn different lessons from several case studies around the world. The results showed how IT governance practices and activities are used in developed and developing countries, public and private organizations, under the scope of the university (Khouja et al., 2018).

*Best practices visits*. We organized four visits to four European universities: Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), Høgskolen I Østfold (Norway), and Universitat de les Illes Balears (Spain) in this order. The visits served to obtain the easy and difficult aspects to imitate and replicate, the lessons learned and the implementation barriers.

The Université de la Manouba attendees learned the following lessons:

- IT governance importance awareness and responsibilities assumption.

- IT responsibilities distribution throughout the institution.
- Definition of the Strategy Committee and the Steering Committee to direct and control IT aspects, e.g., IT projects execution.
- CIO role and a Governance Team establishment who lead the IT governance implementation.
- The digitalization of the processes gives the opportunity to the university to put the sector in a better position to achieve the goals of education and research.
- Design of a good IT governance infrastructure which allows the services to be hosted and managed by the university.
- Carefully analyze the system operation to understand how it works and set the starting level of the university in terms of IT governance.

Université de la Manouba attendees were selected for the four visits considering their profiles, thus involving several managers, i.e., the Vice Director of the ISAMM, several members of the University Scientific Board, Information Systems responsible, and members of the ENSI Scientific Committee. The Université de la Manouba obtained the support, commitment, and participation of several managers during these visits, which allowed a smooth IT governance framework development and deployment.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. To set an initial state of IT governance in the Tunisian universities and thus better understand their needs, we performed an *Initial assessment visit* to each of them. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Université de la Manouba, where we were welcomed by the members of their *IT governance steering group*, belonging to the ISAMM and the ENSI. Before our visit, they responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Université de la Manouba were as shown in Table 5.12:

**Table 5.12 – IT governance assessment at the Université de la Manouba**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 5 | 29 | 17% | 31% |
| Strategy | 6 | 16 | 38% | 31% |
| Acquisition | 15 | 34 | 44% | 28% |
| Performance | 4 | 16 | 25% | 29% |
| Conformance | 5 | 19 | 26% | 18% |
| Human Behavior | 10 | 14 | 71% | 21% |

Blue: near or above average; Orange: under average

Table 5.12 shows a better situation than the previous university and some principles above the ten Spanish universities average (A. Fernández & Llorens, 2011). They were in a better initial level at *Strategy*, *Acquisition*, *Conformance* and *Human Behavior* principles, but in a worse level in *Responsibility* and *Performance*. These results did mean that the Université de la Manouba started from a good level of IT governance maturity and thus, its activities should involve mainly *Responsibility* and

*Performance* principles, to set new structures and control measures. These results are better shown in Figure 5.10, where activities related to *Human Behavior* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility* and *Performance* in the first place.

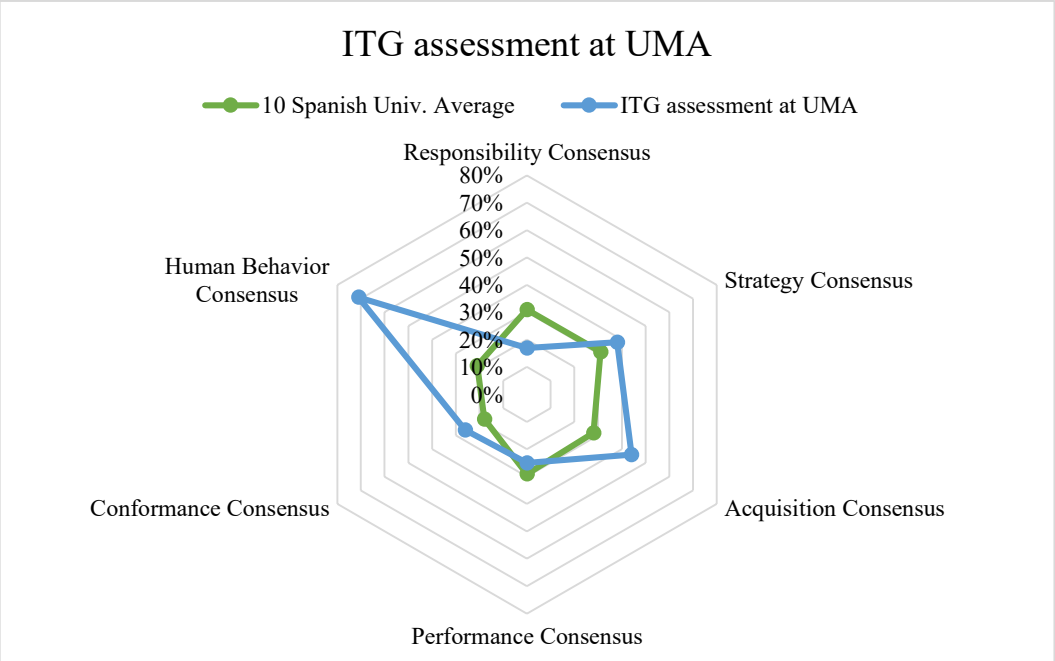


**Figure 5.10 – IT governance assessment at the Université de la Manouba**

We gave them some recommendations on which principle they should focus on first based on these results, at the end of the visit. Furthermore, we requested Université de la Manouba partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities would like to perform first.

Regarding the Université de la Manouba's *IT governance steering group*, it consisted of the following members:

- Professor and Rector of the University.
- Professor and Director of ISAMM.
- Professor and Director of ENSI.
- Director of Studies and Followship and member of ISAMM advisory board.
- Head of International Cooperation and Academic relations at Manouba University.
- IT Manager at ISAMM.
- Financial Officer at ISAMM.
- Purchasing Manager at ISAMM.
- General Secretary / Chief of Staff.
- Several Professors and Assistant Professors belonging to ISAMM and ENSI.

Several managers and members who occupied crucial positions in their organization were engaged and participated on the project, including its rector. This meant that the Université de la Manouba obtained their support on the IT governance framework development and deployment. However, most of them belonged to the institute, and the less occupy general positions of the university. This is worth

mentioning because, as explained before, in Tunisia faculties and institutes were formed long before the universities and therefore have more authority of decision. Nonetheless, the participants from the Université de la Manouba focused on the university with the support of the institute in developing and deploying the IT governance framework.

*IT governance best practices adaptation*. The organization, in this case the Université de la Manouba, should adopt and adapt the best practices that best suit their needs, according to the ITG4U framework (A. Fernández & Llorens, 2009). This activity consisted of the IT governance best practices adaptation, a self-assessment of the organizational IT governance maturity level in best practices and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Université de la Manouba's *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Université de la Manouba IT governance framework best practices catalog can be found in the Annex A. Then, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.13:

**Table 5.13 – Initial situation of existing best practices at the Université de la Manouba**

| | |
|---|---|
| **Responsibility (5 existing best practices)** | |
| 1. | The GT is aware of the importance of IT Governance. |
| 2. | The GT promoted actions (training, communication, etc.) disseminate in the university community the importance of proper IT governance. |
| 3. | IT governance is the responsibility of the GT and not of IT experts and professionals. |
| 4. | The GT have a clear vision of the responsibility of third parties in relation to the university's IT objectives. |
| 5. | The university have a catalogue of indicators that serves to enable the GT to monitor whether the responsibilities related to the management of IT are performed correctly. |
| **Strategy (6 existing best practices)** | |
| 1. | The GT plans IT acquisitions in a timely manner and are they included in the next year's budget. |
| 2. | The GT has designed a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs. |
| 3. | The GT knows how many IT developments are still not integrated yet. |
| 4. | The GT has designed a policy that expresses the support for technological innovation on campus. |
| 5. | The GT has allocated a responsibility whose aim is to evaluate emerging technologies and plan their incorporation if they are suited to meeting the university's strategic needs. |
| 6. | The GT promotes a training plan for all the university's stakeholders to promote the mastery of technologies and the awareness of their importance for the university. |
| **Acquisition (15 existing best practices)** | |
| 1. | The GT has set up a procedure to measure clearly and accurately how much the university spends on IT on an annual basis. |
| 2. | The university has a single centralized cost center to carry out the university's main IT investments. |
| 3. | The GT has instigated a study that determines the university's IT assets. |
| 4. | The GT has designed and published a policy that provides guidance on different types of acquisitions. |
| 5. | The university has optimized its purchases using good practices (for example, purchasing consortia, discount negotiations, purchase of special offers, etc.). |
| 6. | Service level agreements have been set up with all IT suppliers. |

| |
|---|
| 7. A template has been created for IT projects which includes all important information (aims, benefits, steps to follow, performance criteria and associated risks) and requires that the GT establish their prioritization. |
| 8. When calculating the costs of an IT project, the IT has been considered regarding investment and maintenance costs, human resource costs, training costs and the costs of organizational changes stemming from the project. |
| 9. The template has been created for IT projects and include the criteria necessary to regularly evaluate the continuity or termination of the service or the withdrawal of an IT system to make decisions thereon. |
| 10. When calculating the cost of an IT project, these costs include the design of activities and the costs necessary to train all the people involved in that project so that maximum IT performance is obtained, and the services offered are improved. |
| 11. The GT has designed and published a set of criteria aligned with the strategic objectives which determines the priority of IT acquisitions and projects. |
| 12. When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university. |
| 13. A procedure has been designed to continuously monitor IT projects and services in operation with a view to determining their performance, redesigning them, if necessary, and to continually seek cost savings. |
| 14. When calculating the benefits of an IT project, a wide range of aspects ranging from cost savings to user satisfaction is measured. |
| 15. The GT support initiatives that aim at exchanging experiences and collaborating with other universities. |
| **Performance (4 existing best practices)** |
| 1. The GT has devoted enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |
| 2. Security measures are in place to maintain the integrity and quality of institutional information. |
| 3. The university actively manages user expectations (for example, through service descriptions, service level agreements, etc.). |
| 4. Deviations in service level agreements are identified and corrective measures are adopted. |
| **Conformance (3 existing best practices)** |
| 1. Those in charge of IT services and projects are encouraged to consider IT-related external regulations and laws and policies and internal procedures. |
| 2. Internal audits are carried out to check whether IT projects and services comply with IT-related external laws and regulations and internal policies and procedure. |
| 3. The GT has officially assigned a person or group of people the responsibility of understanding the IT-related standards. |
| **Human Behavior (10 existing best practices)** |
| 1. Different groupings of stakeholders were identified to offer them different treatment when involving them in IT-supported change processes (for example: grouping them based on their experience of IT use or forming groups according to age and level of responsibility, etc.). |
| 2. IT project plan has included activities aimed at mitigating the risk related to a lack of commitment in participants. |
| 3. A process to raise awareness that leads to reducing people's resistance to an IT-based change process (information, training, etc.) has been set into motion. |
| 4. IT project planning includes the responsibilities assigned to all participants and activities aimed at measuring the extent to which the involvement of these people contributes to the success of the project and therefore to the change process that it promotes. |
| 5. Committees and work groups have been created to facilitate the participation, and therefore the involvement, of stakeholders in the design, supervision, and final evaluation of IT-based change processes. |
| 6. IT project planning includes a stage to train stakeholders on the change that is going to take place in the university service affected by the IT initiative. |
| 7. IT project includes a stage of cross training, training the heads of the university service in IT matters and technicians in the university process affected by the IT initiative. |
| 8. There is a professional career structure that reflects promotions based on the acquisition of skills (also IT) and on successes obtained during change processes. |

| | |
|---|---|
| 9. | There is a procedure established to measure the level of skills (especially those related to IT) of individuals in different interest groups. |
| 10. | The GT knows what human resources are available, what occupational roles are established, and what human potential is available to undertake new IT initiatives, avoiding overloads. |

The percentages of best practices satisfied after the self-assessment are shown in Figure 5.11 and Table 5.14 below. This information was crucial to adapt the maturity model (next activity) as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.14 – Percentage of best practices satisfied by the Université de la Manouba**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 17% | Performance Consensus | 25% |
| Strategy Consensus | 38% | Conformance Consensus | 26% |
| Acquisition Consensus | 44% | Human Behavior Consensus | 71% |

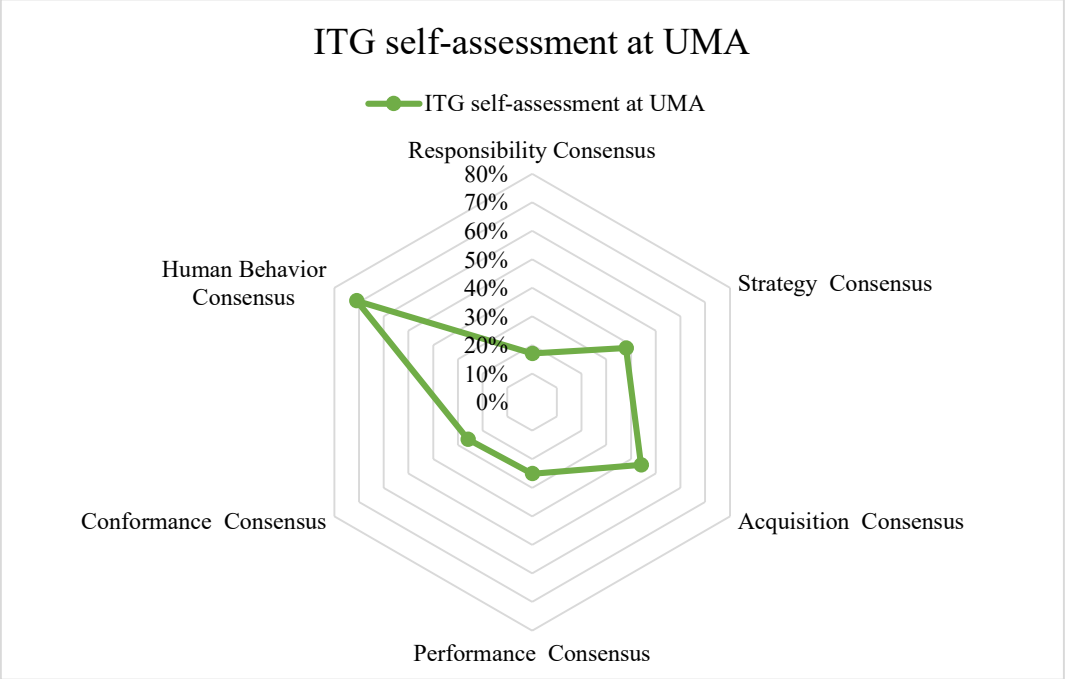


**Figure 5.11 – IT governance self-assessment at the Université de la Manouba**

*IT governance maturity model adaptation*. Once Université de la Manouba partners had defined the set of best practices aimed to be covered by their IT governance framework, they had to adapt the proposed IT governance maturity model, provided by the European partners. Under this activity, they also had to review the maturity model adaptations to their organization, the maturity level current situation and the maturity goal selection. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Université de la Manouba's *IT governance steering group* adopted it with no significant changes motivated by the adequacy of the model to the Tunisian context. Then, they used it to self-assess their maturity level regarding IT governance. Their results can be found in Table 5.15 below. To achieve the next level, the three IT governance activities should have the same level. Otherwise, the lower level of the three activities is selected. That is why *Responsibility* is in the level 1 even though *Monitor* had level 3.

**Table 5.15 – IT governance maturity level at the Université de la Manouba**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management. |
| | Direct | 1 | Directors endeavor to ensure that IT management is planned. |
| | Monitor | 3 | The directors carry out an informal monitoring of responsibilities related to IT management.<br>The directors check whether the responsibilities allocated are understood.<br>The directors check whether the person who is allocated the responsibility understands it.<br>The directors do not check whether all the responsibilities related to IT governance are allocated. |
| Strategy (1) | Evaluate | 1 | Directors carry out medium-term IT planning but from a technological perspective, not with institutional objectives in mind.<br>There are innovations in IT but from a technical perspective, not from a business point of view. |
| | Direct | 1 | University directors design some IT-related policies from a business point of view. |
| | Monitor | 3 | Directors monitor IT activity which begins to be aligned with the university's strategic objectives. |
| Acquisition (0) | Evaluate | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |
| | Direct | 1 | Reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 0 | No aspects are covered. |
| Performance (0) | Evaluate | 1 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective.<br>Directors check whether any internal standards and policies have been drawn up for key aspects concerning the performance of university processes.<br>Directors understand the university's reliance on IT, and they are beginning to engage in taking decisions relating to IT performance.<br>Only the cost of the services is measured as an index for prioritizing the allocation of IT assets.<br>IT assets cover the major operations of current university services (though not all those deemed desirable).<br>Key decisions concerning the performance level of the services will be taken by IT managers.<br>IT managers normally have an excessive workload.<br>Directors design policies and standards to reflect the most important aspects regarding the performance of IT based university processes. |
| | Direct | 0 | Directors plan IT assets to cover all the operations carried out by today's university services but without giving IT managers an excessive workload. |
| | Monitor | 1 | Directors measure to see whether the IT assets provide support for the university's main services and whether their users are satisfied with them. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| | | | Directors analyze and find out about the needs of IT service users. |
| Conformance (0) | Evaluate | 0 | Directors have assigned the responsibility of finding about the legislation concerning IT and ascertaining how it affects the university. |
| | Direct | 0 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 0 | Only with respect to certain individuals or on specific projects is a check made to ensure compliance with regulations (in other words this is not a general procedure). The directors are familiar with key IT-related standards, although they are not widely implemented. |
| Human Behavior (1) | Evaluate | 2 | Directors are concerned that everyone needed to complete the IT activity should take part. |
| | Direct | 1 | Directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |
| | Monitor | 1 | Directors monitor the projects, basing their analysis solely on technical indicators. |

The *IT governance steering group* selected a maturity goal based on the results and the principles they wanted to improve. Concretely, they focused on *Responsibility*, *Strategy*, *Performance*, and *Human Behavior*. They did not plan to improve the maturity model of the other principles but to maintain them. For each selected principle, they planned the actions shown in Table 5.16 to achieve their goal maturity level.

**Table 5.16 – Selected actions to achieve Université de la Manouba's goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. |
| | The CIO should form a part of the GT and participate in making governance decisions. |
| | The CIO should take part in preparing strategic plans. |
| | When choosing a CIO, the GT should bear in mind that this person should be an experienced and skilled governor with excellent communication skills. |
| | The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. |
| | An IT Steering Committee should be set up. |
| | The importance of IT Governance in the GT should be promoted. |
| Strategy | An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy. |
| Acquisition | No actions selected. |
| Performance | The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. |
| | The GT should design a policy that reflects the expected performance of university processes that are IT-based. |
| | The GT should promote the design of a procedure to analyze the satisfaction of various stakeholders with relation to the university's IT based services in operation. |
| | The GT should regularly analyze user requirements. |
| | The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |

| Principle | Actions |
|---|---|
| Conformance | No actions selected. |
| Human Behavior | Everyone needed to complete the IT activity should take part. |
| | Offer technical training and teach the people participating in IT projects how the services work. |

It should be noted that the selection of these actions was influenced mainly by two factors. The members of their *IT governance steering group* had critical positions in their institution thus showing interest in IT governance and supporting the project. However, Université of la Manouba partners focused on some principles thus not taking any action in the others. Even though they had the support of their authorities, they took a conservative position and a slow path of changes. The second factor was the available time. Considering the remaining time, Université de la Manouba partners elaborated a realistic plan of actions tailored to their situation, stakeholder support, and the remaining resources of the project.

*IT governance improvement plan design and assessment*. The last step of this phase was to draw a deployment plan that fits their organizational circumstances. Several elements of the framework were already defined (best practices, maturity goal and improvement actions), thus the Université de la Manouba's IT governance improvement plan was structured in six phases following the PMI project management standard:

- Initiating: by this phase, Université de la Manouba's partners aimed to bring the leaders the realization of the deployment of the framework. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (by the maturity level already calculated), ii) maturity objectives, iii) scope of implementation, iv) general constrains, and v) internal/external resources committed.
- Planning: to provide a project charter with detailed information about the overview of the project, purpose, activities, stakeholders, benefits, and risks among other issues.
- Execution: this phase was meant to present each action with the starting and ending dates, classified by principles, and its state.
- Monitoring and Controlling: to define and implement a controlling system for the aspects included in the framework that allowed a regularly assessment of its success. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Université de la Manouba's partners presented several evidence documentations and KPIs.
- Risk Management: this phase purpose was to define and formalize risk management procedures to be followed during and after the implementation of the framework. The aim of this phase was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Université de la Manouba's partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.

- Communication and marketing plan: Université de la Manouba's partners defined a communication plan, describing activities to disseminate and sustain the effort on IT governance beyond the project. A list of actions depending on the target groups were also defined, e.g., info days, workshops, and seminars addressed to students, internal staff, and/or the industry.

The Université de la Manouba's IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

Université de la Manouba's partners deployed their *IT governance improvement plan* during the third phase of the project. European experts monitored the state of the planned actions in a continuous improvement cycle. Table 5.17 shows the state of the actions at the end of the project, in October 2018. Université de la Manouba partners were requested to indicate the planning dates for each action, start and end, as well as their state. As it can be seen, the actions had three different states: accomplished, rescheduled, and not started. Those accomplished actions were done as planned; however, several actions were rescheduled due to internal issues. As the previous university, Université de la Manouba partners faced the reelection of a new rector. Thus, this led to structural and managerial changes who had not previously worked on the project and were not aware of the importance of IT governance. They had to regain the support from top management because this new situation weakened that support. Again, the partners should have anticipated this change so close to the end of the project and the development of certain activities and should have developed various mitigating measures. Although belatedly, Université de la Manouba partners reacted to this unforeseen event by lengthening fifth and seventh actions in *Responsibility* principle, as can be seen in Table 5.17. In this way they devoted more time to promoting the importance of IT governance in the *IT governance steering group* to obtain the engagement of the new board again, and to ensure that all the stakeholders' representatives belong to the *IT Steering Committee*. Thus, actions belonging to *Strategy*, *Performance* and *Human Behavior* principles were delayed and rescheduled.

**Table 5.17 – State of Université de la Manouba's improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. | May 2018 | May 2018 | Accomplished April 2018 |
| The CIO should form a part of the GT and participate in making governance decisions. | June 2018 | December 2019 | Accomplished May 2018 |
| The CIO should take part in preparing strategic plans. | June 2018 | June 2018 | Accomplished May 2018 |
| When choosing a CIO, the GT should bear in mind that this person should be an experienced and skilled governor with excellent communication skills. | April 2018 | April 2018 | Accomplished April 2018 |
| The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. | August 2018 | December 2019 | Rescheduled to start on Oct 2018 |

| | | | |
|---|---|---|---|
| An IT Steering Committee should be set up. | July 2018 | July 2018 | Accomplished January 2018 |
| The importance of IT Governance in the GT should be promoted. | May 2018 | December 2019 | Rescheduled to start on December 2018 |
| **Strategy** | | | |
| Actions | Start | End | State |
| An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy. | September 2018 | October 2018 | Not started |
| **Performance** | | | |
| Actions | Start | End | State |
| The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. | September 2018 | February 2019 | Rescheduled to start on December 2018 |
| The GT should design a policy that reflects the expected performance of university processes that are IT-based. | September 2018 | December 2018 | Not started |
| The GT should promote the design of a procedure to analyze the satisfaction of various stakeholders with relation to the university's IT based services in operation. | July 2018 | December 2019 | Not started |
| The GT should regularly analyze user requirements. | July 2018 | December 2019 | Not started |
| The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. | January 2019 | December 2019 | Not started |
| **Human Behavior** | | | |
| Actions | Start | End | State |
| Everyone needed to complete the IT activity should take part. | May 2018 | December 2019 | Not started |
| Offer technical training and teach the people participating in IT projects how the services work. | May 2018 | December 2019 | Not started |

Université de la Manouba partners put mechanisms in place to ensure that performance improvements resulting from the project were sustained over time and ultimately lead to opportunities for additional performance gains. Thus, regarding those accomplished actions, Université de la Manouba partners provided several evidence documentations (Table 5.18) and KPIs. Université de la Manouba' evidence documentation can be found in Annex A.

**Table 5.18 – Evidenced finished actions at the Université de la Manouba**

| Actions | Evidence | KPIs |
|---|---|---|
| The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. | Document of designation of the CIO and his responsibilities. | Number of meetings of the steering committee n_meeting = 2<br>Number of dissemination events n_event = 2 |
| The CIO should form a part of the GT and participate in making governance decisions. | Minutes of meetings with GT. | |
| The CIO should take part in preparing strategic plans. | The IT Strategic Plan. | |
| When choosing a CIO, the GT should bear in mind that this person should be an experienced | CV of the persons and the report for the best CV. | |

| | | |
|---|---|---|
| and skilled governor with excellent communication skills. | | |
| An IT Steering Committee should be set up. | List of members of the steering committee. | |

The ongoing and rescheduled actions have no evidence, except the minutes of the dissemination events. However, KPIs should have been stablished in actions belonging to *Strategy*, *Performance*, and *Human Behavior* principles, even though they were rescheduled, for future monitoring and control. It should be noted also that Université de la Manouba had a conservative plan, even though they had de support of their authorities. Thus, this new situation regarding the re-election of the rector delayed several actions that should have started before the end of the project (October 2018) whose state in Table 5.17 was "not started".

In any case, Université de la Manouba partners elaborated a detailed report showing the state of the art of their activities, which ones were already finished, which ones were delayed and why, and which ones were to be done beyond the project to reinforce the efforts taken during the project. Several evidence documents were attached to this report as a way of demonstration of their serious participation and execution of the project.

Therefore, the evolution of the activities and the behavior regarding IT governance in Université de la Manouba institution should be highlighted, not only through the above-mentioned reports and deliverables, but also with the implication of people, especially those occupying high positions in the internal structures of the organization. From the project point of view, we can say that it was as planned, and even achieving results beyond what was initially expected.

**Université de Tunis El Manar**

The Université de Tunis El Manar (UTM) was founded on 2000 in Tunis, Tunisia. The university is a multidisciplinary university in which most of the scientific fields are represented: fundamental sciences, engineering and technology sciences, economics, legal sciences, human sciences, computer sciences, medical and paramedical sciences. To adjust to the new social and economic realities and respond to the new daily requirements, the university, in accordance with the trends of the National Higher Education in Tunisia, adopted the education system of the LMD regime (Bachelor, Master and Doctorate) since 2006. The Université de Tunis El Manar is one of the largest universities in the country accounting, at the beginning of the project, with 38,000 students, and 3,000 teaching staff. It included 15 higher education and research institutes that offered 77 bachelor's degrees, 67 master's degrees, 14 engineering training programs, 21 kinds of PhD programs and 19 kinds of habilitation programs. In terms of the number of research structures, scientific and doctoral production, the Université de Tunis El Manar ranked first at the national level: five doctoral schools, 60 research laboratories and 68 research units. At the international level, the university had more than 100 Cooperation Agreements all over the world and about 105 scientific cooperation projects and was receiving students at all academic levels from different countries. Among its objectives, the Université de Tunis El Manar introduced on the 2014 – 2015 period a course on IT governance for computer science students (bachelor and master) and wanted to improve it by using the expertise of European universities.

### A. First phase – Learning about IT governance

*Training*. Researchers and managers were the two different profiles that were addressed in the trainings. The first training, *Initial training researchers*, was held at the Universitat de les Illes Balears (Spain) and attended by researchers in computer science belonging to the Faculty of Sciences at the Université de Tunis El Manar. This was a positive aspect because these researchers wanted to implement a new IT governance course in their faculty, thus fulfilling one of the objectives of the project.

The second training, *Initial training managers*, was held at the Universidad de Almería (Spain) instead of Tunisia due to security and financial issues. For this reason, the participation at this training decreased but the Université de Tunis El Manar obtained the engagement and participation of several managers, i.e., the Vice President of training, programs and professional integration, the Dean of the Faculty of Sciences, and the President of the IT Committee. The engagement of these managers caused a positive impact in the IT governance framework development and deployment throughout the project.

*Literature review*. Researchers from the four Tunisian institutions jointly performed a study about practices in IT governance outside the consortium of the project. Results showed how other universities and higher education institutions around the world are implementing and deploying IT governance solutions. The study helped them to consolidate the knowledge acquired in the trainings and to adapt the examples of the practical cases to their specific situation (Khouja et al., 2018).

*Best practices visits*. We organized four best practices visits to the European universities belonging to the project: Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), Høgskolen I Østfold (Norway), and Universitat de les Illes Balears (Spain) in this order. Université de Tunis El Manar attendees took advantage of the visits to obtain the easy and difficult aspects to replicate, the lessons learned and the main implementation barriers.

Specifically, Université de Tunis El Manar attendees learned the following lessons:

- There is a clear difference between IT governance and IT management.
- IT governance is an integral part of Corporate Governance.
- The main aim of IT governance is to align business strategy with IT strategy.
- The process of IT decision-making.
- Portfolio management concepts and development.
- Top management team should be aware of IT impact on business, and thus, decide on it.

Regarding the aspects to imitate, they highlighted:

- The IT governance team establishment.
- The Strategy committee establishment, to design strategies about IT.
- Their IT area directors designed an approval circuit to prioritize the most important projects to contribute to the achievement of business goals.
- Definition of several key performance indicators included in a dashboard to measure the IT performance in their university.

Among the aspects difficult to replicate, they highlighted:

- How to prevent business risks related to IT.

- How to analyze and implement new IT trends.
- Difficulties on assessing IT risks by the Governance Team if an IT project fails.
- Difficulties on assessing risks of liability for non-conformity of regulations.
- Definition of good behavior regarding IT and resistance to change management.

Similar to the previous universities, the Université de Tunis El Manar selected their attendees depending on their profile. They obtained the engagement and involvement of several managers for the first visit, e.g., the Vice-president of training, programs and professional integration, the Dean of the Faculty of Sciences, and the IT Chief Engineer and President of the IT Committee. Their participation and attendance were of special importance for the IT governance framework development and deployment as explained in the following sections. As for the other three visits, even though the number of Computer Science researchers increased, the Dean of the Faculty of Sciences and the Director of the Higher Institute of Computer Science attended as well, thus maintaining a managerial presence.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. At the beginning of this phase, we performed several *Initial assessment visits* to each Tunisian university. The aim was to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Université de Tunis El Manar. During the visit we were welcomed by many members of their *IT governance steering group* belonging to different faculties and institutions:

- Faculté des Sciences de Tunis (FST).
- Faculté de Médecine de Tunis (FMT).
- Faculté de Droit et des Sciences Politiques de Tunis (FDSPT).
- Faculté des Sciences Economiques et de Gestion de Tunis (FSEGT).
- Institut Supérieur des Sciences Biologiques Appliquées de Tunis (ISSBAT).
- Institut Supérieur des Sciences Humaines de Tunis (ISSHT).
- École Nationale d'Ingénieurs de Tunis (ENIT).
- Centre de Calcul El-Khawarizmi (CCK).
- Centre National de l'Informatique (CNI).
- Several members belonging to the Université de Tunis El Manar.

It is worth mentioning which institution the members of their *IT governance steering group* came from since it influenced the development and deployment of the framework, as detailed below. Nevertheless, they had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. As mentioned before, the questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Université de Tunis El Manar were as shown in Table 5.19:

**Table 5.19 – IT governance assessment at the Université de Tunis El Manar**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 16 | 29 | 55% | 31% |
| Strategy | 9 | 16 | 56% | 31% |
| Acquisition | 23 | 34 | 68% | 28% |
| Performance | 9 | 16 | 56% | 29% |
| Conformance | 16 | 19 | 84% | 18% |
| Human Behavior | 9 | 14 | 64% | 21% |

Blue: near or above average; Orange: under average

The initial situation of the Université de Tunis El Manar far exceeds the ten Spanish universities average (A. Fernández & Llorens, 2011). This means they were in a better initial level and so, the key aspects of IT governance were already achieved. Moreover, this did not mean that all work was done, but the activities had to be planned in an accurate way. These results are better shown in Figure 5.12, where activities related to *Conformance* achieved higher consensus than the average, thus they should focus their resources on activities mainly related to *Responsibility*, *Strategy* and *Performance*.

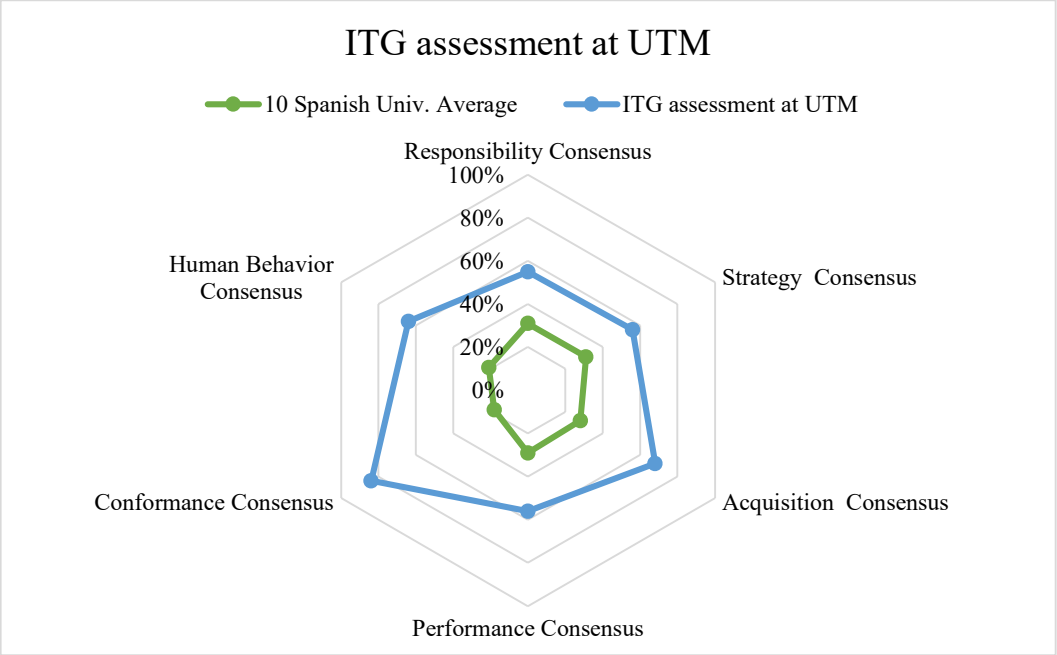


**Figure 5.12 – IT governance assessment at the Université de Tunis El Manar**

It is worth mentioning that one aspect we acknowledge during the visit was that, as it can be shown in Figure 5.12, they were not aware that they were already following the IT governance principles. Therefore, at the end of the visit we gave them some recommendations on which principle they should focus on first. Furthermore, we requested Université de Tunis El Manar partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities they would like to perform first.

As can be guessed by the group that received us during the *Initial assessment visit*, the Université de Tunis El Manar's *IT governance steering group* consisted of the following members:

- President of the Université de Tunis El Manar (Rector).

- Vice-president of the Université de Tunis El Manar.
- Director / Dean of the Institut Supérieur d'Informatique (ISI).
- Director / Dean of the FDSPT.
- Director / Dean of the FST.
- Director / Dean of the FMT.
- Director / Dean of the ENIT.
- Financial Officer.
- Human Resources Officer.
- Purchasing Officer.
- Judicial Officer.
- Quality Manager.
- Department Chief Math / Physics.
- Department Chief IT.
- Head of E-Learning Department.
- IT Manager.
- CIO Director.
- Three researchers belonging to the Faculty of Sciences.

This list reflects the engagement and participation obtained of members who occupied crucial positions by the Université de Tunis El Manar partners. They were involved in the project and supported their activities regarding the IT governance framework development and deployment from the very beginning. We should also highlight the order in the list, showing the importance given to deans over officers. It clear indicates the locus of the authority in the Université de Tunis El Manar, something that seems to be extensible to the whole country.

*IT governance best practices adaptation*. Fernández & Llorens (2009) recommended as a step in their ITG4U framework, to adopt and adapt the best practices that best suit the organization's needs. Thus, this activity consisted of the IT governance best practices adaptation, a self-assessment of the organizational IT governance maturity level in best practices and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Université de Tunis El Manar's *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Université de Tunis El Manar IT governance framework best practices catalog can be found in the Annex A. After adapting the best practices catalog, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.20:

**Table 5.20 – Initial situation of existing best practices at the Université de Tunis El Manar**

| | |
|---|---|
| **Responsibility (4 existing best practices)** | |
| 1. | The University's Governance Team (GT) regularly review which IT assets should be monitored centrally and which should be delegated. |
| 2. | The GT team actively direct the strategic planning of IT in the university. |
| 3. | The GT is aware of the importance of IT Governance. |
| 4. | The GT promoted actions (training, communication, etc.) to disseminate in the university community the importance of proper IT governance. |
| **Strategy (1 existing best practice)** | |

| |
|---|
| 1. The GT promoted a short-term and long-term study to determine the resources (financial, human, etc.) required to fulfil the IT strategic objectives. |
| **Acquisition (8 existing best practices)** |
| 1. The GT has designed multi-annual investment programs that guarantee the funding and execution of large-scale IT projects. |
| 2. The university optimizes its purchases using good practices (for example, purchasing consortia, discount negotiations, purchase of special offers, etc.). |
| 3. The GT has designed and published a policy that provides guidance on different types of acquisitions. |
| 4. Service level agreements have been set up with all IT suppliers. |
| 5. Reports are submitted to the GT that monitor the service levels agreed with suppliers. |
| 6. The GT has designed and published a policy that reflects its stance in relation to the outsourcing of services. |
| 7. The GT has promoted a study on the feasibility of externalizing various services and this study should encompass both the benefits and the risks for the university. |
| 8. Every 12 months the GT reviews the performance of outsourced IT services and determine their continuity. |
| **Performance (2 existing best practices)** |
| 1. The GT monitors whether the inefficient use of IT affects its performance and communicate the results to users so that they are aware of the need for correct usage. |
| 2. Every four months an internal audit is carried out to check the performance of IT services in operation. |
| **Conformance (5 existing best practices)** |
| 1. The GT has officially assigned the responsibility of being aware of IT-related legislation to a person or a group of people. |
| 2. A reference catalogue has been compiled that contains the IT-related regulations and laws that affect the university and is this kept up to date. |
| 3. The GT has defined and published a catalogue with all kinds of IT-related policies to guide the rest of the university community on how to implement IT on campus. |
| 4. The GT has promoted the design and publication of a set of internal procedures and regulations that implement the previously defined IT policies. |
| 5. The GT has promoted processes to communicate IT-related internal policies and regulations to facilitate their dissemination in all spheres of the university community. |
| **Human Behavior (3 existing best practices)** |
| 1. The various stakeholders are identified and is there official documentation on how each one will participate in new IT initiatives. |
| 2. There are different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes (for example: grouping them based on their experience of IT use or forming groups according to age and level of responsibility, etc.) |
| 3. The analysis identifies risk factors arising from resistance to change in the people or groups affected and from a lack of commitment in those involved. |

Figure 5.13 and Table 5.21 below show the percentages of best practices satisfied after the self-assessment. All this information served to adapt the maturity model as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.21 – Percentage of best practices satisfied by the Université de Tunis El Manar**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 22% | Performance Consensus | 25% |
| Strategy Consensus | 28% | Conformance Consensus | 39% |
| Acquisition Consensus | 41% | Human Behavior Consensus | 48% |

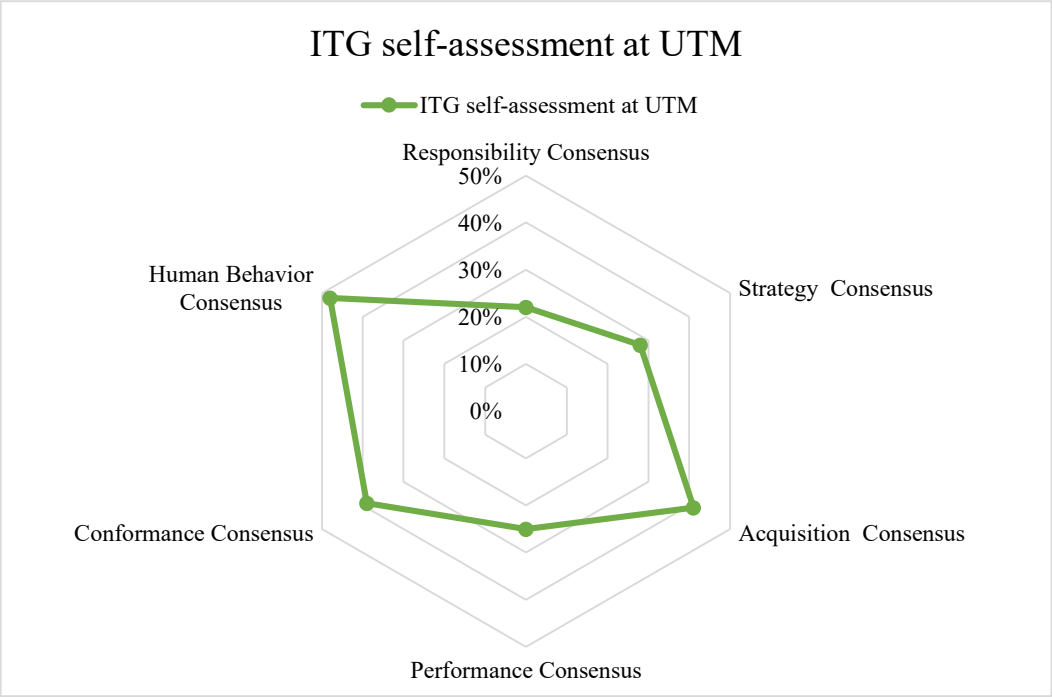


**Figure 5.13 – IT governance self-assessment at the Université de Tunis El Manar**

*IT governance maturity model adaptation*. In the previous activity, the Université de Tunis El Manar's IT governance framework covered the defined set of best practices. In this activity they had to adapt the proposed IT governance maturity model, provided by the European partners, review the maturity model adaptations to their organization, select the maturity level current situation and the maturity goal. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Université de Tunis El Manar's *IT governance steering group* decided to adopt it with no significant changes and then used it to self-assess their IT governance maturity level. Their results can be found in Table 5.22 below. To achieve the next level, the three IT governance activities should have the same level. Otherwise, it will remain at the level of the lowest score obtained.

**Table 5.22 – IT governance maturity level at the Université de Tunis El Manar**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 2 | Directors have allocated responsibilities related to IT management.<br>Directors allocate responsibilities based on their own criteria since they are not aware of any existing models.<br>Directors allocate management responsibilities and some IT governance responsibilities.<br>Directors allocate some IT governance responsibilities, but they do not apply any type of IT governance model.<br>Directors consider if a person that is allocated a responsibility has the appropriate skills. |
| | Direct | 1 | Directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 1 | Directors carry out an informal monitoring of responsibilities related to IT management. Directors check whether the responsibilities allocated are understood. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Strategy (1) | Evaluate | 1 | Directors believe the university has sufficient IT developments, although these are not integrated, to meet users' needs.<br>Directors monitor IT activity but not in a way that is aligned with the university's strategic objectives.<br>Directors analyze some of the risks albeit from an operational and legal compliance perspective but not considering business considerations. |
| | Direct | 1 | Directors plan investments in IT for the coming year.<br>The lack of involvement on the part of all the directors prevents any global policies relating to IT from being designed.<br>There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 2 | Directors monitor the projects at a superficial level for the purposes of justifying their expenditure.<br>Directors measure the results of IT projects from an operational perspective, but not from the university's business standpoint. |
| Acquisition (1) | Evaluate | 1 | Directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level. |
| | Direct | 1 | The reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |
| Performance (0) | Evaluate | 1 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective.<br>Key decisions concerning the performance level of the services will be taken by IT managers. |
| | Direct | 0 | IT assets cover the major operations of current university services (though not all those deemed desirable). |
| | Monitor | 1 | Some other indicators, apart from the economic one, are measured when prioritizing the allocation of IT assets. |
| Conformance (0) | Evaluate | 0 | Directors have assigned the responsibility of finding about the legislation concerning IT and ascertaining how it affects the university. |
| | Direct | 1 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 0 | No aspects are covered. |
| Human Behavior (0) | Evaluate | 0 | No aspects are covered. |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved.<br>Directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| | Monitor | 0 | No aspects are covered. |

The *IT governance steering group* selected their maturity goals based on the above results and the principles they wanted to improve. Concretely, to reach the selected maturity, they focused mainly on *Responsibility*, *Acquisition*, *Performance* and *Conformance*, although they also included actions for *Strategy* principle (Table 5.23).

**Table 5.23 – Selected actions to achieve Université de Tunis El Manar's goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | An IT Strategic Committee should be set up. |
| | An IT Steering Committee should be set up. |
| | The fact that IT governance is the responsibility of the GT should be understood. |
| | The CIO should take part in preparing strategic plans. |
| | The Governance Team should direct the strategic planning of IT. |
| | The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. |
| | The GT should decide which IT assets must be monitored centrally and which ones must be delegated. |
| Strategy | The GT should plan IT acquisitions in a timely manner and include them in the next year's budget. |
| Acquisition | A single, centralized cost center should be set up to carry out the university's main IT investments. |
| | The GT should design a procedure that allows it to measure clearly and accurately the university's expenditure on IT (at least the centralized costs). |
| | The GT should design and publish a policy that provides guidance on different types of supplier relationships. |
| Performance | The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. |
| | The GT should design a policy that reflects the expected performance of university processes that are IT-based. |
| | An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy |
| | The GT should promote the design of a procedure to analyze the satisfaction of various stakeholders with relation to the university's IT-based services in operation. |
| | The GT should regularly analyze user requirements. |
| | The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |
| Conformance | A reference catalogue should be compiled that contains the IT related regulations and laws that affect the university, and this should be kept up to date. |
| | The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. |
| | A reference catalogue should be created that contains the IT related standards applicable or already applied in the university and this should be kept up to date. |
| | The GT should regularly review the skills of those in charge of ensuring the compliance of IT regulations in the university. |
| | The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. |
| Human Behavior | No selected actions. |

A similar situation is perceived also in this university regarding the chosen actions. The *IT governance steering group* clearly influenced the selection of the maturity level goals. As they had the support and commitment of several authorities in their institution, they took an attitude of change and improvement of its governance of IT. This is reflected by their IT governance steering group actively participation throughout this entire phase. Furthermore, the available time was decisive in the selection of maturity goals and feasible activities to be carried out. It should be noted that they had less than a year and a half to prepare the plan and carry out the actions. In any case, their plan was tailored to their specific situation, considering the engagement of their stakeholders, available resources, and attitude of improvement.

*IT governance improvement plan design and assessment*. At this point, the main elements of the framework were defined: i.e., best practices, maturity goal and improvement actions. Thus, the Université de Tunis El Manar drew a deployment plan tailored to their organizational circumstances. The Université de Tunis El Manar's IT governance improvement plan followed the PMI project management standard and was structured in the following six phases:

- Initiating: this phase aimed to bring leaders' awareness and realization of the deployment of the framework. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (self-assessment of best practices and maturity), ii) selected goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.
- Planning: the plan provided the specification of purposes, goals and outcomes, deliverables, stakeholders, risks and involved teams. Furthermore, a Gantt diagram was also provided, indicating responsible people, tasks, and deliverables within the chronogram.
- Execution: this phase was meant to present the implementation actions, its period, its factors and metrics, and its different steps.
- Monitoring and Controlling: this phase aimed to define and implement a controlling system to allow a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Université de Tunis El Manar partners listed evidence and KPIs by each action classified by principles.
- Risk Management: this phase defined and formalized risk management procedures, to be followed during and after the implementation of the framework. The main aim was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Université de Tunis El Manar partners identified main risks, analyzed its probability and impact, prioritized them, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: Université de Tunis El Manar partners defined a communication plan, in which several stakeholders and deliverables were identified. A list of actions depending on the target groups were also

defined, e.g., info days, workshops, and seminars addressed to students, internal staff, and/or the industry.

The Université de Tunis El Manar's IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

During the third phase of the project, Université de Tunis El Manar partners deployed their *IT governance improvement plan*. We monitored the state of the planned actions in a continuous improvement cycle. Table 5.24 shows the state of the actions at the end of the project, in October 2018. We requested Université de Tunis El Manar partners to indicate the planning dates for each action, start and end, as well as their state. As shown in Table 5.24, the actions had two different states: accomplished, and ongoing. Those accomplished actions were done as planned while several actions were still ongoing. Université de Tunis El Manar partners faced a similar situation regarding the reelection of a new rector. Even though, this led to structural and managerial changes who had not previously worked on the project and were not aware of the importance of IT governance, Université de Tunis El Manar managed the situation according to the plan. They had to regain the support from top management to prevent the support from being weakened. In this case, the partners anticipated this change so close to the end of the project and the development of certain activities and considered this new situation when elaborating the plan. Université de Tunis El Manar partners reacted to this event by lengthening until December those actions that ensured the engagement of board and their understanding of IT governance importance (Table 5.24). Thus, actions belonging to the other principles were planned accordingly.

**Table 5.24 – State of Université de Tunis El Manar's improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| An IT Strategic Committee and an IT Steering Committee should be set up. | January 2018 | February 2018 | Accomplished |
| The fact that IT governance is the responsibility of the GT should be understood. | March 2018 | December 2018 | Ongoing |
| The CIO should take part in preparing strategic plans. | March 2018 | December 2018 | Accomplished |
| The GT should direct the strategic planning of IT. | March 2018 | December 2018 | Ongoing |
| The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. | March 2018 | December 2018 | Ongoing |
| The GT should decide which IT assets must be monitored centrally and which ones must be delegated. | March 2018 | December 2018 | Ongoing |
| **Strategy** | | | |
| Actions | Start | End | State |
| The GT should plan IT acquisitions in a timely manner and include them in the next year's budget. | May 2018 | December 2018 | Ongoing |
| **Acquisition** | | | |
| Actions | Start | End | State |
| A single, centralized cost center should be set up to carry out the university's main IT investments. | May 2018 | July 2018 | Accomplished |

| | | | |
|---|---|---|---|
| The GT should design a procedure that allows it to measure clearly and accurately the university's expenditure on IT (at least the centralized costs). | September 2018 | December 2018 | Ongoing |
| The GT should design and publish a policy that provides guidance on different types of supplier relationships. | September 2018 | December 2018 | Ongoing |
| **Performance** | | | |
| Actions | Start | End | State |
| The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. | June 2019 | July 2019 | Ongoing |
| The GT should design a policy that reflects the expected performance of university processes that are IT-based. | July 2018 | October 2018 | Ongoing |
| An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy | September 2018 | October 2018 | Ongoing |
| The GT should promote the design of a procedure to analyze the satisfaction of various stakeholders with relation to the university's IT-based services in operation. | October 2018 | December 2018 | Ongoing |
| The GT should regularly analyze user requirements. | June 2018 | December 2018 | Ongoing |
| The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. | June 2018 | December 2018 | Ongoing |
| **Conformance** | | | |
| Actions | Start | End | State |
| A reference catalogue should be compiled that contains the IT related regulations and laws that affect the university, and this should be kept up to date. | October 2018 | January 2019 | Ongoing |
| The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. | September 2018 | October 2018 | Ongoing |
| A reference catalogue should be created that contains the IT related standards applicable or already applied in the university and this should be kept up to date. | December 2018 | February 2019 | Ongoing |
| The GT should regularly review the skills of those in charge of ensuring the compliance of IT regulations in the university. | November 2018 | February 2019 | Ongoing |
| The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. | September 2018 | October 2018 | Ongoing |

Université de Tunis El Manar partners selected several monitoring and control mechanisms to ensure that improvements were achieved and sustained over time. Thus, regarding those accomplished actions, Université de Tunis El Manar partners provided several evidence documentations (Table 5.25) and KPIs. In fact, they also included evidence and KPIs in those actions with the state of "ongoing" to show their progress. Université de Tunis El Manar evidence documentation can be found in Annex A.

**Table 5.25 – Evidenced finished actions at the Université de Tunis El Manar**

| Principles | Evidence | KPIs |
|---|---|---|
| Responsibility | List of members of the committee.<br>Nomination of CIO.<br><br>Meeting minutes for strategic plan preparation. | Number of meetings.<br>Number of representatives of users and managers that participate in the IT steering committee. |
| Strategy | IT acquisition plan. | - |
| Acquisition | Centralized cost center.<br>A document describing the calculation rules.<br>A catalogue of suppliers and suppliers' relationships. | - |
| Performance | A catalogue of human resources.<br>Policy for aligning University performance and IT.<br>A comparison between the university's strategy and the IT strategy<br>Report on users' requirements<br>Feedback from users. | Number of IT indicators included in the catalogue |
| Conformance | Catalogue of laws and regulations<br>ITG standards catalogue | Number of consultations of the reference guide of IT related laws.<br>Number of consultations of the reference guide of IT related standards. |

Even though the set of evidence seems quite complete, the selection of KPIs should have been more precise. Université de Tunis El Manar had an ambitious plan of actions and willingness of change and improvement, as it is highlighted by the selected actions, the set of evidence and the KPIs design. For them, this new situation regarding the re-election of the rector was not an unexpected situation since they had already foreseen it and acted accordingly. Although the project ended in October 2018, Université de Tunis El Manar partners lengthened the period of several actions to ensure their accomplishment. This behavior is in line with your ambitious plan and your positive attitude to change and improvement.

Université de Tunis El Manar team showed a strong engagement and involvement in the project in general, throughout the duration of the project, but especially in IT governance implementation which can be clearly seen with the people forming their IT governance group. They executed a great ambitious plan to improve their current situation. It is worth noting that after their self-assessment to know their current maturity level, the results showed they were at a medium level, which is why they were able to execute such an ambitious plan.

Along the duration of the project, Université de Tunis El Manar provided several documents and evidence showing their completeness and correctness of their activities. In terms of IT governance, beyond what was initially expected by the project, Université de Tunis El Manar focused on maintaining and reinforcing what they already had in use and also on improving their current situation taking the IT governance of the organization to higher levels. Regarding the objectives of the project, Université de Tunis El Manar's achievements served as an example to other organizations. Thus, Université de Tunis El Manar strongly opted for the integration of IT governance, action that is reflected with the strong interest and involvement of

the internal management of the organization. This has been very important not only for the achievement of the project objectives but also for the complete implementation of IT governance in their institution.

**Université de Sfax**

The Université de Sfax (USS) was founded on 1986, located in the eastern region of Sfax. At the beginning of the project, the university amounted 20 institutions, 43,000 students, 2,800 staff, 5 doctoral schools and 93 laboratories and research units. It also stablished wide international cooperation among European countries, U.S., Japan, and several African countries with programs regarding international partnership and mobility of students and lecturers. The strategic objectives of the Université de Sfax were ensuring teaching efficiency and attractiveness by adopting the LMD (Bachelor, Master and Doctorate) regime and co-constructing degrees with the economic environment, developing R&D actions, i.e., valorization, innovation, patenting, improving governance aspects, i.e., quality assurance and assessment, and promoting the professional partnership and interaction with national and international environment.

**A. First phase – Learning about IT governance**

*Training*. We addressed two different profiles through the *Initial training researchers* and the *Initial training managers*. Researchers belonging to both the Institut Supérieur d'Informatique et de Multimédia de Sfax (ISIMS) and to the Faculté des Sciences Economiques et de Gestion de Sfax (FSEG), and the Chief Engineer at the Université de Sfax attended the first training held at the Universitat de les Illes Balears (Spain). The profile of the participants was mainly researchers in Computer Science, thus the objective of addressing professors and lecturers who may be interested in developing courses on IT governance was achieved. Furthermore, the participation of the Chief Engineer was crucial to obtain the engagement of this university in the project.

The second training should have been carried out in Tunisia, but due to security measures it was rescheduled and held at the Universidad de Almería (Spain). For this reason, the expected number of participants decreased resulting in the above-mentioned researchers. However, the Dean of the Faculté des Sciences Economiques et de Gestion de Sfax, the Dean of the Institut Supérieur d'Informatique et de Multimédia de Sfax, and the President of the Information Systems Committee at the Université de Sfax, also attended the *Initial training managers*. The participation of these people fulfilled the goal of convincing Université de Sfax decision-makers with the importance of IT governance in their university, thus obtaining good opportunities for applying IT governance principles and best practices.

*Literature review*. Researchers from the four Tunisian universities participating in the project performed this activity jointly. As mentioned above, they conducted a literature review to learn different lessons from several case studies that were found. As a result, they learnt about practices used in different developed and developing countries that could be adapted to their specific needs and situation (Khouja et al., 2018).

*Best practices visits*. Due to security and financial issues, the visits were organized throughout the project and held at the Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), Høgskolen I Østfold (Norway), and Universitat de les Illes Balears (Spain) in this order. Each European host presented their best practices

and frameworks, which helped the Université de Sfax attendees to consolidate its knowledge acquired in both trainings, to take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

Université de Sfax attendees learnt the following lessons:

- ISO 38500 standard concrete implementation.
- Understanding the strategic role of the Governance team.
- Understanding the importance of an IT Governance framework.
- Understanding the importance of the CIO.
- The deans realized the importance of IT Governance in their institutions.
- The relation between strategy, responsibility and acquisition convinced the deans of the positive effect a strategy committee should obtain when designing strategies about IT.

Among the aspects the Université de Sfax wanted to imitate were included:

- Governance Team formal establishment.
- Strategy Committee formal establishment.
- The IT portfolio concept.

Among the aspects the Université de Sfax had difficulties to replicate were included:

- The position of the CIO was difficult to be formally established, as well as to find a good candidate with the needed profile.
- The Governance Team was not included in the structure of the institution, which could not be modified easily, thus their decisions were not mandatory.
- The institution did not have the full control of the IT budget. External agents, like the Ministry, could take decisions not aligned with their IT strategy.

In general terms, Université de Sfax attendees were selected considering their profiles. The team selected for the first visit was the Dean of the Faculty of Management and Economics, the Dean of the Higher Institute of Computer Science and Multimedia, and the President of the Information Systems Committee at the Université de Sfax, among some other researchers. This was crucial to obtain the engagement of this university regarding the development and deployment of their IT governance framework. The attendance of the Dean of the Faculty of Management and Economics was constant throughout the project, as well as the Chief Engineer attendance, maintaining the interest of the Université de Sfax participants in learning about IT governance best practices and frameworks.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. As explained above, we performed *Initial assessment visits* to each Tunisian university. The purpose was to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Institut Supérieur d'Informatique et de Multimédia de Sfax belonging to the Faculté des Sciences Economiques et de Gestion de Sfax. During the visit we were welcomed by some members of their *IT governance steering group*,

who had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Université de Sfax were as shown in Table 5.26:

**Table 5.26 – IT governance assessment at the Université de Sfax**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 1 | 29 | 3% | 31% |
| Strategy | 2 | 16 | 13% | 31% |
| Acquisition | 9 | 34 | 26% | 28% |
| Performance | 1 | 16 | 6% | 29% |
| Conformance | 4 | 19 | 21% | 18% |
| Human Behavior | 4 | 14 | 29% | 21% |

Blue: near or above average; Orange: under average

The Université de Sfax presented a similar situation than the Université de Gabès. In comparison with ten Spanish universities average (A. Fernández & Llorens, 2011), the Université de Sfax showed three principles in a similar situation and the other three far below average. Human behavior and Conformance principles presented better results, while Responsibility, Strategy and Performance presented worse results. Acquisition principle was almost the same as the average. These results positioned the Université de Sfax in an initial level of IT governance maturity. Thus, its activities had to involve mainly Responsibility and Strategy principles, to set new structures which, create new policies and plans aligning IT with business. These results are better shown in Figure 5.14, where activities related to *Human Behavior* and *Conformance* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility* and *Performance* in the first place.

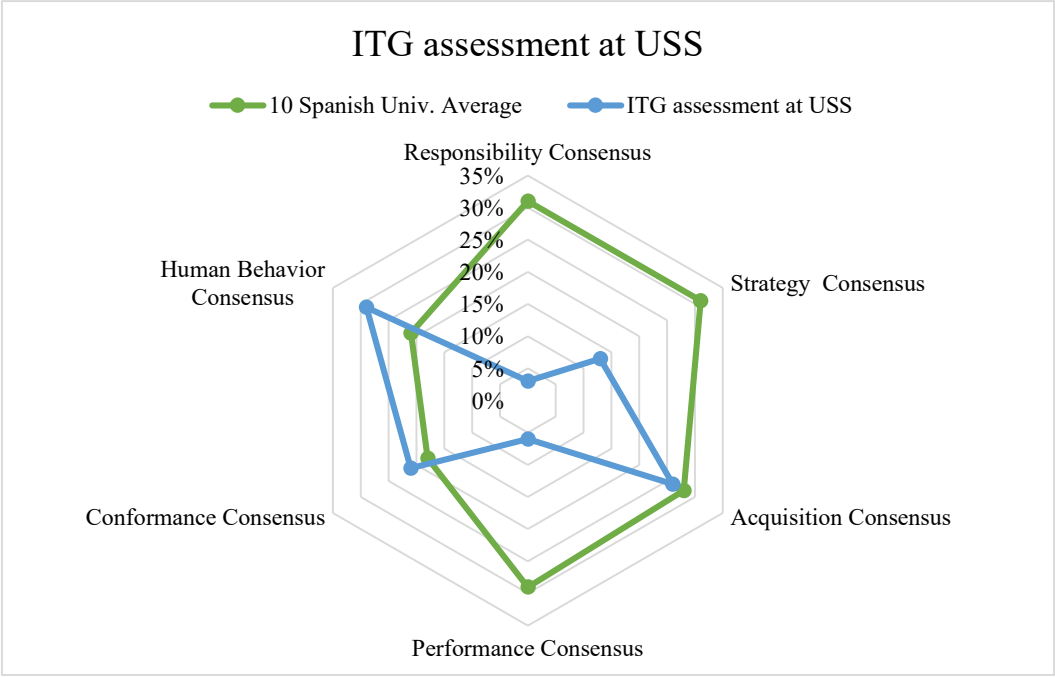


**Figure 5.14 – IT governance assessment at the Université de Sfax**

Focusing on the lower results, at the end of the visit we gave them some recommendations on which principle they had to improve first. Furthermore, we requested Université de Sfax partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities would like to perform first.

Regarding the Université de Sfax' *IT governance steering group*, it consisted of the following members:

- Dean of the Faculté des Sciences Economiques et de Gestion de Sfax.
- The CIO.
- The board of the faculty composed by 10 persons.
- 5 Academic Department Directors.

Partners from the Université de Sfax decided to focus the IT governance actions in their faculty solely. This was an attitude showed from the very beginning as people belonging to this faculty attended the trainings, welcomed us at the *Initial assessment visit* and were part of the *IT governance steering group*. Their attitude was very conservative due to the legal restrictions they were facing in their institution. As mentioned above, faculties have more authority in Tunisia because they were created long before the universities to which they belong. Université de Sfax partners focused on the faculty, and therefore, the framework was developed and implemented in this area.

*IT governance best practices adaptation*. The ITG4U framework suggests to adopt and adapt the best practices that best suit the needs of the institution (A. Fernández & Llorens, 2009). Therefore, in this activity Université de Sfax partners adapted the IT governance best practices, used them to self-assess their IT governance maturity level in best practices. European experts assessed both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Université de Sfax' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Université de Sfax IT governance framework best practices catalog can be found in the Annex A. The results of their self-assessment, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.27:

**Table 5.27 – Initial situation of existing best practices at the Université de Sfax**

| | |
|---|---|
| **Responsibility (1 existing best practice)** | |
| 1. | The faculty's Governance Team (GT) regularly reviews which IT assets should be monitored centrally and which should be delegated. |
| **Strategy (2 existing best practices)** | |
| 1. | The GT plans IT acquisitions in a timely manner and they are included in the next year's budget. |
| 2. | The GT has designed medium-term IT infrastructure renewal plans to prevent this from becoming obsolete while at the same time incorporating emerging technologies. |
| **Acquisition (9 existing best practices)** | |
| 1. | The GT has set up a procedure to measure clearly and accurately how much the faculty spends on IT on an annual basis. |
| 2. | The GT has designed and published a policy that provides guidance on different types of acquisitions |
| 3. | Service level agreements have been set up with all IT suppliers |
| 4. | Reports are submitted to the GT that monitor the service levels agreed with suppliers |
| 5. | When calculating the cost of an IT project, these calculations include the costs required to maintain the continuity of an IT-based service. |

| | |
|---|---|
| 6. | When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university |
| 7. | The GT has designed and published an IT acquisition approval protocol that details all the people responsible for supplying information and making decisions |
| 8. | The GT has the ultimate responsibility for IT projects that are going to be implemented (both those that are centralized and delegated) and decide their priorities in such a way that a large portion of resources are channeled to the most important projects |
| 9. | The GT supports initiatives aimed at exchanging experiences and collaborating with other universities |
| **Performance (1 existing best practice)** | |
| 1. | The GT has devoted enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services |
| **Conformance (8 existing best practices)** | |
| 1. | The GT has officially assigned the responsibility of being aware of IT related legislation to a person or a group of people. |
| 2. | A reference catalogue has been compiled that contains the IT-related regulations and laws that affect the faculty and is this kept up to date. |
| 3. | The GT has defined and published a catalogue with all kinds of IT-related policies to guide the rest of the faculty community on how to implement IT on campus. |
| 4. | The GT has promoted the design and publication of a set of internal procedures and regulations that implement the previously defined IT policies. |
| 5. | The GT has assigned a person or a group the responsibility of monitoring whether a person or group complies with the regulations. |
| 6. | That group supervise IT services and projects encouraged to consider IT-related external regulations and laws, policies, and internal procedures. |
| 7. | Internal audits have carried out to check whether IT projects and services comply with IT-related external laws and regulations and internal policies and procedures. |
| 8. | Reports are submitted to the GT with the results of the internal and external audits, which clearly express the level of the faculty's level of compliance with regulations and the risks that these entails. |
| **Human Behavior (5 existing best practices)** | |
| 1. | There are identified different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes. |
| 2. | A process has been set into motion to raise awareness that leads to reducing people's resistance to an IT-based change process (information, training, etc.). |
| 3. | IT project planning includes the responsibilities assigned to all participants and activities aimed at measuring the extent to which the involvement of these people contributes to the success of the project and therefore to the change process that it promotes. |
| 4. | IT project planning includes a stage of cross training, training the heads of the faculty service in IT matters and technicians in the faculty process affected by the IT initiative. |
| 5. | The GT knows what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. |

Figure 5.15 and Table 5.28 below show the percentages of best practices satisfied after the self-assessment. This needed information served to adapt the maturity model as well as the elaboration of a realistic IT governance implementation plan, as detailed in next sections.

**Table 5.28 – Percentage of best practices satisfied by the Université de Sfax**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 3% | Performance Consensus | 6% |
| Strategy Consensus | 13% | Conformance Consensus | 42% |
| Acquisition Consensus | 26% | Human Behavior Consensus | 33% |

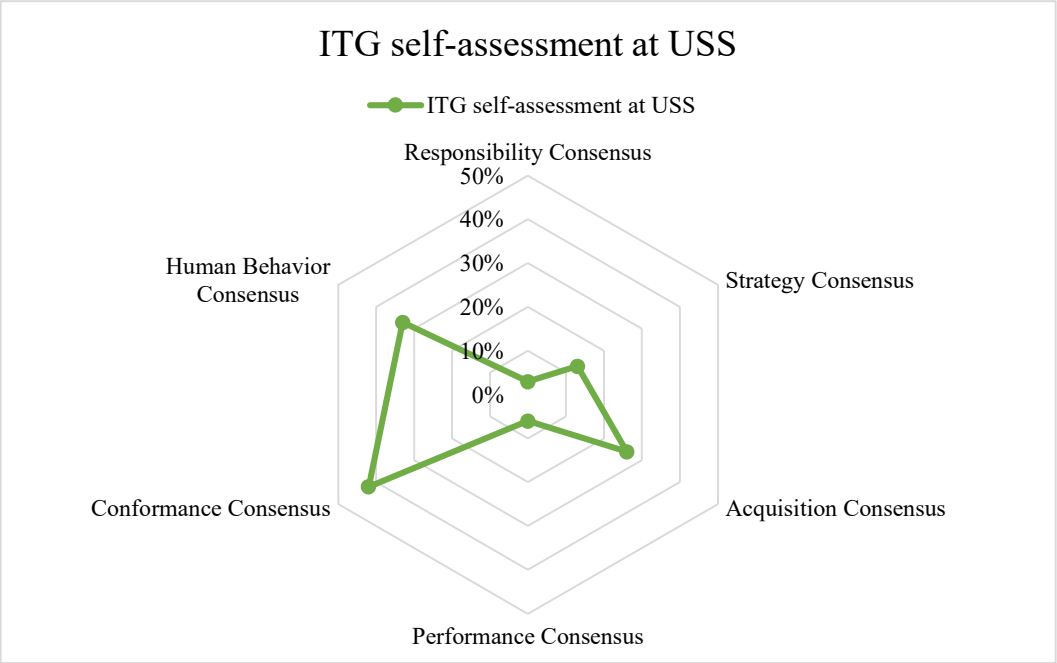


**Figure 5.15 – IT governance self-assessment at the Université de Sfax**

*IT governance maturity model adaptation*. After defining the set of best practices aimed to be covered by their IT governance framework, adaptations on the proposed IT governance maturity model were needed. We provided them with a proposition of IT governance maturity model, and then reviewed their model adaptations. Université de Sfax partners assessed their current maturity level and selected their maturity goal. Therefore, the maturity model provided were classified by each of the six ISO/IEC 38500 standard's principles and divided by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Université de Sfax' *IT governance steering group* adopted it with no significant modifications and then used it to self-assess their maturity level regarding IT governance. These results can be found in Table 5.29 below. The three IT governance activities should have the same level to achieve the next level for each principle. Otherwise, it will remain at the level of the activity with the lowest score obtained.

**Table 5.29 – IT governance maturity level at the Université de Sfax**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management. |
| | Direct | 1 | Directors monitor IT management but not in a planned way. |
| | Monitor | 2 | Directors carry out formal monitoring of responsibilities related to IT management.<br>Directors check whether the responsibilities allocated are understood.<br>Directors check whether the person who is allocated the responsibility understands it. |
| Strategy (0) | Evaluate | 2 | Directors acknowledge that sufficient integrated IT developments exist to meet users' needs. |
| | Direct | 0 | Directors perform IT management without any type of future planning. |
| | Monitor | 1 | Directors monitor the projects at a superficial level for the purposes of justifying their expenditure. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Acquisition (0) | Evaluate | 0 | The faculty directors do not determine major IT acquisitions. |
| | Direct | 1 | The reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process. |
| | Monitor | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |
| Performance (1) | Evaluate | 1 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective. |
| | Direct | 1 | IT assets cover the major operations of current faculty services (though not all those deemed desirable). |
| | Monitor | 1 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets. |
| Conformance (0) | Evaluate | 0 | The faculty directors do not know what legislation exists in relation to IT assets. |
| | Direct | 1 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 2 | The directors check that acquaintance with the IT-related laws and regulations is widespread. |
| Human Behavior (1) | Evaluate | 4 | Directors are concerned to define communities and encourage maximum involvement in the new process of change facilitated by the IT assets. |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved. |
| | Monitor | 1 | The directors monitor the projects, basing their analysis solely on technical indicators. |

After several internal meetings, the *IT governance steering group* at the Université de Sfax decided to select maturity goals in four principles. Concretely, they focused on *Responsibility*, *Strategy, Performance* and *Conformance* to reach level 2. The other two IT governance principles were not planned to be improved. For each selected principle, they planned the actions shown in Table 5.30 to achieve their goal maturity level.

**Table 5.30 – Selected actions to achieve Université de Sfax' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | The fact that IT governance is the responsibility of the GT should be understood. |
| | An IT Committee should be set up. |
| | The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. |
| | Create the CIO role and include it in GT. |
| | The CIO should take part in preparing strategic plans. |
| Strategy | The Governance Team should design a general strategic plan and include in it the strategic planning of IT. |
| | The GT should design medium-term IT infrastructure renewal plans to prevent this from becoming obsolete while at the same time incorporating emerging technologies. |
| | The GT should design a set of IT policies, aligned with the faculty's strategy, that are a reference to guide those who must make IT-related decisions in the faculty. |
| | Design a catalogue of IT policies. |

| Principle | Actions |
|---|---|
| Acquisition | No selected actions. |
| Performance | The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |
| | The GT should design a policy that reflects the expected performance of faculty processes that are IT-based. |
| | Create indicators that measure the value of catalogues regarding IT management. |
| Conformance | The GT should officially assign the responsibility of being aware of IT related legislation to a person or a group of people. |
| | A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the faculty, and this should be kept up to date. |
| | A reference catalogue should be created that contains the IT-related standards applicable or already applied in the faculty and this should be kept up to date. |
| | The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. |
| | The GT should promote the design and publication of a set of internal procedures and regulations that implement the previously defined IT policies. |
| Human Behavior | No selected actions. |

Some conclusions may be raised regarding the selected actions. The formation of the *IT governance steering group* influenced those decisions. As they were taking a conservative attitude, the actions were designed to be applied in their faculty instead of the whole university. Although the obtained results showed an area of the university, the Université de Sfax partners were supported by their faculty authorities during the whole IT governance development and deployment process. As the other Tunisian universities, the remaining time was another influencing factor to consider. They had less than a year and a half to prepare the plan and carry out the actions. For these reasons they presented a realistic plan tailored to their faculty, considering their stakeholder support, and the remaining time and resources of the project.

*IT governance improvement plan design and assessment*. Université de Sfax provided a plan for the implementation of the IT governance framework in their faculty. At this step, they had defined the main elements of their framework, i.e., best practices, maturity goal and improvement actions. They drew a deployment plan tailored to their organizational circumstances, following the PMI project management standard. The Université de Sfax' IT governance improvement plan was structured in the following six phases:

- Initiating: the first phase aimed to engage their leaders to the awareness and realization that the framework was going to be deployed. For this reason, they presented their i) IT governance current situation (by the last two activities), ii) goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.
- Planning: the second phase detailed the scope of the project, stakeholders, risks, and outcomes. They also included a Gantt diagram classifying each action by principle, indicating its priority, responsible people, deliverables, and a chronogram.
- Execution: the third phase identified a list of actions, its factors and metrics and its different steps.

- Monitoring and Controlling: the fourth phase defined a controlling system for the aspects included in the framework that allowed a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Université de Sfax partners presented several documents and KPIs as evidence.
- Risk Management: the fifth phase defined and formalized risk management procedures to be followed during and after the implementation of the framework. The main aim was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Université de Sfax partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: finally, the sixth phase included a communication plan, which indicated the intensity of communication as well as the stakeholders involved. A brief list of actions depending on the target groups were also defined, to communicate the results obtained by this project.

The Université de Sfax' IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

Université de Sfax partners deployed their *IT governance improvement plan* in the third phase of the project. This phase consisted of a continuous improvement cycle in which European experts monitored the state of the planned actions. Table 5.31 shows the state of the actions at the end of the project, in October 2018. We requested Université de Sfax partners to indicate the state of each action. As it can be seen in Table 5.31, the actions had two different states: accomplished, and rescheduled. Those accomplished actions were done as planned; however, several actions were rescheduled due to internal issues. As the other Tunisian Universities, the main barrier that Université de Sfax partners faced was the reelection of a new rector. This led to structural and managerial changes who had not previously worked on the project and were not aware of the importance of IT governance. Even though support from top management was crucial to the development of the framework, and this situation weakened that support, the impact was not so severe. The partners did not anticipate this change so close to the end of the project and did not prepare mitigation measures. In any case, the partners deployed their plan at the faculty level, thus the changes at the rector level affected them to a lesser degree. Nonetheless, the behavior of the Université de Sfax was not as expected since many actions were rescheduled without explaining the reason or assigning new dates. This attitude shows the low interest in change and improvement concerning IT governance, regardless of the project.

**Table 5.31 – State of Université de Sfax' improvement actions**

| Principles | Actions | State |
|---|---|---|
| Responsibility | The fact that IT governance is the responsibility of the GT should be understood. | Accomplished Sept 2018 |

| | | |
|---|---|---|
| | An IT Committee should be set up. | Accomplished Sept 2018 |
| | The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. | Rescheduled |
| | Create the CIO role and include it in GT. | Accomplished Oct 2018 |
| | The CIO should take part in preparing strategic plans. | Rescheduled |
| Strategy | The Governance Team should design a general strategic plan and include in it the strategic planning of IT. | Rescheduled |
| | The GT should design medium-term IT infrastructure renewal plans to prevent this from becoming obsolete while at the same time incorporating emerging technologies. | Rescheduled |
| | The GT should design a set of IT policies, aligned with the faculty's strategy, that are a reference to guide those who must make IT-related decisions in the faculty. | Rescheduled |
| Performance | The GT should devote enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. | Rescheduled |
| | The GT should design a policy that reflects the expected performance of faculty processes that are IT-based. | Rescheduled |
| | Create indicators that measure the value of catalogues regarding IT management. | Rescheduled |
| Conformance | The GT should officially assign the responsibility of being aware of IT related legislation to a person or a group of people. | Rescheduled |
| | A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the faculty, and this should be kept up to date. | Rescheduled |
| | A reference catalogue should be created that contains the IT-related standards applicable or already applied in the faculty and this should be kept up to date. | Rescheduled |
| | The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. | Rescheduled |
| | The GT should promote the design and publication of a set of internal procedures and regulations that implement the previously defined IT policies. | Rescheduled |

Université de Sfax partners provided the documentation indicated in Table 5.32 as evidence for those accomplished actions. They also included two KPIs as control and monitoring measures. Université de Sfax' evidence documentation can be found in Annex A.

**Table 5.32 – Evidenced finished actions at the Université de Sfax**

| Actions | Evidence | KPIs |
|---|---|---|
| The fact that IT governance is the responsibility of the GT should be understood. | List of members of the committee.<br>Formal nomination of the CIO. | Number of meetings of the steering committee n_meeting = 3<br>Number of dissemination events n_event = 1 |
| An IT Committee should be set up. | | |
| The GT should ensure that representatives of all IT users and managers participate in the IT Steering Committee. | | |
| Create the CIO role and include it in GT. | | |

Again, the selected KPIs shows a low interest in progress. Université de Sfax partners could have established KPIs in actions belonging to *Strategy*, *Performance*, and *Conformance* principles, even though they were rescheduled, for future

monitoring and control. In any case, Université de Sfax partners selected these actions considering their resources and possibilities regarding their situation and commitment.

It should be remembered that the *IT governance steering group* in Université de Sfax does not cover the whole scope of the university, but it focuses on the Faculty of Economics and Management. Université de Sfax partners emphasized the cultural and legal difficulties they have in terms of internal structures, appointment of new positions (like the CIO) and management of the IT budget. For this reason, they have focused just on the faculty instead of the whole university. Based on it, they have scheduled several actions to better spread the importance of the CIO role and its responsibilities, the design of an IT strategy plan and policies aligned with the university and a set of internal procedures and regulations regarding IT.

Université de Sfax analyzed their possibilities in terms of resources, legal issues, and engagement of stakeholders, and provided a realistic plan with viable actions to be performed not only under the scope of this project but also beyond the lifetime of this project. Although the plan contains all the sections requested, due to their difficulties, some sections are little ambitious and very conservative. For them it was a challenge to overcome the explained difficulties, reflecting brevity and conservationism in the selection of their actions.

Even so, the Université de Sfax made great efforts to match the minimum level required, showing all the time the engagement and involvement of their leaders and people occupying organizational decision positions. Under this scope, they restricted the area of application to thereby show it as a case of success and evolution in terms of IT governance, to change the behavior of the entire organization.

### 5.2.3. Albanian Universities and HEIs

Four Albanian universities participated in the project: Universiteti Politeknik i Tiranës, Universiteti Aleksandër Moisiu Durrës, Universiteti Europian i Tiranës and Universiteti i Tiranës. Three of them are in Tirana, the capital of Albania, Universiteti i Tiranës, being the biggest public university, Universiteti Politeknik i Tiranës, and Universiteti Europian i Tiranës (a private institution). The Universiteti Aleksandër Moisiu Durrës is a public institution, belonging to west Albanian city of Durrës. These aspects played an important role in the IT governance frameworks implementation, influencing the attitude of the universities towards the adoption of best practices, the available resources, and the support obtained by the different stakeholders.

**Universiteti Politeknik i Tiranës**

The Universiteti Politeknik i Tiranës (UPT) is in Tirana, the capital of Albania, and as a public academic institution, is the only Polytechnic University in Albania. The Universiteti Politeknik i Tiranës was founded on 1951 as a state-chartered institution in Tirana, under the name of Higher Polytechnic Institute. It provides study programs in the three study cycles, and it is composed of seven Faculties and one Institute of research and development.

At the beginning of the project, the Universiteti Politeknik i Tiranës amounted 10,000 students and 280 academic staff. It offered around 60 bachelor's degrees, 21 master's degrees and 12 doctorate degrees. In all main units and base units (departments), the university had records of partnership agreements with foreign higher education institutions through participation in scientific research projects with foreign universities.

It aimed the expansion of cooperation and improvement of scientific research results quality.

**A. First phase – Learning about IT governance**

*Training*. As mentioned above, we performed two different training sessions addressed at two different targets: researchers and managers. Researchers from the Faculty of Information Technology, including its Dean, attended the first *Initial training Researchers*, held at the Universitat de les Illes Balears (Spain). The profile of the participants was related to computer science, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects and train future young researchers was fulfilled. In addition, the participation of the Dean in the training sessions was crucial to obtain the engagement of this university in the project.

The second training, *Initial training Managers*, was held at the Universiteti Politeknik i Tiranës, thus expecting an increased number of attendees than the previous training. As a result, researchers and the Administrator from the Faculty of Information Technology, and the Head of the Department of Electronics and Telecommunications attended this second training, thus obtaining the involvement and engagement of several managers. This had a positive impact on the achievement of the project objectives and specifically on the IT governance framework development by this university, as reflected in the following sections.

*Literature review*. Researchers from the Universiteti Politeknik i Tiranës, in collaboration with several European partners, conducted a systematic mapping review to learn about the overall adoption of IT governance frameworks in different HEIs. As a result, they obtained an extensive list of publications, mainly in Asian countries, with COBIT, several ISO standards and own frameworks as the most popular frameworks used in HEIs. They also highlighted several barriers and benefits of IT governance implementations in HEIs. It should be noted that this study was formatted as a paper and published in the Business Systems Research journal (Kajo-Meçe et al., 2020).

*Best practices visits*. The visits were organized throughout the project, rather than at the beginning, due to financial issues. The visits were held at the SRH Hochschule Berlin (Germany) and the Universidad de Almería (Spain). Two more visits were scheduled, Høgskolen I Østfold (Norway) and Universitat de les Illes Balears (Spain), but they were canceled due to the current health emergency. Hosts presented their activities and practices; thus, attendees could take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

The lessons learnt by the Universiteti Politeknik i Tiranës attendees were:

- IT Governance Committee and Strategy Committee responsibilities and functions.
- Business-IT strategy alignment and IT policies support.
- IT projects prioritization and approval.
- User expectations analysis and decision-making procedures.
- IT related laws, rules, and regulations catalogue definition.
- CIO role and its Governance Team membership.

Among the aspects the Universiteti Politeknik i Tiranës wanted to imitate were included:

- Infrastructure integration to enhance students and academic staff usability.
- Governance Team awareness and involvement in the IT governance framework implementation.

Among the aspects the Universiteti Politeknik i Tiranës had difficulties to replicate were included:

- The position of the CIO, the assignment of their responsibilities and functions is difficult as it should modify internal regulations. In this university, the CIO does not have the full authority to govern IT.
- The allocation of a dedicated budget for IT governance support.

Like the previous universities, the Universiteti Politeknik i Tiranës selected their attendees depending on their profile. The team selected for the visits was composed of various profiles representing different levels of the institution hierarchy to convince them about the importance of IT governance and to have the commitment of top managers. Specifically, the Rector of the university and the Vice-rector for Educational Area attended the visits. This had a positive impact on the project because it involved the engagement of several managers in the project. Unfortunately, due to health and safety issues derived from COVID-19, the las two visits were cancelled thus this activity was not completed. In any case, they obtained best practice application examples and real case studies with the first two visits, which allowed them to consolidate the knowledge acquired in the trainings.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. As mentioned above, we performed several *Initial assessment visits* to each Albanian university to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Universiteti Politeknik i Tiranës. During the visit we were welcomed by the members of their *IT governance steering group*, who had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Universiteti Politeknik i Tiranës were as shown in Table 5.33:

**Table 5.33 – IT governance assessment at the Universiteti Politeknik i Tiranës**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 5 | 29 | 17% | 31% |
| Strategy | 6 | 16 | 37% | 31% |
| Acquisition | 20 | 34 | 58% | 28% |
| Performance | 2 | 16 | 13% | 29% |
| Conformance | 12 | 19 | 63% | 18% |
| Human Behavior | 1 | 14 | 7% | 21% |

Blue: near or above average; Orange: under average

In comparison with ten Spanish universities average (A. Fernández & Llorens, 2011), the Universiteti Politeknik i Tiranës presented three principles above the

average and the other three below. They were in a better initial level at *Strategy*, *Acquisition* and *Conformance* principles, but in a worse level in *Responsibility*, *Performance* and *Human Behavior*. These results did mean that the Universiteti Politeknik i Tiranës, was in an initial level of IT governance maturity and thus, its activities should involve mainly *Responsibility*, *Performance* and *Human Behavior* principles, to set new structures which, create new policies and plans, monitoring and controlling their results and improving communication among stakeholders. These results are better shown in Figure 5.16, where activities related to *Conformance* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility*, *Performance* and *Human Behavior* in the first place.

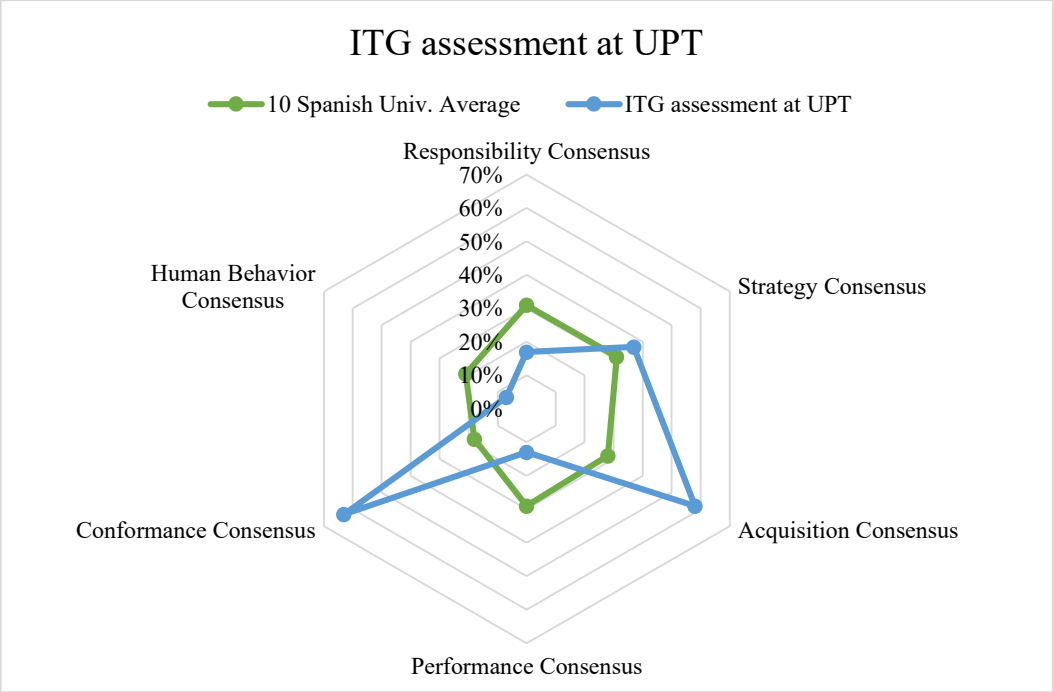


**Figure 5.16 – IT governance assessment at the Universiteti Politeknik i Tiranës**

Based on these results, at the end of the visit we gave them some recommendations on which principle they should focus on first. Furthermore, we requested Universiteti Politeknik i Tiranës partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities would like to perform first.

Regarding the Universiteti Politeknik i Tiranës' *IT governance steering group*, it consisted of the following members:

- Rector.
- Vice Rector of Teaching and IT.
- Vice Rector of Research.
- Dean of the Fakulteti i Teknologjisë së Informacionit (FTI).
- Vice Dean of FTI for Teaching and IT.
- Vice Dean of FTI for Research.

By this list, it is reflected that the Universiteti Politeknik i Tiranës obtained the engagement and participation of members who occupied crucial positions thus

supporting the IT governance framework development and deployment. However, half of them belong to the faculty, and did not occupy general positions of the university. This is worth mentioning because they decided to implement some actions and solutions in under the faculty context and then escalate them to the whole university. Therefore, the framework was developed and implemented in the faculty area.

*IT governance best practices adaptation*. According to the ITG4U framework, the organization should adopt and adapt the best practices that best suit their needs (A. Fernández & Llorens, 2009). This activity consisted of the IT governance best practices adaptation, a self-assessment of the organizational IT governance maturity level in best practices, and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Universiteti Politeknik i Tiranës' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Universiteti Politeknik i Tiranës IT governance framework best practices catalog can be found in the Annex A. Then, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.34:

**Table 5.34 – Initial situation of existing best practices at the Universiteti Politeknik i Tiranës**

| | |
|---|---|
| **Responsibility (6 existing best practices)** | |
| 1. | The University's Governance Team (GT) regularly reviews which IT assets should be monitored centrally and which should be delegated. |
| 2. | The GT team actively directs the strategic planning of IT in the university. |
| 3. | The fact that IT Governance is the responsibility of the GT and not of IT experts and professionals is understood. |
| 4. | The GT has established a model for making IT-related decisions that determines who is responsible for providing the information and who must make the decisions based on it. |
| 5. | The GT has instigated the preparation of a document that details the rights and duties of those who has been delegated a responsibility. |
| 6. | The GT has a clear vision of the responsibility of third parties in relation to the university's IT objectives. |
| **Strategy (6 existing best practices)** | |
| 1. | The GT has instigated the design of a strategic plan for the university that also includes IT strategies to ensure they both follow the same line. |
| 2. | The GT plans IT acquisitions in a timely manner and they are included in the next year's budget. |
| 3. | The GT has designed a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs. |
| 4. | The GT knows how many IT developments are still not integrated yet should be. |
| 5. | The GT has designed medium-term IT infrastructure renewal plans to prevent this from becoming obsolete while at the same time incorporating emerging technologies. |
| 6. | The GT has promoted a training plan for all the university's stakeholders to promote the mastery of technologies and the awareness of their importance for the university. |
| **Acquisition (12 existing best practices)** | |
| 1. | The GT has set up a procedure to measure clearly and accurately how much the university spends on IT on an annual basis. |
| 2. | The GT has instigated a study that determines the university's IT assets. |
| 3. | Service level agreements have been set up with all IT suppliers. |
| 4. | The reports are submitted to the GT that monitor the service levels agreed with suppliers. |
| 5. | The costs of an IT project consider the IT investment and maintenance costs, human resource costs, training costs and the costs of organizational changes stemming from the project. |

| | |
|---|---|
| 6. | The cost of an IT project includes the costs required to maintain the continuity of an IT-based service. |
| 7. | The cost of an IT project includes the design of activities and the costs necessary to train all the people involved in that project so that maximum IT performance is obtained, and the services offered are improved. |
| 8. | When making an IT acquisition, the evaluation criteria assumes that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university. |
| 9. | The GT has designed and published an IT acquisition approval protocol that mentions all the people responsible for information exchange and making decisions. |
| 10. | The GT has the ultimate responsibility for IT projects that are going to be implemented and decide their priorities in such a way that a large portion of resources are dedicated to the most important projects. |
| 11. | The GT knows what percentage of IT projects are to be completed in time and with the planned resources. |
| 12. | The GT supports exchange experiences and collaboration with other universities. |
| **Performance (2 existing best practices)** | |
| 1. | The GT has devoted enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |
| 2. | The GT regularly analyses the requirements of users (for example, employees and students). |
| **Conformance (2 existing best practices)** | |
| 1. | The reference catalogue has been compiled and contains the IT-related regulations and laws that affect the university, and this is kept up to date. |
| 2. | Training processes are carried out related to the compliance of internal procedures with external laws and policies. |
| **Human Behavior (5 existing best practices)** | |
| 1. | The analysis identifies risk factors arising from resistance to change in the people or groups affected and from a lack of commitment in those involved. |
| 2. | IT project planning includes the responsibilities assigned to all participants and activities aimed at measuring the extent to which the involvement of these people contributes to the success of the project, and therefore to the change process that it promotes. |
| 3. | Committees and work groups have been created to facilitate the participation, and therefore the involvement, of stakeholders in the design, supervision, and final evaluation of IT-based change processes. |
| 4. | IT project planning includes a stage of cross training, training the heads of the university service in IT matters, and technicians in the university process affected by the IT initiative. |
| 5. | The GT knows what human resources are available, what occupational roles there are always, and what human potential is available to undertake new IT initiatives, avoiding overloads. |

Figure 5.17 and Table 5.35 below show the percentages of best practices satisfied after the self-assessment. This information was crucial to adapt the maturity model (next activity) as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.35 – Percentage of best practices satisfied by the Universiteti Politeknik i Tiranës**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 21% | Performance Consensus | 13% |
| Strategy Consensus | 38% | Conformance Consensus | 11% |
| Acquisition Consensus | 35% | Human Behavior Consensus | 36% |

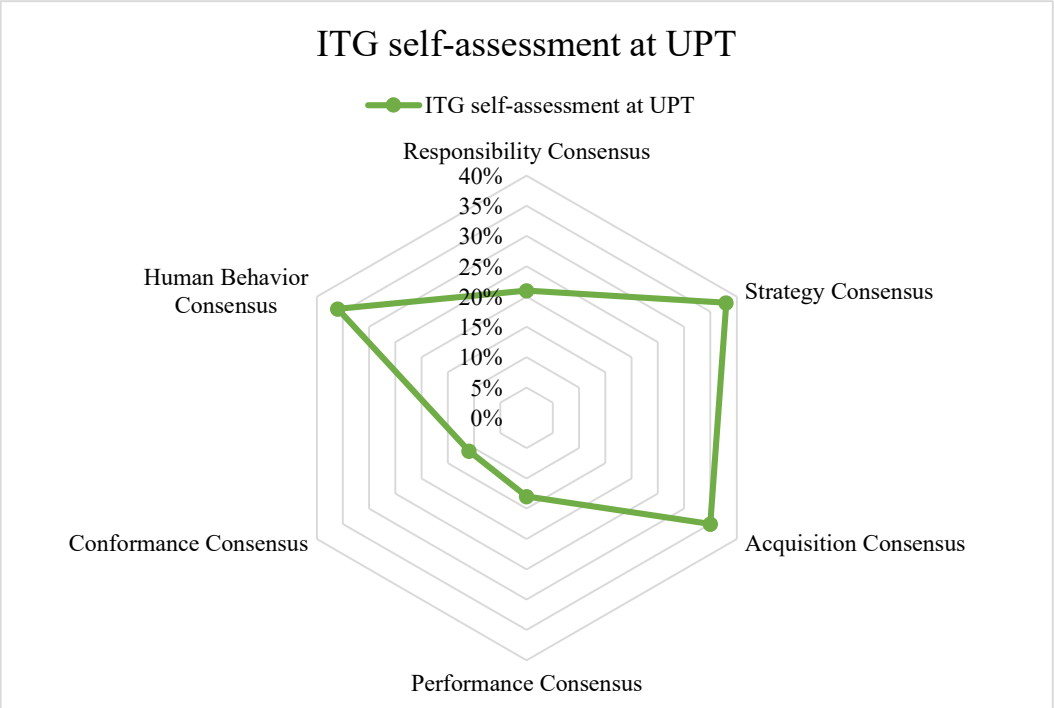


**Figure 5.17 – IT governance self-assessment at the Universiteti Politeknik i Tiranës**

*IT governance maturity model adaptation*. In the previous activity, Universiteti Politeknik i Tiranës partners defined the set of best practices aimed to be covered by their IT governance framework. This activity consisted of the adaptations on the proposed IT governance maturity model, provided by the European partners, the review of the maturity model adaptations to their organization, the maturity level current situation and the maturity goal selection. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Universiteti Politeknik i Tiranës' *IT governance steering group* adopted it with no significant changes and then used it to self-assess their maturity level regarding IT governance. Their results can be found in Table 5.36 below. To achieve the next level, the three IT governance activities should have the same level. Otherwise, it will remain at the level of the lowest score obtained.

**Table 5.36 – IT governance maturity level at the Universiteti Politeknik i Tiranës**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management.<br>Directors allocate responsibilities based on their own criteria since they are not aware of any existing models. |
| | Direct | 1 | Directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 1 | Directors carry out an informal monitoring of responsibilities related to IT management. |
| Strategy (1) | Evaluate | 1 | Directors believe the university has sufficient IT developments, although these are not integrated, to meet users' needs.<br>Directors monitor IT activity but not in a way that is aligned with the university's strategic objectives |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| | | | Directors analyze some of the risks albeit from an operational and legal compliance perspective but not considering business considerations |
| | Direct | 1 | Directors plan investments in IT for the coming year.<br>The lack of involvement on the part of all the directors prevents any global policies relating to IT from being designed.<br>There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 3 | Directors monitor the projects at a superficial level for the purposes of justifying their expenditure. |
| Acquisition (1) | Evaluate | 1 | Directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level. |
| | Direct | 1 | The reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |
| Performance (1) | Evaluate | 1 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective.<br>Key decisions concerning the performance level of the services will be taken by IT managers. |
| | Direct | 1 | IT assets cover the major operations of current university services (though not all those deemed desirable).<br>IT managers normally have an excessive workload. |
| | Monitor | 1 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets. |
| Conformance (1) | Evaluate | 1 | Directors have assigned the responsibility of finding about the legislation concerning IT and ascertaining how it affects the university.<br>Directors are familiar with key IT-related standards, although they are not widely implemented. |
| | Direct | 1 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 1 | Only with respect to certain individuals or on specific projects is a check made to ensure compliance with regulations (in other words this is not a general procedure). |
| Human Behavior (0) | Evaluate | 0 | The university directors are not aware of how important people's behavior is for the success of IT initiatives. |
| | Direct | 0 | The university directors do not consider how people might behave when planning IT activities. |
| | Monitor | 0 | The influence of a person's behavior on the success of IT-supported processes is not measured. |

The *IT governance steering group* selected a maturity goal based on the results and the principles they wanted to improve. Concretely, wished to jump one level in each

principle. Thus, for each principle they planned the actions shown in Table 5.37 to achieve their goal maturity level.

**Table 5.37 – Selected actions to achieve Universiteti Politeknik i Tiranës' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | All GT should be aware of the importance of IT. |
| | GT should create a strategic IT committee led by the CIO. |
| | The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. |
| | When choosing a CIO, the GT should bear in mind that this person should be an experienced and skilled governor with excellent communication skills. |
| Strategy | An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy. |
| Acquisition | A study should be conducted that determines the university's IT assets. |
| | The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. |
| | Establish a centralized procedure to invest on IT with the control of GT. |
| Performance | Establish a procedure to measure the performance of IT and report to the GT. |
| Conformance | The GT should assign a person or a group the responsibility of monitoring whether regulations are complied with in the university. |
| | The GT should define and publish a catalogue with all kinds of IT-related policies to guide the rest of the university community on how to implement IT on campus. |
| Human Behavior | IT project proposals should include activities aimed to mitigating the risk related to a lack of commitment in participants Analysis the workload of IT Staff and try not overload them with new projects. |

It should be noted that the selection of these actions was influenced by several factors. First, the *IT governance steering group* formation. The interest in IT governance and the support of the group members in the project is reflected in the selection of the goal maturity level. In this case they were not very ambitious, and even though they wished to achieve the next level in each principle, the list of actions was very short. Second, the time available affected by the coronavirus pandemic. This phase of the project was performed after the middle, so they had less than a year and a half to prepare the plan and carry out the actions, most of them cancelled or rescheduled due the COVID-19. For these reasons they presented a realistic plan tailored to their situation, stakeholder support, and the remaining time and resources of the project.

*IT governance improvement plan design and assessment*. Once the main elements of the framework are defined (best practices, maturity goal and improvement actions), to draw a deployment plan tailored to organizational circumstances is needed. The Universiteti Politeknik i Tiranës' IT governance improvement plan followed the PMI project management standard. This plan was structured in the following six phases:

- Initiating: by this phase, Universiteti Politeknik i Tiranës' partners aimed to engage their leaders to the awareness and realization that the framework was going to be deployed. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (by the last two activities), ii) goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.

- Planning: the main deliverables of this phase was i) a project charter which was accepted from all relevant stakeholders, and ii) a work breakdown structure that includes all the needed tasks.
- Execution: this phase was meant to present the implementation actions, its factors and metrics and its different steps.
- Monitoring and Controlling: the main deliverable of this phase was a defined and implemented controlling system for the aspects included in the framework that allowed a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Universiteti Politeknik i Tiranës partners presented several documents and KPIs as evidence.
- Risk Management: in this phase risk management procedures were defined and formalized to be followed during and after the implementation of the framework. The aim of this phase was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Universiteti Politeknik i Tiranës partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: Universiteti Politeknik i Tiranës partners defined a communication plan, which indicated the intensity of communication as well as the stakeholders involved. A list of actions depending on the target groups were also defined, e.g., organization of info days, workshops, seminars, addressed to students, internal staff, and/or the industry.

The Universiteti Politeknik i Tiranës' IT governance improvement plan can be found in Annex A.

**C. Third phase – Deploying and monitoring its results**

Universiteti Politeknik i Tiranës partners deployed their *IT governance improvement plan* and executed its actions during third phase of the project. We organized this phase as a continuous improvement cycle in which European experts monitored the state of the planned actions. Table 5.38 shows the state of the actions at the end of the project, in October 2020. We requested Universiteti Politeknik i Tiranës partners to indicate the state of each action. As it can be seen in Table 5.38, the actions had three different states: finished, ongoing, and rescheduled. Those finished actions were done as planned; while those ongoing actions were not finished at the end of the project but planned to be finished soon in the future. However, several actions were rescheduled mainly due to the difficult situation of the COVID-19 pandemic. Universiteti Politeknik i Tiranës partners were in lockdown for two months, working from home till end of June 2020. Hoping that everything will turn in normality soon, they rescheduled the deadlines for their implementation. None of us as project partners foresaw this difficulty in time, especially the confinement. The impact of staying in our homes not only affected the activities to be carried out by the project researchers, but also by other stakeholders of the institution such as

administrative staff, students, lecturers, etc. That is the main reason for rescheduling some activities while transforming others into an online version. In any case, the partners deployed as many actions of the plan as they can at the faculty level. Nonetheless, the behavior of the Universiteti Politeknik i Tiranës was as expected because they proposed a concise plan, covering all the principles but with a short set of actions. This attitude shows the interest in change and improvement concerning IT governance, despite the sanitary difficulties.

**Table 5.38 – State of Universiteti Politeknik i Tiranës' improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| All GT should be aware of the importance of IT. | Jan 2020 | Mar 2020 | Finished (Sept. 2020) |
| GT should create a strategic IT committee led by the CIO. | Jan 2020 | Oct 2020 | Ongoing (new end Oct 2020) |
| The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. | Feb 2020 | Mar 2020 | Finished (Sept. 2020) |
| When choosing a CIO, the GT should bear in mind that this person should be an experienced and skilled governor with excellent communication skills. | Feb 2020 | Mar 2020 | Finished (Sept. 2020) |
| **Strategy** | | | |
| Actions | Start | End | State |
| An IT Strategic Plan should be designed that is aligned with the university's overall strategy or the IT strategy should be included in the overall strategy. | Jan 2020 | Mar 2020 | Finished (Sept. 2020) |
| **Acquisition** | | | |
| Actions | Start | End | State |
| A study should be conducted that determines the university's IT assets. | May 2020 | Jun 2020 | Ongoing (new end Dec. 2020) |
| The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. | Jun 2020 | Aug 2020 | Ongoing (new end Dec 2020) |
| Establish a centralized procedure to invest on IT with the control of GT. | Jun 2020 | Aug 2020 | Ongoing (new end Dec 2020) |
| **Performance** | | | |
| Actions | Start | End | State |
| Establish a procedure to measure the performance of IT and report to the GT | Jul 2020 | Sept 2020 | Rescheduled (Start: Oct. End: Dec. 2020) |
| **Conformance** | | | |
| Actions | Start | End | State |
| The GT should assign a person or a group the responsibility of monitoring whether regulations are complied with in the university. | Sept 2020 | Sept 2020 | Rescheduled (Start: Oct. End: Dec. 2020) |
| The GT should define and publish a catalogue with all kinds of IT-related policies to guide the rest of the university community on how to implement IT on campus. | Sept 2020 | Oct 2020 | Rescheduled (Start: Oct. End: Dec. 2020) |
| **Human Behavior** | | | |
| Actions | Start | End | State |

| | | | |
|---|---|---|---|
| IT project proposals should include activities aimed to mitigating the risk related to a lack of commitment in participants | Jun 2020 | Jul 2020 | Ongoing (new end Dec 2020) |
| Analysis the workload of IT Staff and try not overload them with new projects | Jun 2020 | Jul 2020 | Ongoing (new end Dec 2020) |

Universiteti Politeknik i Tiranës partners provided detailed monitoring of each action, specifying evidence, and defining KPIs (Table 5.39). For each KPI, they indicated the current value belonging to last year, and the goal value expected for next year. Universiteti Politeknik i Tiranës' evidence documentation can be found in Annex A.

**Table 5.39 – Evidenced finished actions at the Universiteti Politeknik i Tiranës**

| Principles | Evidence | KPIs |
|---|---|---|
| Responsibility | A minute with IT Steering Committee members and roles.<br>List of involvement actions taken to promote ITG.<br>A document with a formal nomination of the CIO. | Number of meetings of the steering committee.<br>*Current value: 0*<br>*Goal value: 5*<br>Number of involvement events<br>*Current value: 2*<br>*Goal value: 3* |
| Strategy | IT Strategic Plan | Number of IT projects presented<br>*Current value: 0*<br>*Goal value: 8*<br>Number of IT projects approved aligned with the strategic goals of the university each year<br>*Current value: 0*<br>*Goal value: 2* |
| Acquisition | IT Infrastructure plan | Amount invested in IT each year.<br>*Current value: NA*<br>*Goal value: 50. 000 euros*<br>Percentage of IT investment in relationship with global investments of the university<br>*Current value: NA*<br>*Goal value: 2%* |
| Performance | Catalogue of Performance | Number of indicators included in the IT performance catalogue that achieve the goal value established by the GT.<br>*Current value: 0*<br>*Goal value: 4* |
| Conformance | List of IT related regulations and laws satisfied by university<br>List of IT related standards implemented by university | Percentage of IT-related laws the university complies.<br>*Current value: 10%*<br>*Goal value: 30%*<br>Percentage of IT-related standards the university implements.<br>*Current val.: 20%*<br>*Goal value: 50%* |
| Human Behavior | Report including a workload analysis that includes the working hours for each IT staff on each IT projects | Number of IT Staff we would need to implement all IT Projects<br>*Current value: 2*<br>*Goal value: 10* |

Even though their plan and set of actions were not so ambitious as expected, considering the support they had internally in their faculty, Universiteti Politeknik i

Tiranës partners established KPIs in each action. This establishment was made despite of the rescheduling of actions, which indicates an interest in formalizing the future monitoring and control of the selected actions. In any case, Universiteti Politeknik i Tiranës partners selected these actions considering their resources and possibilities regarding their situation and commitment.

It should be remembered that the development and the framework in Universiteti Politeknik i Tiranës does not cover the whole scope of the university, but it focuses on the Faculty of Technology and Information. This decision was made internally although they had the support of authorities at the level of the entire organization in the formation of their *IT governance steering group*. Universiteti Politeknik i Tiranës partners' strategy was to use the faculty as a niche for the development and deployment of IT governance solutions and scale them as a success story to the rest of the institution. For this reason, they have focused just on the faculty instead of the whole university. Based on it, they have scheduled several actions regarding the creation of an IT strategy, and a formal procedure to prioritize IT projects based on this strategy, importance, and needs of the university.

Universiteti Politeknik i Tiranës rescheduled the dissemination events and even they decided to reorganize some of them in an online way. By this project, they not only acknowledge the importance of implementing IT governance best practices, but also, they were trained about standards, methods, technics, and tools by the European Experts. They intention is to take impulse from this learning and improve their high level of decision-making process, and the performance of his university services. Furthermore, once their framework is fully deployed at the university, they intend to disseminate this knowledge externally to the university.

**Universiteti Aleksandër Moisiu Durrës**

The Universiteti Aleksandër Moisiu Durrës (UAMD) is a public Academic Institution of the Republic of Albania, founded on 2005. At the beginning of the project, the university had seven Faculties and around 18,000 students. Being a multidisciplinary university, it offered six major fields of studies and more than 40 programs in undergraduate studies (bachelor's degrees), and graduate studies (professional masters, Master of Science, and doctoral school of business). His whole activity was aimed at steadily achieve high academic standards nationally and internationally, and to support the educational aspirations and achievements of their students and academic staff. One of their objectives was also promoting integration between academia, research, and industry to encourage assimilation and use of technology in business environments. Regarding to this, they aimed to adapt and implement a new IT governance framework, to maximize their capacity and to improve teaching/learning and research process. The Universiteti Aleksandër Moisiu Durrës play a key role between IT and organizations as it is located near one of the important ports in Albania and in the region (Durres Port), offering unique curricula, having access to future professionals.

**A. First phase – Learning about IT governance**

*Training*. Two different training sessions were performed addressed to researchers on the one hand, and to managers on the other hand. Researchers from the Faculty of Information Technology, including its Dean, and the Head of the Department of Information Technology attended the first *Initial training Researchers*, held at the Universitat de les Illes Balears (Spain). The profile of the participants was related to

computer science, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects and train future young researchers was fulfilled. In addition, the participation of the Dean and the Head of Department in the training sessions was crucial to obtain the engagement of this university in the project.

The second training, *Initial training Managers*, was held at the Universiteti Politeknik i Tiranës, thus expecting an increased number of attendees than the previous training. As a result, researchers belonging to the Faculty of Information Technology, and the Head of Department of Computer Science attended this second training. The Universiteti Aleksandër Moisiu Durrës is placed in a city 30 kilometers west of Tirana, so the attendees had to travel to the capital to attend the training. For this reason, the expected number of attendees decreased, which impacted on the engagement of their managers in the IT governance framework implementation.

*Literature review*. Researchers from the Universiteti Aleksandër Moisiu Durrës conducted a literature review to learn about the benefits of implementing IT governance frameworks in HEIs. As a result, they obtained a list of frameworks applied in other institutions and how IT objectives were validated and assessed. Furthermore, they found that promoting an IT governance culture could influence its framework components. They concluded their report by showing how IT governance initiatives applied in several developed and developing countries have been supported by European projects.

*Best practices visits*. Due to security and financial issues, the visits were organized throughout the project, and they were held at the SRH Hochschule Berlin (Germany) and the Universidad de Almería (Spain). Two more visits were scheduled, Høgskolen I Østfold (Norway) and Universitat de les Illes Balears (Spain), but they were canceled due to the current health emergency. Hosts presented their activities and practices; thus, attendees could take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

The lessons learnt by the Universiteti Aleksandër Moisiu Durrës attendees were:

- IT governance and IT strategy importance.
- Establish a Governance Team, including people who owns crucial positions.

Among the aspects the Universiteti Aleksandër Moisiu Durrës wanted to imitate were included:

- Establish a formal procedure to assign responsibilities.
- Disseminate IT governance materials at the university, training students, lecturers or third parties.
- Create the role of the CIO.
- Design an IT strategy aligned with the strategy of the university, which includes a set of IT policies to guide decision makers.
- Establish a methodology to select IT projects.

Among the aspects the Universiteti Aleksandër Moisiu Durrës had difficulties to replicate were included:

- In their institution, to create or contract such a dedicated staff for IT governance is difficult due to regulations issues. A proposed solution was

assigning these responsibilities to an existing position. A training phase was necessary before choosing the CIO and other staff dedicated to IT governance.

- Assign a specific budget dedicated to IT governance.

In general terms Universiteti Aleksandër Moisiu Durrës attendees were selected considering their profiles. The team selected for the visits was composed of various profiles representing different levels of the institution hierarchy to convince them about the importance of IT governance and to have the commitment of top managers. Specifically, the Rector and the Administrator attended both visits. This had a positive impact on the project because it involved the engagement of several managers in the project. Unfortunately, due to health and safety issues derived from COVID-19, the las two visits were cancelled thus this activity was not completed. In any case, they obtained best practice application examples and real case studies with the first two visits that was transmitted to other institution's managers.

### B. Second phase – Determining and improving the situation

*IT governance environment definition*. To set an initial state of IT governance in the Albanian universities and thus better understand their needs, we performed an *Initial assessment visit* to each of them. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Universiteti Aleksandër Moisiu Durrës, where we were welcomed by the members of their *IT governance steering group*. Before our visit, they responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Universiteti Aleksandër Moisiu Durrës were as shown in Table 5.40:

**Table 5.40 – IT governance assessment at the Universiteti Aleksandër Moisiu Durrës**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 7 | 29 | 24% | 31% |
| Strategy | 3 | 16 | 19% | 31% |
| Acquisition | 17 | 34 | 50% | 28% |
| Performance | 10 | 16 | 63% | 29% |
| Conformance | 9 | 19 | 47% | 18% |
| Human Behavior | 6 | 14 | 43% | 21% |

Blue: near or above average; Orange: under average

Table 5.40 shows a better situation in four principles as they were above the ten Spanish universities average (A. Fernández & Llorens, 2011). They were in a better initial level at *Acquisition*, *Performance*, *Conformance* and *Human Behavior* principles, but in a worse level in *Responsibility* and *Strategy*. These results did mean that the Universiteti Aleksandër Moisiu Durrës started from a good level of IT governance maturity and thus, its activities should involve mainly *Responsibility* and *Strategy* principles, to set new structures and better align IT strategy with business strategy. These results are better shown in Figure 5.18, where activities related to *Performance* and *Human Behavior* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility* and *Strategy* in the first place.

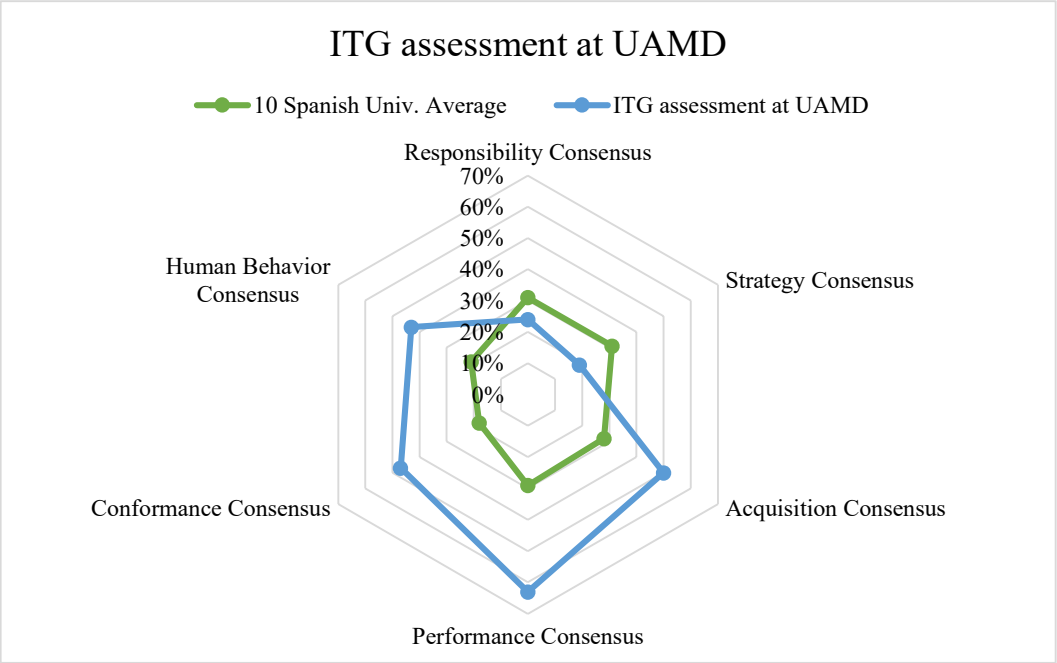


**Figure 5.18 – IT governance assessment at the Universiteti Aleksandër Moisiu Durrës**

We gave them some recommendations on which principle they should focus on first based on these results, at the end of the visit. Furthermore, we requested Universiteti Aleksandër Moisiu Durrës partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities they would like to perform first.

Regarding the Universiteti Aleksandër Moisiu Durrës' *IT governance steering group*, it consisted of the following members:

- Rector of the University.
- Dean of the Fakulteti i Teknologjisë së Informacionit.
- Head of Computer Science Department.
- Head of Administration and Academic Services Sector.
- Head of IT Services Sector.
- Head of Information Technology Department.

Several managers and members who occupied crucial positions in their organization were engaged and participated on the project, including its rector. This meant that the Universiteti Aleksandër Moisiu Durrës obtained their support on the IT governance framework development and deployment. They selected a balance between people from the faculty (the Dean and both Head of Departments) and positions belonging to the whole university (Rector, Administrator, and IT Services). It should be noted how UAMD partners managed to apply the framework to the whole university by controlling its evolution from the faculty. In brief, participants from the Universiteti Aleksandër Moisiu Durrës focused on the university with the support of the faculty in developing and deploying the IT governance framework.

*IT governance best practices adaptation*. The organization, in this case the Universiteti Aleksandër Moisiu Durrës, should adopt and adapt the best practices that best suit their needs, according to the ITG4U framework (A. Fernández & Llorens, 2009). This activity consisted of the IT governance best practices adaptation, a self-

assessment of the organizational IT governance maturity level in best practices and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Universiteti Aleksandër Moisiu Durrës' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Universiteti Aleksandër Moisiu Durrës IT governance framework best practices catalog can be found in the Annex A. Then, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.41:

**Table 5.41 – Initial situation of existing best practices at the Universiteti Aleksandër Moisiu Durrës**

| |
|---|
| **Responsibility (4 existing best practices)** |
| 1. The GT is aware of the importance of IT Governance and promotes it. |
| 2. IT governance is the responsibility of the GT and not of IT experts and professionals. |
| 3. The GT has a clear vision of the responsibility of third parties in relation to the university's IT objectives. |
| 4. The university have an IT balanced scorecard. |
| **Strategy (1 existing best practice)** |
| 1. The GT plans IT acquisitions in a timely manner and are they included in the next year's budget. |
| **Acquisition (8 existing best practices)** |
| 1. The GT has designed and published a policy that provides guidance on different types of acquisitions. |
| 2. Service level agreements have been set up with all IT suppliers. |
| 3. Reports are submitted to the GT that monitor the service levels agreed with suppliers. |
| 4. The cost of an IT project includes the costs required to maintain the continuity of an IT-based service. |
| 5. When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university. |
| 6. The GT has designed and published an IT acquisition approval protocol that details all the people responsible for supplying information and making decisions. |
| 7. The GT has the ultimate responsibility for IT projects that are going to be implemented (both those that are centralized and delegated) and decide their priorities in such a way that a large portion of resources are channeled to the most important projects. |
| 8. The GT support initiatives that aim at exchanging experiences and collaborating with other universities. |
| **Performance (2 existing best practices)** |
| 1. The GT has devoted enough resources to maintain a high level of satisfaction in user groups related to the service regarding performance of IT-based services. |
| 2. The GT regularly analyses the requirements of users (for example, employees and students). |
| **Conformance (5 existing best practices)** |
| 1. Training processes are carried out related to the compliance of internal procedures with external laws and policies. |
| 2. Those in charge of IT services and projects are encouraged to consider IT-related external regulations and laws and policies and internal procedures. |
| 3. Internal audits are carried out to check whether IT projects and services comply with IT-related external laws and regulations and internal policies and procedure. |
| 4. External audits are carried out to check whether IT projects and services comply with IT related external laws and regulations and internal policies and procedures. |
| 5. Reports are submitted to the GT with the results of the internal and external audits, which clearly express the level of the university's level of compliance with regulations and the risks that this entails. |
| **Human Behavior (3 existing best practices)** |

| | |
|---|---|
| 1. | IT project planning includes a stage to train stakeholders on the change that is going to take place in the university service affected by the IT initiative. |
| 2. | There is a procedure established to measure the level of skills (especially those related to IT) of individuals in different interest groups. |
| 3. | The GT knows what human resources are available, what occupational roles are established, and what human potential is available to undertake new IT initiatives, avoiding overloads. |

The percentages of best practices satisfied after the self-assessment are shown in Figure 5.19 and Table 5.42 below. This information was crucial to adapt the maturity model (next activity) as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.42 – Percentage of best practices satisfied by the Universiteti Aleksandër Moisiu Durrës**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 24% | Performance Consensus | 63% |
| Strategy Consensus | 19% | Conformance Consensus | 47% |
| Acquisition Consensus | 50% | Human Behavior Consensus | 43% |

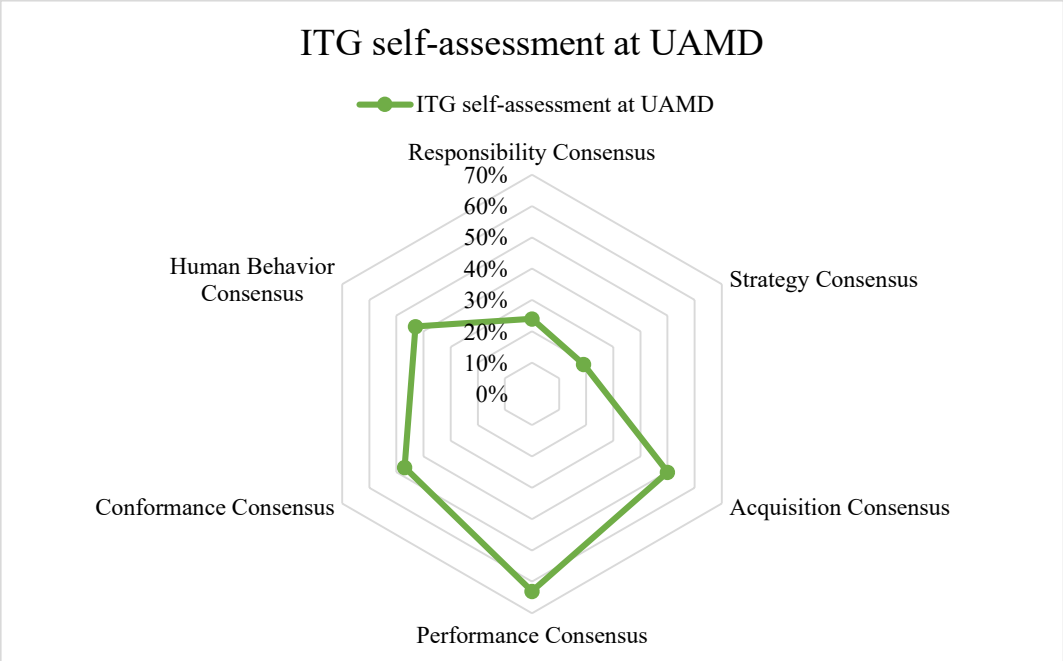


**Figure 5.19 – IT governance self-assessment at the Universiteti Aleksandër Moisiu Durrës**

*IT governance maturity model adaptation*. Once Universiteti Aleksandër Moisiu Durrës partners had defined the set of best practices aimed to be covered by their IT governance framework, they had to adapt the proposed IT governance maturity model, provided by the European partners. Under this activity, they also had to review the maturity model adaptations to their organization, the maturity level current situation and the maturity goal selection. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Universiteti Aleksandër Moisiu Durrës' *IT governance steering group* adopted it with no significant changes motivated by the adequacy of the model to the Albanian context. Then, they used it to self-assess their maturity level regarding IT governance. Their results can be found in Table 5.43 below. To achieve the next level, the three IT governance activities should have the same level. Otherwise, the lower level of the

three activities is selected. That is why *Responsibility* is in the level 1 even though *Monitor* had level 2.

**Table 5.43 – IT governance maturity level at the Universiteti Aleksandër Moisiu Durrës**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management. |
| | Direct | 1 | Directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 2 | Directors carry out an informal monitoring of responsibilities related to IT management.<br>Directors check whether the responsibilities allocated are understood. |
| Strategy (1) | Evaluate | 1 | Directors monitor IT activity but not in a way that is aligned with the university's strategic objectives. |
| | Direct | 1 | Directors plan investments in IT for the coming year.<br>There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 2 | Directors monitor the projects at a superficial level for the purposes of justifying their expenditure.<br>Directors measure the results of IT projects from an operational perspective, but not from the university's business standpoint. |
| Acquisition (1) | Evaluate | 1 | Directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level. |
| | Direct | 1 | Reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 2 | Directors know what IT assets the university currently has available. |
| Performance (2) | Evaluate | 2 | Directors evaluate the operational proposals put forward by the IT managers, albeit only from a technical and/or economic perspective.<br>Key decisions concerning the performance level of the services will be taken by IT managers.<br>Directors analyze and find out about the needs of IT service users. |
| | Direct | 2 | IT managers normally have an excessive workload.<br>Directors plan IT assets to cover all the operations carried out by today's university services but without giving IT managers an excessive workload. The directors design policies and standards to reflect the most important aspects regarding the performance of IT based university processes. |
| | Monitor | 2 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets.<br>Directors measure to see whether the IT assets provide support for the university's main services and whether their users are satisfied with them.<br>Directors check whether any internal standards and policies have been drawn up for key aspects concerning the performance of university processes. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Conformance (1) | Evaluate | 1 | Directors have assigned the responsibility of finding about the legislation concerning IT and as certain in how it affects the university.<br>Directors are familiar with key IT-related standards, although they are not widely implemented. |
| | Direct | 1 | There are no mechanisms for encouraging compliance with laws, regulations and standards governing IT assets.<br>Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 2 | Directors check that acquaintance with the IT-related laws and regulations is widespread.<br>Directors check that at least all IT-related external laws are respected. |
| Human Behavior (1) | Evaluate | 1 | Directors are concerned to determine which people should be involved and those who are affected by IT activities. |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved.<br>Directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |
| | Monitor | 1 | Directors monitor the projects, basing their analysis solely on technical indicators. |

The *IT governance steering group* selected a maturity goal based on the above indicated results and the support obtained by their authorities. Concretely, they wished to improve the six principles by one level each. For each principle, they planned the actions shown in Table 5.44 to achieve their goal maturity level.

**Table 5.44 – Selected actions to achieve Universiteti Aleksandër Moisiu Durrës' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | The importance of IT Governance in the GT should be promoted. |
| | GT should create an ITG committee. |
| | Create a role of CIO, assign responsibility. |
| Strategy | The Governance Team should design the IT strategic plan aligned with the global university's strategy. |
| | Design a catalogue of IT policies. |
| Acquisition | The GT should establish a "portfolio of projects" as a methodology to carry out the planning of IT acquisitions aligned with the university's strategic objectives. |
| | Design a procedure to measure performance of IT services. |
| | The GT should establish a centralize procedure to invest on IT. |
| Performance | The GT will create a list of data or knowledge that needs to support strategic decisions. |
| Conformance | Contract an audit company to design a compliance plan. |
| | A reference catalogue should be created that contains the IT-related standards applicable or already applied in the university and this should be kept up to date. |
| | Contract an audit company to design a compliance plan. |
| | IT management based on standard methodologies should be carried out. |
| Human Behavior | Analysis the workload of IT staff and try not overload them with new projects. |

It should be noted that the selection of these actions was influenced mainly by two factors. The members of their *IT governance steering group* had critical positions in their institution thus showing interest in IT governance and supporting the project. Although, Universiteti Aleksandër Moisiu Durrës partners focused on the six

principles, the list of actions is brief. However, some of these actions are revolutionary and will cause major changes at the organizational level as well as in several critical processes, e.g., establish a centralize procedure to invest on IT, establish IT project portfolio as a methodology to project prioritization and selection, and analysis the workload of IT staff. The second factor was the available time. Considering the remaining time that was affected by the pandemic situation, Universiteti Aleksandër Moisiu Durrës partners elaborated a realistic plan of actions tailored to their situation, stakeholder support, and the remaining resources of the project.

*IT governance improvement plan design and assessment*. The last step of this phase was to draw a deployment plan that fits their organizational circumstances. Several elements of the framework were already defined (best practices, maturity goal and improvement actions), thus the Universiteti Aleksandër Moisiu Durrës' IT governance improvement plan was structured in six phases following the PMI project management standard:

- Initiating: by this phase, Universiteti Aleksandër Moisiu Durrës' partners aimed to bring the leaders the realization of the deployment of the framework. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (by the maturity level already calculated), ii) maturity objectives, iii) scope of implementation, iv) general constrains, and v) internal/external resources committed.
- Planning: to provide a project charter with detailed information about the overview of the project, purpose, activities, stakeholders, benefits, and risks among other issues.
- Execution: this phase was meant to present each action with the starting and ending dates, classified by principles, and its state.
- Monitoring and Controlling: to define and implement a controlling system for the aspects included in the framework that allowed a regularly assessment of its success. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Universiteti Aleksandër Moisiu Durrës partners presented several evidence documentations and KPIs.
- Risk Management: this phase purpose was to define and formalize risk management procedures to be followed during and after the implementation of the framework. The aim of this phase was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Universiteti Aleksandër Moisiu Durrës partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: Universiteti Aleksandër Moisiu Durrës partners defined a communication plan, describing activities to disseminate and sustain the effort on IT governance beyond the project. A list of actions depending on the target groups were also defined, e.g., info days, workshops, and seminars addressed to students, internal staff, and/or the industry.

The Universiteti Aleksandër Moisiu Durrës' IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

The actions planned by the Universiteti Aleksandër Moisiu Durrës partners under their *IT governance improvement plan* were deployed and executed during the third phase of the project. This phase was organized as a continuous improvement cycle in which European experts monitored the state of the planned actions. Table 5.45 shows the state of the actions at the end of the project, in October 2020. We requested Universiteti Aleksandër Moisiu Durrës partners to indicate the state of each action. As it can be seen in Table 5.45, the actions had three different states: finished, ongoing, and rescheduled. Those finished actions were done as planned; while those ongoing actions were not finished at the end of the project but planned to be finished soon in the future. However, several actions were rescheduled mainly due to the difficult situation of the COVID-19 pandemic. Universiteti Aleksandër Moisiu Durrës partners were locked up at home from March to June 2020. The suspension of economic and social activities in their region influenced the establishment of a "portfolio of projects" and IT Strategic plan aligned with their global university strategy. Thus, that was the main reason for rescheduling some activities while transforming others into an online version. In any case, the partners deployed as many actions of the plan as they can as indicated by the finished actions in Table 5.45. In general terms they showed a willingness of improvement and overcoming the difficulties presented.

**Table 5.45 – State of Universiteti Aleksandër Moisiu Durrës' improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| The importance of IT Governance in the GT should be promoted. | Jan-20 | Sept-20 | Finished (Sept 2020) |
| GT should create an IT committee | Mar-20 | May-20 | Finished (May 2020) |
| Create a role of CIO, assign responsibility | Apr-20 | May-20 | Finished (May 2020) |
| **Strategy** | | | |
| Actions | Start | End | State |
| GT should design an IT Strategic plan aligned with the global university strategy. | Mar-20 | July-20 | Ongoing (new end Dec 2020) |
| Design a Catalogue of IT Policies | Jun-20 | July-20 | Ongoing (new end Dec 2020) |
| **Acquisition** | | | |
| Actions | Start | End | State |
| The GT should establish a "portfolio of projects" as a methodology to carry out the planning of IT acquisitions aligned with the university's strategic objectives. | Mar-20 | July-20 | Rescheduled (Start: Oct End: Dec) |
| Design a procedure to measure performance of IT services | May-20 | Jul-20 | Rescheduled (Start: Oct. End: Dec.) |
| The GT should establish a centralize procedure to invest on IT | Jun-20 | Aug-20 | Ongoing (new end Dec 2020) |
| **Performance** | | | |
| Actions | Start | End | State |

| | | | |
|---|---|---|---|
| The GT Create a list of data or knowledge that the GT needs to support strategic decisions. | Mar-20 | Jun-20 | Finished (June 2020) |
| **Conformance** | | | |
| Actions | Start | End | State |
| A reference catalogue should be created that contains the IT-related laws and internal norms applicable or already applied in the university and this should be kept up to date. | Jun-20 | Jul-20 | Finished (July 2020) |
| Contract an audit company to design a compliance plan. | Jul-20 | Sept-20 | Ongoing (new end Oct 2020) |
| IT management based on standard methodologies should be carried out. | Jun-20 | Sept-20 | Ongoing (new end Oct 2020 |
| **Human Behavior** | | | |
| Actions | Start | End | State |
| Analysis the workload of IT Staff and try not overload them with new projects | Aug-20 | Sep-20 | Ongoing (new end Dec2020) |

Universiteti Aleksandër Moisiu Durrës presented several documents as evidence of each action and defined several KPIs (Table 5.46) for future monitoring and control. For each KPI, they indicated the current value belonging to last year, and the goal value expected for next year. Universiteti Aleksandër Moisiu Durrës' evidence documentation can be found in Annex A.

**Table 5.46 – Evidenced finished actions at the Universiteti Aleksandër Moisiu Durrës**

| Principles | Evidence | KPIs |
|---|---|---|
| Responsibility | List of initiatives taken to promote ITG, like seminars, lectures, photos etc.<br><br>Formal Document with the creation of the IT Committee signed by Governance team.<br><br>Formal Document with the nomination of the CIO and his responsibilities signed by IT committee. | Number of initiatives (courses, conferences, readings about success cases, etc.) to promote the importance of IT for GT.<br>*Current value: 0*<br>*Goal value: 4*<br>Number of meetings of the IT Committee leads by CIO.<br>*Current value: 0*<br>*Goal value: 6*<br>Number of times appears at the GT agenda IT-related issues.<br>*Current value: 0*<br>*Goal value: 2* |
| Strategy | Catalogue of IT Policies published.<br>List of standards implemented by the university.<br>Audit report. | Number of IT-related policies published.<br>*Current value: 0*<br>*Goal value: 2* |
| Acquisition | List of IT project implemented this year.<br><br>Audit report. | Number of IT projects designed to achieve the strategic objectives of the university each year.<br>*Current value: 0*<br>*Goal value: 2*<br>Number of indicators included in the IT performance catalogue that achieve the goal value established by the GT.<br>*Current value: 0*<br>*Goal value: 4* |

| Principles | Evidence | KPIs |
|---|---|---|
| | | Amount invested in IT each year<br>*Current value: NA eur*<br>*Goal value: 50000 eur*<br>Percentage of IT investment in relationship with global investments of the university (personal included).<br>*Current value: 1%*<br>*Goal value: 1.5%* |
| Performance | List of IT project implemented this year.<br>Audit report. | Number of indicators included in business dashboard that achieve the goal value established by the GT.<br>*Current value: 1*<br>*Goal value: 4* |
| Conformance | Catalogue of IT Policies published.<br>Audit report. | Percentage of IT-related laws the university compliances.<br>*Current value: 7%*<br>*Goal value: 14%*<br>Percentage of IT-related standards the university implements.<br>*Current value: 20%*<br>*Goal value: 50%* |
| Human Behavior | Analytical report of workload of the IT staff. | Number of IT Staff we would need to implement all the IT projects.<br>*Current value: 5*<br>*Goal value: 15* |

Universiteti Aleksandër Moisiu Durrës partners established KPIs in each action despite of the rescheduling of actions, which indicates an interest in formalizing the future monitoring and control of the selected actions. Furthermore, Universiteti Aleksandër Moisiu Durrës partners took the plan seriously and performed several ambitious actions that led to managerial changes, i.e., the list of IT projects implemented and the catalogue of IT policies with its respective audit report. Since this university is not located in the capital, we expected greater difficulties related to resistance to change, especially at a strategic level. But finally, Universiteti Aleksandër Moisiu Durrës partners' behavior were better than expected regarding their selected actions and their finished ones. In any case, they selected these actions considering their resources and possibilities regarding their situation and commitment.

By participating in this project, Universiteti Aleksandër Moisiu Durrës partners innovated on the ways of governance thinking. Nowadays, the integration of technology in HEIs, helps its progress, performance, and development, thus facilitating the decision-making process. IT governance drives to create new IT strategies, and to prioritize projects according to the importance and needs of the university. After some effort, Universiteti Aleksandër Moisiu Durrës gained the *IT governance steering group* confidence, by disseminating the importance of IT governance at HEIs and specifically at their university. Thus, they changed the vision of IT by their authorities and the value IT can bring to the university. Concretely, their strategy is based on technological development and implementation, allowing higher performance, good services, and a faster decision-making process. Furthermore, in

their strategic plan they considered the challenge to maintain a good governance and these new structures implemented by the framework.

Finally, it can be seen the evolution of the activities and the behavior regarding IT governance in Universiteti Aleksandër Moisiu Durrës institution, not only through the above-mentioned evidence documents and deliverables, but also with the implication of people, especially those occupying high positions in the internal structures of the organization. From the project point of view, it was success achieving results beyond what was initially planned.

**Universiteti European i Tiranës**

Universiteti Europian i Tiranës (EUT) is a private university in Tirana founded on 2006. The university is a leading higher education institution in Albania, established in full compliance with the requirements and criteria of the Bologna Charter, including study programs in the three levels of higher education: Bachelor, Master and Doctorates (PhD). Universiteti Europian i Tiranës engages in high quality teaching and research as well as exchange programs and capacity building projects and joint initiatives with local and international partners in the following major disciplines: law, social sciences, political sciences and economy and information technology. At the beginning of the project, the university had 7,022 students, 575 academic staff. It offered 9 bachelor's degrees, 13 master's degrees and 6 doctorate degrees. The vision of the university is to be a leading university in the development of knowledge in the Albanian society; a center of excellence in the academic formation of our students; a center of expertise in the social, political, legal, economic and information technology studies in the country with a wider impact in the region and beyond; as well as a center of excellence in scientific research according to the areas of expertise within the university.

**A. First phase – Learning about IT governance**

*Training*. Researchers and managers were the two different profiles that were addressed in the trainings. Researchers from the Department of Management and Marketing, the Head of the Office for Project Development and Partnership and the Director of IT Solutions attended the first *Initial training Researchers*, held at the Universitat de les Illes Balears (Spain). The profile of the participants was related to project management and sustainable development, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects was not fulfilled. However, the participation of the Director of IT Solutions and the Head of the Office for Project Development and Partnership in the training sessions was crucial to obtain the engagement of this university in the project.

The second training, *Initial training Managers*, was held at the Universiteti Politeknik i Tiranës, thus expecting an increased number of attendees than the previous training. However, the same people as before attended this training. In this case, the participation of the Director of IT Solutions, who has recently been appointed Deputy Administrator, positively influenced the achievement of the activities and objectives of the project as he personally leaded the IT governance framework implementation, with the support of their rector.

*Literature review*. Researchers from the Universiteti Europian i Tiranës conducted a content web-based analysis to learn different lessons from several universities around the world. They reviewed more than 150 HEIs' websites and finally selected the ones that contained the most accurate and up-to-date information on IT

governance implementations. As a result, they could consolidate the lessons learnt in the trainings about IT governance mechanisms already designed in the found institutions, the standardized solutions the institutions were applying, and how several structures and committees widespread the information along their institutions to culturize their stakeholders on IT governance.

*Best practices visits*. The visits were organized throughout the project, rather than at the beginning, due to financial issues. The visits were held at the SRH Hochschule Berlin (Germany) and the Universidad de Almería (Spain). Two more visits were scheduled, Høgskolen I Østfold (Norway) and Universitat de les Illes Balears (Spain), but they were canceled due to the current health emergency. Hosts presented their activities and practices; thus, attendees could take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

The lessons learnt by the Universiteti Europian i Tiranës attendees were:

- Introduce IT governance to Top Managers to convince them about the importance of IT governance in the university. An effective way they propose to achieve this purpose is to create working groups to define and measure the risks of IT problems, and to present the report to decision-makers, so they can understand what the risk is when not dealing with IT issues.
- Create the CIO position, selecting the right person, assigning responsibilities, and motivating in performing his/her role.
- IT laws and regulations.
- IT governance frameworks and best practices should be designed and adopted to their institution.

Among the aspects the Universiteti Europian i Tiranës had difficulties to replicate were included:

- The creation of the CIO position. Their institution's structure was not flexible in terms of creating the position and hiring the right person.
- The allocation of a dedicated budget for IT Governance

Like the previous universities, the Universiteti Europian i Tiranës selected their attendees depending on their profile. Specifically, the former Rector of the university, recently appointed as Vice-rector for Academic Process, the Deputy Administrator and Director of IT Solutions and the Head of the Office for Project Development and Partnership attended the visits. This had a positive impact on the project because it involved the engagement of several managers throughout the project, highlighting the Director of IT Solutions. Unfortunately, due to health and safety issues derived from COVID-19, the las two visits were cancelled thus this activity was not completed. In any case, they obtained best practice application examples and real case studies with the first two visits, which allowed them to consolidate the knowledge acquired in the trainings, indicated in the design of their IT governance framework.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. At the beginning of this phase, we performed several *Initial assessment visits* to each Albanian university. The aim was to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain),

Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Universiteti Europian i Tiranës. During the visit we were welcomed by Universiteti Europian i Tiranës partners and several *IT governance steering group* members who had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. As mentioned before, the questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Universiteti Europian i Tiranës were as shown in Table 5.47:

**Table 5.47 – IT governance assessment at the Universiteti Europian i Tiranës**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 4 | 29 | 14% | 31% |
| Strategy | 7 | 16 | 44% | 31% |
| Acquisition | 18 | 34 | 53% | 28% |
| Performance | 9 | 16 | 56% | 29% |
| Conformance | 5 | 19 | 26% | 18% |
| Human Behavior | 5 | 14 | 36% | 21% |

Blue: near or above average; Orange: under average

The initial situation of the Universiteti Europian i Tiranës exceeds the ten Spanish universities average except by one principle (A. Fernández & Llorens, 2011). This means they were in a better initial level than the other Albanian institutions and so, the key aspects of IT governance were already achieved. Moreover, this did not mean that all work was done, but the activities had to be planned in an accurate way. These results are better shown in Figure 5.20, where activities related to *Performance* and *Acquisition* achieved higher consensus than the average, thus they should focus their resources on activities mainly related to *Responsibility*.

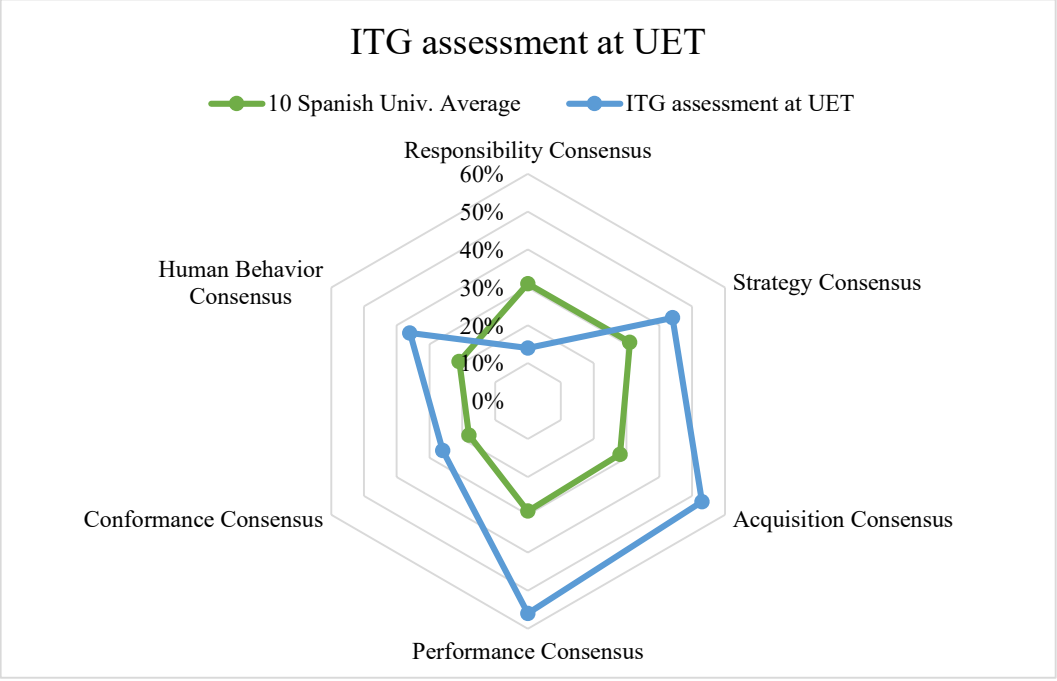


**Figure 5.20 – IT governance assessment at the Universiteti Europian i Tiranës**

As it can be shown in Figure 5.20, they were already acknowledging several concepts about IT governance regarding *Acquisition* and *Performance* aspects.

Therefore, at the end of the visit we gave them some recommendations on which principle they should focus on first. Furthermore, we requested Universiteti Europian i Tiranës partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities they would like to perform first.

The Universiteti Europian i Tiranës' *IT governance steering group* consisted of the following members:

- Chair of the board of Administration of UET.
- Administrator of UET.
- Head of IT / Vice Administrator.
- Vice Administrator.
- Vice Rector for the Academic Process (former Rector).
- Head of the Office for Project Development and Partnership.

Furthermore, they created an IT governance Advisory committee, including the following members:

- Head of IT / Vice Administrator.
- Head of the Office for Project Development and Partnership.
- Vice Rector for the Business Development.
- Dean of Faculty of Engineering, Informatics and Architecture.
- Vice Director of IT.

This list reflects the engagement and participation obtained by members who occupied crucial positions at the Universiteti Europian i Tiranës. In fact, it can be supposed that IT is strongly related with Administration Sector in their institution, viewing the positions occupied by the *IT governance steering group* concretely its CIO. This fact could be also related with the results obtained in *Acquisition* and *Performance* principles in the *Initial assessment Visit*. Thus, those authorities were involved in the project and supported their activities regarding the IT governance framework development and deployment from the very beginning. We should also highlight the order in the list, showing the importance given to the Administrator and its Vice Administrators.

*IT governance best practices adaptation*. Fernández & Llorens (2009) recommended as a step in their ITG4U framework, to adopt and adapt the best practices that best suit the organization's needs. Thus, this activity consisted of the IT governance best practices adaptation, a self-assessment of the organizational IT governance maturity level in best practices and the assessment, made by the European experts, of both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Universiteti Europian i Tiranës' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Universiteti Europian i Tiranës IT governance framework best practices catalog can be found in the Annex A. After adapting the best practices catalog, they established their initial situation of existing best practices by self-assessing themselves. Their results, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.48:

**Table 5.48 – Initial situation of existing best practices at the Universiteti Europian i Tiranës**

| | |
|---|---|
| **Responsibility (4 existing best practices)** | |
| 1. | GT assigned the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance to a CIO. |
| 2. | When appointing the CIO, did the GT bear in mind that this person should be an experienced and skilled governor with excellent communication skills |
| 3. | GT check that people who have been assigned a responsibility correctly perform their duties. |
| 4. | GT have a clear vision of the responsibility of third parties in relation to the university's IT objectives. |
| **Strategy (7 existing best practices)** | |
| 1. | GT plan IT acquisitions in a timely manner and are they included in the next year's budget. |
| 2. | GT designed a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs |
| 3. | GT know how many IT developments are still not integrated yet should be. |
| 4. | GT designed a policy that expresses the support for technological innovation on campus. |
| 5. | GT allocated a responsibility whose aim is to evaluate emerging technologies and plan their incorporation if they are suited to meeting the university's strategic needs |
| 6. | GT promoted processes that enable the evaluation of emerging technologies and the planning of their incorporation if they are suitable for the institution. |
| 7. | GT promoted a training plan for all the university's stakeholders to promote the mastery of technologies and the awareness of their importance for the university. |
| **Acquisition (18 existing best practices)** | |
| 1. | GT set up a procedure to measure how much clearly and accurately the university spends on IT on an annual basis. |
| 2. | The university have a single centralized cost center to carry out the university's main IT investments. |
| 3. | GT designed multi-annual investment programs that guarantee the funding and execution of large-scale IT projects. |
| 4. | The university optimize its purchases using good practices (for example, purchasing consortia, discount negotiations, purchase of special offers, etc.). |
| 5. | Service level agreements been set up with all IT suppliers. |
| 6. | GT regularly publish the objectives of IT projects that are to be implemented. |
| 7. | A template been created for IT projects which includes all important information (aims, benefits, steps to follow, performance criteria and associated risks) and that requires that the GT establish their order of completion. |
| 8. | When calculating the costs of an IT project, the IT investment and maintenance costs, human resource costs, training costs and the costs of organizational changes stemming from the project all considered. |
| 9. | The template for the creation of IT projects includes the criteria necessary to regularly evaluate the continuity or termination of the service or the withdrawal of an IT system to make decisions thereon. |
| 10. | When calculating the cost of an IT project, these include the costs required to maintain the continuity of an IT-based service. |
| 11. | When calculating the cost of an IT project, these include the design of activities and the costs necessary to train all the people involved in that project so that maximum IT performance is obtained, and the services offered are improved. |
| 12. | When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university. |
| 13. | GT have the ultimate responsibility for IT projects that are going to be implemented (both those that are centralized and delegated) and decide their priorities in such a way that a large portion of resources are channeled to the most important projects. |
| 14. | GT know what percentage of IT projects are to be completed in time and with the planned resources. |
| 15. | GT promoted the drafting of a procedure to measure whether the results of the projects, once completed, have met the planned objectives. |
| 16. | When calculating the benefits of an IT project, a wide range of aspects ranging from cost savings to user satisfaction measured. |

| |
|---|
| 17. A procedure been designed to analyze the satisfaction of different user groups with the results of IT projects that have been completed and are now up and running. |
| 18. GT support initiatives aimed at exchanging experiences and collaborating with other universities. |
| **Performance (11 existing best practices)** |
| 1. GT monitor whether the inefficient use of IT affects its performance and communicate the results to users so that they are aware of the need for correct usage. |
| 2. GT informed on the risks and security problems that may affect the continuity of services so that they can decide on an acceptable level of risk for the university. |
| 3. A plan been designed that ensures the continuity and availability of IT-based university services. |
| 4. A contingency plan been designed that contemplates the recovery of a service in the shortest time possible after a serious incident takes place. |
| 5. A procedure been designed that ensures that the GT receives the information it needs to help it take decisions. |
| 6. Security measures in place to maintain the integrity and quality of institutional information. |
| 7. GT allocated a responsibility for establishing an information structure and the intelligent analysis thereof from a strategic standpoint. |
| 8. GT regularly analyze the requirements of users (for example, employees and students). |
| 9. University actively manages user expectations (for example, through service descriptions, service level agreements, etc.). |
| 10. If deviations in service level agreements are identified, corrective measures are adopted. |
| 11. GT promoted the design of a procedure to analyze the satisfaction of various stakeholders with relation to the university's IT-based services in operation. |
| **Conformance (5 existing best practices)** |
| 1. GT assigned a person or a group the responsibility of monitoring whether a person or group complies with the regulations. |
| 2. Reports are submitted to the GT that determine the level of compliance of internal procedures with external laws and policies. |
| 3. Training processes are carried out related to the compliance of internal procedures with external laws and policies. |
| 4. Those in charge of IT services and projects encouraged to consider IT-related external regulations and laws and policies and internal procedures. |
| 5. Internal audits are carried out to check whether IT projects and services comply with IT related external laws and regulations and internal policies and procedures. |
| **Human Behavior (5 existing best practices)** |
| 1. The various stakeholders are identified and is there official documentation on how each one will participate in new IT initiatives. |
| 2. GT promoted the design of a procedure that serves to allow it to become aware of the IT related needs and concerns of stakeholders affected by them. |
| 3. The analysis identifies risk factors arising from resistance to change in the people or groups affected and from a lack of commitment in those involved. |
| 4. IT project planning include activities aimed at mitigating the risk related to a lack of commitment in participants. |
| 5. IT project planning include a stage of cross training, training the heads of the university service in IT matters and technicians in the university process affected by the IT initiative. |

Figure 5.21 and Table 5.49 below show the percentages of best practices satisfied after the self-assessment. All this information served to adapt the maturity model as well as the elaboration of a realistic IT governance implementation plan.

**Table 5.49 – Percentage of best practices satisfied by the Universiteti Europian i Tiranës**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 14% | Performance Consensus | 56% |
| Strategy Consensus | 44% | Conformance Consensus | 26% |
| Acquisition Consensus | 53% | Human Behavior Consensus | 36% |

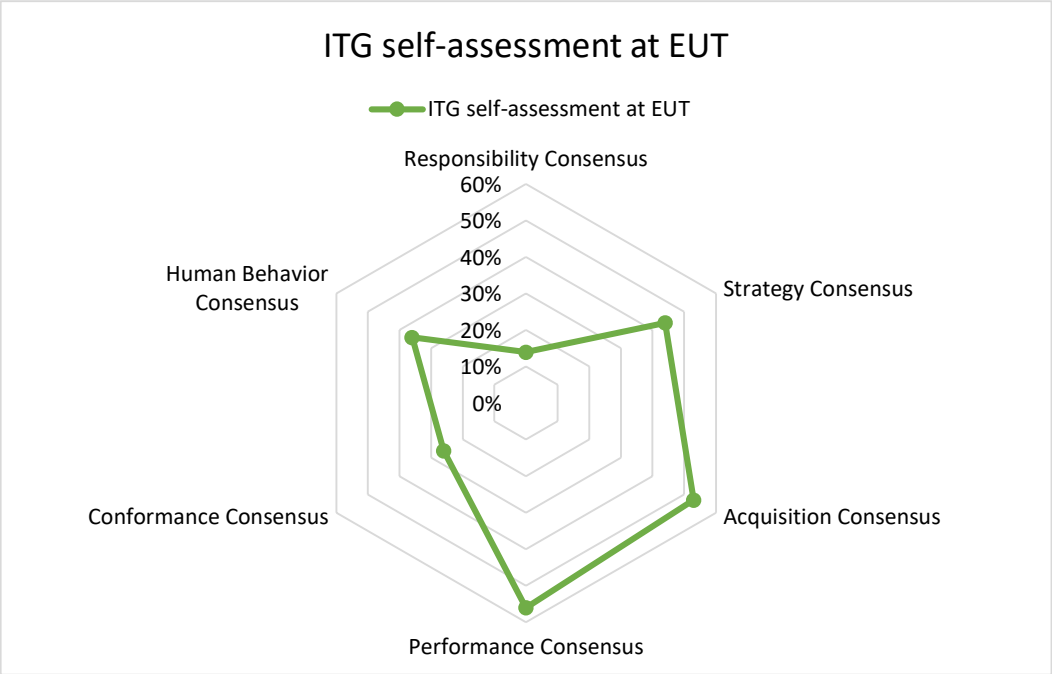


**Figure 5.21 – IT governance self-assessment at the Universiteti Europian i Tiranës**

*IT governance maturity model adaptation*. In the previous activity, the Universiteti Europian i Tiranës' IT governance framework covered the defined set of best practices. In this activity they had to adapt the proposed IT governance maturity model, provided by the European partners, review the maturity model adaptations to their organization, and select the maturity level current situation and the maturity goal. Therefore, we provided them a maturity model for each of the six ISO/IEC 38500 standard's principles and classified by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Universiteti Europian i Tiranës' *IT governance steering group* decided to adopt it with no significant changes and then used it to self-assess their IT governance maturity level. Their results can be found in Table 5.50 below. To achieve the next level, the three IT governance activities should have the same level. Otherwise, it will remain at the level of the lowest score obtained.

**Table 5.50 – IT governance maturity level at the Universiteti Europian i Tiranës**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management.<br>Directors allocate responsibilities based on their own criteria since they are not aware of any existing models. |
| | Direct | 1 | Directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 2 | The directors check whether the responsibilities allocated are understood. |
| Strategy (1) | Evaluate | 1 | Directors believe the university has sufficient IT developments, although these are not integrated, to meet users' needs.<br>Directors monitor IT activity but not in a way that is aligned with the university's strategic objectives. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| | | | Directors analyze some of the risks albeit from an operational and legal compliance perspective but not considering business considerations. |
| | Direct | 1 | There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 2 | Directors measure the results of IT projects from an operational perspective, but not from the university's business standpoint. |
| Acquisition (1) | Evaluate | 1 | Directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level. |
| | Direct | 1 | Reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |
| Performance (0) | Evaluate | 0 | The university directors do not evaluate IT activity since this is left entirely in the hands of the IT managers. |
| | Direct | 1 | IT assets cover the major operations of current university services (though not all those deemed desirable).<br>IT managers normally have an excessive workload. |
| | Monitor | 0 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets. |
| Conformance (0) | Evaluate | 0 | The university directors do not know what legislation exists in relation to IT assets. |
| | Direct | 1 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 1 | Only with respect to certain individuals or on specific projects is a check made to ensure compliance with regulations (in other words this is not a general procedure). |
| Human Behavior (0) | Evaluate | 0 | The university directors are not aware of how important people's behavior is for the success of IT initiatives. |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved.<br>Directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |
| | Monitor | 1 | Directors monitor the projects, basing their analysis solely on technical indicators. |

The *IT governance steering group* selected their maturity goals based on the above results and the principles they wanted to improve. Concretely, to reach the selected maturity, they focused mainly on *Responsibility*, *Acquisition*, *Performance* and *Conformance*, although they also included actions for *Strategy* principle (Table 5.51).

**Table 5.51 – Selected actions to achieve Universiteti Europian i Tiranës' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | The importance of IT Governance in the GT should be promoted, to get the involvement of their members. |
| | Officially assign the role of CIO. |

| Principle | Actions |
|---|---|
| | The Governance Team should create an IT Strategy Committee and direct the strategic planning of IT. |
| | The CIO should take part in preparing strategic plans. |
| Strategy | GT should lead the design of an IT Strategy Plan aligned with the University Strategy. |
| | The GT should design a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs, |
| | The GT should know how many IT developments are still not integrated yet and should be. |
| Acquisition | The GT should establish a centralized procedure to control the expenditures on IT. |
| | GT should invest enough money to achieve the strategic goals of the university. |
| | A study should be conducted that determines the university's IT assets. |
| | The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. |
| | GT Should use a strategic IT Portfolio to prioritize and invest on the most important project. |
| | GT promote a procedure to measure whether the results of the projects, once completed, have met the strategic planned objectives. |
| | Stakeholders should be identified and there should be official documentation on how each one will participate in new IT initiatives. |
| | There should be different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes. |
| Performance | GT promote a procedure to measure the performance of services based on IT and analyze the satisfaction of various stakeholders with these services. |
| | The GT should regularly analyze user requirements. |
| Conformance | The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. |
| | A reference catalogue should be created that contains the IT related standards applicable or already applied in the university and this should be kept up to date. |
| | There should be a measurement to determine the level of knowledge concerning IT policies and laws in the university community. |
| | The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards and level of effort available in the IT team. |
| Human Behavior | No selected actions. |

A similar situation to the other universities is perceived also in this university regarding the chosen actions. The *IT governance steering group* clearly influenced the selection of the maturity level goals reflected by the numerous actions taken on *Acquisition* principle. As they had the support and commitment of several authorities in their institution, they took an attitude of change and improvement of its governance of IT. This is reflected by their *IT governance steering group* actively participation throughout this entire phase. Furthermore, the available time was decisive in the selection of maturity goals and feasible activities to be carried out. It should be noted that they had less than a year and a half to prepare the plan and carry out the actions. Furthermore, the pandemic situation forced to postpone many of the planned actions. In any case, their plan was tailored to their specific situation, considering the engagement of their stakeholders, available resources, and attitude of improvement.

*IT governance improvement plan design and assessment*. At this point, the main elements of the framework were defined: i.e., best practices, maturity goal and improvement actions. Thus, the Universiteti Europian i Tiranës drew a deployment

plan tailored to their organizational circumstances. The Universiteti Europian i Tiranës' IT governance improvement plan followed the PMI project management standard and was structured in the following six phases:

- Initiating: this phase aimed to bring leaders' awareness and realization of the deployment of the framework. For this reason, they organized several workshops and prepared the following information to present: i) IT governance current situation (self-assessment of best practices and maturity), ii) selected goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.
- Planning: the plan provided the specification of purposes, goals and outcomes, deliverables, stakeholders, risks and involved teams. Furthermore, a Gantt diagram was also provided, indicating responsible people, tasks, and deliverables within the chronogram.
- Execution: this phase was meant to present the implementation actions, its period, its factors and metrics, and its different steps.
- Monitoring and Controlling: this phase aimed to define and implement a controlling system to allow a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Universiteti Europian i Tiranës partners listed evidence and KPIs by each action classified by principles.
- Risk Management: this phase defined and formalized risk management procedures, to be followed during and after the implementation of the framework. The main aim was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Universiteti Europian i Tiranës partners identified main risks, analyzed its probability and impact, prioritized them, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.
- Communication and marketing plan: Universiteti Europian i Tiranës partners defined a communication plan, in which several stakeholders and deliverables were identified. A list of actions depending on the target groups were also defined, e.g., info days, workshops, and seminars addressed to students, internal staff, and/or the industry.

The Universiteti Europian i Tiranës' IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

During the third phase of the project, Universiteti Europian i Tiranës partners deployed and executed the actions under their *IT governance improvement plan*. This phase was organized as a continuous improvement cycle in which European experts monitored the state of the planned actions. Table 5.52 shows the state of the actions at the end of the project, in October 2020. We requested Universiteti Europian i Tiranës partners to indicate the state of each action. As it can be seen in Table 5.52, the actions had two different states: finished, and ongoing. Those finished actions

were done as planned; while those ongoing actions were not finished at the end of the project but planned to be finished soon in the future. Like the other Albanian partners, some actions were not performed due to the difficult situation of the pandemic, as they were in lockdown for two months, working from home till end of June 2020. Furthermore, in August and September 2020 there was a big change on the Universiteti Europian i Tiranës ownership and management. A new owner (in addition to the existing one) was introduced to the ownership of the university, to strengthen the financial and management part of the university. With this new change, a new administrator was appointed. Since Universiteti Europian i Tiranës is a private university, the administrator has a key role in the leadership of the university management and the IT governance too. The new administration needed some time to get in track of the ITG4AU project. Fortunately, the new owner is one the founders of the university and he knows the university perfectly, thus giving all his support to the IT governance framework development too. With this new administration they focused on the direction on the IT governance in our institution, and therefore Universiteti Europian i Tiranës partners deployed as many actions of the plan as they can as indicated by the finished actions in Table 5.52. In general terms they showed a willingness of improvement, enhancement, and change.

**Table 5.52 – State of Universiteti Europian i Tiranës' improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| The importance of IT Governance in the GT should be promoted, to get the involvement of their members | Jan-20 | Sep-20 | Finished (May 2020) |
| Officially assign the role of CIO | Jan-20 | Mar-20 | Finished (April 2020) |
| The Governance Team should create an IT Strategy Committee and direct the strategic planning of IT. | Mar-20 | Sep-20 | Finished (April 2020) |
| The CIO should take part in preparing strategic plans. | Jan-20 | Mar-20 | Finished (April 2020) |
| **Strategy** | | | |
| Actions | Start | End | State |
| GT should lead the design of an IT Strategy Plan aligned with the University Strategy | May-20 | Sep-20 | Ongoing (new end Dec 2020) |
| The GT should design a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs. | Apr-20 | Sep-20 | Ongoing (new end Dec 2020) |
| The GT should know how many IT developments are still not integrated yet should be. | Mar-20 | Oct-20 | Finished (Oct 2020) |
| **Acquisition** | | | |
| Actions | Start | End | State |
| The GT should establish a centralized procedure to control the expenditures on IT | Apr-20 | Sep-20 | Ongoing (new end Dec 2020) |
| GT should invest enough money to achieve the strategic goals of the university | Mar-20 | Oct-20 | Finished (budget revised with IT focus) |
| A study should be conducted that determines the university's IT assets. | Jul-20 | Oct-20 | Ongoing (mostly done. Final Dec 2020) |
| The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. | Jun-20 | Jul-20 | Finished (Sep 2020) |

| | | | |
|---|---|---|---|
| GT Should use a strategic IT Portfolio to prioritize and invest on the most important project | Jun-20 | Sep-20 | Finished (Sep 2020) |
| GT promote a procedure to measure whether the results of the projects, once completed, have met the strategic planned objectives | Jun-20 | Oct-20 | Ongoing (New end Dec 2020) |
| The various stakeholders should be identified and there should be official documentation on how each one will participate in new IT initiatives. | Mar-20 | Dec-20 | Ongoing (mostly done) |
| There should be different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes. | Mar-20 | Dec-20 | Ongoing (mostly done) |
| **Performance** | | | |
| Actions | Start | End | State |
| GT promote a procedure to measure the performance of services based on IT and analyze the satisfaction of various stakeholders with these services | Jun-20 | Dec-20 | Ongoing (Formalization in process) |
| The GT should regularly analyze user requirements. | Apr-20 | Sept-20 | Finished (analyze done per project) |
| **Conformance** | | | |
| Actions | Start | End | State |
| The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. | Apr-20 | May-20 | Finished (Sep 2020) |
| A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the university, and this should be kept up to date. | June-20 | Oct-20 | Ongoing (New end Dec 2020) |
| There should be a measurement to determine the level of knowledge concerning IT policies and laws in the university community. | Apr-20 | Oct-20 | Ongoing (New end Dec 2020) |
| The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. | Jun-20 | Jun-20 | Finished (Sep 2020) |

Universiteti Europian i Tiranës defined several documents and its KPIs as evidence (

Table 5.53) for future monitoring and control. They also included those actions that were still ongoing but near to its end, which indicates an interest in formalizing the future monitoring and control of the selected actions. For each KPI, they indicated the current value belonging to last year, and the goal value expected for next year. Universiteti Europian i Tiranës' evidence documents can be found in Annex A.

**Table 5.53 – Evidenced finished actions at the Universiteti Europian i Tiranës**

| | Actions | Evidence | KPIs |
|---|---|---|---|
| Responsibility | The importance of IT Governance in the GT should be promoted, to get the involvement of their members. | List of initiatives to get involve the GT:<br>Meeting with new administration on EUT.<br>Review the progress done through ITG4AU project.<br>ITG meeting with Deans and Head of Departments.<br>Sustainability and experience sharing with HEIs outside consortium. | Number of initiatives to involve the GT.<br>*Current value* (last year): 0<br>*Goal value* (next year): 3 (beginning, middle and end of academic year). |

| | Actions | Evidence | KPIs |
|---|---|---|---|
| | Officially assign the role of CIO. | A new document with formal nomination of the role of CIO. | Number of meetings of the ITC the CIO participate: 1 |
| | The Governance Team should create an IT Strategy Committee and direct the strategic planning of IT. | Minutes of the meetings that includes the name of the members and the responsibilities of the Committee. | Number of documents the ITC propose to the GT to be approved each year.<br>*Current value* (last year): 0<br>*Goal value* (next year): 5 |
| | The CIO should take part in preparing strategic plans. | IT strategic Plan. | Number of meetings participated.<br>*Current value* (last year): 1<br>*Goal value* (next year): 4 |
| Strategy | GT should lead the design of an IT Strategy Plan aligned with the University Strategy. | Joint meeting with other high management bodies.<br>Plans, agreements, Strategic Plan. | Number of plans/ sub-plans.<br>Number of meetings.<br>*Current value* (last year): 1<br>*Goal value* (next year): 4 |
| | The GT should design a long-term program that has the aim of implementing all the IT developments that the university needs to meet its users' needs. | Minutes on meeting, project reports and a long-term IT Developments Plan. | Number of meetings: 2 this year; 5 next year<br>List of plans: 0 this year; 2 next year |
| | The GT should know how many IT developments are still not integrated yet should be. | Reports on current IT Projects | Number of reports: 1<br>Next year: 1 report per quarter. |
| Acquisition | The GT should establish a centralized procedure to control the expenditures on IT. | Report on IT investments needs and forecasts.<br>Budget plans. | Number of meetings related to the budgeting: 1<br>Next year at least 2 meeting per year for budget plans. |
| | GT should invest enough money to achieve the strategic goals of the university. | Clear budget plans for IT | % of budget dedicated to the IT Projects: 2% of investment budget. |
| | A study should be conducted that determines the university's IT assets. | Inventory reports from Finance office.<br>IT projects reports from IT Office. | Number of people involved.<br>Values of the IT Assets.<br>3 people from IT and 1 from finance. |
| | The GT should know what human resources are available, what occupational roles there are always and what human potential is available to undertake new IT initiatives, avoiding overloads. | List of employees from human resources.<br>List of current running projects.<br>Job description. | Number of employees.<br>Number of projects.<br>End of the year to increase the IT staff with 20%. |

| | Actions | Evidence | KPIs |
|---|---|---|---|
| | GT Should use a strategic IT Portfolio to prioritize and invest on the most important project. | List of approved prioritized IT projects.<br>Amount of money to invest by the IT Portfolio. | Number of strategic IT projects approved by ITG to achieve the strategic objectives of the university each year: 1 project with priority (ERP)<br>Amount invested in IT Portfolio each year: Around 150.000 Euro (Local & Erasmus+). |
| | GT promote a procedure to measure whether the results of the projects, once completed, have met the strategic planned objectives. | End of project report of results for IT Projects. | List of policies published: 0 this year.<br>Next year: 2 reports for finished projects. |
| | The various stakeholders should be identified and there should be official documentation on how each one will participate in new IT initiatives. | List of stakeholders and IT project initiatives where they can be involved. | List of stakeholders:<br>*High management + Deans + Head of Departments + External IT Companies (partnerships with EUT).* |
| | There should be different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes. | List of groups of stakeholders. | Number of different groups.<br>Number of stakeholders.<br>Internal stakeholders.<br>External Stakeholders. |
| Performance | GT promote a procedure to measure the performance of services based on IT and analyze the satisfaction of various stakeholders with these services. | Policies on reporting on project performance related to different stakeholders. | Number of policies published.<br>Number of reports. |
| | The GT should regularly analyze user requirements. | Meetings, reports. | Number of reports: 1 report this year.<br>Next year: 2 reports (depends on number of finished project). |
| Conformance | The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. | A person of a group appointed. | Decision report: Head of IT + Head of Legal Office. |
| | A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the university, and this should be kept up to date. | The catalogue listed in a shared folder in intranet and/or on the website of the university. | Number of policies published in catalogue: 1 draft list this year.<br>Next year: 1 complete list. |

| | Actions | Evidence | KPIs |
|---|---|---|---|
| | There should be a measurement to determine the level of knowledge concerning IT policies and laws in the university community. | List of participants in the trainings. Agenda, etc. | Number of trainees.<br>Next year: 30 people. |
| | The GT should officially assign to a person or group of people the responsibility of understanding IT-related standards. | List of people responsible to understand IT Standard. | Number of people: 2 People from IT. |

Universiteti Europian i Tiranës partners defined an ambitious plan and performed several actions that led to managerial changes to position their university in a better level of IT governance and as a result to greater business value. The project had a positive impact to the overall management of the university, especially under the pandemic situation. Nevertheless, some important changes happened to the top hierarchy of the university management which strengthened the overall management and improved their financial situation and management. Some deployment activities were extended in time due to the pandemic situation, and to obtain the engagement of the new administration. All these situations of change were a challenge for the Universiteti Europian i Tiranës partners, who proved to be able to overcome by presenting the list of documents and KPIs above in

Table 5.53 as evidence.

Universiteti Europian i Tiranës team has showed a strong engagement and involvement in the project in general, throughout the duration of the project, but especially in IT governance implementation which can be clearly seen with the people forming their *IT governance steering group*. Even though they took advantage of this opportunity and execute an ambitious plan to improve their current situation, some actions to *Human Behavior* principle could have been selected. It is worth nothing that after their self-assessment to know their current maturity level, the results showed they were at a medium level. In any case, with the support of their new appointment in their hierarchy, they expect to achieve the selected goals and continue with a more ambitious plan.

In terms of IT governance, beyond what was initially expected by the project, Universiteti Europian i Tiranës has focused on maintaining and reinforcing what they already had in use and also on improving their current situation taking the IT governance of the organization to higher levels. Regarding the objectives of the project, Universiteti Europian i Tiranës successfully achieved them, in terms of improving the current situation and adapting the actions to their specific needs, being able to serve as an example to other organizations.

**Universiteti i Tiranës**

The Universiteti i Tiranës (UT) is the biggest and oldest public university in Albania, founded on 1957. It is composed from 6 faculties and 2 research institutes. At the beginning of the project, nearly 40,000 students (full-time and part-time) continue their studies at the Universiteti i Tiranës. Universiteti i Tiranës has approximately 800 full time academic staff and approximately 350 administrative staff. It offered more than 60 bachelor and master's degrees, and 38 doctorate programs. The aims of the university

were working with IT staff to develop initiatives to keep staff skills contemporary. They wanted also to encourage IT staff to continually gain knowledge and to gather intelligence through independent research, professional development opportunities, information sharing and interaction with end-users.

**A. First phase – Learning about IT governance**

*Training*. We addressed two different profiles through the *Initial training researchers* and the *Initial training managers*. Researchers from the Faculty of Economy, including its Head of the Department of Statistics and Applied Informatics, and its Deputy Dean for Information Technology, attended the first training held at the Universitat de les Illes Balears (Spain). The profile of the participants was related to computer science, so the objective of addressing this first training to professors and lecturers who could create this discipline in their subjects and train future young researchers was fulfilled. In addition, the participation of the Head of the Department and the Deputy Dean in the training sessions was crucial to obtain the engagement of this university in the project.

The second training, *Initial training Managers*, was held at the Universiteti Politeknik i Tiranës, thus expecting an increased number of attendees than the previous training. However, the same people as in the previous training attended this second training. This university did not obtain a representative number of managers interested in the training, but the participation of the Deputy Dean for Information Technology influenced the IT governance framework development.

*Literature review*. Universiteti i Tiranës partners performed an exploratory study about IT governance in Albanian universities. The objective was to deepen on how IT governance was organized in several public and private universities in Albania. As a result, they identified common problems and challenges these entities were facing. In their study, they proposed to elaborate a complete set of critical success factors (CSFs) to identify the areas that need more attention for governing IT.

*Best practices visits*. We organized four best practices visits throughout the project, rather than at the beginning due to financial issues, to the European universities belonging to the project. The visits were held at the SRH Hochschule Berlin (Germany) and the Universidad de Almería (Spain). Two more visits were scheduled, Høgskolen I Østfold (Norway) and Universitat de les Illes Balears (Spain), but they were canceled due to the current health emergency. Hosts presented their activities and practices; thus, attendees could take notes on lessons learnt, aspects easy and difficult to imitate, and identified several barriers.

The lessons learnt by the Universiteti i Tiranës attendees were:

- Create the CIO position assigning responsibilities and functions.
- Assign IT responsibilities to specific structures and committees.
- IT laws, rules, and regulations protocol design.
- IT governance framework and best practices adoption.
- IT project portfolio management.

Among the aspects the Universiteti i Tiranës wanted to imitate were included:

- Emphasize and promote the importance of IT Governance in the Governance Team.

- Appoint a CIO and establish a Governance Team, being the CIO the leader of this group.
- Design an IT strategy aligned with the university's strategy.

Among the aspects the Universiteti i Tiranës had difficulties to replicate were included:

- The appointment of the CIO, its responsibilities, and functions definition.
- IT governance dedicated budget allocation.

In general terms Universiteti i Tiranës attendees were selected considering their profiles. Specifically, the Rector of the university, the Head of the Department of Statistics and Applied Informatics, and its Deputy Dean for Information Technology attended both trainings. This had a positive impact on the project because it involved the engagement of several managers in the project, highlighting the Rector and the Deputy Dean for Information Technology. Unfortunately, due to health and safety issues derived from COVID-19, the las two visits were cancelled thus this activity was not completed. In any case, they obtained best practice application examples and real case studies with the first two visits, which allowed them to consolidate the knowledge acquired in the trainings.

**B. Second phase – Determining and improving the situation**

*IT governance environment definition*. As explained above, we performed *Initial assessment visits* to each Albanian university. The purpose was to set an initial state of IT governance in these universities and thus better understand their needs. Therefore, representatives from Universitat de les Illes Balears (Spain), Universidad de Almería (Spain), SRH Hochschule Berlin (Germany), and Høgskolen I Østfold (Norway) visited the Fakulteti i Ekonomisë belonging to the Universiteti i Tiranës. During the visit we were welcomed by some members of their *IT governance steering group*, who had previously responded the survey on IT governance following the methodology explained in section 5.1.3.B.

The complete survey can be found in Annex A. The questions are a subset of best practices classified by each of the six principles of the ISO/IEC 38500 standard. Results of the Universiteti i Tiranës were as shown in Table 5.54:

**Table 5.54 – IT governance assessment at the Universiteti i Tiranës**

| Principles | B-practices satisfied | Total of B-practices | % B-practices satisfied | 10 Spanish Univ. average |
|---|---|---|---|---|
| Responsibility | 12 | 29 | 41% | 31% |
| Strategy | 5 | 16 | 31% | 31% |
| Acquisition | 23 | 34 | 68% | 28% |
| Performance | 10 | 16 | 63% | 29% |
| Conformance | 13 | 19 | 68% | 18% |
| Human Behavior | 7 | 14 | 50% | 21% |

Blue: near or above average; Orange: under average

The Universiteti i Tiranës presented a better situation in comparison with ten Spanish universities average (A. Fernández & Llorens, 2011). In this *Initial Assessment* the principles reached more than half of the practices except *Strategy* that reached a third. These results positioned the Universiteti i Tiranës in a medium level of IT governance maturity. Thus, its activities had to be planned in an accurate way, involving mainly strategic actions. These results are better shown in Figure 5.22,

where activities related to *Acquisition*, *Performance* and *Conformance* achieved higher consensus than the average, but they should focus their resources on activities mainly related to *Responsibility* and *Strategy* in the first place.

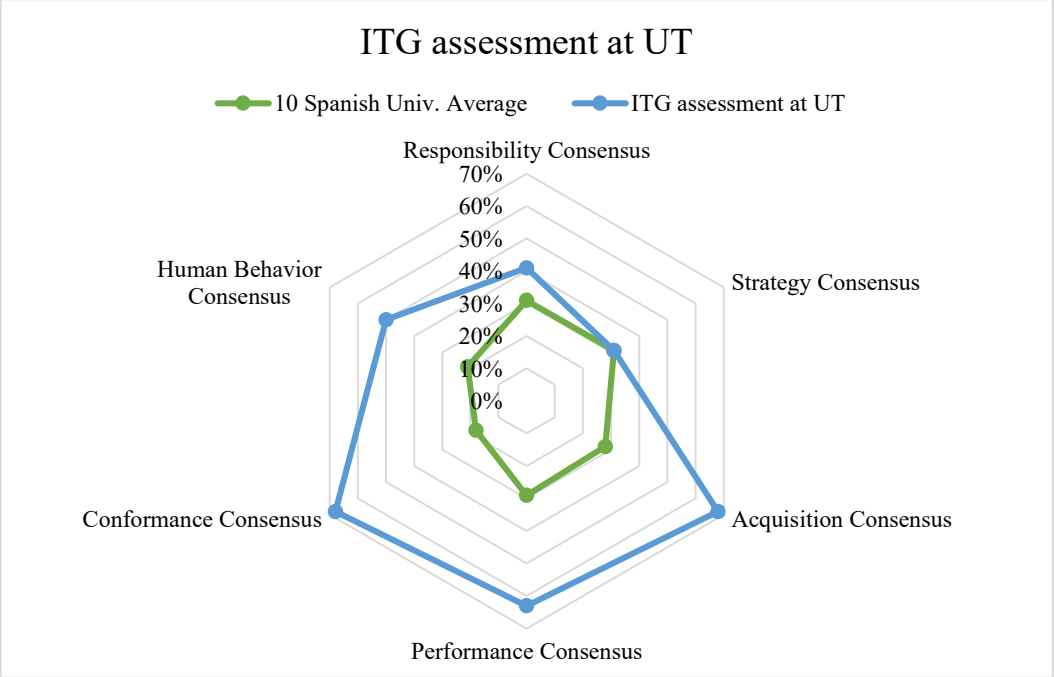


**Figure 5.22 – IT governance assessment at the Universiteti i Tiranës**

Focusing on their results, at the end of the visit we gave them some recommendations on which principle they had to improve first. Furthermore, we requested Universiteti i Tiranës partners to write down a report explaining how the set of best practices presented would best suit their specific necessities and what activities would like to perform first.

Regarding the Universiteti i Tiranës' *IT governance steering group*, it consisted of the following members:

- Dean of the Fakulteti i Ekonomisë (FE), member of UT Academic Senate and FE Advisory Board.
- Vice Dean of the Fakulteti i Ekonomisë for IT, member of FE Advisory Board.
- Vice Dean of the Fakulteti i Ekonomisë for Education and Quality Assurance, member of FE Advisory Board.
- Vice Dean of the Fakulteti i Ekonomisë for Scientific Research and International Relations, member of FE Advisory Board
- Head of Department of Economics, member of FE Advisory Board
- Head of Department of Finance, member of FE Advisory Board
- Head of Department of Financial Accounting, member of FE Advisory Board.
- Head of Department of Marketing-Tourism, member of FE Advisory Board.
- Head of Department of Management, member of FE Advisory Board.
- Head of Department of Statistics and Applied Informatics, member of FE Advisory Board.
- Administrator of FE.

Partners from the Universiteti i Tiranës decided to focus the IT governance actions in their faculty solely, as reflected in the list of members. This was an attitude showed from the very beginning as people belonging to this faculty attended the trainings, welcomed us at the *Initial assessment visit* and were part of the *IT governance steering group*. Their attitude was very conservative due to the internal restrictions they were facing in their institution. Universiteti i Tiranës partners focused on the faculty, and therefore, the framework was developed and implemented in this area.

*IT governance best practices adaptation*. The ITG4U framework suggests to adopt and adapt the best practices that best suit the needs of the institution (A. Fernández & Llorens, 2009). Therefore, in this activity Universiteti i Tiranës partners adapted the IT governance best practices and used them to self-assess their IT governance maturity level in best practices. European experts assessed both the adaptation and the self-assessment. Thus, we provided them with a catalog of best practices classified by the six ISO/IEC 38500 standard's principles, as stated above. The Universiteti i Tiranës' *IT governance steering group* performed several meetings to adopt and adapt the best practices catalog selection. The Universiteti i Tiranës IT governance framework best practices catalog can be found in the Annex A. The results of their self-assessment, classified by each ISO/IEC 38500 standard's principle, are shown in Table 5.55:

**Table 5.55 – Initial situation of existing best practices at the Universiteti i Tiranës**

| | |
|---|---|
| **Responsibility (6 existing best practices)** | |
| 1. | IT Governance is the responsibility of the GT and not of IT experts and professionals. |
| 2. | The GT has assigned the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance to a CIO. |
| 3. | When appointing the CIO, the GT bears in mind that this person should be an experienced and skilled governor with excellent communication skills. |
| 4. | The GT has a clear vision of the responsibility of third parties in relation to the university's IT objectives. |
| 5. | The university have a catalogue of indicators that serves to enable the GT to monitor whether the responsibilities related to the management of IT are performed correctly. |
| 6. | The university have a catalogue of indicators that serves to enable the GT to monitor whether the responsibilities related to the governance of IT are performed correctly. |
| **Strategy (4 existing best practices)** | |
| 1. | The GT has instigated the design of a strategic plan for the university that also includes IT strategies to ensure they both follow the same line. |
| 2. | The GT plans IT acquisitions in a timely manner and they are included in the next year's budget. |
| 3. | The GT knows how many IT developments are still not integrated and yet should be. |
| 4. | The GT has promoted a training plan for all the university's stakeholders to promote the mastery of technologies and the awareness of their importance for the university. |
| **Acquisition (22 existing best practices)** | |
| 1. | The GT has set up a procedure to measure how much clearly and accurately the university spends on IT on an annual basis. |
| 2. | The university has a single centralized cost center to carry out the university's main IT investments. |
| 3. | The GT has designed multi-annual investment programs that guarantee the funding and execution of large-scale IT projects. |
| 4. | The GT has designed and published a policy that provides guidance on different types of acquisitions. |
| 5. | The GT has promoted the design of an IT purchase procedure that includes the analysis of the different offers based on strategic objectives and not only on technical or economic criteria. |
| 6. | The GT has designed and published a policy that provides guidance on different types of supplier relationships |

| |
|---|
| 7. The university optimizes its purchases using good practices (for example, purchasing consortia, discount negotiations, purchase of special offers, etc.). |
| 8. Cost accounting is performed to establish the cost impact of each IT service in respect to all purchase costs, maintenance costs and other applicable costs. |
| 9. The GT has designed and published a policy that provides guidance on different types of supplier relationships. |
| 10. Service level agreements have been set up with all IT suppliers. |
| 11. Reports are submitted to the GT that monitor the service levels agreed with suppliers. |
| 12. The GT has designed and published a policy that reflects its stance in relation to the outsourcing of services. |
| 13. The GT has promoted a study on the feasibility of externalizing various services and this study encompass both the benefits and the risks for the university. |
| 14. When calculating the costs of an IT project, the IT investment and maintenance costs, human resource costs, training costs and the costs of organizational changes stemming from the project are all considered. |
| 15. When calculating the cost of an IT project, these include the costs required to maintain the continuity of an IT-based service. |
| 16. When calculating the cost of an IT project, these include the design of activities and the costs necessary to train all the people involved in that project so that maximum IT performance is obtained, and the services offered are improved. |
| 17. The GT has designed and published a set of criteria aligned with the strategic objectives which determines the priority of IT acquisitions and projects. |
| 18. When making an IT acquisition, the evaluation criteria include the fact that the proposed equipment should be compatible with existing technologies, comply with standards and be flexible and adaptable for future changes that may occur within the university. |
| 19. The GT has designed and published an IT acquisition approval protocol that details all the people responsible for supplying information and making decisions. |
| 20. The GT has the ultimate responsibility for IT projects that are going to be implemented (both those that are centralized and delegated) and decide their priorities in such a way that a large portion of resources are channeled to the most important projects. |
| 21. The GT knows what percentage of IT projects are to be completed in time and with the planned resources. |
| 22. The GT supports initiatives aimed at exchanging experiences and collaborating with other universities. |
| **Performance (1 existing best practice)** |
| 1. The GT is informed on the risks and security problems that may affect the continuity of services so that they can decide on an acceptable level of risk for the university. |
| **Conformance (11 existing best practices)** |
| 1. A reference catalogue has been compiled that contains the IT-related regulations and laws that affect the university and is this kept up to date. |
| 2. The GT has promoted processes to communicate IT-related internal policies and regulations to facilitate their dissemination in all spheres of the university community. |
| 3. The GT has assigned a person or a group the responsibility of monitoring whether a person or group complies with the regulations. |
| 4. Reports are submitted to the GT that determine the level of compliance of internal procedures with external laws and policies. |
| 5. Training processes are carried out related to the compliance of internal procedures with external laws and policies. |
| 6. Those in charge of IT services and projects are encouraged to consider IT-related external regulations and laws and policies and internal procedures. |
| 7. Internal audits have carried out to check whether IT projects and services comply with IT-related external laws and regulations and internal policies and procedures. |
| 8. External audits are carried out to check whether IT projects and services comply with IT related external laws and regulations and internal policies and procedures. |
| 9. Reports are submitted to the GT with the results of the internal and external audits, which clearly express the faculty's level of compliance with regulations and risks that these entail. |
| 10. The GT has officially assigned to a person or group of people the responsibility of understanding the IT-related standards. |

| | |
|---|---|
| 11. | A reference catalogue has been created that contains the IT-related standards applicable or already applied in the university and this is kept up to date |
| **Human Behavior (6 existing best practices)** | |
| 1. | The various stakeholders are identified and there is official documentation on how each one will participate in new IT initiatives. |
| 2. | There are identified different groupings of stakeholders to offer them different treatment when involving them in IT-supported change processes. |
| 3. | The analysis identifies risk factors arising from resistance to change in the people or groups affected and from a lack of commitment in those involved. |
| 4. | IT project planning includes the responsibilities assigned to all participants and activities aimed at measuring the extent to which the involvement of these people contributes to the success of the project and therefore to the change process that it promotes. |
| 5. | Committees and work groups have been created to facilitate the participation, and therefore the involvement, of stakeholders in the design, supervision, and final evaluation of IT-based change processes. |
| 6. | IT project planning includes a stage to train stakeholders on the change that is going to take place in the university service affected by the IT initiative. |

Figure 5.23 and Table 5.56 below show the percentages of best practices satisfied after the self-assessment. This needed information served to adapt the maturity model as well as the elaboration of a realistic IT governance implementation plan, as detailed in next sections.

**Table 5.56 – Percentage of best practices satisfied by the Universiteti i Tiranës**

| | | | |
|---|---|---|---|
| Responsibility Consensus | 21% | Performance Consensus | 06% |
| Strategy Consensus | 25% | Conformance Consensus | 58% |
| Acquisition Consensus | 65% | Human Behavior Consensus | 43% |

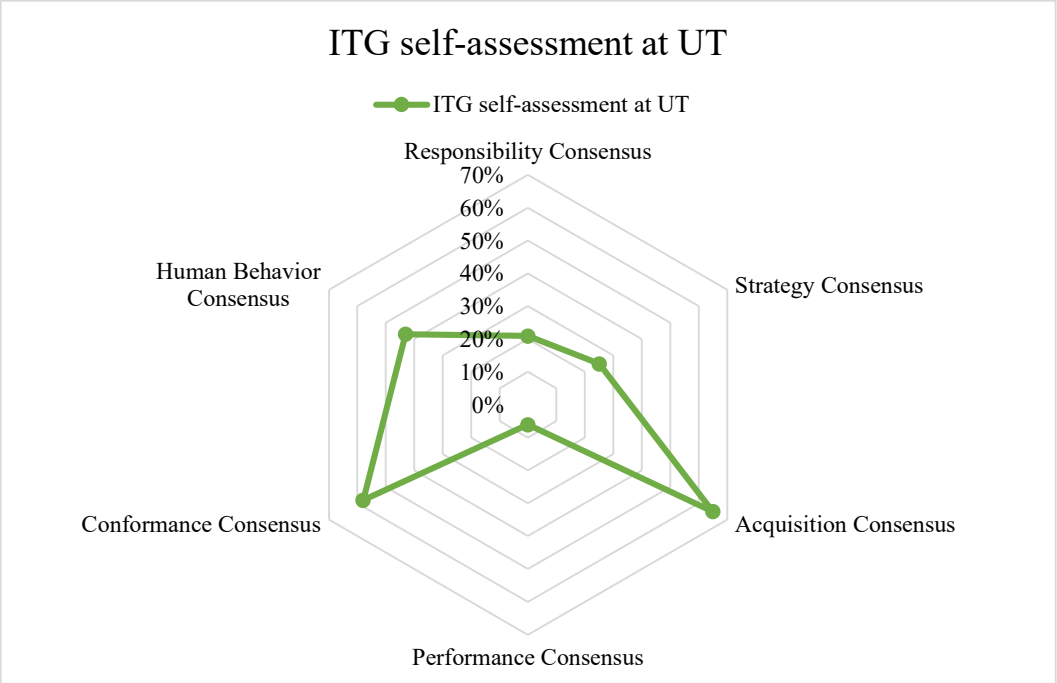


**Figure 5.23 – IT governance self-assessment at the Universiteti i Tiranës**

*IT governance maturity model adaptation*. After defining the set of best practices aimed to be covered by their IT governance framework, adaptations on the proposed IT governance maturity model were needed. We provided them with a proposition of IT governance maturity model, and then reviewed their model adaptations. Universiteti i Tiranës partners assessed their current maturity level and selected their

maturity goal. Therefore, the maturity model provided were classified by each of the six ISO/IEC 38500 standard's principles and divided by the three IT governance activities: *Evaluate*, *Direct*, and *Monitor*. The Universiteti i Tiranës' *IT governance steering group* adopted it with no significant modifications and then used it to self-assess their maturity level regarding IT governance. These results can be found in Table 5.57 below. The three IT governance activities should have the same level to achieve the next level for each principle. Otherwise, it will remain at the level of the activity with the lowest score obtained.

**Table 5.57 – IT governance maturity level at the Universiteti i Tiranës**

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Responsibility (1) | Evaluate | 1 | Directors have allocated responsibilities related to IT management.<br>Directors allocate responsibilities based on their own criteria since they are not aware of any existing models |
| | Direct | 1 | Directors monitor IT management but not in a planned way.<br>Most decisions on IT are made by IT managers and these are confirmed by the directors. |
| | Monitor | 2 | Directors check whether the responsibilities allocated are understood. |
| Strategy (1) | Evaluate | 1 | Directors believe the university has sufficient IT developments, although these are not integrated, to meet users' needs.<br>Directors monitor IT activity but not in a way that is aligned with the university's strategic objectives.<br>Directors analyze some of the risks albeit from an operational and legal compliance perspective but not considering business considerations. |
| | Direct | 1 | Directors plan investments in IT for the coming year.<br>The lack of involvement on the part of all the directors prevents any global policies relating to IT from being designed.<br>There is very little innovation in IT as an attitude prevails that is acquiescent of technologies that can be applied to the business. |
| | Monitor | 3 | Directors measure to see whether projects are completed on time and with the resources planned but do not measure to see whether the benefits anticipated have been obtained.<br>Directors check to see whether policies concerning IT are being applied throughout the university. |
| Acquisition (1) | Evaluate | 1 | Directors determine acquisition mainly based on criteria aimed at reducing costs.<br>Each director determines acquisitions for their own sphere of influence, there being no single decision at institution level.<br>Directors draw up a diverse set of general criteria (in addition to the cost savings) to be considered when acquiring. |
| | Direct | 1 | Reports drawn up to support an acquisition purchase usually include more technical and economic data than other criteria used by directors in the decision-making process.<br>The budget for IT acquisition is centralized and completely separated from other items. |
| | Monitor | 1 | When calculating the cost of a project, particular consideration is taken of the investment and maintenance costs while other costs (human resources and training initiatives) deriving from the organizational change caused by the IT project are normally excluded. |

| | ITG activity | Initial level | Aspects |
|---|---|---|---|
| Performance (0) | Evaluate | 0 | The university directors do not evaluate IT activity since this is left entirely in the hands of the IT managers. |
| | Direct | 0 | Planning is very difficult because IT assets are clearly insufficient. |
| | Monitor | 1 | Only the cost of the services is measured as an index for prioritizing the allocation of IT assets. |
| Conformance (0) | Evaluate | 0 | The university directors do not know what legislation exists in relation to IT assets. |
| | Direct | 1 | Those in charge of IT exhibit the proper professional behavior with respect to the regulations, even though there are no formal mechanisms for achieving such compliance. |
| | Monitor | 1 | Only with respect to certain individuals or on specific projects is a check made to ensure compliance with regulations (in other words this is not a general procedure). |
| Human Behavior (1) | Evaluate | 2 | Directors are concerned to determine which people should be involved and those who are affected by IT activities. |
| | Direct | 1 | Some IT projects fall behind or fail due to lack of implication on the part of the people involved.<br>Directors are concerned to offer technical training and teach the people participating in IT projects how the services work. |
| | Monitor | 2 | IT projects are submitted for a final evaluation but solely based on technical indicators, not on managerial ones. |

After several internal meetings, the *IT governance steering group* at the Universiteti i Tiranës decided to select maturity goals in each principle. Concretely, they focused on *Responsibility*, *Strategy, Acquisition* and *Human Behavior* to reach level 2, while *Performance* and *Conformance* to reach level 1. For each selected principle, they planned the actions shown in Table 5.58 to achieve their goal maturity level.

**Table 5.58 – Selected actions to achieve Universiteti i Tiranës' goal maturity level**

| Principle | Actions |
|---|---|
| Responsibility | The importance of IT Governance in the GT should be promoted. |
| | Assign the role of CIO. |
| | Create an IT Strategic Committee. |
| Strategy | An IT Strategic Plan should be designed that is aligned with the faculty's overall strategy. |
| | The GT should design a long-term program that has the aim of implementing all the IT developments that the faculty needs to meet its users' needs. |
| | The Governance Team should direct the strategic planning of IT. |
| | The GT should design a set of IT policies, aligned with the faculty´s strategy, that are a reference to guide those who must make IT-related decisions in the faculty. |
| Acquisition | The GT should establish a "portfolio of projects" as a methodology to carry out the planning of IT acquisitions aligned with the faculty's strategic objectives. |
| Performance | The GT should create a Performance Catalogue of indicators that reflect the expected performance of university processes that are IT-based. |
| Conformance | A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the faculty, and this should be kept up to date. |
| | The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. |
| Human Behavior | Analysis the workload of IT Staff and try not overload them with new IT initiatives. |

Some conclusions may be raised regarding the selected actions. The formation of the *IT governance steering group* influenced those decisions. As they were taking a conservative attitude, the actions were designed to be applied in their faculty instead of the whole university. Although the obtained results showed an area of the university, the Universiteti i Tiranës partners were supported by their faculty authorities during the whole IT governance development and deployment process. As the other Albanian universities, the remaining time was another influencing factor to consider. They had less than a year and a half to prepare the plan and carry out the actions, affected by the COVID-19 pandemic situation. For these reasons they presented a realistic plan tailored to their faculty, considering their stakeholder support, and the remaining time and resources of the project.

*IT governance improvement plan design and assessment*. Universiteti i Tiranës provided a plan for the implementation of the IT governance framework in their faculty. At this step, they had defined the main elements of their framework, i.e., best practices, maturity goal and improvement actions. They drew a deployment plan tailored to their organizational circumstances, following the PMI project management standard. The Universiteti i Tiranës' IT governance improvement plan was structured in the following six phases:

- Initiating: the first phase aimed to engage their leaders to the awareness and realization that the framework was going to be deployed. For this reason, they presented their i) IT governance current situation (by the last two activities), ii) goal maturity level, iii) scope of implementation, iv) general constrains, and v) resources committed.
- Planning: the second phase detailed the scope of the project, stakeholders, risks, and outcomes. They also included a Gantt diagram classifying each action by principle, indicating its priority, responsible people, deliverables, and a chronogram.
- Execution: the third phase identified a list of actions, its factors and metrics and its different steps.
- Monitoring and Controlling: the fourth phase defined a controlling system for the aspects included in the framework that allowed a regularly assessment of the success of the IT governance framework. The main goal was to put mechanisms in place to ensure that performance improvements resulting from the execution of the project were sustained over time and leaded to opportunities for additional performance gains. Thus, for each action, Universiteti i Tiranës partners presented several documents and KPIs as evidence.
- Risk Management: the fifth phase defined and formalized risk management procedures to be followed during and after the implementation of the framework. The main aim was to minimize the impact of several risk types by detecting and addressing potential risks before significant, negative consequences could occur. Thus, Universiteti i Tiranës partners identified main risks, analyzed its probability and impact, prioritized, and selected a set of risks to be managed, and finally for each risk they indicated how the risk had to be assessed and its contingency plan.

- Communication and marketing plan: finally, the sixth phase included a communication plan, which indicated the intensity of communication as well as the stakeholders involved. A brief list of actions depending on the target groups were also defined, to communicate the results obtained by this project.

The Universiteti i Tiranës' IT governance improvement plan can be found in Annex A.

### C. Third phase – Deploying and monitoring its results

In the third phase of the project, Universiteti i Tiranës partners deployed the selected actions from their *IT governance improvement plan*. This phase was organized as a continuous improvement cycle in which European experts monitored the state of the planned actions. Universiteti i Tiranës partners indicated Table 5.59 the state of the actions at the end of the project, in October 2020. As it can be seen, the actions had two different states: ongoing, and rescheduled. Those ongoing actions were not finished at the end of the project but planned to be finished in the future, while rescheduled actions were not started yet and delayed. Due to the COVID-19 pandemic situation and some internal organizational issues some of the activities were rescheduled to be able to deploy the IT governance framework. Their *IT governance steering group* changed during the quarantine period, thus they had to organize several meetings to reestablish their authorities support and be able to continue with the activities and actions already planned. This internal change caused structural changes that slowed down project activities. For this reason, the state of his actions was so disappointing.

**Table 5.59 – State of Universiteti i Tiranës' improvement actions**

| **Responsibility** | | | |
|---|---|---|---|
| Actions | Start | End | State |
| GT should create a strategic IT committee led by the CIO | Mar-20 | Mar-20 | Ongoing (new end June 2021) |
| All GT should be aware of the importance of IT. | Jan-20 | Sep-20 | Ongoing (new end June 2021) |
| The GT should assign a CIO the responsibility of directing the management of IT and of working together with the GT in preparing the IT strategy and governance. | Feb-20 | Feb-20 | Ongoing (new end June 2021) |
| **Strategy** | | | |
| Actions | Start | End | State |
| An IT Strategic Plan should be designed that is aligned with the university's overall strategy. | Mar-20 | Sep-20 | Ongoing (new end October 2021) |
| The GT should design a long-term program that has the aim of implementing all the IT developments that the faculty needs to meet its users' needs. | May-20 | Jun-20 | Ongoing (new end October 2021) |
| The Governance Team should direct the strategic planning of IT. | May-20 | Jun-20 | Ongoing (new end October 2021) |
| The GT should design a set of IT policies, aligned with the faculty´s strategy, that are a reference to guide those who must make IT-related decisions in the faculty. | Apr-20 | Jul-20 | Ongoing (new end December 2021) |
| **Acquisition** | | | |
| Actions | Start | End | State |
| The GT should establish a "portfolio of projects" as a methodology to carry out the planning of IT | Jun-20 | Aug-20 | Ongoing (new end December 2021) |

| | | | |
|---|---|---|---|
| acquisitions aligned with the faculty's strategic objectives. | | | |
| **Performance** | | | |
| Actions | Start | End | State |
| The GT should create a Performance Catalogue of indicators that reflect the expected performance of university processes that are IT-based. | Apr-20 | Jun-20 | Rescheduled (Start: Oct. End: Dec. 2020) |
| **Conformance** | | | |
| Actions | Start | End | State |
| A reference catalogue should be compiled that contains the IT-related regulations and laws that affect the faculty, and this should be kept up to date. | Aug-20 | Sep-20 | Rescheduled (Start: Nov 2020. End: March 2021) |
| The GT should officially assign the responsibility of being aware of IT-related legislation to a person or a group of people. | Aug-20 | Sep-20 | Rescheduled (Start: Nov 2020. End: March 2021) |
| **Human Behavior** | | | |
| Actions | Start | End | State |
| Analysis the workload of IT Staff and try not overload them with new IT initiatives. | Jan-20 | Sep-20 | Rescheduled (Start: Nov 2020. End: March 2021) |

Even though they were facing the above-mentioned difficulties, Universiteti i Tiranës defined several documents with its KPIs as evidence (Table 5.60) which showed a special interest for future monitoring and control. They included all the actions regardless of its unaccomplished state. For each KPI, they indicated the current value belonging to last year, and the goal value expected for the next year. Unfortunately, Universiteti i Tiranës' did not provide evidence documentation because they did not finish any planned action.

**Table 5.60 – Evidenced finished actions at the Universiteti i Tiranës**

| | Evidence | KPIs |
|---|---|---|
| Responsibility | IT Steering Committee members and roles creation document.<br>List of actions (courses, conferences, readings about success cases, etc.) taken to promote ITG.<br>Document with formal nomination of the CIO. | Number of actions did to promote the importance of IT for GT<br>*Current value: 0*<br>*Goal value: 2*<br>Number of meetings run by the IT Committee<br>*Current value: 0*<br>*Goal value: 5*<br>Number of times that include at the GT agenda IT-related issues<br>*Current value: 0*<br>*Goal value: 3* |
| Strategy | Strategic Plan of the university with IT strategies included.<br>IT infrastructure renewal plan.<br>Catalogue of Policies. | Number of IT-related policies published<br>*Current value: 0*<br>*Goal value: 3* |

| | Evidence | KPIs |
|---|---|---|
| Acquisition | List of IT portfolio projects. | Number of IT projects designed and approval by GT to achieve the strategic objectives of the university each year.<br>*Current value: 0*<br>*Goal value: 5*<br>Amount invested in IT Portfolio each year.<br>*Current value: NA*<br>*Goal value: 30 000*<br>Percentage of IT investment in relationship with global investments of the university (personal included).<br>*Current value: NA*<br>*Goal value: 2.5%* |
| Performance | Catalogue of Performance. | Number of indicators included in the IT performance catalogue that achieve the goal value established by the GT.<br>*Current value: 0*<br>*Goal value: 4* |
| Conformance | List of IT related regulations and laws satisfied by university.<br>List of IT related standards implemented by university.<br>Minute of a GT meeting that include the nomination of a person or a group of people with compliance responsibilities assigned. | Percentage of standards of the list which are implemented yet<br>*Current value: 0%*<br>*Goal value: 30%*<br>Percentage of laws of the list which are implemented yet<br>*Current value: 0*<br>*Goal value: 35%* |
| | List of IT related regulations and laws satisfied by university.<br>List of IT related standards implemented by university.<br>Minute of a GT meeting that include the nomination of a person or a group of people with compliance responsibilities assigned. | Percentage of standards of the list which are implemented yet<br>*Current value: 0%*<br>*Goal value: 30%*<br>Percentage of laws of the list which are implemented yet<br>*Current value: 0*<br>*Goal value: 35%* |
| Human Behavior | Working hours for each IT Staff on each IT projects. | Number of IT Staff (TFE) we would need to implement all the IT Project.<br>*Current value: 1*<br>*Goal value: 5* |

IT should be noted that Universiteti i Tiranës created an *IT governance steering group* focused specifically on the Fakulteti i Ekonomisë. Their decision to focus on the faculty instead to the whole university was because of several internal issues and challenges due to a low engagement of their authorities. Universiteti i Tiranës partners emphasized the cultural, legal, and internal difficulties they had in terms of internal structures, appointment of new positions (like the CIO) and management of the IT budget. Based on this, they rescheduled several actions to better spread the importance of the CIO role and its responsibilities, the design of an IT strategy plan and policies aligned with the university and a set of internal procedures and regulations regarding IT. Thus, they focused in improving all the principles, detailing a list of actions to reach higher levels compared to their initial situation.

However, their general behavior along the project was disappointed. They could have achieved better results by selecting more accurate improvement actions, if they had obtained the full support of their authorities. Although the plan contained all the requested sections, due to their difficulties, some sections were little ambitious and very conservative. Even so, it is worth highlighting the efforts made to overcome these difficulties, being evident in various actions and activities. Universiteti i Tiranës partners analyzed their possibilities in terms of resources, legal issues, and engagement of stakeholders, and provided a realistic plan with feasible actions to be performed not only under the scope of this project but also beyond the lifetime of this project.

Universiteti i Tiranës team provided a brief list of actions to perform regarding the communication of their results under the scope of this project. In general terms, they focused on social events and in actions related to disseminate the results. Considering their initial situation regarding IT governance, it was a good starting point to dedicate the efforts in disseminating and communicating the objectives achieved as a success story to be imitated at the whole university. In fact, they emphasized their specific problems and risks related to legal and administrative issues from the beginning of this project, which reflected their challenge to overcome them and their plan to defeat all these imposed difficulties. For this reason, brevity and conservationism are reflected in the selection of their actions.

## 5.3. Implications for studied participants

According to the previous results, the eight universities participating in this study have shown different characteristics, i.e., location, size, public or private scope, number of students, number of academic staff, number of undergraduate and graduate programs, etc. which have influenced their status and attitude towards IT governance implementation. The objective of this thesis has not been to compare them, but to extract the lessons learned from each case for its incorporation into our metamodel and thus adapt it, make it more flexible, and generalize it.

Most of the universities, both in Tunisia and Albania, had decentralized decision-making structures independent of the rectorate, whose authority and responsibilities used to be vested in the faculties and its deans. These profiles were reflected in the training and best practices visits attendees who held positions of directors, head of departments, deans, deputy deans, etc. Those HEIs whose attendees' positions were rectors/presidents, vice rectors, administrators, IT directors, president of the IT committee, etc. had a more proactive attitude in the adaptation and selection of best practices, selected more ambitious objectives and implemented a greater number of improvement activities in a timely manner. Below I briefly present a summary of these aspects as a conclusion.

The lessons learned, the aspects to be imitated and the difficulties encountered from our metamodel Phase 1: *Learning* are common to the eight cases. Regarding the aspects learnt and to be imitated the participants highlighted:

- Top management commitment and awareness.
- Responsibility assumption, assignment, and communication.
- The CIO as a key role.
- Business-IT strategy alignment.
- IT projects selection and prioritization.

- Establishment of structures such as the IT steering and strategy committees.
- IT laws and regulations catalogue.

Regarding difficulties, they emphasized:

- Creation of the CIO position.
- Source of authority definition.
- Dedicated budget to IT and its control.

Furthermore, many situations, experiences, and resolutions from different places more or less similar to their situation were studied; results obtained by Tunisian and Albanian researchers when studying practices outside the consortium, and attendees' experience in visits to European partners. Thus, they could verify that they could adapt a framework to their specific needs.

Accordingly, at the beginning of our metamodel Phase 2: *Development*, practitioners were requested to establish an IT governance steering group who was constant throughout the IT governance framework implementation. This was particularly important since the sustainability of not only both projects but also the IT governance once the project was finalized depended on it. For this reason, they involved staff responsible for IT, i.e., the IT director or the CIO, but also some people belonging to the executive board of the organization. According to Toomey (2009), the responsibility of IT in an organization in terms of decisions, investments and risks should not lie solely with the CIO but should be a joint responsibility with the board. At this point, one of the outstanding differences to adapt was precisely the figure of the CIO. In none of the four Tunisian and Albanian universities did this figure exist as such, and creating it entailed organizational and structural changes very difficult to implement in the life cycle of the project. In addition, it was difficult to select the people that should be part of the IT governance steering group because, although several had attended the previous training and had participated in the first assessment about their initial IT governance situation at their university, not only new internal procedures in the organization but also a profound cultural and behavioral change that would affect the entire organization emerged. Several meetings and seminars were held to get the support of various leaders and managers and their commitment to participate actively in the group so that the implementation of the framework was a success. Thus, because each organization was structured in different ways, i.e., some could be categorized as Business Monarchy, while others IT Duopoly (Weill & Ross, 2004), the people engaged in the IT governance steering group had different profiles in each institution. For example, the Université de Gabès got support and participation of the Director of Studies and career center, IT manager, Financial Officer, among others, while the Université de Sfax focused on the Faculty of Economics and Management and obtained the engagement of their Dean, IT Director, the board of the faculty and five academic department directors. Therefore, commitment to the improvement actions to be carried out was affected by the profile of the group and its attitude towards IT governance.

Regarding the IT governance best practices adoption and adaptation, the annexes contain the complete sets, but as a summary, the common aspects Tunisian and Albanian HEIS selected were:

- Responsibility: they focused on the Governance Team (GT) responsibility and the Chief Information Officer (CIO) because they are two of the most precarious aspects in their institutions, but which are key in terms of good IT governance.

- Strategy: they focused on the Strategic Plan and the IT Policies, been both tools to strategically align IT with business objectives and thus produce value to the institution (ITGI, 2003).
- Acquisition: they focused on IT investment and acquisitions and projects priority. In this case, the portfolio of IT projects indicates what is the set of present and future projects that the organization should undertake, providing this tool a very important vision for the prioritization of investments and the allocation of resources (Toomey, 2009), and given its importance it should be the responsibility of the board jointly with the CIO (Bonham, 2005).
- Performance: they focused on the establishment of good indicators about continuity, availability, and quality. Several tools that can aid in this task are BSCs (Kaplan & Norton, 1996) and Strategic Maps (Marr, 2010) to ensure an adequate decision-making process from the GT.
- Conformance: they focused on catalogs, audits, and standards. A well-established catalog of IT-related regulations and laws are essential in the IT governance framework.
- Human Behavior: they focused on stakeholders, resistance to change and people involved in the process. As mentioned before, the whole process of an IT governance framework implementation implies an internal cultural and behavioral change within the institution.

Best practices adoption and adaptation in universities was very similar in each region. Practitioners from the four Tunisian universities, as well as the four Albanians, jointly participated in the workshops and meetings. They shared the same regulatory or legal issues regarding their respective ministries of education, so they came up with common solutions. The subtle differences can be found in those smaller institutions or of a private scope, or in those that they chose to implement IT governance in a smaller context, such as a faculty, which would serve as an example of success for the rest of the university.

The IT governance initial situation in each university, regarding best practices, was different, as shown in detail in chapter five. Even though the IT governance concept was not known to them, certain best practices were already established, thus none of them started at 0% (Table 5.61).

**Table 5.61 – Participants' self-assessment state**

| | Responsibility | Strategy | Acquisition | Performance | Conformance | Human Behavior |
|---|---|---|---|---|---|---|
| UGB | 14% | 06% | 24% | 13% | 26% | 29% |
| UMA | 17% | 38% | 44% | 25% | 26% | 71% |
| UTM | 22% | 28% | 41% | 25% | 39% | 48% |
| USS | 03% | 13% | 26% | 06% | 42% | 33% |
| UPT | 21% | 38% | 35% | 13% | 11% | 36% |
| UAMD | 24% | 19% | 50% | 63% | 47% | 43% |
| UET | 14% | 44% | 53% | 56% | 26% | 36% |
| UT | 21% | 25% | 65% | 06% | 58% | 43% |
| SPAIN* | 31% | 31% | 28% | 29% | 18% | 21% |

*Ten Spanish HEIs average from Hontoria (2014)

Because a CIO's appointment and roles and responsibilities establishment were among the main difficulties indicated from the beginning, the percentages of *Responsibility* principle were below 25%, a not surprising aspect. Similarly, as IT managers/directors did not have a clear position on the board and decisions were delegated to them without

control, there was no established alignment between IT and the business due to the lack of IT strategy adapted to the university strategy. Thus, regarding the *Strategy* principle, the values are quite different, highlighting the universities whose profile of IT governance steering group members held positions of greater responsibility and authority.

Regarding *Acquisition* principle, as this principle implies budget control, all the universities had several mechanisms that provide guidance on different types of acquisitions, evaluation criteria and reports to monitor suppliers service agreements. Universities with the highest scores were those that went beyond simply controlling purchases of IT products by establishing mechanisms for the investment of resources and staff in any new IT initiative that involves organizational changes. In addition, they make balances on benefits, opportunities, costs, and risks, even without a concrete IT portfolio.

One of the reasons for the insecurity of the board in terms of the usefulness of IT is precisely the lack of information regarding the performance of IT. This can be clearly seen in the percentages shown in the *Performance* principle, except for UAMD. The lack of indicators at the strategic level makes communication between IT management and IT governance difficult since IT managers/directors reports showed too technical information of little value for the board. In addition, as indicated above, the figure of the CIO was not on the board and IT issues were barely discussed in the agenda of the board, so this communication was scarce.

Regarding *Conformance* principle, its percentages are higher than those of performance, not a surprising fact, although they also refer to communication tools on IT activities. However, as conformance includes the legal and regulatory aspects, mainly at the governmental level, the eight universities presented mechanisms for assigning and controlling those responsible who are aware of the legislation that affects IT.

In the case of the *Human Behavior* principle, the eight universities presented average results (except for UMA, which surpasses the rest) because although they do not reach high levels in best practices related to resistance to change, they have clearly established who are the stakeholders and in what way IT affects them. They also maintain programs to improve their IT workers skills and capabilities.

Subsequently, practitioners assessed their IT governance maturity obtaining a current maturity level by each principle. They were requested to select a maturity goal and to define several improvement actions to achieve such goal. Under our metamodel Phase 3: *Deployment*, practitioners executed those actions considering their available resources and the remaining time of the respective projects. Afterwards, during our metamodel Phase 4: *Monitoring*, practitioners provided (and we, ADR researchers as IT governance experts, reviewed) several documents and KPIs results as evidence of their achieved goals (Table 5.62).

As mentioned previously, there were several aspects and issues to highlight that affected the performance of the improvement actions. On the one hand, in the Tunisian region, several months before the end of the project, rector elections were called at the national level, which directly affected the implementation of IT governance. The new top management team had not participated in the project, so they did not acquire the knowledge of the training nor were they aware of the IT governance framework implementation plan. The IT governance steering group suffered as several of its members were dismissed. Therefore, the lack of support from the board at a crucial moment in the development and deployment of the IT governance framework and their attitude are reflected in the selected goal maturity and, in the chosen actions, as well as

those accomplished. On the other hand, in the Albania region, one of the universities also called for rector elections months before the end of the project. In addition, the COVID-19 pandemic had its peak during our metamodel Phase 3: *Deployment* and Phase 4: *Monitoring* of improvement actions, thus its results were affected. The low resources available at that time as well as the difficulty in the appointment of the CIO figure in both regions must be considered. The remaining time of the project also affected its achievement. The sustainability of the project, despite having designed a plan for this purpose, was affected by the indicated issues.

**Table 5.62 – Participants' current maturity, goal, and improvement activities state**

| | Responsibility | Strategy | Acquisition | Performance | Conformance | Human Behavior |
|---|---|---|---|---|---|---|
| UGB | 1 → 2 | 1 → 2 | 0 → 2 | 0 → 1 | 0 → 1 | 1 → - |
| | Finished Ongoing | Rescheduled | Rescheduled | Rescheduled | Rescheduled Not started | - |
| UMA | 1 → 2 | 1 → 2 | 0 → - | 0 → 1 | 0 → - | 1 → 2 |
| | Finished Rescheduled | Not started | - | Rescheduled Not started | - | Not started |
| UTM | 1 → 2 | 1 → * | 1 → 2 | 0 → 1 | 0 → 1 | 0 → - |
| | Finished Ongoing | Ongoing | Finished Ongoing | Ongoing | Ongoing | - |
| USS | 1 → 2 | 0 → 1 | 0 → - | 1 → 1 | 0 → 1 | 1 → - |
| | Finished Rescheduled | Rescheduled | - | Rescheduled | Rescheduled | - |
| UPT | 1 → 2 | 1 → 2 | 1 → 2 | 1 → 2 | 1 → 2 | 0 → 1 |
| | Finished Ongoing | Finished | Ongoing | Rescheduled | Rescheduled | Ongoing |
| UAMD | 1 → 2 | 1 → 2 | 1 → 2 | 2 → 3 | 1 → 2 | 1 → 2 |
| | Finished | Ongoing | Rescheduled Ongoing | Finished | Finished Ongoing | Ongoing |
| UET | 1 → 2 | 1 → * | 1 → 2 | 0 → 1 | 0 → 1 | 0 → - |
| | Finished | Ongoing Finished | Ongoing Finished | Ongoing Finished | Ongoing Finished | - |
| UT | 1 → 2 | 1 → 2 | 1 → 2 | 0 → 1 | 0 → 1 | 1 → 2 |
| | Ongoing | Ongoing | Ongoing | Rescheduled | Rescheduled | Rescheduled |

1 → 2 means from current maturity level 1 to achieve level 2.
1 → - means they did not select a goal level nor improvement actions.
1 → * means they defined some improvement actions to be performed even though they did not select a goal level.

However, this research is not about comparing the eight universities, nor is it the purpose of Table 5.62. In fact, Table 5.62 shows that our metamodel phases helped to achieve the objectives of this research:

- IT governance awareness in both regions, including its learning.
- Training and active learning in improvement actions that enhance their IT governance situation, based on the practitioners' own participation.
- Each institution's own IT governance framework through which they have not only learned to build it, but also to control their IT situation.

Table 5.62 shows each institution necessary *radiography* for our metamodel Prebuilding Phase: *self-assessment* to know how to react in the rest of the phases, reinforcing the need to include it in our metamodel.

## Summary

In this chapter, I explained each project general design including the antecedents that led us to the gestation of both projects. The projects were comprised by three sequential phases, lasting about a year each, and a parallel one: A. First project phase – Learning about IT governance, B. Second Phase – Determining and improving the situation, C.

Third Phase – Deploying and monitoring its results, and the parallel P. Dissemination, exploitation, and sustainability activities. Four Tunisian HEIs, i.e., Université de Gabès, Université de la Manouba, Université de Tunis El Manar, and Université de Sfax, participated in the first project. The four partners attended and actively participated in the training activities, performed jointly a study about best practices in HEIs outside our consortium, and their managers visited the EU HEIs to learn about implemented best practices in each destination. Similarly, four Albanian HEIs, i.e., Universiteti Politeknik i Tiranës, Universiteti Aleksandër Moisiu Durrës, Universiteti European i Tiranës, and Universiteti i Tiranës participated in the second project and, as before, attended their respective trainings, their managers visiting our EU HEIs as well. Unlike Tunisian partners, each Albanian partner performed their own study about best practices in HEIs outside consortium each focusing on what mattered most to them, e.g., IT governance frameworks implementation in HEIs, benefits and initiatives, IT governance mechanisms design, and common problems and challenges in both public and private scope. Under the second phase, we could determine and describe each practitioner case, detailing its profile, characteristics, aim, and specific situation and context. We detailed, for each practitioner, the IT governance implementation plan following the ADR method, i.e., with the active participation of both researchers and partners. As shown, we highlighted the similarities and differences of both regions and the same for each of the four-participating university belonging to each developing country. The partner HEIs shared common challenges and thus, they agreed to design a set of best practices tailored for everyone. Regarding the IT governance maturity model, each participant after assessing their situation, selected the goal that best fitted their resources and environment. Finally, under the last phase they deployed their plan, executed the improving activities, and we researchers and practitioners together monitored their results. As shown, partner HEIs presented different profiles of action facing resistance to change, selecting improvement activities, and their commitment to the execution of such activities. Therefore, by applying our metamodel, we designed, developed, deployed, and monitored the IT governance framework adapted to each university. The active participation and intervention resulted in adapted best practices sets, maturity models, key performance indicators definitions, and outcomes. The combination of our metamodel with the active participation of the practitioners helped us to refine the metamodel explained in chapter four by applying the stages of the ADR method in various rounds of the improvement cycle. Output practitioners, i.e., IT governance frameworks, are in use today and we hope that the defined sustainability plans will perpetuate and improve them in the future.

# 6. Conclusion

This final chapter summarizes the statements, concepts, contributions, the action design research method used and results of this thesis. I also include the main contributions we have identified, implications for the studied participants, limitations to be considered and open a discussion about future work and further research.

## 6.1. Thesis summary

This thesis presents a metamodel for the implementation of IT governance through the building of frameworks. The metamodel has been designed, built, and evaluated jointly with the members of the participating institutions of this research study. For this reason, the metamodel is based on the specific context of higher education institutions and universities belonging to developing countries. The selection of such a context is due to the need to promote the implementation of IT governance in the selected regions, i.e., to improve the current and future use of IT in their organizations. In addition, the university environment was selected to cover a wider audience that could directly influence their society by training future engineers and workers and as an example of a success story that could inspire other different sector organizations. In Chapter 2, I defined the concept of IT governance, starting from corporate governance, and developing its mechanisms, its standard, and the different existing frameworks and guides for its implementation, focusing on those specifically designed for universities. Because IT governance implementation entails cultural and behavioral changes in the organization, I selected a research method that involved not only researchers, but also practitioners. Chapter 3 described the Action Design Research (ADR) method, which covers this joint participation allowing the design of an artifact, in this case a metamodel that builds IT governance frameworks, with the active participation of the organization's practitioners and end users. Following the method described by Sein et al. (2011), I adapted the ADR method phases to our specific context, obtaining a flexible metamodel that serves as a guide for the creation of IT governance frameworks, based on the organization’s specific needs. Chapter 4 detailed these phases as well as the set of IT governance best practices used by the metamodel. We used best practices instead of processes because the needs of the social, cultural, economic, and legal context of the regions required a more flexible element. Our metamodel is formed by four phases and a prebuilding phase. Prebuilding Phase: *Self-assessment* was developed after several ADR improvement cycles as we realized that organization’s initial state and attitude towards IT governance may influence the following four phases, identifying enablers and barriers, in which case taking containment measures. Phase 1: *Learning* aims to train practitioners regarding IT governance concepts not only to be able to communicate with the same vocabulary and jargon in the following phases, but also so that they learn to direct and control their IT by building a framework adapted to their needs. Phase 2: *Development* aims to assess the organization’s current IT governance state, select a desired state, and design a plan which contains improvement actions to achieve such state. For that purpose, we highly recommend establishing an IT governance steering group who lead the IT governance implementation plan development, deployment, and monitoring. Phase 3: *Deployment* aims to execute the IT governance implementation plan defining key performance

indicators and metrics to assure the expected results. Finally, Phase 4: *Monitoring* aims to monitor the improvement actions state, reviewing the defined metrics, and taking measures if needed in a never-ending improvement cycle. In Chapter 5, I explained the practitioners' active participation and its outcomes under two three-year European projects, one project with four Tunisian partners and the other with four Albanian partners. The selected institutions in each region presented different characteristics and needs, which allowed the adaptation of more flexible joint solutions: each IT governance framework adapted to each specific situation. For the building of each of the eight different IT governance frameworks, the four phases of our metamodel were followed in various cycles of building, evaluation, and adaptation, with the active intervention of researchers and practitioners, until the final product was obtained. Although Chapters 4 and 5 were explained sequentially, their process until obtaining the final output must be understood and considered as part of a research method that involves various cycles and parallel activities. Although our metamodel has been designed for a specific context, i.e., universities belonging to developing countries, our solution is flexible enough to be used in any other context and sector. It should be considered, however, that we were building our metamodel while we were experiencing it, i.e., we did not wait to finish the projects to build it, nor did we build it and then we performed the projects. For this reason, I conducted our research under the action design research approach, as we researched in parallel with the execution of the projects. Finally, we concluded that adapting IT governance best practices can increase the direction and control of IT use, aligning it with business needs. IT governance implementation implies cultural changes in the organization, however resistance to change can be mitigated with such adaptation of best practices.

## 6.2. Contributions

This research contributes to IT governance research field by investigating its adoption in developing countries with the purpose of increasing it. I identified the following contributions which address the initial research questions:

- *Proposal to increase the adoption of IT governance in developing countries.* The literature review indicated issues in the adoption of IT governance in these regions. Based on such issues, we selected the context of universities and higher education institutions for their social impact in training future IT engineers and as an inspiring success story for other sectors. Our proposal presents our metamodel whose four phases are aimed at specific objectives that together increase the adoption of IT governance. We included a first phase of training aimed at the organization's stakeholders, on the one hand, the managers who direct and control IT to guide them in the adoption and adaptation of best practices, and on the other hand, the lecturers to open new lines of studies that can spread IT governance knowledge to society directly through their students or through courses, seminars, conferences, etc.
- *Builder of IT governance frameworks for HEIs in developing countries.* We selected IT governance frameworks and its building as a facilitator of knowledge acquisition and learning through implementation and practice. We considered IT governance aspects and concepts, the knowledge of practitioners belonging to developing countries, their resources and sustainability. Our metamodel phases

two to four (development, deployment, monitoring) are aimed at building an IT governance framework adapted to the organization' specific needs. The purpose is for participants to learn to build a framework by building their own, applying the knowledge acquired after the training, thus increasing the use of IT governance best practices in their organization. Participants not only obtained an IT governance framework adapted to their needs, but because they built it themselves, the engagement of those involved, the adoption of improvement actions, resistance to change, and the communication of the solutions adopted improved substantially.

- *Flexible metamodel for conducing IT governance implementation in organizations.* We considered the existing frameworks, guidelines, and standards, mainly focused on universities, and adapted them to the specific situation of each developing country institution. I followed the ADR method phases to actively participate researchers and practitioners in building each IT governance framework. Even though our metamodel was designed under the specific context and scope of universities belonging to developing countries, our metamodel phases could be adapted to any other context or sector.
- *Proposal for the dissemination and training of IT governance concepts, and specifically the construction of IT governance frameworks.* We considered practitioners' low awareness on the subject, and dissemination and exploitation ways to impact society. For that purpose, we included a training phase in our metamodel addressed to different profiles of attendees: managers, lecturers, and students. We developed several training sessions to include all the stakeholders in the organization. Furthermore, we added practical activities to consolidate the theoretical contents. Trained lecturers were requested to study IT governance best practices applied by organizations outside our consortium. Trained managers were invited to visit EU organizations inside our consortium to learn about the best practices we were applying. Several seminars and public congresses were organized throughout the project addressed to students from different disciplines, public and private companies, and the society in general. This proposal can be adapted by assessing in advance the practitioners' knowledge and attitude towards IT governance. The training activities were specifically designed for stakeholders from universities but could be adapted for stakeholders from other sectors and contexts.
- *Proposal to increase IT governance awareness, engagement, and maturity.* Our metamodel used an active participation method for both researchers and practitioners. Researchers were actively involved in the research development, mainly acting not only as trainers but also as mentors, guides, reviewers, and recommenders, considering our IT governance expertise; practitioners addressed their specific concerns aiming to improve through action and learning through reflection. We organized various activities in each phase for this purpose. For example, in the training phase, the training sessions for lecturers were designed as master classes. However, the training sessions for managers were designed as workshops and participatory meetings. The framework building phases were designed as participatory workshops where the members of each IT governance steering group designed their own framework with the active intervention of the ADR researchers (we, EU partners) to guide and mentor them.

## 6.3. Limitations

As with all research, this study is not without limitations. The following limitations need to be considered while interpreting the results and analysis of this research. The literature review focused on IT governance main aspects with the purpose of consider them in the framework. The three IT governance mechanisms are well understood and accepted by both researchers and practitioners, but we needed to seek on more aspects because we based our study on best practices. There is no one-size-fits-all catalogue of best practices and thus, we presented three IT governance dimensions: the six ISO/IEC 38500 standard principles, the three governance activities, and the three IT governance mechanisms. We needed a flexible catalog that includes all possible aspects of IT governance, adaptable to the specific context of universities belonging to developing countries. In fact, the selected context could also be a limiting factor. However, our resulting metamodel is flexible enough to be adapted to any other sector because our phases have been actively designed together with practitioners. In fact, this study should be analyzed considering the entire set formed by researchers, practitioners, the ADR research method, and the resulting metamodel. The flexibility provided by this study is the result of the execution of the metamodel phases, applying a research method with the active participation of the end users, who really and finally are going to use the final product, i.e., each IT governance framework, to increase the adoption of IT governance in their organization, and therefore in their region.

Other limitations specific to the scope of this study must be considered. Aspects such as the language, culture, and idiosyncrasies of each region affected communication between researchers and practitioners. All of us involved in this study used a known language, i.e., English, but none of us were native speakers. In the university environment we are all used to this language, in fact, in the training sessions there were no major unforeseen events. However, as we all were not natives, the conversations in the workshops and meetings were less profound than desired. Language differences made it difficult to understand the social and cultural differences of each region and country. Internal regulations, laws, and customs had to be calmly analyzed to be included and considered in the adaptations of best practices. This situation prolonged several workshops and we also had to organize unscheduled meetings. Sharing cultural aspects or language would have facilitated adaptation and perhaps increased the number of accomplished improvement actions.

As we previously explained, we developed this study under two Erasmus + projects granted by the EACEA. Both projects were an opportunity for all the partners, not just to be funded, but also for research purposes and to develop the strategic lines the country and the EU commission had stablished for that period, as priorities. I should highlight that without a project it would have been very difficult to carry out this study research, with such magnitude regarding a strategic level in organizations, and even so, we dealt with change resistance due to their abovementioned cultural and social aspects.

In the specific project with the Tunisian partners, the training for managers had to be postponed and reorganized due to several attacks that occurred in the country. Instead of organizing it in Tunisia, we organized it in another location, thus minimizing the number of attendees to the event. Had more managers attended, we would have achieved more awareness regarding IT governance and engagement with the project. In Albania, however, there were no issues regarding the training for managers, the training was

located in Tirana and the number of attendees were higher. However, I should highlight that of the four Tunisian universities, the representatives of three of them knew each other previously, which meant a team union and facilitated the progress of the phases. This was not the case among the Albanian partners, who brought more individualized solutions to their own institutions.

Finally, I should mention that the subjects of each institution could have provided biased information, because people act differently when they feel observed, and even evaluated (Wadsworth, 1991). We tried to mitigate this bias by selecting the ADR research method and make them actively participate in building their own framework, so that they would feel comfortable using it and improving it in the future.

## 6.4. Future work

Besides the contributions provided by this thesis, I propose further research as future work that can for instance:

- Spread the IT governance discipline in developing countries. Since the experience gained in Tunisia and Albania was so positive, the consortium of European universities is currently analyzing the possibility to work on the same initiative in universities belonging to another developing country. The intention of this new project would be the same, to increase the progression of the country through the implementation of improvements in IT governance (and therefore corporate governance) of the universities. The idea is to spread the basic concepts and best governance practices among the different stakeholders, beyond the universities. Therefore, in addition to training activities for academic and administrative staff in HEIs, dissemination and exploitation activities with other members of society could be organized, to diffuse not only the project but its concepts.
- Focus on the CIO role. Tunisian and Albanian partners shared similar issues and concerns as Spaniards regarding main IT governance aspects, e.g., the role of the CIO. The figure and role of the CIO is necessary and vital, not only to improve strategic alignment between IT and business but also to create that communication bridge between the board and the IT department, especially in these times in which the digital transformation is disrupting the business models. The lack of clear principles and an IT strategy based on the university's strategy hinders an efficient and effective decision making on the IT budget that could drive the university in new technologies and be closer to society.
- Review participants' progress within three years and measure the impact in the region. Monitor whether the ongoing and rescheduled activities have been completed, whether the frameworks are still active, and whether they have reached higher levels of maturity.
- Take the Tunisian and Albanian cases as example of success in universities of developing countries. Such examples can serve as a source of inspiration and drive to adapt activities in any other field, not only universities, and of course, not only in Tunisia or Albania. Emerging countries in the central and south America region, e.g., Ecuador and Paraguay, are spreading the IT governance concepts and

including it in several degrees' programs. Our metamodel could be adapted to their specific region considering private entities or non-university sectors.

- Expand the number of case studies in both public and private HEIs and compare whether the proposed methodology (ADR) as well as the metamodel presents significant differentiation or not. Our proposal has been based on six public and two private universities, showing practically the same shortcomings at the beginning. However, the attitude towards change seems to have been more positive in the private than in the public ones. Thus, the sample is small, so it would be interesting to study it in more case studies.
- Design an IT tool, for instance a dashboard, to help practitioners in their day-to-day regarding the best practices catalog. Our proposal includes the best practices categorized under the three IT governance dimensions. An IT tool could minimize the complexity of representing a best practice under more than one ISO/IEC 38500 standard principle and thus provide a better visual of the improvement actions impact in the organization.

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# A. Annexes

Table A.1 and Table A.2 include both projects practitioners' outputs available online to access for more information. Documents and reports regarding project management are also available in each website. Please, check each project website and social networks to find more about dissemination activities in each partner's institution, e.g., seminars, conferences, pilot courses and research visits (last accessed on October 2021).

**Table A.1 – ITG4TU Project**

| Project parameter | Link |
|---|---|
| ITG4TU project website | https://itg4tu.uib.eu/ |
| Outputs | https://itg4tu.uib.eu/IT-Governance-documents/Deliverables/ |

**Activities**

| | | | |
|---|---|---|---|
| A – Learning | Initial Training Researchers | Materials | https://itg4tu.uib.eu/IT-Governance-documents/Initial-Training/ |
| | | Event | https://itg4tu.uib.eu/News/Carlos-Juiz--taught-the-Initial-Training.cid423752 |
| | | Report | https://itg4tu.uib.eu/digitalAssets/402/402750_1-3InitialTrainingResearchers-Palma-v1-2a.pdf |
| | Initial Training Managers | Materials | https://itg4tu.uib.eu/IT-Governance-documents/Training-Managers/ |
| | | Event | https://itg4tu.uib.eu/News/Antonio-Fernandez-taught-the-Initial-Training.cid452069 |
| | | Report | https://itg4tu.uib.eu/digitalAssets/402/402751_1-4InitialTrainingManagers-Almeria-v1-1a.pdf |
| | Study outside consortium | https://itg4tu.uib.eu/digitalAssets/463/463795_1-6Study-and-document-practices-outside-consortium-v2-3.pdf | |
| | Published paper | Khouja, M., Rodriguez, I. B., Ben Halima, Y., & Moalla, S. (2018). IT Governance in Higher Education Institutions: A Systematic Literature Review. *International Journal of Human Capital and Information Technology Professionals (IJHCITP), 9*(2), 52-67. http://doi.org/10.4018/IJHCITP.2018040104 | |
| | Best practices visit to Almeria | https://itg4tu.uib.eu/News/ITG4TU-project-partners-make-their-first-Best.cid452600 | |
| | | UGB: | https://itg4tu.uib.eu/digitalAssets/411/411918_2-2BestPracticesAlmeria_UGB-v1-1.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/411/411915_2-2BestPracticesAlmeria_UMA-v2-0.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/411/411916_2-2BestPracticesAlmeria_UTM-v1-1.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/411/411917_2-2BestPracticesAlmeria_USS-v1-1.pdf |
| | Best practices visit to Berlin | https://itg4tu.uib.eu/News/ITG4TU-project-partners-make-their-second-Best.cid508087 | |
| | | UGB: | https://itg4tu.uib.eu/digitalAssets/511/511132_2-2BestPracticesBerlin_UGB-v1-1.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/511/511207_2-2BestPracticesBerlin_UMA_V3.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/511/511208_2-2BestPracticesBerlin-UTM-V1-2.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/511/511209_2-2BestPracticesBerlin_USS_V1-2.pdf |
| | Best practices visit to Halden | https://itg4tu.uib.eu/News/ITG4TU-project-partners-make-their-third-Best.cid535601 | |
| | | UGB: | https://itg4tu.uib.eu/digitalAssets/511/511210_2-2BestPracticesHalden_UGAB_V1.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/512/512302_2-2BestPracticesHalden_UMA-V2.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/516/516279_2-2BestPracticesHalden_UTM.pdf |

| Project parameter | | Link | |
|---|---|---|---|
| | | USS: | https://itg4tu.uib.eu/digitalAssets/512/512683_2-2BestPracticesHalden_USS_V1.1.pdf |
| | Best practices visit to Palma | https://itg4tu.uib.eu/News/ITG4TU-project-partners-make-their-fourth-Best.cid563614 | |
| | | UGB: | https://itg4tu.uib.eu/digitalAssets/515/515424_2-2BestPracticesPalma_UGAB_V1.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/515/515425_2-2BestPracticesPalma_UMA-V2.0.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/515/515928_2-2BestPracticesPalma-UTM.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/515/515426_2-2BestPracticesPalma_USS_V1.1.pdf |
| | Report on Best Practices validation | https://itg4tu.uib.eu/digitalAssets/524/524283_2-3BestPracticesValidation-v1-4.pdf | |
| B – Development | Initial assessment visit to Tunisian universities | https://itg4tu.uib.eu/News/The-European-partners-of-the-ITG4TU-project-travel.cid465802 | |
| | | https://itg4tu.uib.eu/digitalAssets/433/433036_2-4InitialAssessmentVisitToTunisianUniversities-v1-1.pdf | |
| | IT governance framework development | https://itg4tu.uib.eu/digitalAssets/512/512902_Governance-framework-development_v3-0.pdf | |
| | | UGB: | https://itg4tu.uib.eu/digitalAssets/515/515499_2-5GovernanceFrameworkDevelopment-UGB.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/515/515500_2-5AnnexUGAB.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/515/515635_2-5GovernanceFrameworkDevelopment-UMA.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/516/516549_2-5minutesUMA-Annex.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/516/516490_2-5GovernanceFrameworkDevelopment-UTM.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/516/516491_2-5GovernanceFrameworkDevelopment-UTM-Annex.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/515/515644_2-5GovernanceFrameworkDevelopment-USS.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/516/516489_2-5GovernanceFrameworkDevelopment-USS-Annex.pdf |
| | IT governance framework assessment | https://itg4tu.uib.eu/digitalAssets/516/516421_Minutes-Online-meeting---skype---3May18.pdf | |
| | | https://itg4tu.uib.eu/digitalAssets/516/516826_2-6GovernanceFrameworkAssessment-OUC-UTM.pdf | |
| | | https://itg4tu.uib.eu/digitalAssets/516/516828_2-6GovernanceFrameworkAssessment-UAL-TU.pdf | |
| | | https://itg4tu.uib.eu/digitalAssets/524/524284_2-6GovernanceFrameworkAssessment-UIB-TU-v2-1.pdf | |
| C – Deployment & Monitoring | IT governance framework deployment | UGB: | https://itg4tu.uib.eu/digitalAssets/515/515583_4-5GovernanceFrameworkDeployment-UGB.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/515/515584_4-5Annex-UGB.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/515/515637_4-5GovernanceFrameworkDeployment-UMA.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/515/515638_4-5Annex-UMA.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/518/518007_4-5GovernanceFrameworkDeployment-UTM.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/518/518008_4-5Annex-UTM.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/515/515646_4-5GovernanceFrameworkDeployment-USS.pdf |
| | | | https://itg4tu.uib.eu/digitalAssets/515/515647_4-5Annex-USS.pdf |
| | IT governance framework monitoring | UGB: | https://itg4tu.uib.eu/digitalAssets/524/524285_4-6GovernanceFrameworkMonitoring_UGB_V1.1.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/518/518867_4-6GovernanceFrameworkMonitoring_UMA_V1.1.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/524/524286_4-6GovernanceFrameworkMonitoring_UTM_V1.1.pdf |

| Project parameter | | Link | |
|---|---|---|---|
| | | USS: | https://itg4tu.uib.eu/digitalAssets/519/519465_4-6GovernanceFrameworkMonitoring_USS_V1.1.pdf |
| D – Dissemination and Sustainability | Dissemination and Exploitation plan | UGB: | https://itg4tu.uib.eu/digitalAssets/515/515502_4-1Dissemination-ExploitationPlan-UGB.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/515/515636_4-1Dissemination-ExploitationPlan-UMA.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/515/515732_4-1Dissemination-ExploitationPlan-UTM.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/515/515645_4-1Dissemination-ExploitationPlan-USS.pdf |
| | Pilot courses | UGB: | https://itg4tu.uib.eu/News/The-UGB-partners-perform-the-pilot-course-about-IT.cid563367 |
| | | | https://itg4tu.uib.eu/digitalAssets/515/515131_4-4-PilotCouse-UGAB1.4.pdf |
| | | UMA: | https://itg4tu.uib.eu/News/The-UMA-partners-perform-the-pilot-course-about-IT.cid564455 |
| | | | https://itg4tu.uib.eu/digitalAssets/516/516260_4-4ReportPilotCouse-UMA-V1.2.pdf |
| | | UTM: | https://itg4tu.uib.eu/News/The-UTM-partners-perform-the-pilot-course-about-IT.cid564474 |
| | | | https://itg4tu.uib.eu/digitalAssets/516/516278_4-4-PilotCouse-UTM-1.3.pdf |
| | | USS: | https://itg4tu.uib.eu/News/The-USS-partners-perform-the-pilot-course-about-IT.cid554139 |
| | | | https://itg4tu.uib.eu/digitalAssets/512/512706_4-4-ReportPilotCourseUSS-v1-3.pdf |
| | Sustainability plan | UGB: | https://itg4tu.uib.eu/digitalAssets/524/524295_4-9SustainabilityPlan-UGB.pdf |
| | | UMA: | https://itg4tu.uib.eu/digitalAssets/524/524296_4-9SustainabilityPlan-UMA.pdf |
| | | UTM: | https://itg4tu.uib.eu/digitalAssets/524/524298_4-9SustainabilityPlan-UTM.pdf |
| | | USS: | https://itg4tu.uib.eu/digitalAssets/524/524297_4-9SustainabilityPlan-USS.pdf |

**Table A.2 – ITG4AU Project**

| Project parameter | Link |
|---|---|
| ITG4AU project website | https://itg4au.uib.eu/ |
| Outputs | https://itg4au.uib.eu/IT-Governance-documents/Deliverables/ |

**Activities**

| | | | |
|---|---|---|---|
| A – Learning | Initial Training Researchers | Materials | https://itg4au.uib.eu/IT-Governance-documents/Initial-Training-Researchers/ |
| | | Event | https://itg4au.uib.eu/News/Carlos-Juiz--taught-the-Initial-Training.cid513707 |
| | | Report | https://itg4au.uib.eu/digitalAssets/501/501622_1-3InitialTrainingResearchers-Palma-v1-2a.pdf |
| | Initial Training Managers | Materials | https://itg4au.uib.eu/IT-Governance-documents/Initial-Training-Managers/ |
| | | Event | https://itg4au.uib.eu/News/Antonio-Fernandez-taught-the-Initial-Training.cid555266 |
| | | Report | https://itg4au.uib.eu/digitalAssets/525/525095_1-4InitialTrainingManagers-Tirana-v1-2a.pdf |
| | Study outside consortium | UAMD: | https://itg4au.uib.eu/digitalAssets/625/625862_1-6StudyOutsideConsortium-UAMD-v2-3.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/574/574885_1-6Study-and-Document-practices-outside-consortium_UET_22-09-2019.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/613/613283_1-6StudyOutsideConsortium_UT_v1-2.pdf |
| | Published paper | UPT: | https://hrcak.srce.hr/ojs/index.php/bsr/article/view/12911 Meçe, E. K., Sheme, E., Trandafili, E., Juiz, C., Gómez, B., & Colomo-Palacios, R. (2020). Governing IT in HEIs: Systematic Mapping Review. *Business Systems Research: International journal of the Society for Advancing Innovation and Research in Economy*, *11*(3), 93-109. |
| | Best practices visit to Almeria | https://itg4au.uib.eu/News/ITG4AU-project-partners-attend-their-second-Best.cid601240 | |
| | | UPT: | https://itg4au.uib.eu/digitalAssets/574/574647_2-2BestPracticesAlmeria_PUT-v1-1.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/574/574668_2-2BestPracticesAlmeria_UAMD-v1-1.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/577/577753_2-2BestPracticesAlmeria_UET-v1-0.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/574/574648_2-2BestPracticesAlmeria-UT.pdf |
| | Best practices visit to Berlin | https://itg4au.uib.eu/News/ITG4AU-project-partners-attend-their-first-Best.cid570493 | |
| | | UPT: | https://itg4au.uib.eu/digitalAssets/532/532465_2-2BestPracticesBerlin_PUT-v1-1.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/529/529958_2-2BestPracticesBerlin_UAMD-v1-1.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/532/532466_2-2BestPracticesBerlin_UET-v1-1.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/529/529954_2-2BestPracticesBerlin_UT-v1-1.pdf |
| | Best practices visit to Halden | Cancelled due to COVID-19 lockdowns. | |
| | Best practices visit to Palma | Cancelled due to COVID-19 lockdowns. | |
| | Report on Best Practices validation | https://itg4au.uib.eu/digitalAssets/611/611074_2-3BestPracticesValidation_v1-2.pdf | |
| B – Development | Initial assessment visit to Albanian universities | https://itg4au.uib.eu/News/The-European-partners-of-the-ITG4AU-project-visit.cid589589 | |
| | | https://itg4au.uib.eu/digitalAssets/611/611086_2-4InitialAssessmentVisit_v1-1.pdf | |
| | IT governance framework development | https://itg4au.uib.eu/digitalAssets/610/610392_IT-Governance-framework-development-plan.pdf | |
| | | UPT: | https://itg4au.uib.eu/digitalAssets/612/612633_2-5DevelopmentFramework_UPT_v2-4.pdf |
| | | | https://itg4au.uib.eu/digitalAssets/610/610265_2-5DevelopmentFramework_UPT_v2-1_Annexes.pdf |
| | | | https://itg4au.uib.eu/digitalAssets/612/612634_2-5GovernanceFrameworkDevelopment-UPT-Annexes.pdf |

| Project parameter | | Link | |
|---|---|---|---|
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/610/610273_2-5DevelopmentFramework_UAMD_v4-2.pdf<br>https://itg4au.uib.eu/digitalAssets/613/613399_2-5DevelopmentFramework_UAMD_Annex_v2.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/610/610972_2-5DevelopmentFramework_UET_v2-5.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/610/610968_2-5DevelopmentFramework_UT-v3-3.pdf |
| | IT governance framework assessment | https://itg4au.uib.eu/digitalAssets/613/613107_2-6FrameworkDevelopmentAssessment_v1-2.pdf | |
| C – Deployment & Monitoring | IT governance framework deployment | UPT: | https://itg4au.uib.eu/digitalAssets/612/612732_4-5FrameworkDeploy_UPT_v2-5.pdf<br>https://itg4au.uib.eu/digitalAssets/613/613456_evidence1.pdf<br>https://itg4au.uib.eu/digitalAssets/613/613457_evidence2.pdf<br>https://itg4au.uib.eu/digitalAssets/613/613458_evidence3.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/612/612727_4-5FrameworkDeployment_UAMD-v2-4.pdf<br>https://itg4au.uib.eu/digitalAssets/612/612512_Evidence-1.pdf<br>https://itg4au.uib.eu/digitalAssets/612/612513_Evidence-2.pdf<br>https://itg4au.uib.eu/digitalAssets/612/612514_Evidence-3.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/613/613469_4-5FrameworkDeployment_UET_final-v2-4.pdf<br>https://itg4au.uib.eu/digitalAssets/613/613649_4-5FrameworkDeployment_UET_Annexes.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/612/612752_4-5FrameworkDeploy_UT_v1.3.pdf |
| | IT governance framework monitoring | UPT: | https://itg4au.uib.eu/digitalAssets/612/612842_4-6MonitoringFramework_PUT_v1-3.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/612/612843_4-6MonitoringFramework_UAMD_v1-3.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/613/613470_4-6MonitoringFramework_EUT_v1-3.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/612/612844_4-6MonitoringFramework_UT_v1-3.pdf |
| D – Dissemination and Sustainability | Dissemination and Exploitation plan | UPT: | https://itg4au.uib.eu/digitalAssets/612/612635_4-1DissPlan_UPT_v2-2.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/612/612726_4-1DissPlan_UAMD_v3-2.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/610/610970_4-1DissPlan_UET_v3-3.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/612/612503_4-1DissPlan_UT_v1-4.pdf |
| | Pilot courses | UPT: | https://itg4au.uib.eu/News/The-PUT-partners-performed-seminars-and-pilot.cid643155<br>https://itg4au.uib.eu/digitalAssets/610/610206_4-4PilotCourses_PUT-v1-1.pdf |
| | | UAMD: | https://itg4au.uib.eu/News/The-UAMD-partners-performed-pilot-courses-about-IT.cid643386<br>https://itg4au.uib.eu/News/The-UAMD-partners-performed-several-seminars-and.cid643188<br>https://itg4au.uib.eu/digitalAssets/612/612617_4-4PilotCourse-v1-2.pdf |
| | | UET: | https://itg4au.uib.eu/News/The-EUT-partners-performed-seminars-and-pilot.cid643131<br>https://itg4au.uib.eu/digitalAssets/610/610162_4-4ReporPilotCurses_UET-v1-3f.pdf |
| | | UT: | https://itg4au.uib.eu/News/The-UT-partners-performed-seminars-and-pilot.cid643890<br>https://itg4au.uib.eu/digitalAssets/613/613189_4-4PilotCourses_Report_UT_v1-2.pdf |
| | Sustainability plan | UPT: | https://itg4au.uib.eu/digitalAssets/610/610225_4-9SustPlan_PUT_v2-1.pdf |
| | | UAMD: | https://itg4au.uib.eu/digitalAssets/610/610272_4-9SustPlan_UAMD_v3.pdf |
| | | UET: | https://itg4au.uib.eu/digitalAssets/610/610971_4-9ISustPlan_UET_v2-3.pdf |
| | | UT: | https://itg4au.uib.eu/digitalAssets/612/612507_4-9SustPlan_UT_v1-3.pdf |

Figure A.1 shows our metamodel implementation, step by step, representing the communication between the IT governance experts (ADR researchers) with each HEI partner (ADR practitioners) during the IT governance framework building phase (BIE).

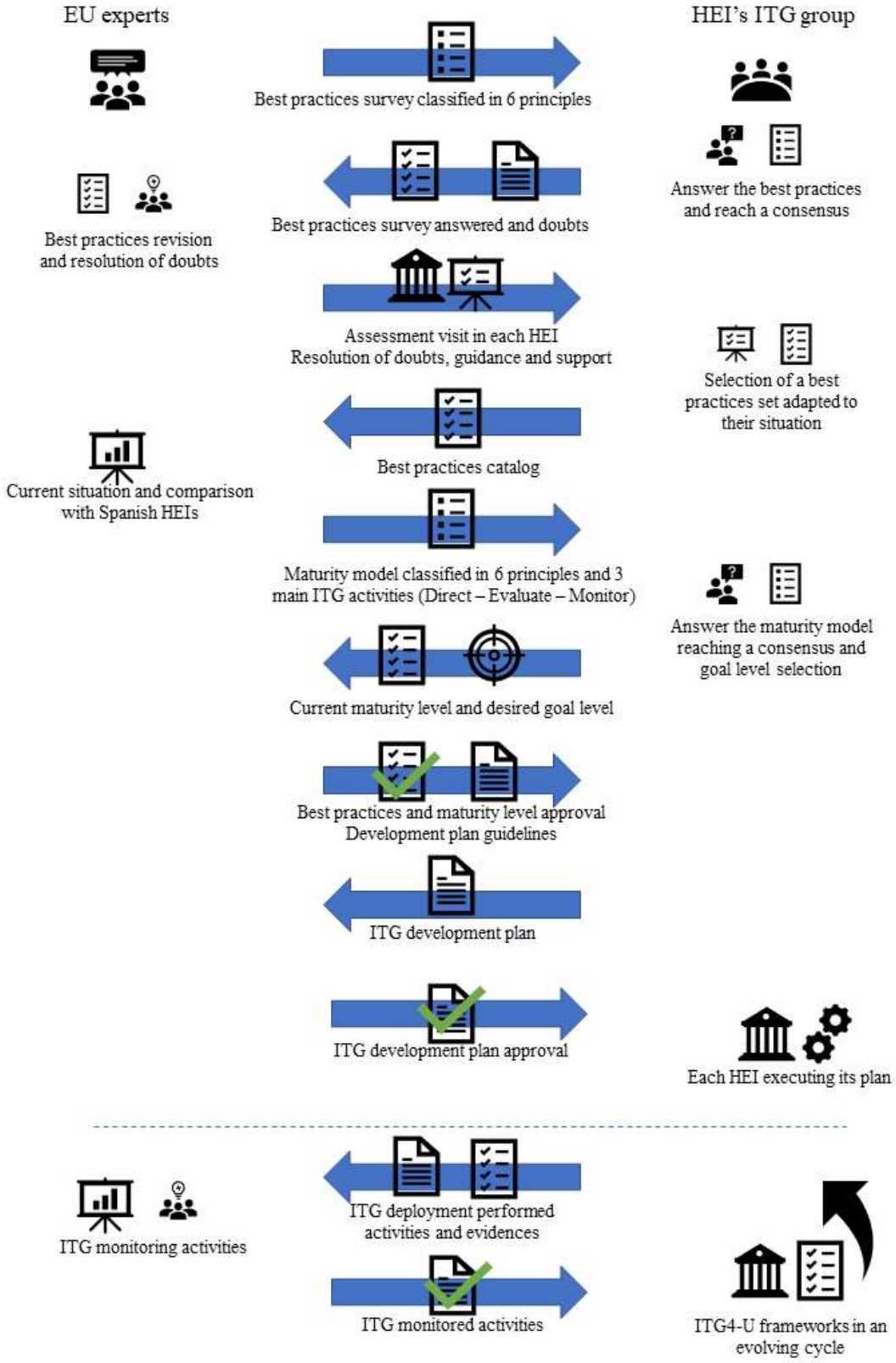


**Figure A.1 – IT governance framework steps**

Figure A.2 shows all the artifacts grouped to show all the involved actors, inputs, outputs, and relations among the participants in the ADR research method.

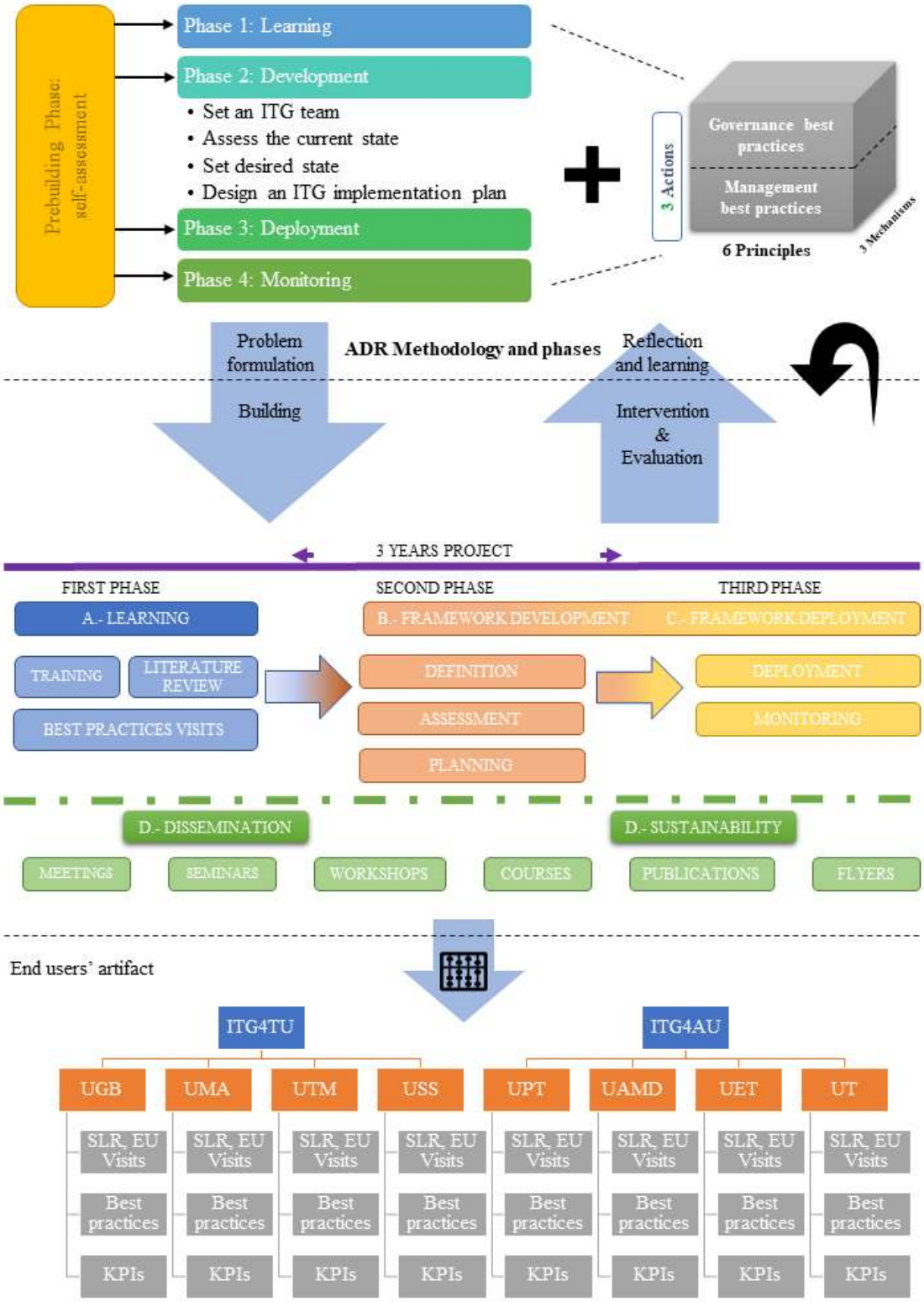


**Figure A.2 – ADR involved elements**