Developing an Inter-Enterprise Alignment Maturity Model: Research Challenges and Solutions

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Abstract

Business-IT alignment is pervasive today, as organizations strive to achieve competitive advantage. Like in other areas, e.g., software development, maintenance and IT services, there are maturity models to assess such alignment. Those models, however, do not specifically address the aspects needed for achieving alignment between business and IT in inter-enterprise settings. In this paper, we present the challenges we face in the development of an inter-enterprise alignment maturity model, as well as the current solutions to counter these problems.

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Chapter 1

Introduction

Due to increasing competitive pressure in their markets, many enterprises are implementing changes to the way they conduct business. These changes range from implementing new IT, to redesigning the structure of the organization and entering into all kinds of cooperations with other enterprises, forming what we call 'networked businesses'.

In such networked businesses, an important issue to solve is business-IT alignment. In the context of this paper, business-IT alignment is the problem of matching services offered by IT with the requirements of the business, but also of coordinating the business and IT strategies. In businesses of any significant size, business-IT alignment is a hard problem that currently is not completely solved. With the advent of networked businesses, the problem gets a new dimension because in inter-enterprise settings there is usually no single decision point. Different decisions are often taken at different times and by different individuals or groups in a networked business, and these have to be coordinated.

Business-IT alignment can be achieved at various levels of maturity. Therefore, maturity models – a concept that has proven its value over the past 15 years – seem a suitable vehicle for a networked business to use in order to gain a deeper understanding of how it progresses towards better business-IT alignment. The basic idea of a maturity model is to assess a specific area of an organization against a norm to identify fields of possible improvements that must connect to business benefits. There have been some proposals for architecture alignment maturity models, e.g., Luftman's strategic alignment assessment [1] and the architecture alignment and assessment guide of the Federal Architecture Working Group [2]. However, as they are oriented to single enterprises, they lack an inter-enterprise viewpoint that takes specific characteristics of this settings into account, e.g., that there is no single decision point. The aim of this paper is to investigate which design choices have to be made in the development of a maturity model that address this. A networked business which tries to achieve business-IT alignment will need a guide for determining the maturity of such alignment, planning future ways of action, and evolving toward a culture of process improvement excellence.

In this paper, we present a systematic overview of design choices that an extensive literature review uncovered. Filling in these design choices is our research challenge, for which we present our current position. This paper is intended to serve two purposes: first, it frames a discussion of research issues in maturity models for business-IT alignment in networked businesses. Second, it serves as a literature survey on development and validation of maturity models, from the perspective of networked businesses and business-IT alignment.

To develop an understanding of what the inter-enterprise perspective includes and how it impacts the design elements of an alignment maturity model, we need to look first at the very nature of the networked business as a phenomenon. A sound way to explain the origin of the networked business is to trace it down in terms of resource dependence [3], transaction costs [4, 5] and IT impact on organizations [6, 7]. Our position is that these theoretical frameworks provide a solid and specific foundation for extending maturity models to networked business settings. The rest of this paper is organized as follows: Sect. II provides a background on networked businesses. Section III deals with related maturity models literature. Then, in Sect. IV, we present the research challenges we identify in the development of our inter-enterprise model, and in Sect. V, we analyze possible solutions to these challenges. Finally, Sect. VI concludes the paper.

Chapter 2

Understanding Networked Businesses

We analyze the networked business concept based on the scheme shown in Fig. 2.1. The horizontal layers classify entities in a service provisioning hierarchy in the operational process of a business: physical entities provide services to a software infrastructure, which provides services to enterprise systems, which provide services to businesses. In the business layer, we take four views on businesses: businesses provide services that have a utility, they perform processes, they communicate with one another, and while doing that, they exchange data that has semantics. This framework is taken from previous research on business-IT architecture alignment by some of our co-researchers[1]. Our interest is in the upper two layers of the framework, because this is where the business services and systems alignment in networked organizations takes place. These services and their processes do not necessarily have to be carried out by one organization.

Changes in the business environment and in competition force companies to re-think the way they are doing business. More and more organizations nowadays take advantage of the next level of re-engineering approaches which capitalize on connecting and aligning one company's business and IT operations with other companies to meet important organizational goals. The origin of these

[1] For more information, refer to http://graal.ewi.utwente.nl/ and [8]

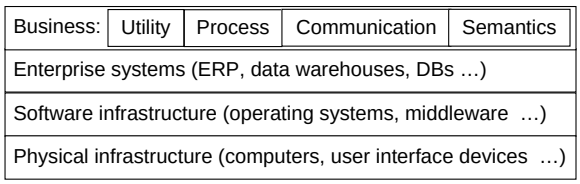

Figure 2.1: The framework for business-IT alignment.

interconnected cross-organizational business structures, called networked businesses, can be explained from three different, but related, perspectives: resource dependence, transaction cost theory and IT impact [9].

2.1 Resource dependence perspective

According to resource dependence theory, a theory formulated in the 1970's by Pfeffer and Salancik [3], organizations manage their dependence with the goal of decreasing uncertainty by creating formal cross-organizational structures that formalize their relations with other organizations. In such a condition, organizations begin to collaborate together for a common purpose.

In [10], Montoro Sánchez shows how resource dependence theory can be viewed as a perspective to explain and design a networked business. This perspective emphasizes the fact that no organization is self-sufficient; no organization is able to generate all necessary resources by itself. That is the reason why businesses need to be connected with other businesses to make trade-offs while they assure their survival.

In summary, this approach tells us that organizations must study themselves in relation to the organizations with which they want to share resources. In such a study, organizations need to give special attention to external control which they could face when their processes depend partially, or completely, on other organizations' resources.

2.2 Transaction cost perspective

An additional tool that helps to explain the existence of the networked business is transaction costs theory, initiated in 1937 by Ronald Coase [4] and developed further in the 1970's by Williamson [5]. The central claim of this theory is that the existence of transaction costs is the cause of the existence of companies.

In contrast to neoclassical economic theory [11], Coase claims that transaction costs, and not the price mechanism, determine resources allocation in organizations. He defines transaction costs as costs derived from the necessity to negotiate and to make an individual contract for each transaction. Transaction costs are the costs of searching for the right alternative, negotiating a contract for that, and monitoring and enforcing this contract.

Organizations incur transaction costs when, instead of using their own internal resources, they go out to the market for products or services. For example, in place of buying a product on the market, the buyer can decide to produce it in-house so that the buyer can save the costs of going to the market. In this case, the buyer creates a "company" (i.e., an entity, an organization) that takes care of the production of a good by using certain resources. The buyer of a product considers the alternatives of "buying" and "producing" (to buy or to make), depending in each case on the costs of each activity: buying would lead to external costs of transaction, while producing would lead to internal costs of

transaction or costs of administration within the company. The decision of buy versus make is mediated by authority, i.e., by a manager, rather than by the price mechanism.

Thus, the company is considered an alternative to the market in the coordination of the resources available in the market. It is taken into account as a system of relations that comes into existence when the coordination of resources is under the direction of a manager [12].

If we apply transaction cost theory to a networked business, the decision to participate in such a network results from comparing the transaction costs involved in joining, to the transaction costs involved in not joining and then producing in-house.

2.3 IT & business co-evolution perspective

IT impact also is a driver to consider when discussing the origin of the networked business. While the motivation of inter-enterprise relationships is the reduction of costs, IT enables the coordination necessary between the partners and the ability to control the entire network [6, 7].

We know that IT is a vital part of most organizations. Modern companies realized that putting relevant coordination support systems in place would yield more and better information more quickly. Innovative uses of IT were perceived as a source of value and, thus, started driving the formation of technology-enabled value networks, that is, value webs of business entities deploying business models that are executed online [13]. Today's networked businesses see themselves as evolutionary business entities subjected to changes due to developments both in their markets and in the coordination support technologies they deploy. Planning and cross-organizational architecture processes should help value networks change and manage the co-evolution of value, process flow and data control flow patterns in their specific cross-organizational contexts.

Our literature review helps us to identify the following phenomena that are unique to the networked business settings where business-IT alignment takes place:

1. independent companies share resources and try to decrease the resulting uncertainty,
2. cross-organizational coordination is viewed as the source to reduce costs,
3. there is a joint co-evolution of networked business and coordination support systems that enable them, and
4. business-IT alignment in networks is driven by inter-partner dependencies.

Chapter 3

Alignment Maturity Models

Maturity models have been around for almost 15 years. A maturity model is a framework that describes, for a specific area of interest, a number of levels of sophistication at which activities in this area can be carried out. The best-known maturity model is the software capability maturity model[1] (SW CMM) proposed by Carnegie Mellon University's Software Engineering Institute. This model identifies, specifically for software production, five levels of software process management sophistication. For each level, the SW CMM describes which processes need to be executed for an organization to be considered working at this level.

Generally, maturity models help organizations to assess a specific area against a norm to identify lacks of efficiency that can have a negative impact on business benefits. In the literature, several architecture alignment maturity models have been proposed, however they do not include the networked business perspective.

Luftman's strategic alignment assessment [1] presents an approach for determining an organization's business-IT alignment based on six variables, namely skills, technology scope, partnership, governance, competency measurements, as well as communications. Each of these variables is assigned five levels of alignment. The level of alignment for each individual variable is determined by the answers to some questions. Luftman's model also provides a short description of the variables at each level.

The Chief Information Officer (CIO) Council, a consortium of US Federal executive agency CIO's, developed an architecture-specific alignment and assessment guide as well [2]. This guide provides an overview of the integration of enterprise architecture within the information technology investment planning process. It is useful to determine to what degree a proposed investment aligns with business strategies, and to know how well the technology of investments aligns with the infrastructure architecture. This assessment model does not identify specific business-IT alignment variables, which disables the opportunity of improvement in organizations on some particular areas.

[1] For more information, refer to http://www.sei.cmu.edu/cmm/

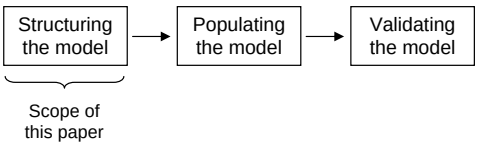

Figure 3.1: Three stages of a maturity model development.

Given the problem of aligning business and IT in inter-enterprise settings, we intend to put what we know about alignment maturity models and networked businesses into practice by developing a new maturity model to assess business-IT alignment in inter-enterprise settings. As identified in [14], the three main development stages of a maturity model are: (i) structuring the model, (ii) populating the model with key processes and (iii) validating the model (see Fig. 3.1). Currently, our maturity model is in its first stage of its development process. This stage necessitates to make some fundamental decisions concerning the design of the model and its elements. The next section gives an overview of these decisions.

Chapter 4

Research Challenges

From our review of the literature concerning maturity models (e.g. [1,2,15–18]), we have identified the decisions that should be made when designing a maturity model:

- What is the perspective, or standpoint, of the model to design?
- What is the type of the model? Is it an assessment model or a development model?
- What are the variables to include in the model?
- What is the architecture of the model? Is it a staged model or a continuous model?
- How can the levels be defined? What is going to be included in each level?
- How can the fit of the model in real life be judged? How can it be validated?

Each of these design decisions leads to a major research challenge in our project. The following subsections describe these challenges.

4.1 Standpoint of the Model

Determining the standpoint of the model means deciding the general point of view that the model will take. In a networked business, each participating organization can have a different level of business-IT alignment maturity. The maturity of each participating organization is going to influence the maturity of the alignment between business and IT of the entire network. A maturity model can take the standpoint of one participant in the network and limit itself to the maturity level of that participant, but a maturity model can also take the standpoint of the entire network.

Decisions concerning achieving, or assessing, business-IT alignment in a networked business can be made by one participating organization or by the entire network. Who the decision-maker is depends on the power relationships we can find in the inter-enterprise cooperations [19–21]. In real life, two kinds of networked businesses are conceivable. First, there are networks with asymmetric power relationships where one participating organization wields power and decides over the other participants. For example, the big players in the automotive sector, like Ford, Chrysler and General Motors, require small suppliers to adapt to the given interfaces of these car manufacturers. In this case, suppose a power-holding organization has certain (presumable higher) level of maturity. When working with other organizations, the decisions to make concerning the topics to consider reaching business-IT alignment in the network are going to be directly influenced by the experience regarding alignment of such power-holding organization.

Second, there are networks with symmetric power relationships where each participating organization has similar power in the network, so that democratic decision-making concerning the entire inter-enterprise cooperation can take place. For example, the R&D division of the multinational Sony Ericsson with offices in Sweden, Japan, China, US and UK, is responsible for coordinating and monitoring the corporate research activities aimed at bringing out new mobile services and products to the market.

In contrast with current alignment maturity models, which focus on a single company, our maturity model will provide meaningful interpretations of the assessment from the perspective of the entire networked business. We plan it as a tool to be used by both the entire networked business and one participating organization that wants to assess and/or improve the business-IT alignment of the network.

4.2 Assessment or Development Model

Various maturity models have been put forward by different organizations for different purposes since 1986 [22]. Generally, we can group them in two classes based on the key purpose these models serve when companies use them. The first category consists of normative models which serve as assessment tools – e.g. the SEI series of CMMI-compliant models. These models target certification, and help create or improve the company's image as a reliable partner. The second category includes models serving as development tools that organizations use not because they strive for certification but because they need guidance and focus in implementing best practices and key process areas that, ultimately, lead to improvements and better business results.

This distinction between maturity models as assessment tools and maturity models as development tools is a discussion topic among maturity models experts. Commonly, organizations choose a maturity model that not only enables them to determine the level at which they currently stand, but also provides them with guidance to reach a higher level of maturity. A development, i.e.,

assessment plus improvement, maturity model gives such guidance. So, we can say development maturity models seem to offer a more complete support to organizations.

Our model will be a development maturity model that will provide an in-depth business transition plan for the network including a roll up of recommendations, e.g., coordination mechanisms, implementation strategies and organizational changes. We intend to provide improvement routes for those factors that are most important for bridging the alignment gap in networked businesses.

4.3 Identification of Units

This challenge concerns identifying what variables, or units, to include in the maturity model.

Our literature review indicates that a maturity model has two dimensions[1]: the maturity levels and the areas to which these levels are applied. In our context we name those areas 'units'. They are the main topics that should be considered to help reaching business-IT alignment.

From the literature review (e.g., [1, 2, 23]), it is well-known that units such as skills, technology scope, partnership, governance, competency measurements, communications, informal organization, requirements and IT architecture help to align business and IT in single enterprises. Our challenge is to identify such units for a network business context.

Currently, based on a literature review of topics as IT processes (ITIL [24], ASL [25], BiSL [26]), governance (e.g. [27–29]), resource dependence theory [3], transaction cost theory [4, 30], multi-agent theory (e.g. [31–33]), distributed work, networks and teams (e.g. [34–38]), we have a proposal concerning the units to be included in the model (see Fig. 4.1). These units address the current scope of our model, and are the following:

- Enterprise architecture
- IT governance
- Workflow structure
- IT/business processes
- Coordination

There are several approaches that can help us to support our decision on including those units in our model. Some of them are discussed in the next paragraphs.

[1] Take for example CMMI [15]. In CMMI the first dimension consists of five levels: initial, managed, defined, quantitatively managed, and optimizing; and the second dimension distinguishes four aspects: process management, project management, engineering, and support.

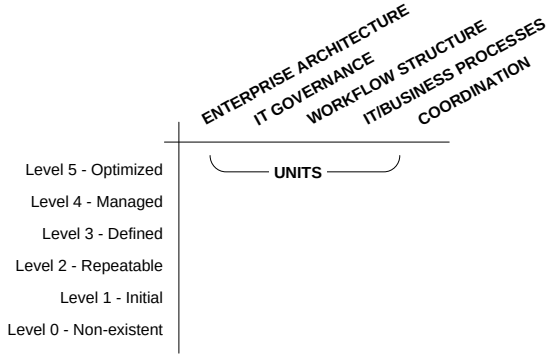

Figure 4.1: The maturity model's possible units.

Van der Raadt et al. explore in [39] the relation between business-IT alignment and architecture maturity models. They argue that (i) architecture maturity models see business-IT alignment as a unit of the models and that (ii) alignment models see architecture as variable within the models. We agree with these authors on the hypothesis that when architecture maturity increases, alignment generally improves as well. We also found evidence that without architecture there is no way to reach business-IT alignment [40]. For that reason *enterprise architecture* is the first unit of our model.

There are several definitions of *enterprise architecture* from different perspectives (e.g. [41–43]) but for the purpose of our model we borrow Zarvic's definition: *"an enterprise architecture is the structure of an enterprise, consisting of the relationships amog its ICT systems, the external properties of those ICT systems, and the way these create emergent properties with added value for the enterprise."* [44, p. 263]

Supposing a networked business is successful in developing an *enterprise architecture*, it will open up different areas to analysis (e.g., IT infrastructure, IT applications) and it will be a critical data source. With such data, *enterprise architecture* can help organizations to address *IT governance* by better (i) planning of IT development and (ii) understanding of the value of technology investments [27].

This motivated us to select *IT governance* as our second unit. *"IT governance is the ... leadership, organizational structures and processes that ensure that the enterprise's IT sustains and extends the organisation's strategies and objectives."* [27, p. 5] We chose this because (i) we agree with Luftman [1] and Henderson et al. [45] on thinking that governance is a valuable mechanism to facilitate business-IT alignment, (ii) *IT governance* can help the networked business to control the implementation of IT (i.e., planning, selecting and prioritizing IT projects, assuming ownership of IT, controlling budgets and IT investments, managing IT compliance) to achieve competitive advantage and support the business strategies while allowing cost-effective deployment of IT [27], and (iii)

governance also specifies the allocation of decision rights, i.e., roles and responsibilities, to implement the goals and strategies in organizations [45].

We have already said that in inter-enterprise settings, there is usually no single decision point. In such settings is important to establish 'who' is going to be responsible for 'what'. That is what we name *workflow structure* (how work gets done and who is involved). For example, in a large multinational, each of its subsidiaries in each country has its own IT department that is going to make 'internal' decisions. However, the multinational also has a corporate IT group responsible for general decisions concerning topics related to the whole organization, e.g., corporate-wide IT projects. This way of running operations is common and therefore easy to understand in well-established mature organizations. That is, however, not the case when organizations begin to collaborate with other organizations as a networked business. In this case, the definition of goals, ownership and the how the IT processes are distributed among the participating organizations are important topics to be considered in the process of setting up the networked business.

The next unit in the model is precisely *IT/business processes*. In a networked business context, participating organizations need to integrate their processes when they have to define and manage their networked processes for reaching the goals and for exchanging information. Such integration is a major issue in the management of a networked business [46]. The successful achievement of the goals depends on the ability to align both IT processes and business processes among participating organizations supporting a better alignment of business and IT.

In a situation where independent participants of a networked business need to work together, they necessarily need to coordinate their activities to manage dependencies [47]. So, *coordination* is unavoidable [46, 48]. We acknowledge the fact that cross-organizational coordination is a very subtle characteristic of a networked business and we include *coordination* as our fifth unit in our maturity model. This decision rests on the following observations we did in our literature review:

1. proper coordination mechanisms led by IT reduce costs and improve productivity and control [7] – situations that are limited by transaction cost theory [4].

2. networked businesses are enabled by a variety of coordination mechanisms and the choice of a mechanism depends on what partners share in a network and how they share it [48, 49].

3. communication through coordination among partners is found essential to face transaction costs complications and the lack of balance in available information in the network [21] – situations that primarily come through Williamson's two fundamental hypotheses related to the behavior of partner organizations in inter-enterprise settings [30, 50]: limited rationality (i.e., minimization of transaction cost taking into account the search for

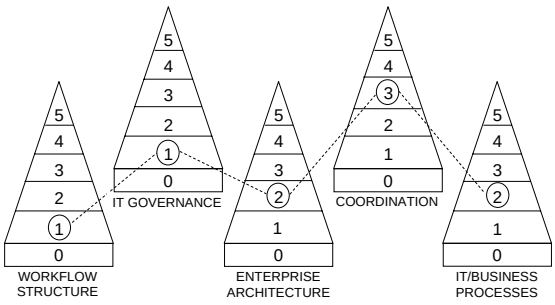

Figure 4.2: The pyramid structure of the model.

an appropriate market price and the process of negotiate a contract) and opportunistic behavior.

4.4 Staged or Continuous Maturity Model

We borrow from CMMI [15] the terms 'staged' and 'continuous'. They refer to the two representations that a maturity model may have. In the staged representation, the key areas are organized by maturity levels. Each level is a layer for continuous process improvement using a predefined improvement sequence. It is like a prescription that shows what to do and the exact order to do it. The staged representation is used to assess the organizational maturity and it is focused on the levels of the model. For instance, before reaching level 3, an organization needs to achieve successfully what is mentioned in level 2 for all the key areas included in the model.

In the continuous representation, the levels are used to describe a sequential order for approaching improvement within each key area. It allows selection of the order of improvement that best meets the objectives of organizations. This representation is used to appraise the key areas and gives more flexibility to the organizations to choose areas to focus on. It is a prescription but it does not have a strict order to follow.

Both representations provide essentially the same content and use the same model components but are organized in different ways.

In inter-enterprise settings, our model will be a continuous maturity model. We find this representation more suitable because a networked business can have different levels of maturity in each of the units included in the model (see Fig. 4.2). A continuous model will let the network focus, for instance, on the units with a low level of maturity. Those units that are associated with higher maturity can, then, be candidates for inclusion in later improvements efforts.

To illustrate this, imagine the management of an organization wants to improve (i) how the organization controls IT implementation and (ii) the allocation of decision rights and responsibilities, i.e., IT governance and workflow structure in our model. The organization is satisfied with how the organization's other

areas are developed, i.e., enterprise architecture, IT/business processes and coordination, and so decides to focus on the IT governance and workflow structure units. With our continuous maturity model, this organization will concentrate on only those units trying to improve its IT governance and workflow structure to reach a higher level of maturity on those areas. So, if the organization successfully achieves what is described in level 3 for those units (suppose it had level 1 in both units), it could be said that the organization is at level 3 in IT governance and workflow structure; and maybe the organization still have lower levels of maturity in other units, or otherwise.

A continuous inter-enterprise business-IT alignment maturity model will help to: a) have a more granular assessment for each unit, and b) identify a specific practice across the maturity levels to find its path from a low to a higher level of maturity.

4.5 Decisions Concerning the Levels

Once decisions on units are made, the next key decision is about what to include as best practices characterizing those units. This challenge is threefold: we need to define (i) the number of dimensions or process areas at several discrete levels of maturity (typically five or six) and their qualifiers, (ii) the levels of maturity of each of the units, i.e., what is going to be 'level 1', 'level 2', ..., 'level 5', and (iii) why we decide to do it in such a way. To the best of our knowledge, the literature on maturity models does not explain how the decisions about what to include in each level were made. Building maturity models is not a topic that is widely covered in the literature [51, 52]. Instead, the maturity model literature just presents the resulting models and does not discuss the model developing process itself.

To maintain adherence to the CMMI maturity model, which is well-known all over the world, and after deciding that our model will be a continuous maturity model, we propose six levels be included. These can be characterized as it is showed in Table 4.1.

We will also need to identify what is a good and a not so good practice for each of the units to determine their maturity levels. For example, for the unit enterprise architecture, we need to identify what is the best way to structure the relationships among IT systems so that these create value for the entire networked business and business-IT alignment is achieved. With this in mind, we can begin to think about what the attributes and key process areas are that will relate to specific aspects of the enterprise architecture best practices we found. The most basic practices are, then, going to be located at lower levels, whereas the most advanced ones will be included in higher levels of maturity.

In our model, higher maturity will be a guarantee for smooth operations running in a network, but cannot be a guarantee that the value proposition of the network will be 100% profitable, or of excellent quality.

4.6 Validation

Before using our model, we need to validate it. Questions arise as to how we can judge the fit of the maturity model in real-life inter-enterprise settings, and how we will know that the model we propose is valid and even what validity comprises.

Validation is the biggest challenge in our research since, with very few exceptions, existing literature offers almost no advice on how to empirically validate a maturity model. Based on recommendations by researchers in empirical software engineering evaluation [53], we must provide evidence that the model is in fact useful, that is, to investigate it by empirical means in order to understand it, to evaluate it, and to deploy it in proper contexts. In the next section we will provide more information concerning this validation aspect.

Table 4.1: The levels of our inter-enterprise IT alignment maturity model

Level	**Level name**	**Short description**
0	Non-existent	The processes, which are related to a specific unit are not performed. The unit does not exist in the company.
1	Initial	The basic part of all the processes is well performed.
2	Repeatable	The processes are managed in a repeatable manner.
3	Defined	The processes are defined, and consistent, across all the organization.
4	Managed	The unit's processes are quantitatively managed, e.g., processes performance is measured and goals are known.
5	Optimized	The processes are optimized by continuous correction of common causes of problems.

Chapter 5

Solution directions

In this section, we analyse ideas about possible solutions to three of the research challenges we identified in the development of our model, namely the identification of units, the decisions concerning the levels and the validation of the model. Solving the first two of these three research challenges amounts to finding how the content of the model can be validated. If the model contains all the main topics to help reaching business-IT alignment in inter-enterprise settings, or a good representative sample of them, then content validity is achieved [54]. How we will validate the model and its content is explained in the following subsections.

5.1 Identification of units

For the identification of the units to include in the maturity model we synthesized and integrated information obtained from our literature review. Figure 4.1 shows our first proposal concerning these units. While published information was a valuable resource to define the first proposal of units, it is seldomly more than a fraction of the existing knowledge about an specific topic that is put into writing. Thus, we will look for information from professionals experienced in the areas related to the identified units by conducting surveys and focus groups sessions. The basic idea of such surveys is to present the units of the maturity model to the experts and to get their opinions and suggestions to validate the units and, if it is strictly necessary, to change or add units creating new hypothesis concerning them [54].

5.2 Decisions concerning the levels

Holistic multiple-case studies [55] will help us to recognize the best practices of each of the identified units to define their levels of maturity. We also intend to follow the steps of Ramasubbu et al. [56], i.e., in-depth interviews and review sessions with experts, to validate the levels. We will present to the experts

the units and levels identified in a random list to ask them to rank and order the levels's definitions along a maturity path that will need to match with the presented units. We then can compare our model with the experts' opinions.

5.3 Validation

Typically, validating a maturity model by means of a comparison with another model is considered a difficult task, as there is no reference model in practice. Therefore, we plan to evaluate our maturity model against its purpose. Based on advice of schools-of-thought in case study research [53], we consider two types of validity concerns be included in assessing the fit of our maturity model in real-life inter-enterprise settings: external and internal validity concerns. The threat to external validity means that the assumptions or the components of our maturity model may not be representative for all cross-organizational business-IT alignment projects. When carrying out our validation case studies, we will consider those context factors under which our model is suitable for use and the ones under which it is not.

Furthermore, we consider as the internal validity threat to our maturity model, the risk that while the application of the model brings meaningful results, this might be due to factors that we are unaware of and over which we do not have any control. To ensure internal validity, we plan to make sure that all case studies we carry out share some commonalities – for example, in terms of context factors, business-IT alignment goals, roles and key performance indicators.

There are more approaches useful to validate maturity models. For instance, the empirical validation method used by Beecham et al. to validate their requirements capability maturity model: expert panels [14]. After reaching a model development mature stage, we will need some independent feedback to know how well our model meets its purpose and our objectives. Following the steps of Beecham et al., we rest on (i) our objectives for building the model, (ii) the units and (iii) the components of the model to define a list of criteria useful to design a questionnaire. This questionnaire should be completed by the experts and, with the obtained results, we can identify how these results might affect our objectives in order to decide to re-engineer our model.

Industrial trials can also be performed to validate and improve our maturity model [17]. Sponsorship from organizations would be necessary in order to use a prototype of the model to appraise the maturity of their business-IT alignment. After the assessment, we can ask to the appraised organizations how they perceive the assessment process, the model, and the results. With such information, we can produce improved new versions of the maturity model.

Chapter 6

Conclusion

In this paper, we have presented the research challenges we identified in the development of our inter-enterprise alignment maturity model. These research challenges have been grouped in six categories: the definition of the model's standpoint, the specification of the model's type – i.e., assessment versus development model, the identification of the units, the determination of the model's architecture – i.e., staged versus continuous model, the definition of the maturity levels, and the validation. We have also presented our current solutions to these challenges. Among all our challenges, we have argued that the core challenge of our research is the identification of units to be included in the model. It should be noted that the units proposed in this paper are just a first proposal and such units need to be validated in order to refine the model.

Directions for future work will include the following: first, we intend to conduct surveys and focus groups sessions with experts to finalize the identification of the model's units. Second, we plan to carry out multiple case studies in Dutch companies to identify the best practices for each of the units to define the maturity levels. We also plan to conduct in-depth interviews and review sessions to validate these levels. Third, we will validate the model by conducting case studies considering context factors under which our maturity model is suitable for use and the ones under which it is not. Finally, and following the structure of most maturity models, we will design questionnaires that will function as tools to determine the levels of maturity for each business-IT alignment unit of the model.

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