Information Technology Governance for Tunisian Universities (ITG4TU): a real experience of IT governance framework capacity building from European Universities

Beatriz Gómez[1], Carlos Juiz[1], Ricardo Colomo-Palacios[2] Antonio Fernández[3]

[1]University of Balearic Islands, Department of Computer Science,
Carretera de Valldemossa, Km. 7,5, 07122 Palma, Spain, {b.gomez, cjuiz} @uib.es

[2]Østfold University College, B R A Veien 4, 1783 Halden, Norway, ricardo.colomo-palacios@hiof.no

[3]University of Almeria, Carretera de Sacramento, S/N, 04120 Almeria, Spain, afm@ual.es

Keywords
IT Governance, ISO 38500, ITG framework, HEIs

1. ABSTRACT

Information Technology (IT) are becoming an essential part of the business and boards are expecting value from it. However, the results are not always as expected so that they are realizing the necessity to govern IT. IT Governance (ITG) is a matter of each kind of business including universities but unfortunately, the adoption of best practices in order to conduct to good governance is still scarce. Regarding the three obstacles that obstruct the adoption of IT governance in universities namely ITG best practices absence, budget constraints and the inexistence of any method for implementing a framework, and mainly in developing countries like Tunisia, we have developed a project to provide them our expertise in implementing IT governance based on previous experiences but adapted to their specifically necessities and current situation.

2. INTRODUCTION

Nowadays, 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. Because of that, boards expect IT to offer business value that means rapid solutions and safer and more quality services (Gómez, Bermejo, & Juiz, 2017). In order to achieve this expectations, organizations are starting to take into account IT as a governance activity like other fundamental pillars of the organization (Juiz & Toomey, 2015). Thus, IT governance is the direction and control of current and future IT assets assuring the effective, efficient and acceptable use of it (ISO/IEC 38500, 2015).

In today's leading and profitable organizations, effective ITG structure is a top business priority (Gartner, 2013). Organizations that have effective ITG structures could have got more return from their assets in comparison with other without ITG practices (Weill, 2004). Effective ITG enables such superior business performance as they promote effective and efficient resource allocations (Weill, 2004). ITG permits an IT manager to focus on three essential requirements: reducing risks, controlling costs and extending the value of the information system (Tsai, Chou, Leu, Chen, & Tsaur, 2015).

In university settings, studies like (Creasey, 2008) discovered a positive relation between effective ITG and organizational performance in universities. As a consequence, ITG is key activity for universities (Khouja, Bouassida Rodriguez, Ben Halima, & Moalla, 2018). However, and in spite of the importance of the topic worldwide, with relevant actors like, for instance ISACA, the penetration of IT governance in universities is still scarce.

Organizational dependence on information technology in developing economies is increasing (Gartner, 2013). In the specific case of the African continent, the penetration of IT governance is weaker. As mainstream IT governance related researches tend to focus more on developed economies, the viability of these established IT governance structures 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). Taking this into account, any framework must be tuned in countries, for instance, in Higher Educational Institutions (HEI) from Tunisia.

In previous and recent studies like, for instance (Jairak, Praneetpolgrang, & Subsermsri, 2015), the three main obstacles in IT governance implementation in universities are 1) lack of clear ITG principles, 2) budget limitations and 3) lack of method for selecting the ITG framework. Problems in IT governance are not particular of a given country or continent. Taking this into account, IT governance artefacts can be common to almost all country in the world. However, special needs in the deployment are purely local (i.e. dependent on the university teaching portfolio, the ownership of the HEI, the level of knowledge on the topic…). These two assertions lead to the fact that already implemented approaches in ITG for universities can be used as inspiration for a "Glocal" Tunisian initiative. 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 ITG setup. Thus, knowledge and experience gained by partners is a sine qua non condition. This active participation cannot be reached without European cooperation in this case, formed by four HEIs from three different countries: University of Balearic Islands (being the coordinator) and University of Almeria from Spain, SRH Hochschule Berlin from Germany and Østfold University College from Norway.

Therefore, we developed an innovative project to tackle the three obstacles by providing a set of experts from HEIs with previous experience on the topic, to implement an IT governance framework based on previous efforts, but also specifically designed for Tunisian universities. Developing a specific framework for Tunisian universities is, itself, a pioneering task. This is being a new development that will also lead way to the development of new research lines in the field among Tunisian universities. An introduction of such framework would be an innovation not only to Tunisia but also to entire North African region and also to the whole continent.

3. THE ITG4TU PROJECT

This project is aimed to gather a set of researchers from four universities with a wide experience in developing and deploying ITG framework models from 3 different countries (Spain, Germany and Norway) to develop, adapt and test a new ITG framework to be implemented in four HEIs in Tunisia: University of Gabes, University La Manouba, University Tunis el Manar and University of Sfax. Expected results of this project include a better governance model for IT in Tunisian HEIs as well as an overall modernization of the governance processes for HEIs and a contribution of the cooperation between EU and Tunisia.

Specific objectives of the project are:

- Perform specialized training modules for building ITG models in Tunisian universities. This training targeted three types of stakeholders of universities: professors, students and administrators/managers. Professors were trained in two different ways, those professors who wish to acquire new knowledge to include ITG as a teaching and research discipline. Regarding, graduate students from related studies of IT students and even in Management/Business administration could acquire new skills to ensure their further professional or academic integration. Of course, the main target of this project were the intermediate management and board executives of universities, as well as functional IT departments that can take this opportunity to better align their IT strategies.
- Perform training to employers in IT sector, mainly mid-size and large companies both public and private. ITG 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 Tunisian universities and the surrounding economic and social stakeholders. It will also provide project sustainability, since once Tunisian trainers (professors) of local universities were accredited, they may continue providing specific training to local businesses.

- Build ITG frameworks, adaptable to each institution, for the participants of the project. As a result of initial and advanced training in ITG, Tunisian universities in collaboration with EU must be able to implement their own ITG framework and their corresponding instruments of ITG.
- Build the skills and tools to ensure the sustainability of IT governance project beyond.
- Set the value chain of IT in HEI and its Key Performance Indicators (KPI). The achievement of this aim should change how ITG is discussed as well as the strategic focus of this asset as important for the ITG of the HEI. The biggest changes that must be observed by all stakeholders are:
    - Increased transparency of governance decisions and the way that the board is managing IT.
    - Increased accountability of ITG structures, their composition and nature and their spheres of action and responsibility.
    - Governance of Portfolio, Programs and Projects (PPP) (Juiz, Gómez, & Barceló, 2012; Serrano, Gómez, & Juiz, 2017).
    - Outsourcing, provisioning and subcontracting of IT are clearer and focused.
    - IT service catalogues are published, auditable, responsive and proactive.
    - Increased motivation and proactive IT staff due to increased visibility, changing reactivity added value of IT.
    - The strategy of HEIs is connected with tactical and operational IT, almost automatically and naturally through a virtuous cycle from the mission, vision and strategic objectives to measures and KPIs for the IT assets.

To achieve these aims the project were divided in different phases, each of them with the necessary activities for its completion.

4. PROJECT ACTIVITIES

The scheduled activities in the project were divided into three phases:

- The first phase consisted of the training of the stakeholders of the HEI, i.e. training on IT Governance. This part consisted of the following activities: in situ training for trainers, training for local entrepreneurs and training future researchers and professionals.
- The second phase was the definition of a framework for IT governance in the HEIs and its future implementation for Tunisian partners.
- The third phase consisted of the deployment of the IT governance framework previously planned and monitoring its results.

The main target that this project was addressed was the IT staff, managerial staff and governance boards at Tunisian universities. In order to improve the IT governance of HEI, all the direct stakeholders should know the existing standards, methods, techniques and tools to implement IT governance frameworks through European specialists who intend to develop their competence. Another primary target were the professors on related issues (Information Systems, Enterprise Management, Business Administration, etc.) in order to start up 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, increasing productivity based on IT governance good practices, organizations which lack research expertise that are based in their communities. Another secondary target was graduate students looking for expertise in a new area.

The first phase of the project was the development of several training seminars for HEI staff and professors. Additionally, the project created a communication web portal that enabled all vested interest groups to be reached. This web platform is also used for project outcomes dissemination. From this portal, the target groups could interchange their ideas and be grouped around specific themes of consideration.

The second phase of the project was the development and validation of a specific ITG framework for each Tunisian university. After both trainings, the partners and involved stakeholders were able to use specific common language related to ITG. Thus, an initial assessment was performed in order to know the current situation of each Tunisian partner. Based on the results of this assessment, they were able to create, with the help and guide of the EU partners, their own ITG framework adapted to their characteristics, needs and situation. Next, the European partners validate the new framework so that it is in line with the best practices already taught in the training, and the plan to deploy it is acceptable in terms of the project.

The last phase of the project is the above mentioned deployment of the ITG framework in each Tunisian university as well as some activities in order to sustain the philosophy of the project in time, as it is shown in Figure 1.

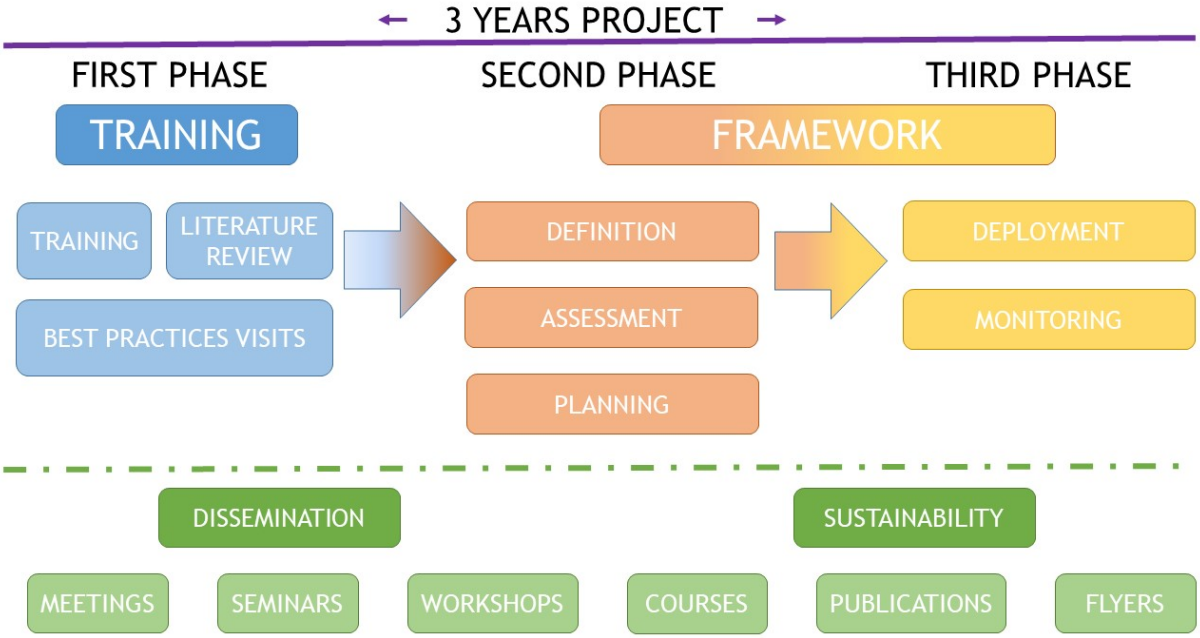

Figure 1: Project phases

Throughout the duration of the project and beyond it some dissemination activities were and are being performed in order to sustain the project in time.

4.1. First phase: determine the situation

Two on-site trainings were performed under the scope of the project to achieve competences and skills to play a leading role in the IT governance discipline and IT assets, and to improve IT efficiency use in respect with strategy of HEI and the communities that it serves. The academic portfolio was focused to promote IT governance principles in all stakeholders. Additionally, the academic resources may be used for training future enterprise leaders and postgraduate students in the role of governing IT assets.

The first one, named *Initial Training Researchers*, were performed to set a minimum level of competency among researchers. This training being the first training in taking place, has also been an initial contact with ITG procedures in Tunisian universities.

The objective of this training was to perform specialized training modules for building IT governance models in Tunisian universities. The primary target in this training were the professors on related issues (Information Systems, Enterprise Management, Business Administration, etc.) in order to start up a new discipline in their subjects for future training and research for master students and young researchers. The training was composed by several initial modules: systematic and strategies thinking and possessing profound competences – knowledge, skills and attitudes – required to meet

challenges in governing IT assets and efficiency issues related to the particularities of the HEI institutions.

Representatives of European universities have been in charge of dictating this course. The core of the sessions was the main aspects of Governance of IT: structures, standards, business strategy, value of IT, and the presentation of a framework of ITG (dFogIT) as an own case study (Juiz, 2011). Another ITG framework (GTI4U) was presented as an explanation of another case study (Fernández & Llorens, 2009). Finally, 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 to the added value of IT.

The second training, named *Initial Training Managers*, were performed to set a minimum level of competency among managers in HEI at partner countries. This has been the second training in takin place and also has been useful in order to set an initial state level of IT governance procedures in Tunisian universities.

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.

Representatives of European universities have taught this course. After a summary of the main aspects of IT governance (structures, standards, business strategy, and value of IT) the course was divided in several working sessions with a brief explanation but mainly consisted on ITG workshops where attendees had to work first individually, second in groups formed by each Tunisian university and finally with the whole group of participants. The trainers explained their own experience in implementing a framework of ITG in several Spanish universities. They depicted the processes done in order to apply ITG best practices based on the six principles referred in ISO 38500. Thus, they showed the results of that implantation and then worked in a similar way with the Tunisian attendees exploring each principle in each working session, so they can achieve the same or better results.

Once reached this point, they were able to consider that IT is a strategic tool for universities and that the IT governance in HEI 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 (Weill & Ross, 2004), it is important that ITG includes strategies, policies, responsibilities, structures and processes for using IT within a HEI. It was important for them to search in the literature to identify best practices in this domain to implement an ITG system more efficient for their HEIs. Thus, they perform a study and overview of the state of the art of ITG in HEI outside the consortium of the project. A literature review was conducted to learn different lessons from the various case studies that were found and be able to build their own framework adapted to their specific situation (Khouja et al., 2018).

After the trainings and in parallel with the literature review, Tunisian partners visited the EU universities in order to learn about the 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 Tunisia.

Finally, the last activity belonging to the first phase was performing an initial assessment on-site visit to each Tunisian university. This activity was performed to get information about the state of IT governance in these institutions and thus better understand their needs. A total of four assessment visits took place in each of the universities belonging to the project. The objective of this initial assessment was to set the achievement of the knowledge gained in the two initial trainings through several surveys designed by representatives of European universities, and therefore it was possible to achieve an initial level of IT governance in the Tunisian universities. In addition, participants could assess whether the early-stage framework was suited to the special structural characteristics of their own institutions. 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 the goals of the project.

This activity was previously prepared and Tunisian partners were requested in advance to submit the survey running the following procedure:

i. Project leader had to create an ITG Group and include in it a couple of ITG researchers belonging to ITG4TU project and a couple of Governance Body Members.

ii. Assign a number for each member of the group (from 1 to 4) and ask them to answer individually the survey of the six ISO/IEC 38500 principles.

iii. Project leader had to collect all the answers and put all together in the same spreadsheet. Later on, he/she had to fill in the FINAL column with Y if all the group answered YES in a best practice or N if everybody answered NO. Project leader had to leave it blank if they did not have a unique response.

iv. Organize a consensus meeting to discuss about the best practices with blank at the FINAL column. The group had to discuss about the different values reported and had to decide a consensus one (Y or N), trying not to leave blanks.

v. As the second goal of this assessment visit was validating the best practices included in this survey. The Project leader 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. These notes would be revised during the assessment visit.

vi. At the end, the group had to report a consensus values for all the best practices of the survey following the ISO/IEC 38500 principles of IT governance.

All this procedure was very important for the project since it was the first step for the creation of the ITG framework. European representatives reviewed all the documents before their on-site visits in Tunisia and, once at each assessment visit, worked hand in hand with each ITG Group, reviewing the survey, principle to principle, explaining the results and stopping in those that had not reached a consensus.

Finally, as a result of each assessment visit, a final chart was created showing the maturity level of ITG in each university and some recommendations were given from European partners about which actions should perform from the scratch. Based on that, European partners requested Tunisian partners to write down a report explaining how the framework presented would best suit their specific necessities and which activities would like to perform first. As an example showed in Figure 2, in comparison with ten Spanish universities average (Fernández Martinez & Llorens Largo, 2011), the University of Gabes presented three principles very similar and the other three below average. Activities related to *Human Behavior* principle had achieved higher consensus than the average, so they had to focus their resources in activities mainly related to *Responsibility* principle in the first place.

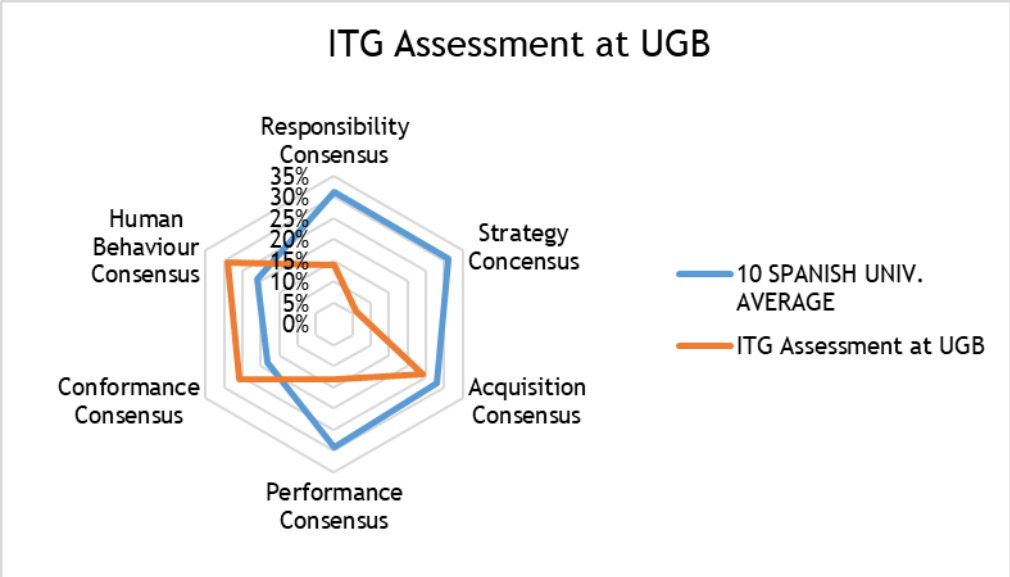

Figure 2: ITG Assessment at the University of Gabes

4.2. Improve the situation

The implementation framework initiated the development of the instruments and tools necessary to govern the IT assets in the HEI, using the competences and skills of the previous course development. These outcomes cover the activities for staff development and the manager leadership in the IT governance framework construction. This phase had to take into account the following aspects to ensure the sustainability of the project:

- Build university governance frameworks, adaptable to each institution, for the participants of the project.
- Build the skills and tools to ensure the sustainability of IT governance project beyond.
- Set the value chain of IT in HEI and their Key Performance Indicators.

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 ITG framework tailored to the specific needs to the four universities participating as partners:

1. Define and validate an ITG Framework: structures (committees), the strategic alignment artifacts (processes, procedures, best practices…) and the communication issues, necessary to assure a good governance of IT.
2. Design and validate an ITG Maturity Model based on this ITG Framework. This tool was useful and necessary to establish the current ITG maturity of each university, select the goal maturity level and describe the best practices that each university had to implement to achieve it.
3. Evaluate the current ITG maturity level through the previous analysis of the best practices and propose a future maturity level they wish to achieve.
4. Design an improvement ITG plan based on the best practices to achieve the ITG maturity level proposed for each university. Specify how the creation of such structures were going to be done, which kind of alignment activities were going to be performed and what documentation to communicate that was going to be required.
5. Assess, by the European partners, of the proposed plan and the viability of the activities, taking into account the resources, involved people and calendar.
6. Implement, by the Tunisian partners, the approved plan including the recommendations if any.
7. Follow-up, by the European partners, on the evolution of the plan, and monitor the results.

It should be noted that some steps belong to this second phase related to the improvement of the situation (step 1 to 5) while others belong to the third phase related to the execution of the desirable changes (step 6 to 7).

Anyway, the first step followed by the Tunisian partners consisted in the definition and validation of a common ITG Framework specifying its structures, how to achieve the strategic alignment and how to implement the communication of all the activities related with it. For this, it was necessary to review each initial ITG Best Practices used previously to assess the current situation in each Tunisian university and define a framework that include all the structures, strategic alignment and communication described in that best practices. Each Tunisian university had to review that model and propose its own version. After that, all the proposals were discussed, and a common final version of the framework was decided by the Tunisian partners to be created.

In the second step 2 the Tunisian partners had to design and validate an ITG Maturity Model working in the same way as the step before but in relation to the Spanish ITG Maturity Model to be used as the future Tunisian ITG Framework. Tunisian partners decided to work with one of the solutions already learnt in the first and second training (Fernández & Llorens, 2009). Thus, each Tunisian university reviewed this 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.

The evaluation of the current ITG maturity level of each Tunisian HEI was the third step. It was also included the proposition of the goal level they wish to achieve in the future. By using the ITG

Maturity Model to self-assess themselves, the current ITG maturity level of each university were presented. After that, they selected the goal maturity level that each university wished to be achieved.

Once the initial situation is known and the state to be achieved is established, it is possible to design an IT governance plan to improve the current situation. In the fourth step, the Tunisian partners designed an improvement ITG plan that included all the best practices each university needed to implement to achieve the ITG maturity level proposed previously. Each university selected areas to improve based on their own available resources and made a realistic "IT Governance Plan" considering people, resources and time. To select these areas, based on the previous review, each Tunisian university had to assure they have structures, alignment and communication tools following the recommendations learnt in the trainings. Figure 3 depicts the methodology above explained, specifically those steps belonging to the first and second phase.

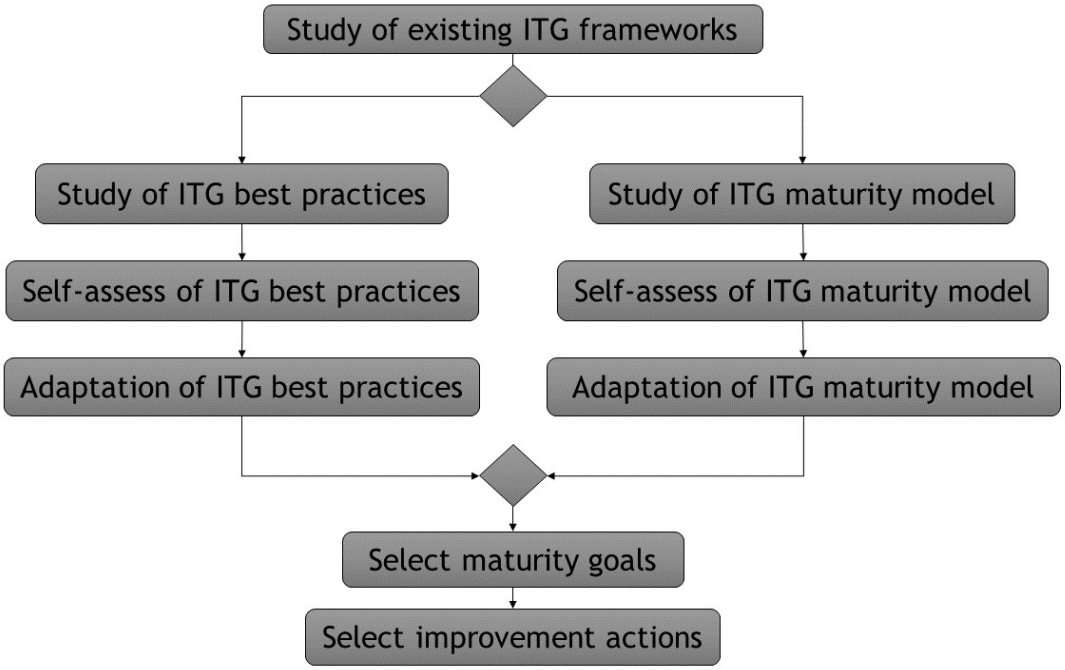

Figure 3: Framework wrap-up

It was very important the active involvement and participation of the European partners along the project. Although the previous steps were follow mainly by the Tunisian partners, they were guided during each activity by the European partners. In fact, the fifth step was the assessment of the proposed IT Governance Plan and the study of the viability in each specific situation. As indicated above, the action plan for the implementation of an IT Governance framework in Tunisian universities follows the methodology of incremental evolution, that is, continuous improvements are made to each of the elements until it is reached the optimal level according to the characteristics and needs of the entity and midterm goals established previously. For this 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, so that this step was leaded by the European partners.

4.3. Executing the changes

Sixth and seventh steps, although strongly related with the second phase, actually belong to the third phase. The execution of the IT Governance plan previously established strongly depends on the involvement of top management and boards in Tunisian HEIs. Although several seminars and workshops were performed to explain the aims of the project, the benefits and the future positive organizational impact of ITG, the project was also designed for the identification of possible risks, including the absence of top management commitment.

Once the implementation plan was done (step 4) and reviewed (step 5) it was time to execute 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 phase 2 and 3, including all steps, were lasting one year and half approximately. Hence, 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 Tunisian partners, all together, were monitoring the executed plan after these steps were performed. Because of that it was important having documented properly all the steps done, not only in terms of transparency and best practices of IT governance, but also was of significant help for the continuous improvement of the framework and the sustainability of the project.

5. BEYOND THE PROJECT

At the end of the project the consortium is continuing to improve and maintain the platform to cascade the results across as a provider of training and research backed problem solving on IT resources efficiency and IT governance support issues. Each respective ITG group will continue improving the IT governance framework in their respective HEIs and implementing courses and seminars for newcomers. Additionally, as the secondary target groups has been made out of professionals and relevant industry segments from across Tunisia, it is expected that they will enhance their knowledge and capabilities on the management IT resource efficiency or to further their new ITG skills. Therefore,

- A postgraduate continue education module system program on IT governance on a virtual platform form of delivery is being implemented.
- The virtual platform for graduate and postgraduate students' entrepreneurship industry skills development and business design is being established.
- The virtual platform will further develop and disseminate the existing good practice and will seek the enlargement of the network so that they include all vested parties in other partners and countries.

The objective on this phase is to disseminate and exploit the project results within the regional contexts. It is of key importance for the project results that all regional stakeholders are involved in project findings. This also includes other actors different from project partners. It is very important to realize that the project results target two different secondary target groups, namely, regional companies and the regional higher education community.

The regional authorities are also being involved in the project through close dialogue thorough workshops at regional level. This participation will facilitate the integration of project results into national and regional policy about governance of public institutions after the duration of the project. Furthermore, the project web site is linked to existing regional web sites to provide easy access to the information about project progress and activities carried out in the project.

The consortium is providing targeted dissemination to the relevant national actors. The project results will be relevant to a broad group of actors for which reason the national entities, as for instance the Ministries of Education are important to include in the valorization activities.

European partners are organizing workshops at their campus in order to disseminate the best practice obtained during the project and also to share and to be informed of results and experiences gained from other community programs for identification of new users and a user guide is being developed. In fact, a second project derived from this one is getting underway, maintaining the same philosophy and aims achieved but learning from our day to day and spreading the best practices of ITG governance now in Albania.

Along the execution of the project, some activities were performed in order to disseminate the project results. For example, Tunisian partners had to develop training materials based on those learnt in the trainings, but adapted to their HEIs in order to catch new trainees. Furthermore, they are using these materials in several pilot courses with local students but also preparing workshops and seminars with regional and national scope, including the industry. All these activities are included in the dissemination and exploitation plan elaborated by each Tunisian partner, besides a sustainability plan including those activities beyond the duration of the project, all this being validated by European partners.

It should be added that at the beginning of the project, the project consortium elaborated a quality management plan and a project management plan in order to achieve an expected level of quality and results. Hence, each activity performed under the scope of this project has had a double check in terms of quality and results, being mandatory to move on to the next activity. The project also has a webpage and social networks to disseminate all the activities and results.

6. CONCLUSIONS AND FUTURE WORK

Universities are increasingly realizing the importance of governing IT. Because of that, several studies, standards and frameworks are being developed which share best practices that lead to good IT governance. In developing countries like Tunisia, this behavior is still scarce, so they are facing several problems and misalignment regarding IT and business. To improve this situation, we have developed a project intended to deploy an IT governance framework for Tunisian universities.

The project was planned in different phases in order to facilitate the achievement of its aims. The first phase consisted of two trainings targeting not only academia but also industry stakeholders to better realize and understand the importance of having a good governance of IT. These trainings served to set a common knowledge about ITG and its three mainly pillars: structures, alignment and communication. The first phase also helped to study about best practices of good ITG and to assess the current situation of the Tunisian HEIs. The second phase, with the information gathered in the first one, consisted of the creation of their own framework, based on ISO/IEC 38500 standard, adapted to each specific Tunisian university, takin into account their situation and expectations. Depending on their people involved, resources and wishes, they set the desirable ITG maturity level and defined a plan to achieve it. Finally, in the las phase they execute their plan and, with the continuous help of the European universities, were monitoring its progress.

The experience of having developed this project has led to, not only a better relationship between European countries with Tunisia in terms of professors and students, but also the spread of IT governance philosophy and good behavior. Since the obtained results have been so good, European partners have developed a new project with the same topic and aims but this time with Albanian universities. We expect to achieve again similar results as in Tunisia.

Regarding the sustainability of the Tunisian project, the activities related to monitoring are still being executing. The idea is to assure that the mechanisms for assess the ITG situation are well implanted, so it is under the plan to maintain the communication with Tunisian universities to trace their activities and check if the proposed goals have been achieved. Furthermore, in the future an assessment of their new situation and the evolution of their ITG should be performed in order to study the impact of the project and the awareness of good IT governance.

7. ACKNOWLEDGMENT

This work has been partially supported by EACEA in the Erasmus+ KA2 project Information Technology Governance for Tunisian Universities (ITG4TU) under the grant 561614-EPP-1-2015-1-ES-EPPKA2-CBHE-JP.

8. REFERENCES

Bianchi, I. S., & Sousa, R. D. (2016). IT Governance Mechanisms in Higher Education. *Procedia Computer Science*, *100*, 941–946. https://doi.org/10.1016/j.procs.2016.09.253

Creasey, W. (2008). *The influences of information technology organizational performance in higher education*. *ProQuest Dissertations and Theses*. Retrieved from http://search.proquest.com/docview/304367501?accountid=12104

Fernández, A., & Llorens, F. (2009). An IT Governance Framework for Universities in Spain. *EUNIS 2009 Conference*, 1–13.

Fernández Martinez, A., & Llorens Largo, F. (2011). Gobierno de las TI en las Universidades Españolas. *Universidad de Almeria*, 1–17. https://doi.org/978-84-8143-764-6

Gartner. (2013). Gartner Says Worldwide IT Spending on Pace to Reach $3.8 Trillion in 2013. Retrieved from http://www.gartner.com/newsroom/id/2394415

Gómez, B., Bermejo, B., & Juiz, C. (2017). IT Governance and Its Implementation Based on a Detailed Framework of IT Governance (dFogIT) in Public Enterprises. In *Information Technology Governance in Public Organizations* (pp. 133–155).

ISO/IEC 38500. (2015). Information Technology — Governance of IT - For the organization. Retrieved from http://www.iso.org/iso/catalogue_detail?csnumber=62816

Jairak, K., Praneetpolgrang, P., & Subsermsri, P. (2015). Information technology governance practices based on sufficiency economy philosophy in the Thai university sector. *Information Technology & People*. https://doi.org/10.1108/ITP-10-2013-0188

Juiz, C. (2011). New engagement model of IT governance and IT management for the communication of the IT value at enterprises. In *Communications in Computer and Information Science* (Vol. 194 CCIS, pp. 129–143). https://doi.org/10.1007/978-3-642-22603-8_13

Juiz, C., Gómez, M., & Barceló, M. I. (2012). Implementing business/IT projects alignment through the project portfolio approval process. In *Lecture Notes in Electrical Engineering* (Vol. 180 LNEE, pp. 1–8). https://doi.org/10.1007/978-94-007-5083-8_1

Juiz, C., & Toomey, M. (2015). To govern IT, or not to govern IT? *Communications of the ACM*, *58*(2), 58–64. https://doi.org/10.1145/2656385

Khouja, M., Bouassida Rodriguez, I., 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),* 16. https://doi.org/10.4018/IJHCITP.2018040104

Nfuka, E. N., & Rusu, L. (2011). The effect of critical success factors on IT governance performance. *Industrial Management & Data Systems*, *111*(9), 1418–1448. https://doi.org/10.1108/02635571111182773

Serrano, A., Gómez, B., & Juiz, C. (2017). Why the Governance of Projects , Programs and Portfolios (PPP) cannot be separated from the Governance of IT standard. In *Proceedings of the 35th National Information Technology Conference (NITC 2017)* (pp. 106–111). Colombo.

Tsai, W. H., Chou, Y. W., Leu, J. Der, Chen, D. C., & Tsaur, T. S. (2015). Investigation of the mediating effects of IT governance-value delivery on service quality and ERP performance. *Enterprise Information Systems*, *9*(2), 139–160. https://doi.org/10.1080/17517575.2013.804952

Weill, P. (2004). Don't just lead, govern: How top-performing firms govern IT. *MIS Quarterly Executive*, *8*(1), 1–21. https://doi.org/10.2139/ssrn.664612

Weill, P., & Ross, J. W. (2004). *IT Governance: How Top Managers Manage IT Decision Rights for Superior Results* (Harvard Bu). Harvard Business Press.

9. AUTHORS' BIOGRAPHIES

Beatriz Gómez received the B.Sc. and M.Sc. degrees in Informatics on 2011 and 2013 respectively from the University of the Balearic Islands (UIB), Spain. Currently, she is Assistant Lecturer at the UIB teaching in the area of Architecture and Computer Technology. Before joining the Department of Computer Sciences of the UIB, she served for two years as an analyst and programmer and thereafter participated as an engineer and researcher at the chair Telefónica – UIB of Digital Health and Sustainable Tourism. She is member of the ACSIC research group (http://acsic.uib.eu) in the Department of Computer Science at UIB. Her research interests are mainly about IT Governance and eHealth. Currently, she is the project manager of both Erasmus+ KA2 projects IT Governance for Tunisian Universities (ITG4TU) and IT Governance for Albanian Universities (ITG4AU).

Carlos Juiz is Associate Professor of Computer Technology and Architecture at University of the Balearic Islands (UIB). He has a postgraduate degree on Office automation from the Polytechnic University of Madrid, Spain. He had several positions related with the computer systems industry. He was visiting researcher at Department for Computer Science and Business Informatics, University of Vienna, in 2003 and Visiting Associate Professor at Biomedical Informatics Research, in 2011, at Stanford

University. Carlos Juiz is heading the ACSIC research group (http://acsic.uib.eu) and his research interest mainly focuses on performance engineering, green computing and IT governance. Carlos Juiz is senior member of IEEE, senior member of ACM and Academic Advocate of ISACA. He is the coordinator of the IT Governance WG within SC 40 at AENOR, the Spanish body in ISO/IEC. Currently, he is involved in the ISO/IEC 38503 standard development.

Ricardo Colomo-Palacios, Full Professor at the Computer Science Department of the Østfold University College, Norway. Formerly he worked at Universidad Carlos III de Madrid, Spain. His research interests include applied research in information systems, software project management, people in software projects, business software, software and services process improvement and web science. He received his PhD in Computer Science from the Universidad Politécnica of Madrid (2005). He also holds a MBA from the Instituto de Empresa (2002). He has been working as Software Engineer, Project Manager and Software Engineering Consultant in several companies including Spanish IT leader INDRA. He is also an Editorial Board Member and Associate Editor for several international journals and conferences and Editor in Chief of International Journal of Human Capital and Information Technology Professionals.

Antonio Fernández-Martínez is a professor of Computer Science and Artificial Intelligence at the University of Almería (UAL), Spain. He received his B.Sc. and M.Sc. in Computer Science from the University of Granada, and his Ph.D. in Computer Science from the UAL. He was director of the IT Service at UAL (1999-2007). He is currently the Government Coordinator and Delegate of the Rector for Interaction with Society and Companies of the University of Almeria. He is coordinator of the GTI4U research team, responsible for the research part of the UNIVERSITIC report for Spanish and Latin American universities and the IT Government Start-up Project, which has been successfully implemented in 10 Spanish universities. Both initiatives promoted by the ICT Sectorial Commission of the Conference of Rectors of Spanish Universities. Member of the BencHEIT initiative of European University Information Systems, of the ISO 20000 and ISO 38500 Standards Committee of AENOR and he is ISACA Academic Advocate.