Reference model and architecture maintenance

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Abstract The amount of information managed by the IT systems, as well as the number of IT projects each organization is accountable for, is rising exponentially. This, allied to the shorter implementation cycle demands, transforms the information management into a problem, instead of a solution. When it becomes the case of an enterprise not having the architectural views that are useful and link the business processes with its strategic goals, there is no guarantee that it makes the right decisions. The organization that is approached here, aware of these flaws, has come up with the task to find a solution. In response to these challenges, a reference model is proposed, aligned with what are the best information architecture guidelines. Overall, this artefact proposes to fix the mentioned gaps with the even out of project's architecture, combined with the standardization of information, and the alignment between the enterprises' strategic goals and the architectural principles.

After some research and empirical evidence, a third challenge rises, intrinsic to this work. This occurs on the target organization but it is common to many others – the model's maintenance. A reference model loses its main scope, to be a common domain model, if it isn't iterated with the results and developments of the several projects. Knowing how the IT documentation tends to be undervalued and responding to a request by the organization to find the enabler for the reference model, a solution for the architectural maintenance is presented, with the collaborative side of the process being part of the scope.

Keywords Information architecture, reference model, strategic goals, TOGAF, Archimate, Sharepoint

1 Introduction

The opportunity to create a solution to deal with the increasingly demanding development cycles, which are moreover rich in information, rose with the awareness on this big retail company. These concerns were that the Project documentation was becoming more relevant as the lack of it on an architectural level was creating a great gap that left them without visibility when it was the moment to decide. This Project purposes the definition of an architectural solution that helps this enterprise and other alike with the IT Project management. Also, a solution to maintain the model is tested and implemented. In detail, a reference model is proposed, with the focus on the alignment with the strategic goals of the organization. Over the years, organizations have taken advantage of solutions like ERPs and CRMs to help on the competitiveness and productivity of their business, which is the case of this organization. What they became aware of and is becoming a more common problem is that the increasing amount of information demands new planning and structuring to feed correctly these systems. Due to the dimension of the organization, this work will consider only the IT structure when attaining the architectural principles and strategic goals. A reference architecture will allow the management to have a better overall view of the several systems and projects and also to decrease the time to change or implement projects. It should become the enabler of the technological flexibility of the organization and one of the cornerstones that provides competitiveness. The inferred challenge of the creation of a reference model it's
the maintenance: it has to keep the alignment with the enterprise’s goals and should keep growing and feeding on new projects, adapting itself to new requirements and technologies. This will be approached considering the organizations context.

### 2 Background

The organization has been on the retail market for over 80 years, has activity on more than 30 countries, including the European, North American and Asian market. It has 12 thousand stores and 250 thousand employees overall. Portugal is considered a medium sized country on this context. An IT department of this organization is usually divided on: Service and Support – enterprises IT support team; Projects and Organization – Project managers and responsible for innovation; IT – infrastructure maintenance and Information Security – data and identity management. The business processes of this four departments play a key role on the reference model.

The retail systems have become more technological of the years and they approach IT projects like e-commerce, beacons, biometric terminals and mobile applications. With such progress, the management of information becomes even more relevant.

Since the scope of this project is on reference models, there was the need to gather information on a higher level, more abstract – the international centre of the organization. Considering the IT objectives for the company, it was relevant to verify that the company is focusing on making the overall work more collaborative through IT solutions and raising awareness for the importance of information quality and its relation to the business processes. This way, the solutions presented here were seen through this scope. The organization is also aware that there are many gaps between and on projects’ architectures, with different systems supporting the same core business processes. This also results on more effort on the project teams to interpret the information, architectural principals, different models and standards of the several different projects.

### 3 Related work

The advantages of several types of architectural models are proven and the focus is usually on requirements, policies and business compliance. In order to answer the organization concerns, this work approaches the creation of a reference model. This allows them to have an artefact that is business oriented and is aligned with its strategic goals.

Relying on TOGAF’s architectural development model and with Archimate’s taxonomy, we will provide a model that reduces implementation time and maintenance costs of new and existing projects and that supports the management’s decision process by being aligned with its strategic goals.

After the gathering of the enterprise’s main architectural principles, we have proceeded with a validation against TOGAF’s suggested architectural principles. This gave the organization an understanding platform with TOGAF. Then, we mapped the IT strategic goals with the architectural principles in order to identify the core concepts that should take part on the reference model. The even out of project’s architecture, combined with the standardization of information, and the alignment between the enterprises’ strategic goals and the architectural principles are the main advantages that came of this work.

After the instantiation of the model and the gap analysis using two existing projects and the architectural views available, we have made an efficient solution for the model’s architecture maintenance and a path was defined for the organization to start implementing
and achieving the benefits that were stated. A reference model [2] is a set of architectural guidelines that compose a common domain for all applications and systems of the organization. It defines the standard terminology and it is fed by the new and existing projects, resulting of the best of the practices and experiences of the organization. This way it has the potential to evolve over time but also requires some maintenance and iteration, as it is core of the most architecture development practices.

Due to the focus on the information layer and the proved reputation of the architecture development management cycle, this solution is going to be presented as based on TOGAF and complemented with Archimante’s Taxonomy.

The strategic goals of an enterprise are defined on TOGAF as a key block of information on the strategic plan of the company. These were the ones that were gathered on the organization:

1. Reduced number of national systems variants
2. High availability and secure systems
3. Key processes on standard systems
4. Create digital solutions
5. Efficient project management and IT marketing
6. Technological continuity plan
7. Lean IT processes
8. User satisfaction
9. Information exchange
10. Better resource allocation
11. Guaranteed employee safety
12. Well defined tasks and responsibilities
13. Improved cost management
14. Be better than comparable IT departments
15. Law compliant systems

An architecture principle concept is also defined by TOGAF and divided on statement, rationale and implications. They are a set of rules that define the usage of IT resources for the business. This way, they were the basis of the reference model.

The architectural principles of the organization were mapped with the ones on TOGAF’s for a validation of quality mainly, but also to approach the language of the organization. The result was:
They were also instantiated on Archimate’s view – Principles Viewpoint – in order to match the reference model’s layers.

Afterwards, in order to align the organization’s strategic objectives with the model and in the end with the project’s architecture, these principles were aligned with the goals. This underlines the alignment with the objective and the decision support features of the reference model. Using Archimate’s Goals Realization Viewpoint, that allows the identification of the most relevant architectural principles, we have modelled this relationship between architecture principles and strategic goals:

Is this case, the objective is the 1. Reduced number of national systems, which is clearly realized by the 4 architectural principles: standard platforms, countries knowledge sharing, efficient IT structure and cost adapted to the organization’s development. With this step, we identified what were the main strategic goals and with that we knew that the principles that were related to them should me highly considered on the reference architecture.

Considering the mapping between the organization’s principles and the ones suggested by TOGAF, we can extract the main elements and concepts that should be a part of the reference model. We did that by looking on the implications definition of each TOGAF architectural principle that was mapped. For example, consider the principle P.16 from TOGAF – Technology Independence. It is an application principle that states that for the development and maintenance of the applications on the organization it should be considered an interface for the legacy platforms that operates together with the standard applications interface. Also, a secure middleware solution should be used to separate applications from infrastructure context. The next two illustrations are a part of the reference model and demonstrate this specific alignment:
The resultant model of this work is outlined below. All the layers focus on the alignment of the model with the goals of the organization. In particular, the business layer provides the task and responsibility definition, as well as standard’s definition and alignment of the IT function with the IT goal. Also, it considers compliance with requirements, policies and laws.

The applications layer focus on forcing the standard interfaces and supporting the legacy applications, as well as usability requirements compliance.

The technology layer shows the usage of a secure middleware solution and supports all the model and therefore the systems with standard compliance features such as workflow engines and rule engines. Also it considers cloud based solutions for future applications and mobility support.

The alignment with the organization’s objectives was then compiled and validated with an organization responsible. They have decided to go through with the instantiation of the model on 3 pilot projects. On the sometime a gap analysis was performed. Considering the low information maturity level, the most representative project architecture views were analysed and compared. The organizational views were also put to test and compared with what the reference model has to offer. This increased the benefits contrast of the adoption of a solution like this, mainly due to the instantiation of the reference model on two core projects. The following two illustrations clearly demonstrate the differences.
Below we have a peak of the collaborative solution that was made to cope with the lack of concern for the documentation of each project and at the same time to be a mean to maintain the reference architecture. The tool that was use was Microsoft Sharepoint, which is widely available on the organization. With it, we have managed to create a solution for the improvement of the reference model, but also to make other project’s compliance with the model easier to work on.

Fig. 10 Standard project view

Fig. 11 Instantiated reference model for the same project

Fig 12. Sharepoint site structure for the reference model

The main benefits that came with the implementation:

1. A collaborative mean that puts together the change and standards management of the reference model and the project’s architecture management
2. It’s a single point of information which allows for improved decision making
3. Allows collaborative work on each artefact and versioning
4. It has helped greatly to establish a standard specification for the architectural solutions in the company
4 Conclusions and future work

Even though the organization presented some arguments to justify the lack of information maturity and massive gaps on project’s architecture, it became clear that their concerns were completely justified and the bet on finding a solution was the right decision to make. The responsibles are aware of the misalignment of the architecture of information and the strategic goals and they have welcomed the path defined by this project. It was possible to show all the reference model key benefits to a standard medium/great sized organization and provide them with an architectural view on which they can rely and base their decision on. The collaborative way that was implemented to introduce this solution to the organization, is undoubtedly un-implementable on some organizations and that is an item that must be reviewed. But, in this case, it became the great catalyser on the decision of the acceptance, as expected. The empirical expertise allowed us to focus on the solution but also on the aftermath of the implementation, which in this case is key for the success of a useful reference model – it will have to be maintained and keep being fed by all the stakeholders to keep its indisputable value. Regarding the model’s implementation, and responding to a request by the organization to find the enabler for the reference model, a solution for the architectural maintenance is presented, with the collaborative side of the process being part of the scope. We will follow the development of the reference model, starting by educating the stakeholders and exposing the importance of this work. As a final note, the organization acknowledge the following contributions:

1. It has now an away to solve the mentioned architectural problems that it was aware of
2. The reference model is elaborated and ready to be implemented. It offers the first true global view of the IT information architecture in the organization
3. It became perceptible how a technological change can impact the strategic goals
4. The collaborative solution responds to the main risk of the implementation of this model – the closure on the projects contributions after the initial phase

References