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# A comprehensive information model for business change projects

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## ABSTRACT

Enterprises act in an economic and social environment characterized by frequent changes. Due to this, for many enterprises the efficient and effective management of change projects is key factor for staying competitive. The resulting need for changes and the development of corresponding strategic, organizational or IT characteristics is a very complex task and depends very much on the ability mapping the information systems (IS), which is a socio-technical system, on the real world state of adaption. Therefore we introduce a meta model for enterprise modeling that extends existing approaches by proposing not only a set of entities describing the strategic and organizational fit as well as the IT fit but also relevant components to express the overall fit with the cultural and emotional characteristics of an IS. Helping designers of IS to comprehend the complex relations between the elements that need to be aligned we follow design science research.

## Keywords

Alignment, change management, corporate culture, meta model, enterprise architecture,

## INTRODUCTION

The process of business/IT alignment is still one of the main reasons for initiating change in enterprises (Baskerville and Myers, 2002). However, a current study by Jørgesen, Owen and Neuss, (2008) emphasizes the fact that even though business/IT alignment is no longer “nice to have” but a “must have” (Gartner, 2006) still only 41% of the analyzed projects are described as successful. The main challenge to overcome was pointed out as being twofold: On the one hand, the development and implementation of the required changes with respect to the existing organizational structures were very challenging, because they often involve more or less the whole organization. On the other hand, the effects of the intended change on the employees, was difficult to handle. For 58% of the asked managers the change of people’s attitudes and mindsets was denoted as the greatest challenge. Furthermore, the adaption of the present culture (49%) as well as the right estimation of the project complexity (35%) were pointed out as main difficulties. To solve these problems, we assume that a systematic approach for driving the change projects stemming from the alignment process is needed (Baumöel, 2010). This approach has to serve two purposes: First, it supports the systematic analysis and documentation, and second, with that, it enables the communication throughout the whole organization. As a consequence, the approach has to be based on a comprehensive information model, which offers a holistic understanding of the required changes and measures to reach the alignment goal. The model has to go beyond the mere focus on technical processes or organizational structures; in addition the possibility to discuss and interpret the reactions of the people and their underlying beliefs has to be made possible.

Although there are already quite a few information models which aim at catalyzing change processes, there are no really comprehensive ones which fill the white spaces between organizational structures, technology and corporate culture. Popular types of information models are enterprise architectures (EA) (Buchanan and Soley, 2002). They promote alignment by postulating strategy and process changes to the software and infrastructure level, by supporting reliable business transformation enabled by technology innovations, and by decoupling business-oriented and technology-oriented architectures (Fischer, Aier and Winter, 2007). Moreover companies have to coordinate strategic positioning, organizational structures, business processes, and information technology (IT) on the one hand and the company’s people and their commitment towards these different levels of alignment on the other hand. The most critical success factors of aligning are the readiness and motivation of the business and the IT professionals and their true commitment towards the new ways of doing things (Baumöel, 2010). Because of that, the modeling of cultural and emotional issues of alignment is as important as the coordination of business and IT structures and processes.

As a consequence the different approaches of EA have to support the coordination tasks between business and IT plus its people by offering a holistic perspective of current as well as to-be organizational structures. Existing approaches of EA, like the ARIS Business Process Framework (Scheer, 1999), the Semantic Object Model (SOM) (Ferstl and Sinz, 1997), the MEMO Conceptual Framework and Modeling Languages (Frank, 2002) and, the EA based on the BAI Method (Braun and Winter, 2005) often focus only on business and technical aspects. The influence from a cultural and behavioral perspective is still largely missing. Important questions from this perspective are: Who is involved in the alignment process and what are the perceptions of business or IT people? What motivation does lead people to fulfill certain alignment activities? In order to answer these questions, the EA has to describe the fundamental structure of an enterprise by containing a hierarchy of design layers in order to represent the different strategic, organizational, IT and behavioral views on an enterprise. As current approaches do not consider the cultural and emotional design layer, there is need for research. Moreover, most of the multi-layer approaches are very abstract and do not offer a consistent and comprehensive meta model to specify the consistency of the different architecture artifacts and their connection on and across the different layers (Braun and Winter, 2005). To align all layers an EA has to be able to offer sufficient information to identify inconsistencies between strategic goals, business process specifications, software or hardware solutions and people's qualifications, needs, and behavior. As a result, an appropriate model has to fill these white spaces by offering suitable information about the connections between the different EA layers and their artifacts.

The goal of this research paper is to fill these gaps by constructing a specific type of information model, i.e. a meta model for an EA which integrates cultural and emotional as well as behavioral aspects to improve alignment and furthermore connects them to other architecture artifacts. The research process is based on the design science approach suggested by March and Smith (1995) and Hevner, March, Park, and Ram (2004). In order to come to a rigorous and relevant research result and to describe the construction process of the meta model in a transparent and observable way, we refer to the specific design science process of Peffers, Tuunanen, Gengler, Rossi, Hui, Virtanen, and Bragge (2008) and finally evaluate our constructed artifact by case study research.

## STATE OF THE ART

Based on the decision theory of behavioral science (Barnard, 1938; Simon, 1976), we assume that successful change is a function of people's decision behavior. All relevant decisions and corresponding activities are taken and executed by people and therefore influenced by their personality as well as their skills (Agboola and Salawu, 2011). Building upon this we believe that all people who are involved in change processes are characterized by bounded rationality and a limited information processing capacity (Simon, 1976). The decisions and actions to change therefore depend on the one hand on personal interests and needs and on the other hand on the respective characteristics of organizational structures as well as corporate culture (Aiken and Scott 2009). The required addition to common EAs is therefore the modeling of corporate culture, emotions as well as behavioral aspects.

To use EA for successful communication and documentation, the semantic rigor between the different components of an EA has to be secured. In fact, this is accomplished by providing a meta model of the EA. The meta model offers an overall consistency by properly modeling the valid entities and their connections with the intention that all components based on it are coherent. In this paper meta models are defined as core concepts of EA (Saat, Franke, Lagerstroem and Ekstedt, 2010), which describe the fundamental artifacts of business, IT, and its people as well as the relationships between each other and consequently guarantee interoperability, and traceability (Franke, Ullberg, Sommetad, Lagerstroem and Johnson, 2009). We assume that for each EA layer a fundamental artifact, the so called core artifact, can be defined (Fischer et al. 2007). In addition, a core artifact consists of several entities and its connections between each other, which describe the core artifact in detail. The following analysis is based on the core artifacts "Strategic specification", "Organization specification", "Process specification" and "IT specification", which are used to represent the relevant information of the strategic, organizational, process as well as IT layer of an EA (Fischer et al., 2007).

Table 1 presents the results of the meta model analysis of ARIS (Scheer, 1999), SOM (Ferstl and Sinz, 1997), MEMO (Frank, 2002) and, the EA based on the BAI Method (Braun and Winter 2005). The selection criteria for these four approaches are based on Leist (2006). First, all chosen approaches offer different types of layers to represent business and technical aspects of an enterprise. Second, all approaches possess a high publicity in practice and research. Furthermore they are characterized by a high practical use. Third, the literature offered on each approach is easy to access and substantial, so that an equal start for a valid analysis can be found. The results show that all approaches contain different EA layers that can be summarized in four types of layers. Although, not all approaches explicitly point out a strategy or organizational layer, they introduce entities like "strategy" or "organizational unit" which describe the strategic positioning as well as the organizational structure of an enterprise. Further analysis shows that most of the examined EA do not propose a comprehensive meta model. While some EA, like the EA based on the BAI Method present a nearly comprehensive meta

model, some others like ARIS, SOM, and MEMO have shortcomings with respect to this. All EA have two main shortcomings in common. Firstly, none of their meta models offers a comprehensive overview about the connections between the different entities representing the core artifacts on the different layers of the EA. Moreover, a cultural and emotional layer representing behavior is missing in each of the existing approaches.

<i>EA layer</i>	<i>Core artifacts</i>	<i>Entities</i>	<i>ARIS</i>	<i>SOM</i>	<i>MEMO</i>	<i>EA based on BAI</i>
Strategy layer	<b>Strategic specification</b>	<b>Customer segment</b>	Customer group	Management object	Customer	Customer segment
		<b>Value configuration</b>	Supply chain	-	Supply chain	Value network
		<b>Service specification</b>	Supply chain function	-	Activity group	Service specification
		<b>Strategy</b>	-	-	Strategy	Strategy
Organization layer	<b>Organization specification</b>	<b>Organizational unit</b>	Organizational unit	Operational object	Organizational unit	Organizational unit
		<b>Organizational structure</b>	Organizational structure	-	Formal principle	-
		<b>Position</b>	Position	Operational object	Position	Position
		<b>Business role</b>	Business role	Task manager	Organizational role	Role
Business process layer	<b>Process specification</b>	<b>Activity</b>	Function	Task	Task	Activity
		<b>Output</b>	Output	Management object	-	-
		<b>Process</b>	Process	Transformation task	Process of task fulfillment	Process
IT layer	<b>IT specification</b>	<b>Application</b>	-	-	-	Application
		<b>Software</b>	-	-	-	Software
		<b>Hardware</b>	-	-	Hardware	Hardware
		<b>Data object</b>	Macro-Data object	Object	-	Data object

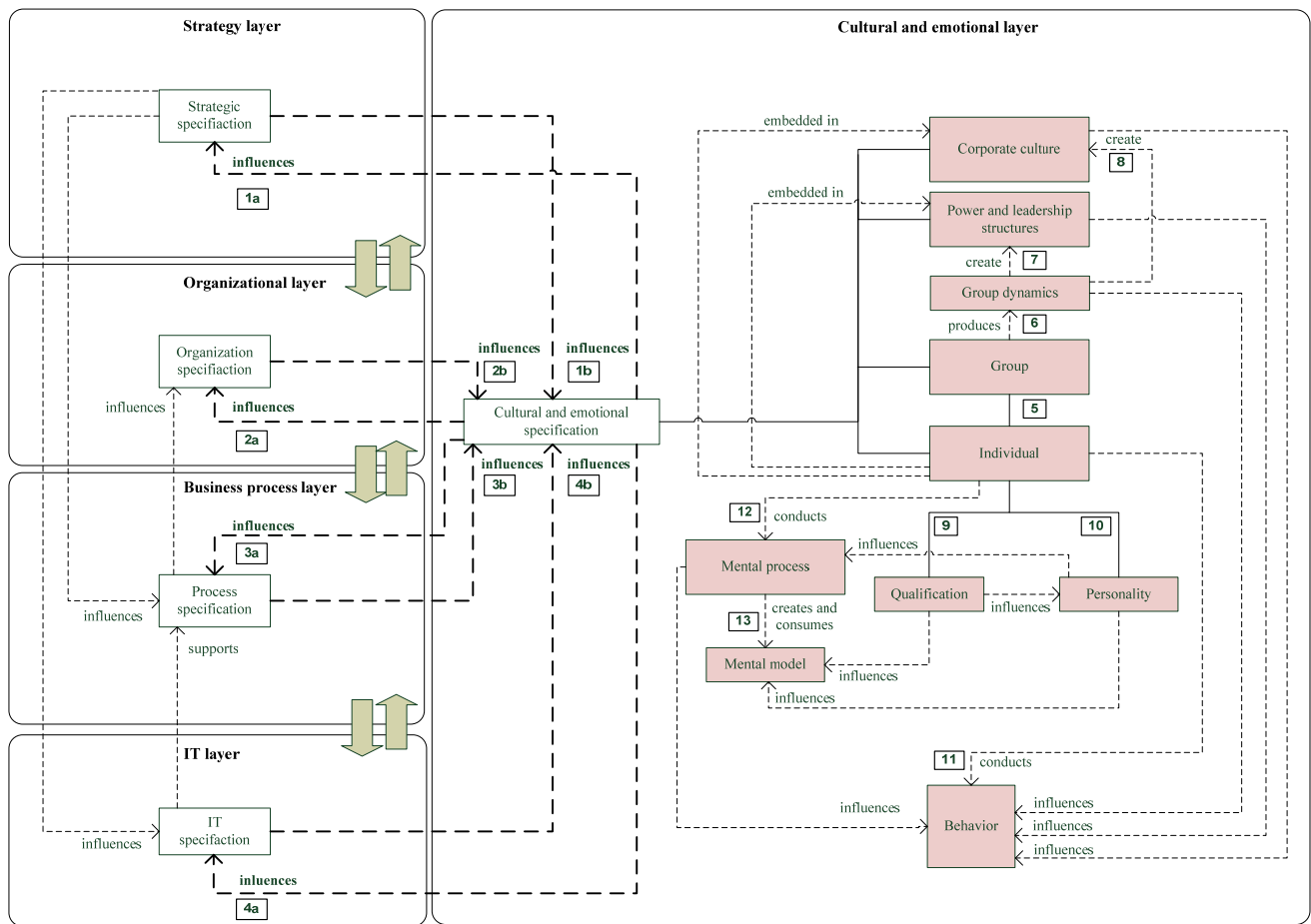
**Table 1. Core artifacts and entities from meta models of EA approaches**

Table 1 shows in the second and third column the extracted core artifacts and its corresponding entities which are used as starting point for a solution in the construction of the advanced meta model in the following sections have been highlighted.

### **DESIGN AND DEVELOPMENT: COMPREHENSIVE META MODEL OF EA**

In this section, we briefly present the design of the comprehensive meta model. The main goal is to address the specific requirements of the needed cultural and emotional alignment. In a first step the relationships between the core artifacts of the meta model are presented. As a second step, the newly constructed meta model for the cultural and emotional layer is explained. To represent the models graphically, the Unified Modeling Language (UML) is used (Eriksson and Penker, 2000). The main components of the meta models are rectangles; white ones represent core artifacts and grey ones specify entities. A solid line between two rectangles depicts an aggregation relationship like “is-part-of” finally a dashed line with a tip represents an association relationship between two objects like e.g. “influences” or “uses”.

In the following Figure 1, the added relationships between the core artifact “cultural and emotional specification” and the original core artifacts are graphically illustrated in the left box. The cultural and emotional specification directly influences the characteristics of all other core artifacts and vice-versa (1a, 1b, 2a, 2b, 3a, 3b, 4a, 4b). All changes that are made on the different layers to align business and IT must be harmonized regarding the behavior and attitudes of the people as well as the overall culture of the enterprise (Leavitt and Bahrami 1988). Moreover, the relationships between the different core artifacts on the strategy, organizational, business process as well as the IT layer are often interdependent. This effect is graphically illustrated by the relationships between these core artifacts.



**Figure 1. Comprehensive meta model of EA with entities on the cultural and emotional layer**

Based on the analysis of the state of the art we extended the existing model of core artifacts (Fischer et al., 2007) with the core artifact “cultural and emotional specification”. The diamond model of the organization (Leavitt and Bahrami 1988) is used as primary construct and conceptual base of the advanced EA model. It does not only represent a strategic and organizational as well as IT view on the structures of the IS, but also offers a cultural and emotional view by characterizing the organizational culture and people’s behavior. The comprehensive meta model provides a holistic understanding of the change project and thereby expands the focus on strategy, processes, and IT by filling the white spaces between them.

In summary, we propose the following set of core artifacts and entities:

Strategic specification:

We imply that the strategic specification and the cultural and emotional specification influence one another (1a and 1b). According to Leavitt and Bahrami (1988), a change of the strategic market position or a merger with a competitor influences people’s attitude and behavior.

Process specification:

The process specification is influenced by all core artifacts except for the core artifact “organization specification”. The most important interdependency is illustrated by the relationships numbered 3a and 3b. According to this relationship, the process structure and the cultural and emotional specifications of an enterprise have to be harmonized (Leavitt and Bahrami, 1988). The alignment of business processes leads e.g. to the need for qualified people who make change happen successfully. Moreover, the overall culture of business and IT people could lead to a change of the business process structure. An increasing attendance to communicate and a growing interdivisional cooperation between IT and business people can e.g. require changes of the current processes.

IT specification:

The software, hardware, and application objects have to be harmonized with respect to the different people using them (4a and 4b). Especially, the information-processing techniques of people are influenced by the characteristics of IT. The decision processes of people have to be supported via suitable applications. Moreover, adaptation of the IT can require new skills.

Organization specification:

The characteristics of the core artifacts “process specification” and “cultural and emotional specification” are the basis for the design of the “organization specification”. The design of this core artifact has to assure a double fit (Lorsch, 1973). On the one hand, the characteristics of the organization specification e.g. business units have to support the value creation on the process layer. On the other hand, the requirements of the business as well as the IT professionals should be met by the design of this artifact (2a and 2b).

Cultural and emotional specification:

The general design goal of the core artifact “emotional and cultural specification” is modeling the organizational culture and people’s attitudes, with respect to the positioning of enterprise in business as a well as IT.

In fact, the definition of the layers described before, are highly dependent on the way the cultural and emotional layer is defined. The topics addressed here deal with the experience and the skills required in change projects as well as leadership aspects and acceptance of change. Questions, such as “How can the specification of the artifacts on this layer help to design measures, to make sure that people proactively drive and accept the change process?”, “What cultural and behavioral structures and processes have to be established, to make sure that culture becomes an enabler and not an inhibitor of change processes?”, “What qualification and motivation is needed to make sure that the change processes take place in the most effective and efficient manner” are addressed. The design of this layer is based on the theories and concepts of decision theory of behavioral science, the human relation theories and organizational psychology. In Table 2, choice and arrangement of the different entities composing the core artifact “cultural and emotional specification” are explained in detail by describing the theories and concepts which were used as a construction base. Moreover, some important relationships between the entities of the cultural and emotional layer are explained and numbered.

Entities	Meaning	Construction base
<b>Individual</b>	Individuals in enterprises act as high performers, deciders and possessors of needs. Their main aim is to influence and execute the alignment of all relevant processes and structures in an enterprise.	Organizational theory
		<i>Hill, Fehlbaum, Ulrich, 1994</i>
<b>Group</b>	A group is an aggregation of three or more individuals who are interlinked via several relationships of interaction and have a common duty to fulfill (5).	Organizational theory
		<i>Barsade, 2002</i>
<b>Group dynamics</b>	Group dynamics is an auxiliary construct, which represents the behavior of individuals in groups (6).	Organizational theory, Organizational psychology
		<i>Barsade, 2002; Schein 1980</i>
<b>Power and leadership structures</b>	Power and leadership structures e.g. are power centers and relationship networks, which are constructed through group processes and occur out of self-determined action of individuals (7).	Change Management, Organizational theory
		<i>Baumoel, 2010; Hill et al., 1994</i>
<b>Corporate culture</b>	The corporate culture contains the attitudes, experiences, and values of an enterprise and its people. We assume that the corporate culture partly is defined by the chosen strategy but mainly generated by the people and their interactions (8).	Organizational psychology
		<i>Schein 1980</i>
<b>Qualification</b>	A qualification is defined as a capacity, knowledge, or skill that people possess to fulfill their organizational tasks (9).	Organizational management
		<i>Ellstroem, 1997</i>
<b>Personality</b>	The personality is the sum of attitudes, beliefs and opinions or values which characterize an individual in an enterprise and influence its behavior (10).	Organizational theory, Organizational psychology
		<i>Hill et al., 1994; Leavitt and Bahrani, 1988</i>
<b>Behavior</b>	This entity represents several relevant types of behavior which are executed in an enterprise by the people to fulfill the necessary activities of value creating (11).	Organizational theory, Organizational psychology
		<i>Hill et al., 1994; Leavitt and Bahrani, 1988; Weick 1979</i>

<b>Mental process</b>	A mental process describes the cognitive process which is activated by a stimulus and leads to a specific behavior of the individual (12).	Organizational psychology
		<i>Hill et al., 1994; Weick 1979</i>
<b>Mental model</b>	A mental model is a representation of the understanding of human knowledge about the world (13).	Organizational psychology
		<i>Mathieu, Hefner, Goodwin, Salas, and Cannon-Bowers, 2000; Weick 1979</i>

**Table 2. Meta model entities of the cultural and emotional layer**

## EVALUATION USING CASE STUDY RESEARCH

The main aim of the explanatory case studies (Yin, 2009) was to provide a first validation of the developed meta model in practice. Because of that, the goal of the case study was not to test or develop new theories (Eisenhardt, 1989) but to describe and investigate a complex research area with regard to change projects in the field of business/IT alignment.

### Case study design and sampling

In the study, six different change projects were examined with respect to their planning, specification, and implementation. This enhances the analytical potential of the research and generalizability of findings, because only by multi case studies cross-case comparisons are possible (Benbasat, 1985). Between June and August 2010, we interviewed six project managers using semi-structured interviews. Our selected cases were heterogeneous in enterprise type and size, industry sector and scope as well as type and size of the change project. This produced a broad variety of aspects and topics which had to be dealt with. The average interviewee had approximately fifteen years of working experience and almost five years of working experience in planning and implementing alignment projects in the case enterprise.

The interview itself was split into three sections. In the first section, general information about the interview partner and the change project was gathered. The second section was composed of questions regarding the main challenges and difficulties with respect to the specification as well as the implementation phase. In the third section we asked the interviewees to give us information about the concepts used to specify the consequences of the project and to plan its implementation. We mainly asked about suitable specifications to document and communicate the consequences of the project on the strategic, organizational, IT as well as cultural and emotional layers of the enterprise. To simplify the analysis, we introduced a generic two phase project model consisting of the phases, (a) project specification and (b) project implementation.

### Results

The following table 3 gives an overview of the case studies. Before consolidating the results in a cross-enterprise comparison, we analyzed the data recorded during each interview. After that we had the results checked by the interviewee for correctness of data.

All six change projects were focused on change with respect to strategy and organizational structure. None of the cases contained a project, which was based on "IT adaption". Four of the six interviewees described their projects as business process adaption. Although the projects had some differences with respect to project type and set-up, they all had in common that the change initiative in the end touched all layers of the enterprise. The interviewees used well-known and structured instruments (e.g. strategy maps, business process maps) to describe the basics of the change project in the more "technical" layers. However, for the description and analysis of the cultural and emotional aspects no formal instruments were used. Instead they rather chose a more or less unstructured and "free-style" way to deal with the effects of change. As a consequence, the interviewees stated that they did not have a suitable set of instruments to comprehensively describe the change project and its effects on the entire enterprise.

Criteria	Case 1:	Case 2:	Case 3:	Case 4:	Case 5:	Case 6:
Industry sector	Financial services	Logistics services	Aerospace industry	Insurance industry	Mechanical engineering	Consulting
Cause of change	Financial crisis	Improving effectiveness and efficiency			Strategic repositioning	Improving effectiveness and efficiency

Focus of the change	<i>Changes of:</i> <input checked="" type="checkbox"/> Strategic positioning <input checked="" type="checkbox"/> Organizational structure <input type="checkbox"/> Business process <input type="checkbox"/> IT	<i>Changes of:</i> <input checked="" type="checkbox"/> Strategic positioning <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input type="checkbox"/> IT	<i>Changes of:</i> <input checked="" type="checkbox"/> Strategic positioning <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input type="checkbox"/> IT			
	Changes had a direct or indirect impact on all layers of the enterprise					
Concepts used to specify the project	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input type="checkbox"/> Culture <input type="checkbox"/> Behavior <input checked="" type="checkbox"/> Qualification <input type="checkbox"/> Personality	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input checked="" type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input type="checkbox"/> Culture <input type="checkbox"/> Behavior <input type="checkbox"/> Qualification <input type="checkbox"/> Personality	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input checked="" type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input type="checkbox"/> Culture <input checked="" type="checkbox"/> Behavior <input checked="" type="checkbox"/> Qualification <input type="checkbox"/> Personality	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input checked="" type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input checked="" type="checkbox"/> Culture <input checked="" type="checkbox"/> Behavior <input type="checkbox"/> Qualification <input type="checkbox"/> Personality	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input checked="" type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input checked="" type="checkbox"/> Culture <input checked="" type="checkbox"/> Behavior <input type="checkbox"/> Qualification <input type="checkbox"/> Personality	<input checked="" type="checkbox"/> Strategy <input checked="" type="checkbox"/> Organizational structure <input checked="" type="checkbox"/> Business process <input checked="" type="checkbox"/> IT <input type="checkbox"/> Culture and emotions <input checked="" type="checkbox"/> Culture <input checked="" type="checkbox"/> Behavior <input type="checkbox"/> Qualification <input type="checkbox"/> Personality
Difficulty in project specification	Identification and development of change activities to identify suitable measures to make the involved people support the changes;		Lack of a comprehensive specification concept;	Identification and development of change activities to identify suitable measures to make the involved people support the changes;		Lack of a comprehensive specification concept;
Difficulty in project implementation	Insufficient sustainability					
	Coordination of the different change processes; Time lags Missing employees' enthusiasm;	Time lags Missing employees' enthusiasm;	Problems to manage and coordinate the involved people;	Coordination of the different change processes;	Coordination and motivation of employees	Time lags Missing employees' enthusiasm;

**Table 3. Consolidated results of the case study analysis**

## Discussion

The interviews clearly showed that the main problems of change are still rooted in the lack of an understanding of the cultural and emotional aspects. In four of the six cases the main challenges were a comprehensive understanding of the reaction of people and the right measures to overcome resistance and doubts. Although the entities used to describe the more technical layers of the EA were very similar to the ones proposed in our meta model, it became clear, that they need to be connected so that the overall effects of change activities can clearly be established. These results and the discussion of our approach with the change managers supported our two main suggestions for improving the models used to describe and drive change projects: (1) All entities used to describe the change project need to be connected to each other so that the interdependencies become clear. (2) There is a need for structured entities to describe the cultural and emotional aspects of change, and they also have to be connected to the other entities so that the interdependencies become clear. Only then a comprehensive understanding and managing of change becomes possible.

## CONCLUSION

Models and methods for managing change are widely available. Nonetheless, change projects are still not as successful as intended. We argued that the reason for this can be found in the still missing systematic and structured integration of the cultural and emotional aspects of change in the available models. Moreover, the entities used for describing the effects of change on the different layers of an EA are mostly not connected to each other so that the interdependencies do not become



clear. The information provided by the integration of cultural and emotional aspects and connecting all entities of an EA are obviously crucial for successfully managing a change project.

With a first validation of the entities found for the cultural and emotional layer in the case studies an initial step is done. The next step in research is to conduct more case studies to render this new layer for EA models more consistent and applicable.

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