

Trends for Enterprise Architecture Management Tools Survey

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Abstract

The Enterprise Architecture (EA) management discipline emerged in order to cope with the complex problem of managing the EA in a holistic manner. In this vein, tool support became of high interest for enterprises with the increasing maturity of the EA management discipline. This survey analyzes the future development of EA management and trends with a particular focus on tools supporting this management function.

In a first step, this study identifies future trends of business and IT that may be supported by EA management tools. We conducted this analysis from different point of views ranging from tool vendors, industry partners, consultancy and research. Our partners selected 16 scenarios that are relevant for their companies and industries during the upcoming three years. In a second step, we asked the tool vendors in which scenarios they see the greatest potential for future EA management support. The validation of our scenarios facilitated an interesting comparison in case the future development of the EA management is seen similarly by the tool vendors and the actual users. This study also contributes a portfolio of possible scenarios in which EA management is seen as a value-adding approach. The positioning of most of the scenarios in the portfolio certainly confirms that EA management is more and more seen relevant for strategic business topics. Towards the end this survey also outlines major players in the market of EA management tools and their philosophy in an executive summary for each tool vendor.

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1.1 Motivation and setup of the study

The complexity of the enterprise landscape – i.e. of the business processes and IT systems – is more and more discussed in the practice. The companies notice that their architecture often prevents them from operating effectively and realizing their business strategies instead of supporting their business transformation. It is more and more frequently realized that to avoid a holistic management of architectures to succeed is not possible. In this context, enterprise architecture (EA) management gains on importance. It is reflected for example in the fact that EA management becomes a dedicated function positioned in the IT or business area. In some cases it is extracted from both to ensure a close cooperation between these two. Currently, EA management starts to overtake the role of a partner of the business ensuring the optimal realization of business visions by the IT. Of course, it occurs in this sense in particular with a growing degree of maturity of the EA management function in the organization. It is recognized, that having a holistic EA management function results in multiple advantages which refer both to business and IT: a greater flexibility to use the IT to best handle new opportunities, more agility to realize business requirements, foundation to execute the business strategy and foster competitiveness reflected in turn in improved differentiation from competitors, sped up time-to-market and cost optimization.

Despite of this raised awareness about the need for and benefits of the EA management, there is still little understanding on the areas in which EA management methods can help develop sustainable solutions, in which initiatives should architects be involved to ensure a maximum business benefit and finally how to apply EA management methods in different scenarios.

To close this gap, we conducted a research on the relevant trends in business and IT which are likely to occur in the future or already start appearing now. We pointed out how EA management supports these scenarios describing respective solution spaces. We identified and

analyzed the possibilities which EA management offers to a company due to its role as business enabler.

We conducted this analysis from the point of view of the academy and the consultancy and, above all, we involved industry partners and tool vendors. Our partners selected 16 scenarios, which are or could be relevant for their companies and industries during the coming three years. In the second step we asked the tool vendors in which scenarios do they see the greatest potential for EA management support. Validation of our scenario list by the latter group facilitated an interesting comparison if the future development of the EA management is seen similarly by the tool vendors and the actual users. Finally, in this study we present a complete portfolio of possible scenarios in which EA management is seen as a value-adding approach. The positioning of the most of the scenarios in the portfolio certainly confirms that EA management is more and more seen relevant for strategic business topics.

This study is indented for medium companies with international presence, as well as for big sized enterprises, which want to understand more about the role of enterprise architecture when defining and executing their strategies. In particular, we would like to address:

- Persons in charge of the IT strategy and enterprise architecture which have the mandate to support different initiatives with the EA management approach
- IT project managers and solution architects who are interested in approaching current and future initiatives in a holistic way
- Requirement managers from business departments who search to develop synergetic solutions to address business demands
- Tool vendors willing to learn how the future of EA management is seen by the companies, possibly their customers, as an input for validation with their development roadmaps.

1.2 Participating industry partners and tool vendors

We want to thank our industry partners and tool vendors for their interest and active involvement in the development of the *Trends for Enterprise Architecture Management and Tools*. Their participation contributed to validation of the initially created list of scenarios ensuring that they are realistic and mirror current and future concerns of the industries. We appreciate their invaluable participation in the workshops, as well as their precious input provided via surveys. We specially want to thank the following companies:

alfabet, AMOS SE (Allianz Managed Operations Services), AvailabilityPlus GmbH, Bearing-Point Management and Technology Consultants, BOC, BT, bwin interactive entertainment ag, Christiana Care Health System, Capgemini, Daimler AG, Deutsche Lufthansa Passage Airline, Dr. Nink IT Consulting, Enterprise Architecture Solutions Ltd., E.ON IT GmbH, Federal Ministry of the Interior (Bundesministerium des Innern), Golestan Software Engineering Inc. (GOLSOFT), Infineon Technologies AG, iteratec, ITM Beratungsgesellschaft mbH, Kühne + Nagel, Landesbank Berlin, Lübeck University of Applied Sciences, LVM Versicherung, MEGA, Rheinland Versicherungen, Ruag, RWE IT GmbH, santix AG, Schufa Holding AG, Software AG, sparx System, University of Technology (Sydney), and Xenium AG.

1.3 Who we are

This survey is a joint effort of Detecon International GmbH and the Chair for Software Engineering for Business Information Systems (sebis) at Technische Universität München. Both parties contribute their unique expertise in the field of EA management as well as related fields to the survey. Below both organizations are briefly introduced and their expertise is summarized.

Detecon International is a leading worldwide company for integrated management and technology consulting founded in 2002 from the merger of consulting firms DETECON and Diebold. Based on its comprehensive expertise in information and communication technology (ICT), Detecon provides consulting services to customers from all key industries. The company's focus is on the development of new business models, optimization of existing strategies and increase of corporate efficiency through strategy, organization and process improvements. This combined with Detecon's exceptional technological expertise enables us to provide consulting services along our customers' entire value-added chain. The industry know-how of our consultants and the knowledge we have gained from successful management and ICT projects in over 160 countries form the foundation of our services.

In the field of EA management, Detecon gained broad experience in numerous projects worldwide, including consulting on senior management level and specific EA management operationalization projects. Our customers profit from our proven EA management framework shown in figure 1, which is built on the expertise gained in such contexts as mergers and acquisitions, landscape consolidation or outsourcing. Our consultancy approach aims to prepare the platform for our customers' businesses with the right level of standardization while balancing the necessary degrees of freedom. An effective EA management enables business and IT leaders to plan and control the transformation of business and the underlying platform. With our proven consulting services we accompany our customers' organization from an effective introduction strategy to the realization and usage of a sustainable EA practice within the organization as well as necessary adaptations of existing approaches.

Detecon's EA management offering covers:

- Management consulting for business and IT executives
- EA guidance for platform and business transformation programs
- Effective change management to support business transformation

As an active member of the Open Group, Detecon shares its knowledge and experience from business transformation and EA projects at customers from different size and industry to support the enhancement of TOGAF[®], the Open Groups leading architecture framework, as an open, well accepted standard.

The chair sebis has a long history and an outstanding publication record in the field of EA management. In 2003 the research project *Software Cartography* was started with the aim to develop methods and modeling techniques that go beyond the scope of the single application system. The documentation, analysis, and communication of complex *landscapes* of applications was the key challenge, at which the research project aimed. Based on techniques from conventional cartography, so called *Software Maps* were developed as means of

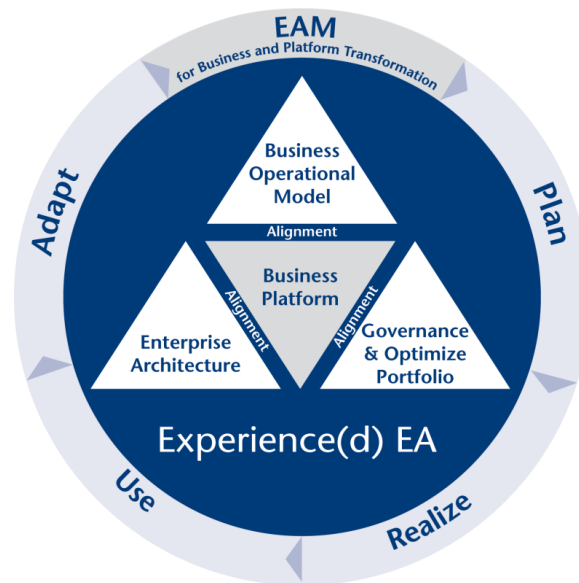


Figure 1.1: Detecon's Business Transformation framework

stakeholder-specific communication. As the application landscape is intrinsically tied to the larger enterprise context, Software Cartography necessarily outgrew its initial scope. Still calling them Software Maps, we developed visualizations that covered more and more of what would become known as *Enterprise Architecture* in later years.

Due to the complexity of the overall management subject as well as the embracing nature of the necessary information both Software Cartography and EA management are predestined for tool-support. In 2005 the chair conducted the *EA management tool survey 2005*, a first investigation into the state-of-the-art in EA management tools. Based on the input of ten industry partners, the survey presents a set of 14 scenarios that describe concrete functional requirements as well as typical actual usages of such tools in EA management. Each of these scenarios was executed with each of the nine tools. The result of the tool evaluation is not a simple ranking of tools but to a tool-specific scorecard indicating which requirements are fulfilled by each tool to which extent. This allows a company to match individual requirements with the scorecard to derive the tool most suitable for the intended purpose. The *EA management tool survey 2008* repeated the success story of its predecessor using a set of 16 scenarios updated and refined in cooperation with 30 industry partners.

One key finding of the tool surveys was a lack of tool support for the automatic generation of stakeholder-specific visualizations based on arbitrary information about the EA. In 2005 the chair developed a technique for automatically generating such visualizations from information about the EA. This technique can be used to replace the laborious and error-prone task of manual visualization creation. The *SystemCartographyTool (SyCaTool)* implements this technique based on best-of-breed libraries for modeling, diagram layouting, and graphics rendering. By customization, users of the SyCaTool can develop their own organization-specific viewpoints on the enterprise. Visualizations adhering to these viewpoints are generated from tabular descriptions of the EA.

The *EA management Pattern Catalog* builds on the chair's research on EA management viewpoints. It consolidates the knowledge gathered in an extensive series of interviews conducted in 2007 and 2008. In these interviews practice-proven viewpoints were elicited from 18 industry partners. The catalog contains observed solutions to re-occurring problems in EA management, as so-called *EA management patterns*. Each of these patterns either describes a management method (M-pattern), a relevant viewpoint (V-pattern), or an underlying information model for a part of the EA (I-pattern). These patterns are linked to each other, to display which combination thereof is best used to address which typical problem in EA management. The pattern catalog further describes EA management anti-patterns that describe 'solutions' that have been repeatedly been applied but proven not to work.

In 2009 the chair started the research project *Building Blocks for EA Management Solutions (BEAMS)* to further consolidate the best-practice knowledge for EA management methods as well as for EA modeling. Based on the observed practices from the EA management pattern catalog, but also on the recommendations and prescriptions from 22 EA management approaches, among other TOGAF® and ArchiMate, BEAMS presents four types of *building blocks* for EA management functions. Method building blocks (MBBs) describe practice-proven processes for describing and planning, for communicating and enacting, and for analyzing EAs. Information model building blocks (IBBs) present re-usable information model fragments specifically designed for integration and customization, and link to glossary building blocks (GBBs) that provide textual definitions for the model concepts. Viewpoint building blocks (VBBs) describe typical visualization techniques that can be combined and applied to arbitrary EA information. The different building blocks are further based on formal foundations that support the consistent integration. The formalisms further lay the basis for the tool-supported implementation of any organization-specific EA management function that has been developed using the BEAMS development method.

Over 70 peer-reviewed scientific EA management-related publications in workshop and conference proceedings as well as journals demonstrate the chair's leading role in EA management research both on national and international level. Six book chapters on EA management and software cartography as well as 25 technical reports and articles in practitioners' journals illustrate the chair's commitment to theoretically well-founded research for practice-relevant problems. Knowledge transfer from academia to practice and vice versa is also the key principle of the chair's engagement in recurring practice events in the field such as the EAMKON¹.

1.4 Scope and approach of the *Trends in Enterprise Architecture Management Tools Survey*

The survey follows a hermeneutic method [Ga75] for eliciting the trends relevant in the field of EA management. This means that we have iterated our trend analysis over several steps. For seeding the hermeneutic circle, we analyzed trends from relevant sources in both academia and practice. These trends were reflected against TOGAF® [Th09] and BEAMS [Bu10], more precisely against the Architecture Development Method (ADM) and the structuring of layers and cross-functions. The frameworks thereby provide a conceptual basis for deciding

¹<http://www.eamkon.de/>

whether one of the initially identified trends impacts the discipline of EA management. Over several iterations involving the different authors of the survey, the trends are refined and consolidated into a set of trend candidates that are mutually distinct regarding their impact on EA management.

At this point the first iteration of the hermeneutic circle is completed. In the second iteration, the industry partners of the survey are invited to on-site workshops as well as to telephone interviews to comment on selected trends. In addition the representants of the involved industry partners are invited to raise additional trends or further implications of trends regarding EA management. Over a series of 4 workshops in Germany and 3 web workshops we refined the trends and the trend descriptions. The workshop nature of particularly the on-site meetings allowed the identification of 3 additional trends. After each workshop and each interview we consolidated the input. Stepwise, we also adapted the descriptions of the trends. After the final workshop and interview we integrated the input into all trends and derived the trends as presented in this document. As part of the integration we further grouped the different trends into larger groups targeting a similar direction of evolution. These groups are additionally used to provide a frame of reference for clearly distinguishing related trends. The hermeneutic iterations of the knowledge base are finished after this step.

Accompanying the development of the trends, we used a first questionnaire asking the participating industry partners to prioritize the tool-vendors that we should involve in the survey. The results of the questionnaire allowed us to narrow down the number of tool vendors to 11. In the final step of the survey, we approached both the selected tool vendors and the industry partners of the survey to rank and prioritize the final trends according to their importance. The prioritization of both - the industry partners and of the vendors is thereby anonymized and aggregated.

1.5 Structure of the *Trends in Enterprise Architecture Management Tools Survey*

The results of the *Trends in EA management Tools Survey* are presented in Chapters 2 and 4. Thereby, Chapter 2 provides a brief summary of the future scenarios that have been derived in cooperation with the survey's industry partners while Chapter 4 provides the detailed descriptions.

In Chapter 3 the survey's understanding of EA management is detailed. Central to this understanding is the *method-language-dichotomy*, i.e. the idea that in general EA management can be regarded from the perspective of the performed management methods, processes, and tasks, as well as from the perspective of the employed EA models, visualizations, and modeling languages. The survey's understanding of the method part is described using the *Architecture Development Method (ADM)* presented in The Open Group Architecture Framework (TOGAF®). For framing the language part of EA management the EA framework of BEAMS [Bu11b, Sc11] is applied. This framework reflects the nature of EA management as a design process for the EA and applied Simon's general design propositions (cf. [Si96]) on the context of the enterprise [Bu10].

Chapter 4 introduces the 16 scenarios describing future trends for EA management of the survey. The future scenarios cover a broad range of trends as elicited in cooperation with the industry partners of the survey. Each scenario follows a common structure that sketches the upcoming challenge, states indicators and contra-indicators for the applicability of this scenario for a certain organization, delineates how EA management can contribute to address this challenge, and lists opportunities as well as threats that may arise from applying scenario's solution. In addition, the detailed description of each scenario gives an indication on the expected importance of the scenario for an industry partners.

The tool vendors who participated in our survey were invited to add a short description of their profile which can be found in Chapter 5. The profiles are intended to help interested readers to gain an overview on the market of different tools and decide which tool might be most interesting for them. Further information on the performance of the different tools can be found in the *Enterprise Architecture Management Tool Survey 2008* (EAMTS2008) of Matthes et al. in [Ma08].

Final Chapter 6 summarizes the findings of the survey and gives an overview about the most important enterprise trends pertaining to EA management. Further, the summary reflects on the survey's understanding to EA management and delineates, which aspects of the method as well as of languages for EA management can be expected to be most important according to the prioritization of the scenarios.

Executive Summary

With strongly increasing importance of enterprise architecture (EA) work throughout the past decade the positive effects of EA are widely acknowledged. EA management represents a commonly accepted instrument to guide and increase the mutual alignment of business and IT.

The rising demand for enterprises to quickly adapt to changing market situations and to flexibly reorganize their IT in order to enable innovative business capabilities calls for an integrated and holistic management perspective. This holistic point of view is even more important in presence of the heterogeneous structures of the historically grown IT landscapes. To address these challenges there are different approaches a company can introduce and make use of the EA management function (“EA approaches”). The sustainable success of the EA efforts is determined by the way, the EA management function is put in place and tailored to the company’s business goals.

While multiple studies capture the current status of the different EA (management) approaches and target the capabilities and functionalities currently provided by existing EA management tools, information on relevant business- and IT-related trends which can be addressed by EA initiatives is scarce.

In order to optimize investments into EA management the CIOs, chief architects and their stakeholders need clarity on practice-relevant emerging trends in EA management that could serve as reference point for a future development of their EA management approach and to assess the tool vendor’s roadmaps how they plan to support future EA management.

This is the research gap that this survey seeks to close. Its objective is to identify relevant business- and IT-related trends which can be addressed by EA initiatives, and to develop a set of possible scenarios for the future of EA management. In this sense, the survey answers the following three core questions:

- What are the emerging EA-relevant business and technology trends?
- How is future EA management impacted by these trends and how does the future of EA management look alike?
- How do the capabilities and functionalities currently provided by prominent EA management tools currently support future EA management?

The first part of the study provides seventeen different scenarios about relevant business- and IT-related trends which were identified and weighted by sebis and Detecon Consulting in cooperation with industry partners. The second part gives an overview on how the major players in the market of EA management tools are actually prepared to support these scenarios in the future.

There are numerous benefits for CIOs and enterprise architects from using the results of this study e.g. get indicators to close the gap between company's strategy and future EA management approach, directed hints on improving the EA management approach for the future, optimize EA investment, avoid cost from ineffective EA management.

Approach to Enterprise Architecture Management

Enterprise architecture (EA) and its management are topics of ongoing and increasing interest from practitioners. In recent years, a changing economic, regulatory, and technological environment [La05, Wa05, RWR06] motivated companies to introduce an EA management function. By this function, the companies seek to realize benefits that are widely alluded to as connected to EA management, namely “consistent strategic IT planning”, “increased business/IT alignment”, “business process optimization”, and “architectural guidance for projects” (for a comprehensive list see Aier et al. [ARW08]). The ongoing interest that EA management received from diverse directions has led to a broad variety of proposals for methods, guidelines, and techniques for EA management. These proposals differ with respect to the employed terminology but also with respect to the addressed aspects of managing EAs. This is not surprising as the proposals originate from largely different backgrounds. The literature analysis of Aier and Schelp in [AS09] draws a more consistent image of the discipline. The compared scientific EA management frameworks and approaches¹ differ with respect to their terminologies but agree on a central dichotomy in the field. All approaches supply one or more *EA modeling languages* and a *method* description for the EA management function. In the following we explain how we understand these two constituents and refer to well-adopted standards in the field.

In 1995 The Open Group published the first version of the *The Open Group Architecture Framework* (TOGAF[®]) which was based on the *Technical Architecture Framework for Information Management* (TAFIM) published by the Department of Defense. The current version 9.0 of TOGAF[®] has been released in October 2009 [Th09]. TOGAF[®] builds on the terminology introduced in the ISO Standard 42010 [In07] and provides a method and supporting models as well as techniques for an EA management function. In particular, TOGAF[®] 9 consists of six main parts, namely

¹In the paper, the frameworks are imprecisely alluded to as *EA frameworks*, although the frameworks focus on activities related to or being part of managing the EA.

- the *architecture development method (ADM)* describes an iterative process consisting of eight interconnected phases of EA development and a complementary preliminary phase (see Figure 3.1)
- the *ADM guidelines and techniques* cover aspects of adaptability and configuration of the ADM to different process styles or specific architectures, i.e. security
- the *content framework* provides a conceptual metamodel for describing the EA,
- the *enterprise continuum and tools* represents a view on the architecture repository providing methods to structure and classify architecture and solution artifacts to enable communication and reuse of EA-related descriptions, and
- the *TOGAF[®] reference models* are divided into the *TOGAF[®] foundation architecture* and the *integrated information infrastructure reference model (III-RM)*. The foundation architecture is embodied in the *technical reference model (TRM)*, which is universally applicable and can be used to build any system architecture. The III-RM helps to address the need to design an integrated information infrastructure with reference designs.

TOGAF[®]'s ADM can be regarded as one of the most well-known methods for managing the EA. The ADM describes an iterative management process that consists of eight phases. An additional preparation phase is meant to initialize the execution of EA management, whereas the central activity of requirements management provides input to all phases. Figure 3.1 summarizes the ADM.

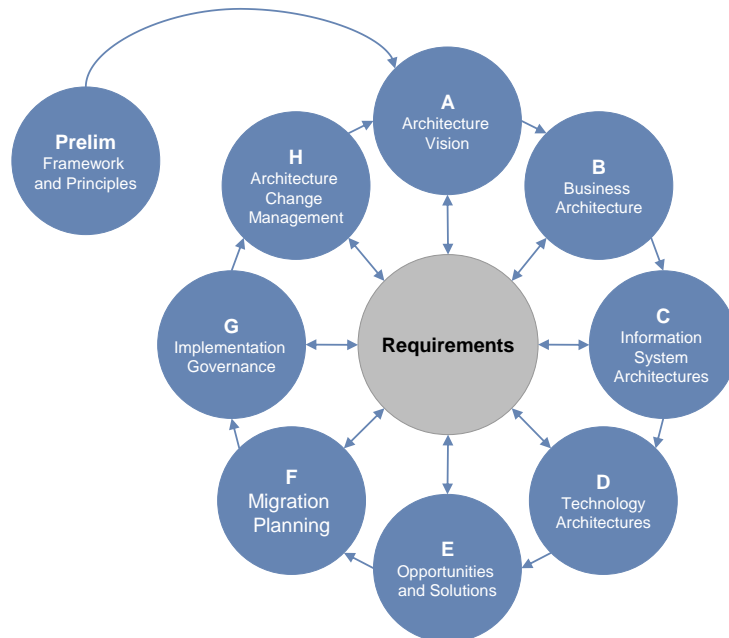


Figure 3.1: The architecture development method of TOGAF[®] [Th09]

The TOGAF[®] ADM cycle starts with the *preliminary* phase, which prepares and initializes the EA management project. Typical tasks executed in this phase include the definition and

3. Approach to Enterprise Architecture Management

establishment of the EA team, the selection and implementation of supporting tools, as well as the definition of architecture guidelines and principles. After the preparation and initialization activities are performed, the scope of the EA management endeavor is defined within the *architecture vision* phase (*A*). A core objective of this phase is to identify the relevant stakeholders and their concerns. Based on the identified stakeholders and concerns a high-level architecture vision of the enterprise is derived in this phase. Preceding phase *A*, the business, information systems, and technology architecture are developed in the phases *business architecture* (*B*), *information systems architectures* (*C*), and *technology architecture* (*D*) phase respectively. The fundamental make up of these three phases is very similar: Initially, the baseline architecture (current state of the EA) is described. Based on this architecture, a target architecture is developed taking the architecture vision into account. This vision was formulated as part of the preceding phase *A*. A delta analysis is performed to evaluate the differences between the current and the target architecture and roadmap components enabling the transition from baseline architecture to target architectures. The phase *opportunities and solutions* (*E*) is concerned with linking the separated business, information system, and technology architecture and deriving projects and programs, which describe the transformation from the current to the target architecture via intermediate transition architectures (planned states). The major steps to be performed in this phase are the consolidation of the delta analyses from phases *B* to *D*, the identification, refinement, and validation of dependencies between the different architectural layers, and the establishment on an integrated project and program portfolio. The transition architectures form the input of the *migration planning* phase (*F*), which is concerned with the formulation of an implementation and migration plan that schedules and realizes some or all of the planned architectures. The major steps within this phase are the assignment of a business value to each project, the prioritization of projects, and the generation of a roadmap and migration plan. In the phase *implementation governance* (*G*) the projects selected for realization in the preceding phase are executed. Major tasks of this phase are the identification of deployment resources and skills, monitoring of the execution, and the conduction of reviews, e.g. regarding architecture compliance. The final phase (*H*) *architecture change management* concludes an ADM cycle and prepares the initiation of the next iteration. As part of the phase, the changes of the architecture are assessed. Key tasks of this phase are the deployment of monitoring techniques for the architecture process and the development of change requirements to meet performance targets.

Today's enterprises do not rely on a single IS to enable and support their business models and processes. Instead, dozens or even hundreds of IS, varying in size but also regarding their technical and organizational implementation, have to interoperate. These IS are densely linked over different interfaces, but also rely on shared hardware assets and organizational resources. The different kinds of interdependencies necessitate a means to understand the interplay between the manifold elements of interest. EA is not concerned with the intricacies of IS implementation, but with the relationships between the IS as well as the utilization of hardware assets and other organizational resources. This frames the holistic scope of the EA, whose object of consideration is nothing less than the enterprise as a whole. Enterprises continuously transform in response to the changing requirements of their diverse stakeholders. The relevant elements of the enterprise and hence the enterprise itself are subject to design and re-design activities on different levels. These can be local changes to hardware assets, but can also be enterprise-wide process re-engineerings that affect numerous IS. The overarching planning of the EA has to account for all these changes and has to keep track on their non-local

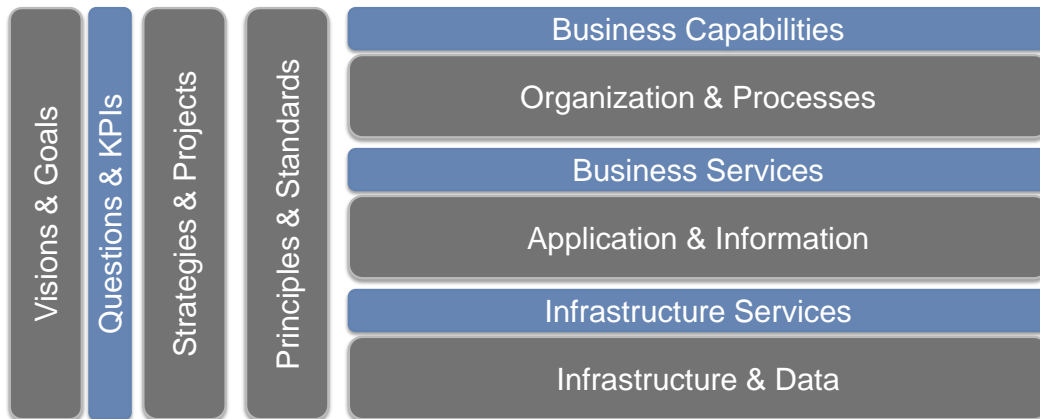


Figure 3.2: Framework of EA layers and cross-cutting aspects

impacts as well as interdependencies. Furthermore, it has to establish guidelines and has to communicate enterprise-wide goals that these changes are meant to contribute. *Strategies & projects, principles & standards* and *visions & goals* are relevant to understand the dynamic evolution of the enterprise. Together the different evolution-related aspects form *cross-cutting aspects* that can influence various elements in the static structure of the EA. Especially in the context of EA planning and evolution, it is necessary to understand the EA or parts thereof not only in terms of implementation, but also in terms of the requirements that should be fulfilled in that state. IS and the relevant elements in their “static” environment are complemented with a requirements’ perspective. Therein, not the elements but the *abstract services* offered to the environment as well as to other elements are described. These services delineate functions, both in a technical and in an organizational sense, attributed with information about non-functional qualities that the particular services offer. Together, the different aspects and layers described above establish a conceptual framework for the EA. This framework, as shown in Figure 3.2, provides an abstract basis, into which an organization’s stakeholder-dependent and problem-specific understanding of the EA is embedded. Dependent from these two contingencies, the actual degree to which a particular layer or cross-cutting aspect is covered in an organization can vary.

Scenarios of the Trends in Enterprise Architecture Management Tools Survey

The trend scenarios for EA management presented in this survey are based on current business and IT trends as well as on the experience from the participating industry partners and the consulting as well as research practice of the TU München and Detecon. Each scenario is described by attributes which allow the companies identify, if a given scenario applies for their sector (see: indications, contra-indications). We furthermore describe a solution space for the scenarios showing how EA can be applied to face the challenge. Thereto, we relate the scenario's solution with the recognized EA management framework TOGAF® [Th09] and a structure model for the EA, as developed at TU München [Bu10]. We aim at this point to present the scope and applicability of various EA management approaches and convey hints to the companies willing to stronger employ their EA capabilities. In addition, we describe consequences from applying the scenario in terms of resulting opportunities and threats. A classification of the scenario along the dimensions *business-technical* and *strategic-operational* further helps the reader to understand the role of the scenario in future EA management. Finally, we present a prioritization of the scenario both from a partner's and a vendor's perspective.

4.1 Trends related to enterprise federation and sourcing

Today's enterprises find themselves confronted with an economic environment that provides both challenges and opportunities. Former arise from increased competitiveness in a globalized market environment, but also from the increasing depth of value creation due to more sophisticated consumer goods and services. Opportunities result from the increased diversification in value creation as well as from convergence regarding widely used business and IT services. Different paradigms leverage these opportunities and can be applied to make enterprise operations sustainable in the current economic environment. In particular the following four paradigms are of special interest:

Cloud computing provides cost-efficient ways for accessing commodity IT products and services.

Outsourcing provides cost-effective operation of IT products and services of medium specificity.

Extended enterprises are formed to deliver sophisticated consumer goods and services created in the virtual environment of networking enterprise peers.

Modular sourcing is a business-level approach to access business capabilities provided by specialized sourcing companies.

4.1.1 Cloud Computing

A product portfolio which adjusts itself according to the changes of the economical environment is a crucial requisite for the survival of today's companies. Cloud computing offers a broad spectrum of IT enabled capabilities, which could support the establishment of such a responsive product portfolio. EA management guides the incorporation of the cloud computing paradigm into the enterprise from infrastructure level (platform as a service) to product deployment (product as a service).

Indications

Cloud computing is especially interesting for enterprises that

- experience high cost pressure regarding IT support for the business,
- seek to quickly realize different IT-based products,
- operate under volatile performance and scaling requirements, and
- use highly standardized IT platforms and IT services.

Contra-indications

The realization of cloud computing may be impeded in enterprise that

- have not established a mature understanding of the business-related IT demands,
- have highly predictable computation demands in the IT, and
- must focus on data protection, data security and compliance management issues.

Solution

Cloud computing takes a service perspective on central elements of the enterprise IT. These (software and hardware) services are consumed *Pay-As-You-Use* and can reside on three different levels of an EA:

- Infrastructure as a Service (IaaS) allows the allocation of logical systems, with or without an operating system.
- Platform as a Service (PaaS) allows for deploying developed application, e.g. into an existing Java Enterprise Edition compliant application server.
- Software as a Service (SaaS) allows organizations to pay for a business application (software services) in proportion to use.

Cloud computing has both a technical and a business impact, as the cloud operational model allows to change the way of product offering. Especially, strongly IT-dependent products can be offered in an *elastic* way as services that can adapt to changing demands. Thereby, the service paradigm is refined to the level of *products as a service*. Products as a service follow the basic economy of scale for shared services. It works under the assumption that increasing utilization per product lowers the cost per customer.

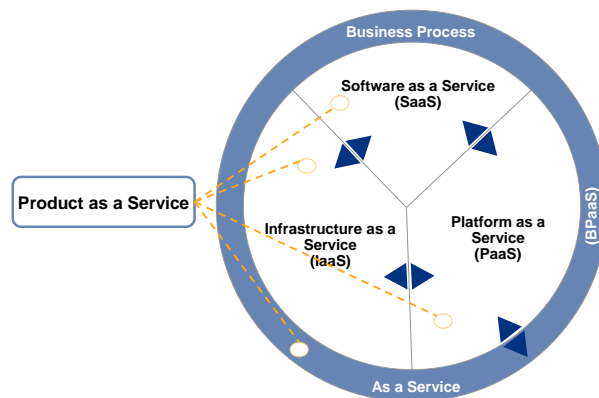


Figure 4.1: Possible iteration of cloud services in order to enable business agility

In cloud computing the service offering concept *Pay-As-You-Use* allows companies to purchase units of a service and to account for them as variable cost rather than undertaking large capital

investments. In this vein cloud computing can be used to transform fixed costs into variable costs. Cloud computing further offers improved agility to deploy solutions and dynamically choose between vendors.

The paradigm of cloud computing targets the whole enterprise at both operative and strategic levels. In order to leverage the potential benefits, cloud solutions have to be considered early during EA management. Figure 4.2 shows the phases of TOGAF®'s ADM, in which cloud computing solutions have to be considered:

Phase B: Business architecture In designing the business architecture, *products as a service* available in the cloud should be considered to find a cloud-optimal realization of the business processes.

Phase C: Information systems architecture During the design of the information system architecture, available *software as a service* solutions have to be considered as alternatives for implementing business support.

Phase D: Technology architecture In the design of the technology architecture particularly available *platform as a service* solutions can be used to implement the supportive information systems.

Phase F: Migration planning Particular emphasis has to be laid on migration planning, when former in-house solutions are moved to cloud solutions.

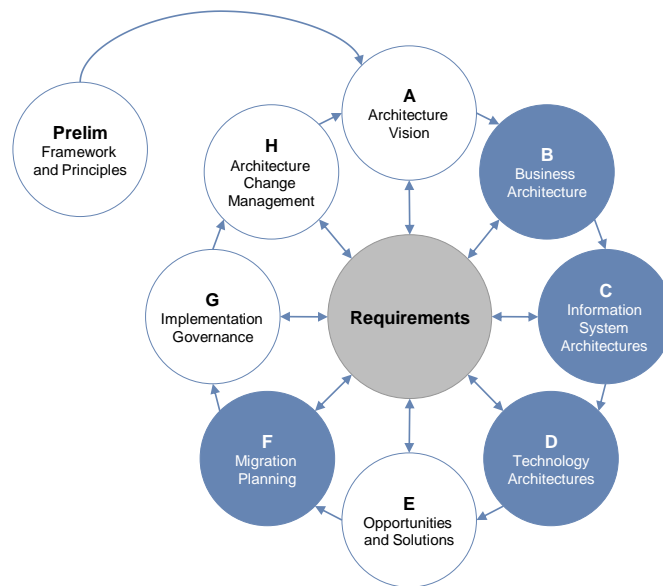


Figure 4.2: ADM phases relevant for scenario *Cloud Computing*

Cloud computing can be used to provide a cost-efficient operational basis for many business processes. Therefore, the enterprise is affected as a whole, whereas the concepts relevant for designing an enterprise-specific cloud solution reside on three architectural layers (see Figure 4.3). Product as a service solutions can be used as business services, system as a service solutions are applications dealing with enterprise information, and both platform as well as infrastructure as a service solutions act as infrastructure services.

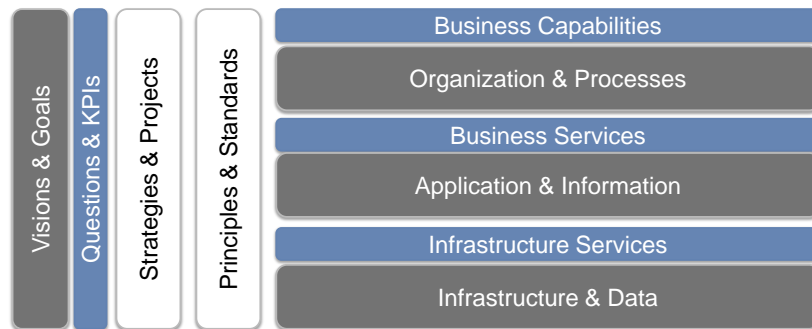


Figure 4.3: EA aspects relevant for scenario *Cloud Computing*

The utilization of cloud computing particularly impacts operation-related processes in the enterprise. In addition, risk and compliance management aspects have to be considered, and both demand as well as project portfolio management have to be adapted to align and make use of cloud offerings.

Opportunities

Cloud computing plays a key role since:

- It allows the implementation of completely different levels of scale and economics in terms of the ability to scale very rapidly and to operate IT systems more cheaply than previously possible.
- It enables companies to monitor, measure, customize, and bill for asset use at a much more fine-grained level than ever before.
- It offers improved agility to deploy solutions and choice between vendors, particularly when cloud interoperability becomes more of a reality than it is today.
- It offers an onramp to new computing advances such as non-relational databases, new languages, and frameworks that are designed to encourage scalability and take advantage of new innovations such as modern Web identity
- It enables the realization of cost saving potentials. Using cloud resources does not eliminate the costs of IT solutions, but does re-arrange some and reduce others. Consuming cloud services enterprises will increasingly act as cloud providers and deliver application, information or business process services to customers and business partners.
- As more as an enterprise consumes cloud services as more as they will act as cloud providers and will deliver application, information or business process services to customers and business partners.

Threats

- Loss of control over cloud resources run and managed by someone else, and reliability.
- Risk of vendor lock-in, e.g. if a company program against a particular cloud API.
- Higher IT related business risk due to third party providers; any failure of the provider has an impact on the core company’s business.

Classification in the scenario portfolio

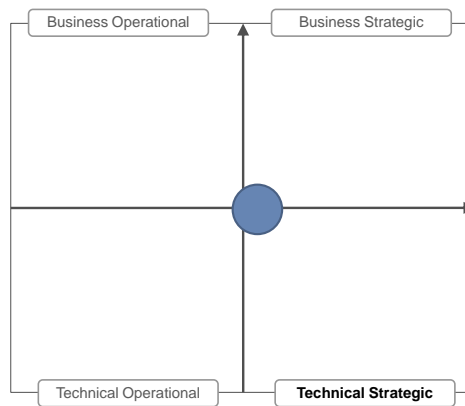


Figure 4.4: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.1. The tool vendors’ prioritization is detailed in Table 4.2.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	1
Finance	0
Government	0
Healthcare	0
IT Products & Services	0
Manufacturing	-1.5
Telecommunication	-1
Transportation & Logistics	-1
Other	0

Table 4.1: Partner prioritization of *Cloud Computing*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	1
Avolution	2
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	0
Software AG	2
SparxSystems GmbH	-3
<i>Median</i>	1.5

Table 4.2: Vendor prioritization of *Cloud Computing*

4.1.2 Collaboration with Partners in an Extended Enterprise

Today's companies enhance cooperation with partners to foster a close collaboration within the value chain. This implies the challenge to align different technological environments, share knowledge, and exchange information across organizational boundaries. For EA management this implies the need to align different EAs as well as to ensure alignment while the EA evolves. Therefore, EA transparency has to be provided in the larger context of the extended enterprise. Transparency nevertheless should be confined to interoperability-relevant parts of the EA, while avoiding to disclose business-critical architecture information.

Indications

Collaboration with partners in an extended enterprise is especially interesting for enterprise that

- participate in well-defined production or service delivery processes involving equally-sized enterprises,
- face growing customer demands which cannot be addressed by a single participating enterprise, and
- are confronted with economic pressure built up in a highly competitive market.

Industries as automotive are particularly likely to cooperate in the extended environment.

Contra-indications

Collaboration with partners in an extended enterprise may be impeded in enterprise that

- have no skills to establish or maintain participation in a seamless integration along the value chain, or
- have no technical capabilities to enable collaboration mastering security and interoperability challenges.

Solution

Nowadays customers are demanding more and more from the business, competition on the markets is increasing and new business models emerge with a growing frequency. These and many other factors increase pressure on margins and force enterprises to become more agile and innovative to better fulfill the expectations of the customers. Closer collaboration with partners is one of the ways to foster innovation and gain competitive advantage. This results in a tendency to extend the borders of the enterprise, i.e. to form a network of cooperating partners in an *extended enterprise*. These *extended enterprises* gained importance as companies have become more specialized and inter-connected, trade has become more global (see Figure 4.5), processes have become more standardized and information has become ubiquitous. An essential advantage of such a loosely-coupled extended enterprise is that it is a flexible alternative to the "megafirm structure (...). IT facilitates the coordination necessary

between the partners along the chain. Firms in a VAP [value adding partnerships, red.] obtain operational scale economics and lower internal coordination costs by choosing to be vertically small and horizontally large.” [GW91]

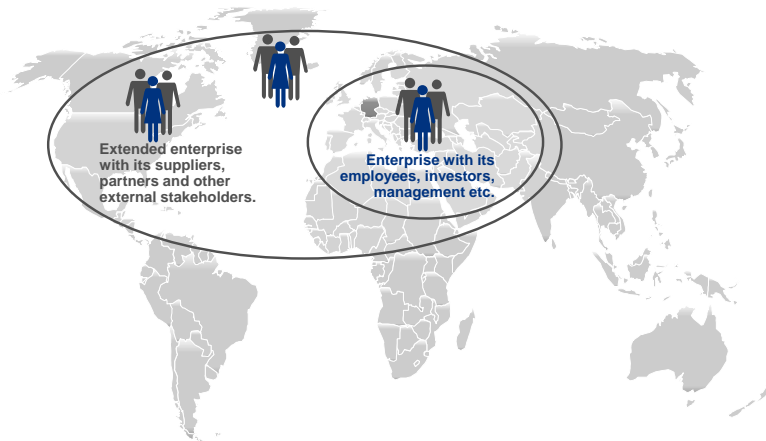


Figure 4.5: Illustrating a globally extended enterprise

Operating in the extended enterprise is related to challenges regarding both technical and business aspects. These aspects have to be addressed by the architecture management method for the extended enterprise. Such method can build on the basis provided by TOGAF[®]'s ADM (see Figure 4.6), which is adapted as a step-by-step approach to support controlled changes regarding both business and IT aspects:

Phase B: Business architecture In designing the business architecture of a particular extended enterprise the business capabilities of the participating partners have to be aligned.

Phase C: Information system architecture The business support in the partnering enterprises has to be designed in a way that it facilitates boundaryless information flow.

Phase H: Architecture change management The change management activities of the partnering enterprises have to be aligned with each other, especially if collaboration-related architecture elements are considered.

In the context of the extended enterprise stakeholder management takes a crucial role. A systematic approach thereto is necessary, that the right people in all involved enterprises are informed. Stakeholder communication is further needed to foster innovation and agility in realization of solutions. There are several methods and techniques provided — such as stakeholder maps — to help efficiently manage complex stakeholder groups. Security architecture is certainly an issue, if integration of e.g. strategic management systems or customer base within an extended enterprise is considered. Particular methods, as e.g. discussed by the Security Forum of The Open Group, should be set in place to ensure that cross-organizational information security is ensured.

Architecture transparency and enterprise interoperability entails considerations of the EAs as a whole. Based on the business capability that the enterprise seeks to contribute to the extended enterprise, at least information about selected business processes have to be shared between the partnering enterprises. Depending on the degree of agility that has to be achieved regarding

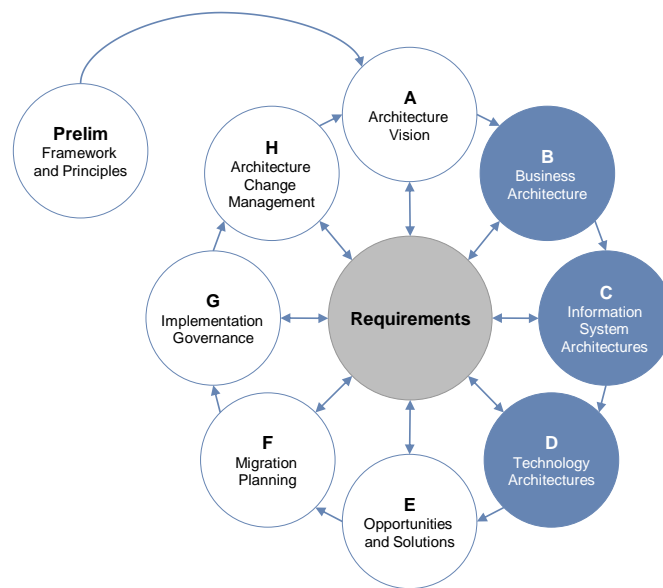


Figure 4.6: ADM phases relevant for scenario *Collaboration with Partners in an Extended Enterprise*

the linked processes, it can become necessary to share additional EA information to facilitate integration. Integration on the level of business services is necessary, when integration goes beyond passing coordination messages along the value chain. Via service integration it becomes possible to negotiate and dynamically adapt production plans in response to unforeseen delays. Even closer integration on application level is necessary, whenever dynamic changes in the production process have to be propagated along the value chain. Nevertheless, transparency on the relevant architectural layers (see Figure 4.7) should not target the entire enterprise but only selected elements of relevance. Thereto, TOGAF®'s concept of *partitioning* can be applied, considering the enterprise in terms e.g. “time period of relevance”, “affected business units”. In addition enterprise modeling faces the following challenges: exchange of models between partners, interoperability between different tools e.g. in the context of as-is and to-be modeling and user access rights to the models.

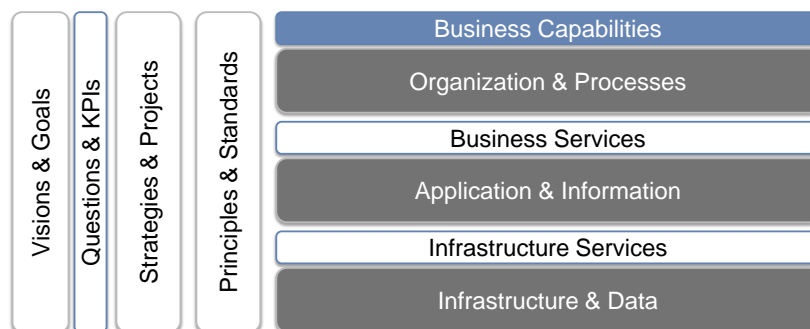


Figure 4.7: EA aspects relevant for scenario *Collaboration with Partners in an Extended Enterprise*

EA management for an extended enterprise needs to be strongly coupled with other management functions. In particular such functions as strategic management, supply chain management and broadly understood IT management (incl. Security Management, IT Service Management and Application Management etc.) are mostly in focus. In terms of a practical application of EA management, there are multiple artifacts which can be created by EA management tools and which contribute to transparency and support decision making. Depending on the specific challenge, such artifacts may be useful as:

- cross-organizational capability diagrams further showing the supporting business applications and business object flows
- capability diagrams showing which capabilities are impacted by a market change and which influence does it have on the business processes in each of the involved companies.

Opportunities

Maximized economies of sales: due to the focus on the right core capabilities (this right choice can as well be supported by EA management methods, see as well: “Sourcing decisions in a modular enterprise”) companies can maximize their scale effects and increase revenue.

Increased innovation potential: due to specialization of right capabilities their choice and setup is one of the core EA management topics.

Increased synergetic effects — improved service/product quality: due to profiting from the know-how of the specialized suppliers, if appropriate information exchange is given.

Holistic process management: with a full flexibility which would not be possible without EA management.

Simplification of the production process: due managed modularization.

Threats

While integration techniques are not a show stopper any more, a wrong management of an extended enterprise and lack of sufficient application of EA management methods may lead to the following threats:

Strong dependency on the providers of the functional modules / services etc: due to the black-box reality.

Possible know-how lost: through missing protection of core competencies (e.g. in the sense of data protection).

High coordination and communication effort: if no systematic stakeholder management and governance are applied, involved stakeholders may not perceive that the benefits are mutual and imply a win-win situation.

The challenge to translate an agreed business strategy to solution platforms: especially if no appropriate methods like ADM are in place.

Questionable sustainability: of the developed solutions.

Classification in the scenario portfolio

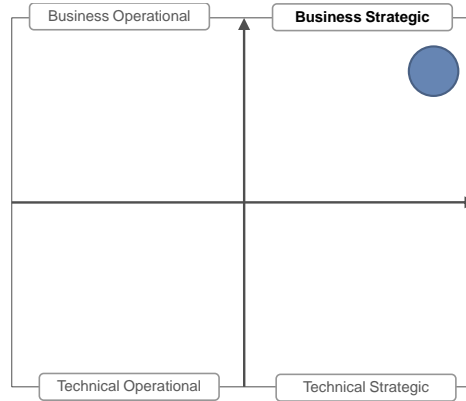


Figure 4.8: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.3. The tool vendors’ prioritization is detailed in Table 4.4.

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	-2
Finance	0
Government	0
Healthcare	2
IT Products & Services	1
Manufacturing	1.5
Telecommunication	1.5
Transportation & Logistics	2
Other	1

Table 4.3: Partner prioritization of *Collaboration with Partners in an Extended Enterprise*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	1
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	2
MEGA International	1
Software AG	2
SparxSystems GmbH	2
<i>Median</i>	2

Table 4.4: Vendor prioritization of *Collaboration with Partners in an Extended Enterprise*

4.1.3 Federated Network of Outsourcing Partners and Services

Selective outsourcing is a prominent example how companies try to save costs and get better quality by sourcing their IT services and products from various external and related suppliers. In such cases the IT support for a company’s business processes is provided by a network of different supplies. EA management can support a successful orchestration of different IT services provided in the federated IT supplier infrastructure.

Indications

Selective IT outsourcing is especially interesting for enterprises that

- experience high cost pressure regarding IT support for the business,
- operate in an environment with rapidly changing scaling requirements, and
- follow branch-standard business processes supported by customized standard software as well as custom software.

Contra-indications

The realization of selective IT outsourcing may be impeded in enterprise that

- employ specialized business processes requiring highly specific IT support,
- heavily rely on host-based business applications, or
- operate a densely meshed application portfolio with strongly proprietary interfaces and protocols.

Solution

Providing products and services in a fast, flexible, and reliable way at a reasonable price remains an ongoing challenge for corporate businesses. In order to achieve business performance, agility, business-IT-alignment, and service orientation, companies try to streamline and optimize their in-house IT landscape as well as the level of vertical integration of their IT resources. In this context, sourcing IT resources from external IT service providers has become a common business practice. While for many years, IT was provided in a “monolithic way” from a single source, either in-house or from external providers, today a variety of provision models and service providers have emerged. Selective outsourcing and the recent emergence of cloud computing are prominent examples how customers try to save costs, get better quality (“best of breed”), or mitigate their risk by sourcing their IT services and products from various external and internal sources. In many cases, the IT of a company is provided by a value network of different suppliers. In the light of such a value network of IT provision, however, it is not sufficient for an IT customer to manage each supplier separately. Rather, the challenge is to successfully orchestrate the different IT services provided by different suppliers. A promising way to holistically manage such autonomous, disparate, and highly distributed services is to employ a federated approach to IT service management.

Such federated IT service management creates a layer of abstraction above basic business applications and IT resources. The company seeking to outsource business support changes the understanding of support to a service-oriented perspective, where business services are used by the business processes. Such services detail both required functional aspects, but also describe relevant non-functional qualities of the services. Business service demands and business service descriptions constitute the abstraction layer *business services* in the EA. This layer is shared between the using company and the IT outsourcing providers. Thereby, the boundaries of EA management are extended into the network of partnering enterprises. This network in turn

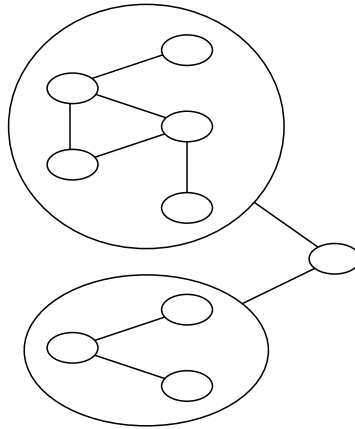


Figure 4.9: Federated Network of Outsourcing Partners and Services

itself is dynamic, i.e. different partners may enter the network and offer services, while other partners are disbanded due to ending service contracts. In an extended enterprise setting both the company as well as its outsourcing partners have to balance conflicting goals. The company seeks to optimize the federated business support while keeping service costs low. While the former entails a clear communication of both the functional and non-functional requirements together with information e.g. on expected loads, the latter requires hiding information on business criticality and value creation based on the corresponding business services. The outsourcing provider wants to establish a stable and enduring relationship with the company and seeks to create maximum revenue from the provided services. The former goal requires customer-specific services provision, adapted to the particular requirements of the client company, while standardized and commodity services contribute to the minimization of expenses.

EA management can provide techniques and artifacts that facilitate the establishment of outsourcing relationships under the tensions created by the conflicting goals on both the side of the outsourcing provider as well as the client company. Particular artifacts, like service demand sheets and service fact sheets, are extracts from the EA descriptions of the company and the provider, respectively. Automated exchange and import of such artifacts in case an outsourcing relationship is created, facilitates the creation of a comprehensive model of the federated EA. Beyond the exchange of static artifacts, the dynamic federation of the EA management information may provide a starting point for a fruitful and beneficial integration of related enterprise-level management processes. The company's incident management, for example, may access information supplied by the outsourcing provider along the service description to propagate incidents related to particular business services to the corresponding support processes at the provider.

Particularly challenging in this context are questions of confidentiality. Both the service provider and the using company have to decide, which information about the EA is federated and which information is kept private. While for commodity services, only a minor information exchange is needed, the establishment of an outsourcing relationship can require additional information. For this, explicit information sharing policies have to be determined as part of a negotiation between (prospective) service provider and the consuming company. Thereby,

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

relationships between the two companies have to align the development of both the information system architectures and the technology architectures (cf. Figure 4.10):

Phase C: Information System Architecture The business support in the outsourcing enterprise has to be aligned with the available business services of the outsourcing provider.

Phase D: Technology Architecture Both company's technological architectures have to be aligned with each other to resolve and prevent enterprise integration issues.

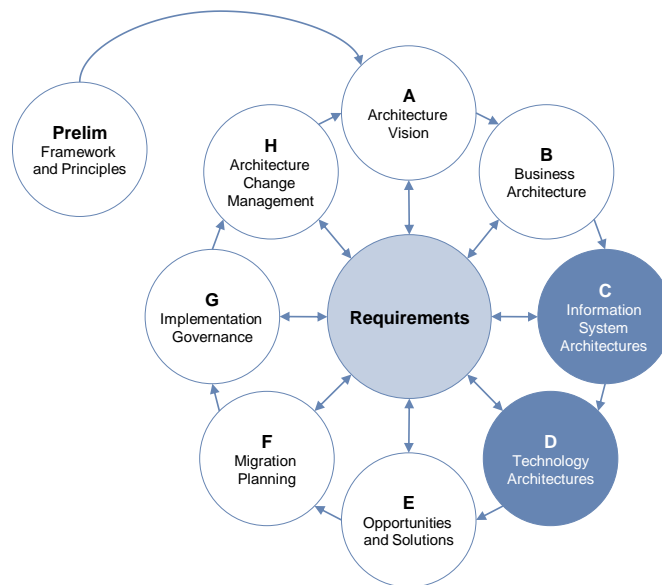


Figure 4.10: ADM phases relevant for scenario *Federated Network of Outsourcing Partners and Services*

The scenario strongly focuses on business services as abstraction concepts decoupling the business layer from the support application layer. Different cross-cutting aspects apply onto the business services, in particular goals as well as metrics that reify non-functional requirements as costs or availability, see Figure 4.11. Especially the federation on latter concepts can be regarded critical, but necessary to achieve optimal results from IT outsourcing activities.

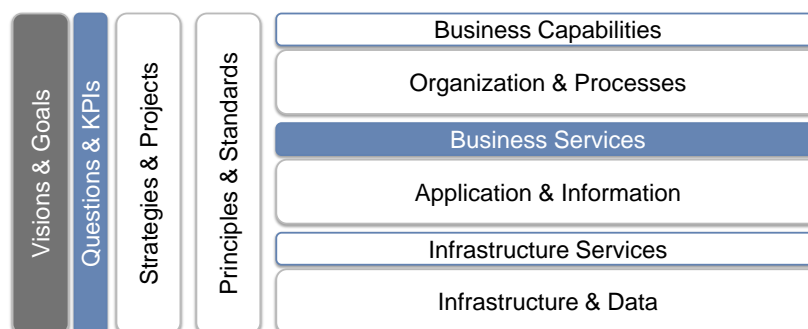


Figure 4.11: EA aspects relevant for scenario *Federated Network of Outsourcing Partners and Services*

Opportunities

- Selective IT outsourcing can help to provide predictable and more specific business services for the business support.
- Dynamic binding and unbinding of outsourcing providers facilitates the realization of cost advantages.
- Business demands can be addressed more quickly building on external business services.

Threats

- Loss of control over business services run and managed by someone else.
- Risk of “brain-drain” especially regarding the operation and development of critical business services.
- Risk of vendor lock-in, when particularly specific business services are outsourced.
- Risk of “pseudo-outsourcing” of highly specific services not realizing cost-benefits and flexibility.

Classification in the scenario portfolio

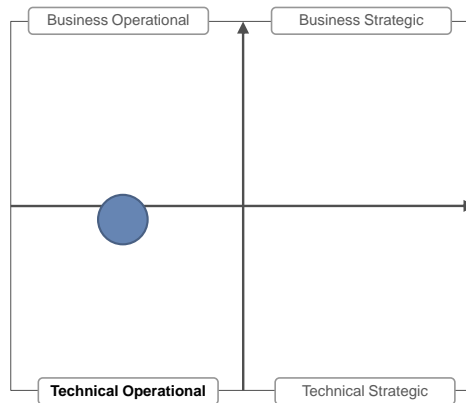


Figure 4.12: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.5. The tool vendors' prioritization is detailed in Table 4.6.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	0.5
Finance	-1
Government	0
Healthcare	-1
IT Products & Services	0
Manufacturing	-0.5
Telecommunication	0.5
Transportation & Logistics	0
Other	0

Table 4.5: Partner prioritization of *Federated Network of Outsourcing Partners and Services*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	2
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	0
Software AG	1
SparxSystems GmbH	-2
<i>Median</i>	1.5

Table 4.6: Vendor prioritization of *Federated Network of Outsourcing Partners and Services*

4.1.4 Sourcing Decisions in a Modular Enterprise

Faced with new business challenges and dynamically changing economic conditions, enterprises are demanding new models and methods for a successful sourcing. Disaggregation of value chains and processes resulted in modular sourcing approaches. EA management enables companies to better align their sourcing activities with business strategy, deliver innovation, and facilitate operational efficiency.

Indications

Sourcing decisions in a modular enterprise are especially interesting for enterprises that

- have a well-defined and understood business model detailed along identified business capabilities,
- seek to reduce costs by concentrating on key business capabilities, and
- rely on standardized support capabilities, e.g. regarding HR.

Contra-indications

The realization of sourcing in a modular enterprise may be impeded in enterprise that

- lack an explicit definition of its business capabilities further distinguished in key and supportive ones or
- strongly rely on support capabilities for non-standard cases, as high percentage of temporary work.

Solution

In today’s economy, businesses are on the one hand under constant pressure to increase efficiency and control costs. On the other hand, they need to maintain strategic focus on core business capabilities and keep innovation potential. In the context of these considerations, companies tend to get involved in mergers and acquisitions or outsourcing activities. Foreign sourcing is currently a popular trend in many industries. It has been playing a key role in sectors as automotive, apparel or customer electronics. Sourcing is based on modularization or disaggregation of value creation processes — and is in this sense often referred to as modular sourcing. Modular sourcing relies on adopting inputs from processes conducted by other companies. In the automotive industry, for example, companies do not purchase single complementary parts, but buy ready assembled elements, e.g. ready car dashboards or services which are produced by their partners.

EA management provides methods which establish a foundation for a holistic approach to sourcing decisions. The modern approach to modular sourcing is based on the concept of business capabilities which encapsulate people, processes and technology, i.e. elements of all architecture layers in a given functional scope, see Figure 4.13. The role of EA management is to identify the business capabilities and their relationships to each other and to other architecture elements.

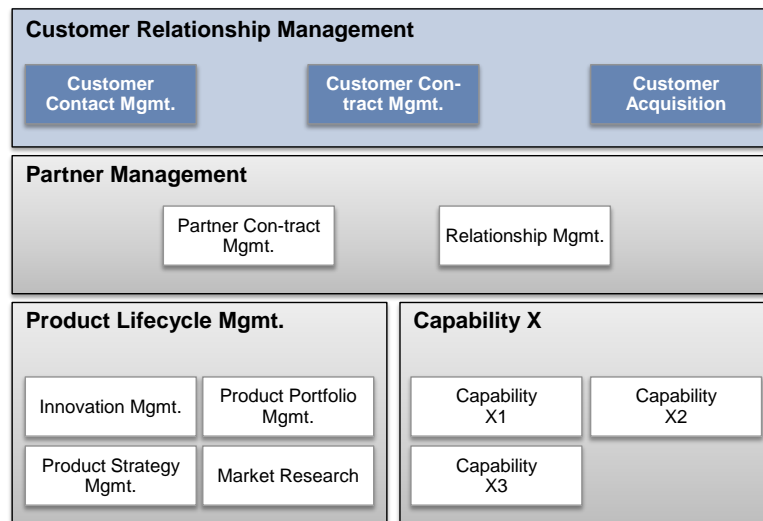


Figure 4.13: Business capability map as a reference model of the enterprise

A modular sourcing approach relies on focusing on the company’s core capabilities and on outsourcing the non-core capabilities — see Figure 4.14. In other words, the capabilities which can be better, easier, cheaper etc. delivered by other providers and are not strategically relevant may be outsourced [Po98].

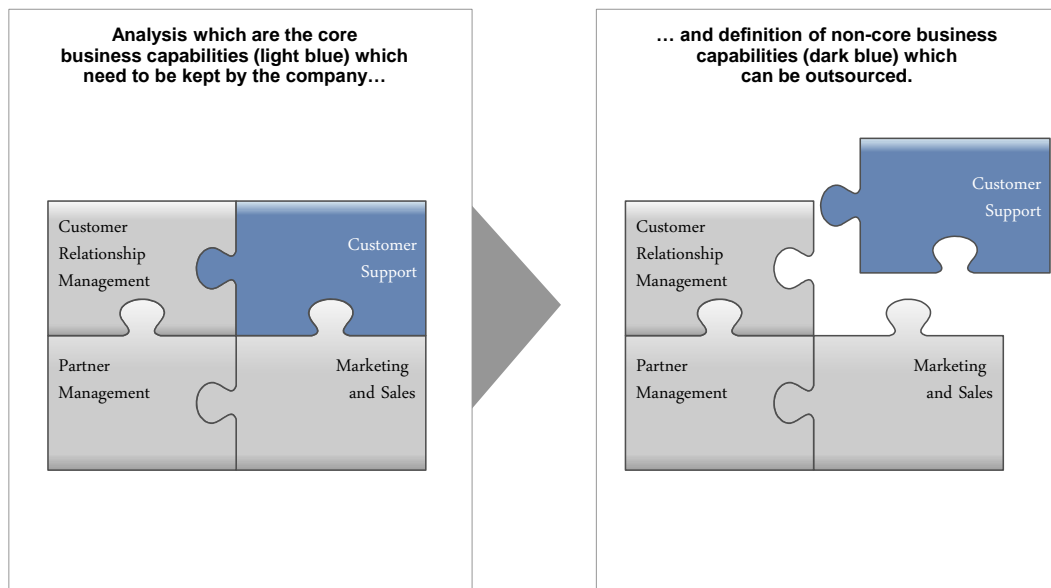


Figure 4.14: Capability-based approach to sourcing decisions — illustratively

In order to define the capabilities to be outsourced, the analysis of the business strategy and of market trends is recommended to learn which capabilities are particularly strategically important. EA management methods can be well applied with typical management analysis methods. Particularly useful techniques at this point are strategy modeling methods such as strategy maps or strategy trees, illustrated in Figure 4.15. Strategy trees decompose the business strategy into sub-objectives. Such approach creates a better understanding of the strategy and is a powerful tool to identify initiatives which optimally contribute to the realization of the strategy.

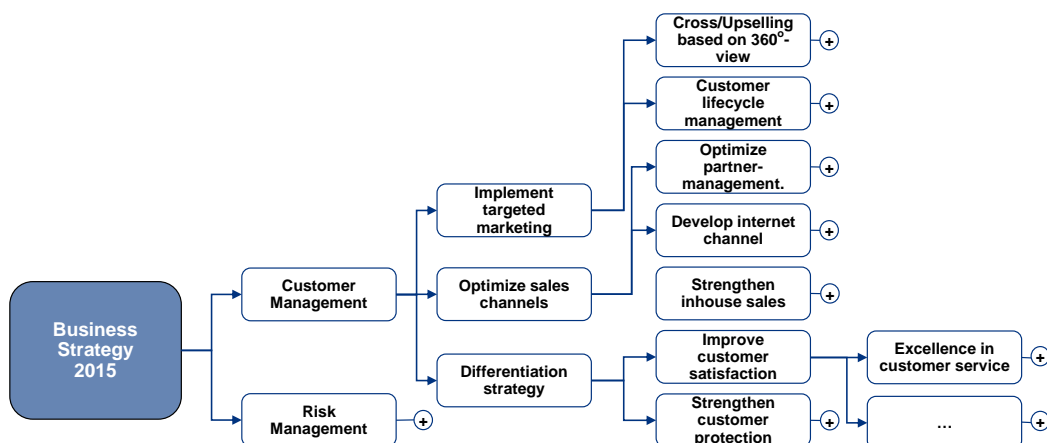


Figure 4.15: Exemplary strategy tree

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

This strategy analysis needs to be related on the business capability map. In this way one can learn which business capabilities are particularly important to fulfill strategic objectives. This information is subsequently used to decide which business capabilities should be kept in the organization, which of them can be outsourced, and which new capabilities are necessary and need to be in-sourced. Following the EA management approach, in the next step it is recommended to analyze what is “under” the capabilities, e.g. which business processes or applications are impacted.

Having conducted the strategy and trend analysis, business capabilities can be optionally further evaluated using so called value maps. Value maps are portfolio visualizations which contain dimensions as strategic value and potential for standardization. Dependent on the dimensions of a portfolio, different strategies can be defined reflecting the recommendations for evolving the capability portfolio. It may, for example, be proposed to strengthen a capability within an enterprise or to standardize it and source from external suppliers.

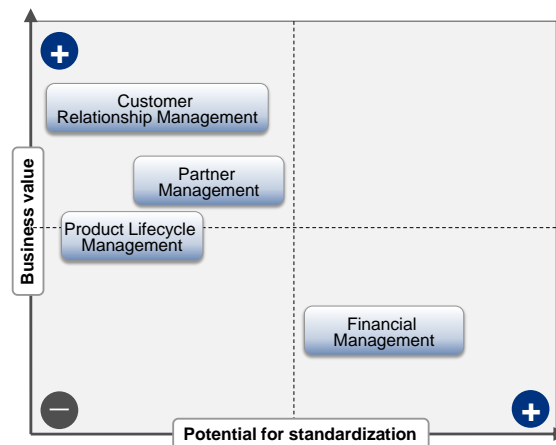


Figure 4.16: Exemplary business capabilities portfolio

The EA management approach knows numerous concepts, methods and techniques to facilitate the decision making process considering sourcing. Concepts as business capabilities or partitioning, as presented in TOGAF[®], apply here. Architecture partitioning relies in turn in “slicing and dicing” the enterprise along such dimensions as functional domains, i.e. capabilities, architecture layers, and period of relevance. Partitioning facilitates optimization of the enterprise and pursuing different goals for each partition. In the context of modular sourcing the EA management method has to be adapted to particular requirements (see Figure 4.17):

Phase A: Architecture vision The vision introduces the distinction between core and support business capabilities, of which the latter may be subject to modular outsourcing.

Phase B: Business architecture The design of the business architecture reflects the former distinction and seeks to minimize the dependencies and information flows to the support capabilities.

Phase C: Information system architecture In designing the information system architecture the relevant information flows between the core and the support capabilities are analyzed and reified into interoperable interfaces.

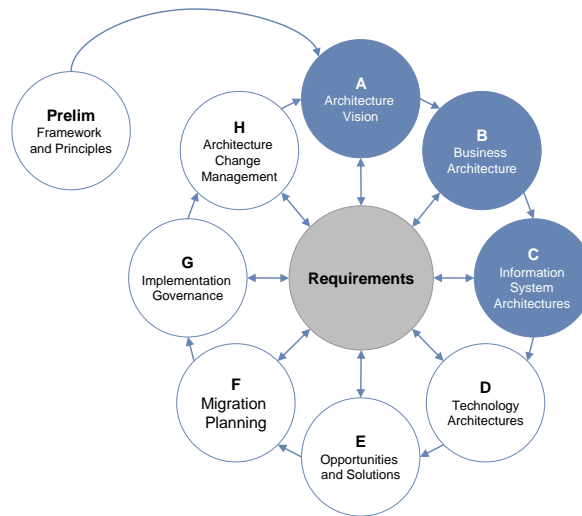


Figure 4.17: ADM phases relevant for scenario *Sourcing Decisions in a Modular Enterprise*

Sourcing decisions refer to any part of the EA. Necessary in this case documentation of the business capabilities as a part of the business architecture and a reference description of the enterprise’s main functions. Furthermore business strategies, goals and trends need to be analyzed and systematically documented. In order to ensure success after the integration, business capabilities need to be considered in relation to other architecture elements, e.g. applications or business processes. Figure 4.18 refers to the BEAMS model and highlights the layers and cross-functions which need to be involved in this context.

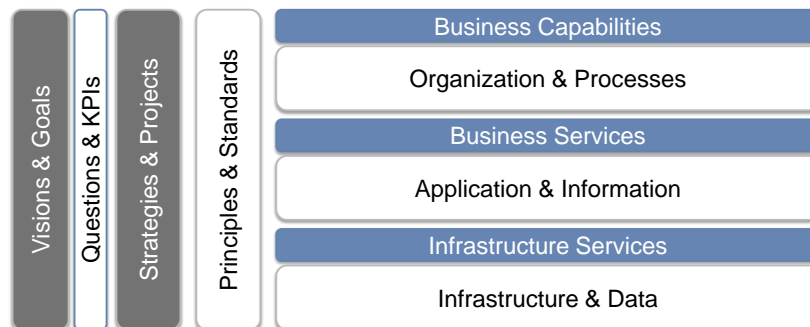


Figure 4.18: EA aspects relevant for scenario *Sourcing Decisions in a Modular Enterprise*

Sourcing decisions require management attention and are taken on the highest level. The decision is prepared by the strategic management team. Decisions on the core competencies are taken based on the business strategy. EA management methods, if applied, need to be integrated with the strategic planning processes.

Opportunities

Application of EA management for the sourcing strategies will allow the companies to profit from the following conceptual changes:

Enterprise-wide holistic view instead of sole process/IT focus: i.e. sourcing decisions will not be focused on the IT but will also consider the implications to other architecture elements such as business processes.

Stronger focus on the market dynamics and the need for flexibility: instead of development of static roadmaps, monolithic structures and focus on operational aspects, i.e. EA management methods foster development of architectures which are agile and into which change can be realized staying strategy-conform.

Predictability and flexibility of architecture: due to business capabilities approach.

White-box instead of black-box: i.e. EA management supports complete transparency in terms of foundation for the decision making and for further seamless integration of value creation processes.

Scoping and prioritization in the roadmapping: instead of all-at-once approach — EA management methods as presented above encourage clear scoping and creation of a clear, defined and realistic vision.

EA management enabled business innovation instead of reactivity: taking decisions in terms of business capabilities encourages identification of core capabilities in which investments for innovation should take place as well as capabilities which can be standardized supporting cost savings

Strategic, innovation and operational focus: instead of silo sourcing approaches.

Threats

The following threats and challenges may on the other hand occur in this scenario:

- The challenge to build consensus on the capability portfolio.
- It may be tempting to develop too much time to master the capability map and strategy trees and postponing the decision.
- Threat of lack of understanding of this approach by the IT management used to silo sourcing approaches.

Despite of a growing recognition of EA management methods in the referred context, some companies still keep old conventions and e.g. outsource the whole data centers without systematically considering impacts of this decision on the rest of the enterprise, e.g. business processes. The following exemplary threats arise, if no holistic approach is applied:

- Integration problems.
- Sub-optimal data security or even data leakage.
- Loss of know-how due to outsourcing of strategic core capabilities.

Classification in the scenario portfolio

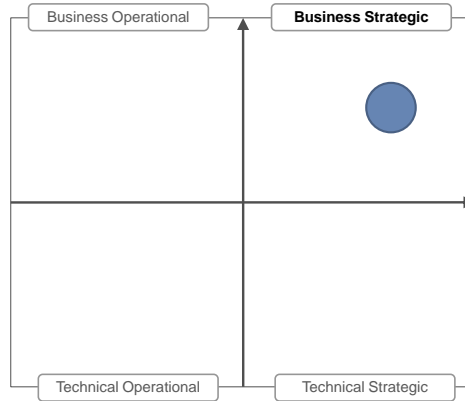


Figure 4.19: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.7. The tool vendors’ prioritization is detailed in Table 4.8.

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	-0.5
Finance	0
Government	0
Healthcare	-0.5
IT Products & Services	0
Manufacturing	-0.5
Telecommunication	0.5
Transportation & Logistics	1
Other	1

Table 4.7: Partner prioritization of *Sourcing Decisions in a Modular Enterprise*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	1
Avolution	2
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	3
Software AG	2
SparxSystems GmbH	0
<i>Median</i>	2

Table 4.8: Vendor prioritization of *Sourcing Decisions in a Modular Enterprise*

4.2 Flexibility-related trends

Modern enterprises find themselves confronted with an environment, which undergoes continuous changes. These changes require the enterprise to quickly respond in particular to unforeseen conditions. An enterprise seeking to survive under these challenging conditions has to provide a flexible EA that facilitates quick responses and frequent adaptations. Flexibility in the enterprise can be achieved on various levels pertaining to the entire structure

from business to infrastructure. The following flexibility-related trends reflect enterprise flexibilization on these different layers.

Business platform management provides flexibility on a holistic level, i.e. regarding business support.

Agile Support of continuous IT restructuring provides flexibility on the level of IT support.

Virtualization for data centers enables flexible usage of data centers via virtualization, i.e. flexibility on the infrastructure level.

4.2.1 Business Platform Management

Today's markets are characterized by their volatility. Changing customer behavior and novel environmental conditions require the enterprises to flexibly adapt their business processes. This requirement demands an adaptive and responsive business platform, consisting of technological and informational resources framed into an appropriate organizational structure. This kind of business platforms are a key management subject for EA management. Future management procedures combine methods to identify changing customer behavior with analysis techniques to evaluate how this change will result in adaptation requirements for the underlying business platform. One of these methods is known as Pattern Based Strategy.

Indications

Business platform management is especially interesting for enterprises that

- operate large businesses building on diverse business capabilities,
- define customer satisfaction or market share as critical success factors,
- are able to track customer behavior, especially regarding purchasing, and
- have business rule management systems as well as business intelligence, business activity monitoring, complex event processing, and simulation systems in place.

Contra-indications

The realization of business platform management may be impeded in enterprise that

- have neither identified and modularized the components of business support, nor established governance structures for these components,
- have no top-level management support for enterprise-wide transformations towards adaptive business platforms, or
- do not want to take the ramp-on investments for establishing business platforms.

Solution

The establishment of business platforms prepares an enterprise to quickly respond to customer's current and future demands. A business platform in this context is composed by standardized and modular infrastructure, information and business layers, which support and enable the implementation of business directives (in form of business principles and business vision). EA management lays the basis for establishing business platforms by providing clear transparency regarding the structure of today's business support as well as by creating a basis for planning the transformation of the support (cf. Figure 4.20).

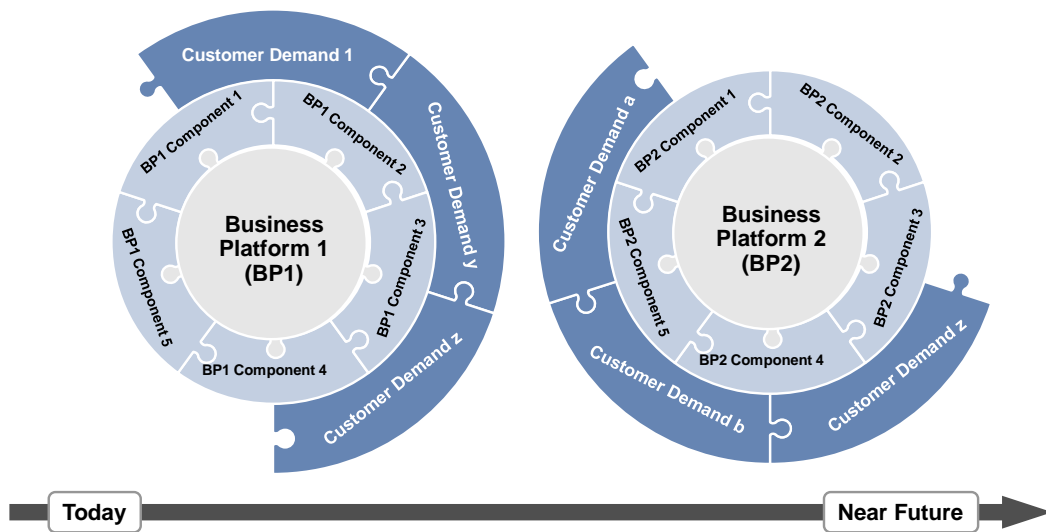


Figure 4.20: Transformation of business platforms

Business platforms can further be complemented by *pattern based strategy*, which allows to identify current and future customer's behavior, through the generation of predictive models (based on statistical analytics). This quantification is translated into a set of concrete configuration changes applying to the business platform and to the overall organization using EA management methods. In particular, different phases of the ADM are impacted by the implementation of business platform management:

Phase A: Architecture vision During the elicitation of the architecture vision, business capabilities that should “sense” customer behavior are defined.

Phase B: Business architecture The development of the business architecture defines process steps for measuring customer behavior and introduces metrics over the business objects. Based thereon, flexibility rules are defined.

Phase C: Information system architecture During the design of the needed business support, relevant measurements are reified via operational metrics and analytics procedures in the information systems.

Phase D: Technology architecture In designing the technological basis for business support, focus is lead on flexibility and interoperability enhancing means, whereas standardization is considered a minor topic.

Phase H: Architecture change management Dedicated change management processes react to the occurrence of defined patterns, as reflected by rules. Further, particular processes for handling unforeseen patterns are established to facilitate the feed-forward to architecture visioning.

As the identification of patterns involves several sources of information, such a data, people, processes as well as new sources such web 2.0 (for example through analysis of customer’s preferences in platforms such a Facebook) , the following TOGAF® phases are involved:

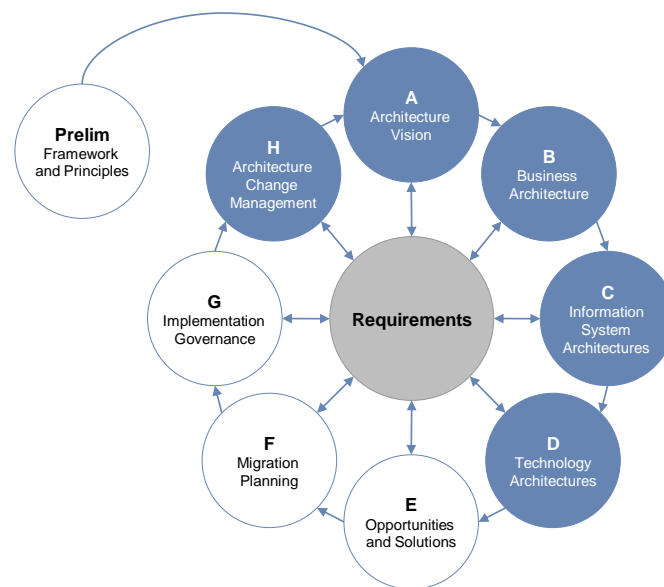


Figure 4.21: ADM phases relevant for scenario *Business Platform Management*

An appropriate stakeholder management is crucial for the successful implementation of this paradigm, as business pattern strategy implies not only a technological change but a cultural one. Reactive adaptation to customer behavior is thereby replaced by an increased flexibility that allows proactive and anticipatory changes. This aspect is supported by TOGAF® in the way as it provides guidelines for stakeholder management.

Business platform management based on customer behavior is a holistic approach which impacts the whole organization (technical and business aspects) in order to enable the implementation of flexible business capabilities and business services, which are flexible enough for satisfying current and future customer’s demands. The underlying infrastructure services need to be configured in such a way that they are able to respond to the changing organizational processes. Therefore, the following layers are involved when implementing and executing business platform management scenario: Business Capabilities (Organization & Processes), Business Services (Applications & Information) and Infrastructure Services (Infrastructure & Data).

The predictive models of the pattern based strategy inputs for KPIs, which indicate the new business goals to be reached by the organization. The establishment and tracking of those KPIs is crucial for the implementation of this scenario. This new paradigm impacts as well the way in which an organization defines its vision and sets up its goals, as this new approach allows an organization to operate more flexible. In particular, the cross-cutting aspects of Vision & Goals (Questions & KPIs) are affected.

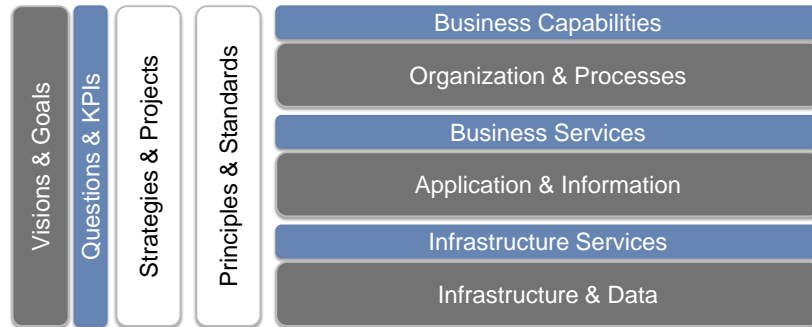


Figure 4.22: EA aspects relevant for scenario *Business Platform Management*

The following enterprise-level management functions are affected when implementing this scenario: change management, performance management, risk management, project portfolio management, demand management, innovation management, financial management and strategic right-sourcing. Some of EA management artifacts produced during the implementation of business platforms are:

- Business support diagrams: which enables the fast identification of affected units and technology components when implementing a new business capabilities.
- Reference domain models: which support the establishment of transparency in the company across organizational and geographical units and facilitate a common understanding of patterns and signals inside the (extended) enterprise.
- Stakeholder analysis lists: which are useful during the initial deployment of this concept in the organization.

Opportunities

- Offer a platform for the enterprises to identify new patterns and for exploiting them in order to gain competitive advantage
- Force competitors to react to new patterns of change within the marketplace created as result of the organization's own innovation activities
- Enable change through the alignment of organizational resources to strategic performance metrics
- Maximize the allocation and utilization of enterprise resources as new patterns emerge

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Threats

- For implementing Pattern Based Strategy with repeatable accuracy it is necessary to get technologies which provide sustainable agility in place. An initial investment is required.
- The establishment of appropriate data and information management is crucial for getting appropriate data in terms of quality and actuality.

Classification in the scenario portfolio

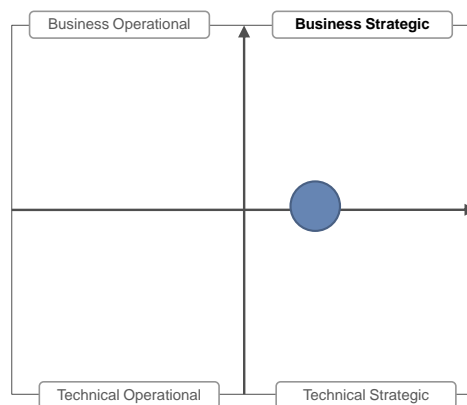


Figure 4.23: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.9. The tool vendors' prioritization is detailed in Table 4.10.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	1
Finance	0
Government	0
Healthcare	0
IT Products & Services	0
Manufacturing	-1.5
Telecommunication	-1
Transportation & Logistics	-1
Other	0

Table 4.9: Partner prioritization of *Business Platform Management*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	0
BOC Information Technologies Consulting AG	1
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	2
Software AG	3
SparxSystems GmbH	0
<i>Median</i>	1.5

Table 4.10: Vendor prioritization of *Business Platform Management*

4.2.2 Agile Support of a Continuous IT Restructuring

Technological, economical, political, and social changes continuously lead to new opportunities and challenges in today's highly dynamic business environment. An enterprise must be able to respond quickly to relevant changes to secure existing business capabilities and to generate new assets. Agile methods for EA management may support continuous restructuring of the architecture.

Indications

- Companies applying agile project management and agile software development approaches will strongly benefit from an agile EA management.
- Companies having a dynamically changing business behavior will benefit from agile EA management support.

Contra-indications

- Companies not applying agile techniques for project management and software management are unlikely to benefit from an agile EA management.
- Companies facing a small number of changes in their business behavior are unlikely to benefit from agile EA management support.

Solution

Similarly to existing EA management approaches, the “classic software development” faces the problem, that diverse stakeholders with domain-specific backgrounds must work together to enable the development of a specific software. Agile software development in combination with agile project management, applies an iterative and incremental development method, where software requirements and solutions evolve through collaboration between stakeholders and product developers. Agile EA management can therefore provide an corresponding method, where the EA management requirements and solutions evolve through collaboration between different stakeholder and enterprise architects. According to [Bu11a], agile EA management approaches have to address following challenges:

- The EA management endeavor has to be aligned with the stakeholders' interests expressed in a shared terminology.
- An EA management endeavor has to ensure an early and periodical delivery of concrete EA products.
- An EA management endeavor has to ensure commitment and involvement of all parties.
- An EA management endeavor has to continuously adapt to a volatile environment with changing criteria for goal fulfillment.

Agile EA management will enable companies to respond quick to relevant changes in order to protect existing business capabilities and to generate new assets. One related approach is to continuously improve the efficiency of the IT in an agile manner responding to the changing business environment. Increasing the efficiency of IT could be achieved in different ways, e.g.:

- Improvement of scalability & flexibility,
- Usage of cloud computing,
- Extended service portfolio, and
- Client virtualization.

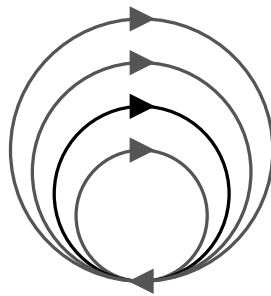


Figure 4.24: Agile Support of a Continuous IT Restructuring

In terms of the ADM of TOGAF[®], the most affected phases are the following phases (cf. Figure 4.25):

Phase E: The different technical and organizational opportunities should be evaluated and the solutions to be realized have to be selected, prioritized and bundled to an “EA management run” in this phase.

Phase F: In this phase the migration planning is performed which step by step transforms the enterprise towards the defined EA management run.

This scenario affects especially the application & information layer as well as its abstracting service layer (cf. Figure 4.26). Concepts on the latter layer are used to define both the functional and non-functional requirements that have to be fulfilled by any implementing application portfolio.

Consequences

EA management provides an engineering approach for the continuous advancement of the enterprise as a whole. The high number of involved components and their dense web of interdependencies nevertheless form a major challenge for such approach and demand high initial investment into documentations, communications, and analysis. The aforementioned fact has in the past been an impediment for successful EA management in practice. In the field of software engineering recently lightweight and agile methods have become more and more important. These scenario aim at quickly creating results, while staying flexible in respect to

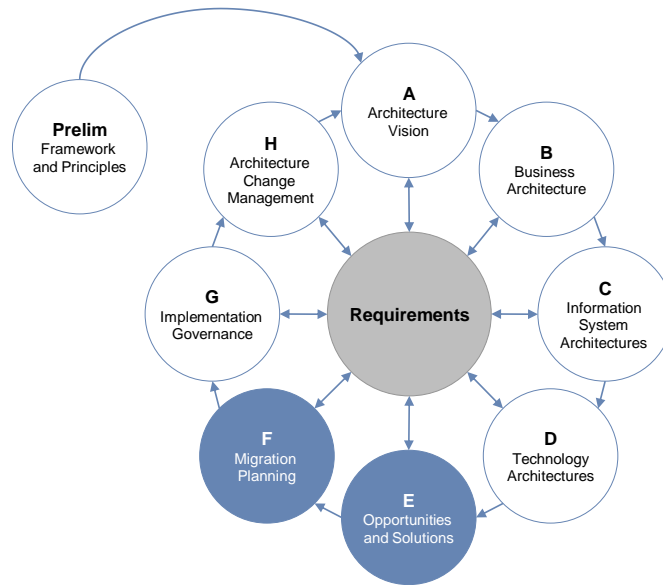


Figure 4.25: ADM phases relevant for scenario *Agile Support of a Continuous IT Restructuring*

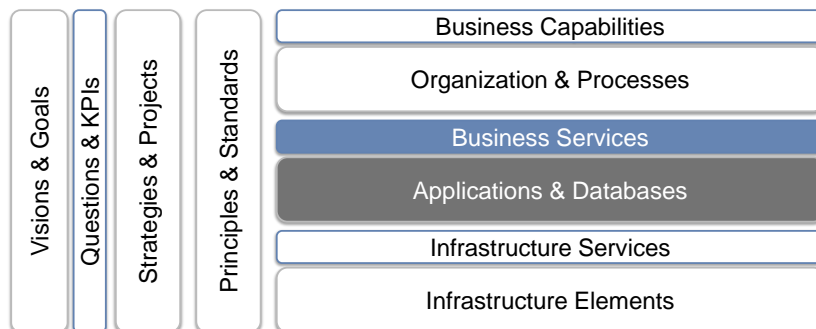


Figure 4.26: EA aspects relevant for scenario *Agile Support of a Continuous IT Restructuring*

the design goals to attain. It will affect the way how EA management is performed in the enterprise.

Opportunities

Time-to-market: results & EA management artifacts are created faster.

Increased-flexibility: agile EA management is more flexible in respect to the defined design goals.

Higher acceptance: due to the improved delivery time of EA management artifacts and to due to the shorter EA management cycle durations, EA management will become better understandable and more accepted in ongoing projects.

Threats

Higher IT-related business risk: the continuous improvement of systems, the extensions to the service portfolio and the usage of cloud computing will increase the IT-related business risk.

Classification in the scenario portfolio

The scenario was classified as technology-oriented and from strategical role of EA management in the company by the participating industry partners.

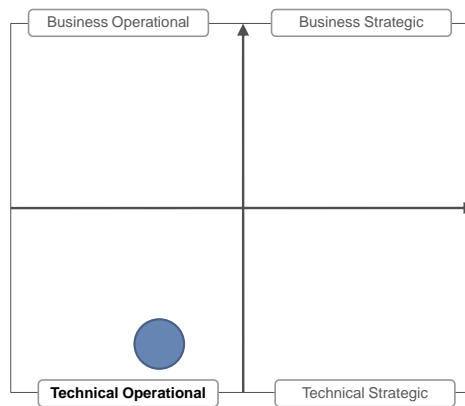


Figure 4.27: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.11. The tool vendors' prioritization is detailed in Table 4.12.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	1.5
Finance	1
Government	0
Healthcare	0
IT Products & Services	1
Manufacturing	0.5
Telecommunication	2
Transportation & Logistics	1
Other	1

Table 4.11: Partner prioritization of *Agile Support of a Continuous IT Restructuring*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	1
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	3
iteratec GmbH	3
MEGA International	2
Software AG	3
SparxSystems GmbH	0
<i>Median</i>	2

Table 4.12: Vendor prioritization of *Agile Support of a Continuous IT Restructuring*

4.2.3 Virtualization for Data Centers

An adaptive IT infrastructure has been recognized as a vehicle for cost optimization in industries such as telecommunications and energy. The concept of data center virtualization provides as basis for realizing such infrastructure. EA management provides helpful means to identify demand for adaptiveness and potential for virtualization and can thus help to adopt adaptive IT infrastructures in new branches. In addition, EA management supplies a holistic view on the company and allows to analyze adaptive infrastructures against the background of existing business rules.

Indications

- The company experiences high energy costs for data centers.
- Increasing load, especially on customer-facing business applications, demands a growing amount of hardware assets.
- The company experiences high hardware maintenance costs.

Contra-indications

- The company has a dynamically changing business behavior leading to unpredictable load profiles in the data centers.
- The company uses cloud computing solutions and retains only a small data center.

Solution

According to recent analyses between 30% and 60% of the energy consumed by data centers is wasted for idle hardware devices. This results from the fact that as of today, hardware devices, especially servers, are designed to support peak load specifications. Between the peaks, such servers necessarily are not completely used to capacity, but have to be kept running. Notwithstanding modern energy saving mechanisms on hardware level, such servers add to the waste of electrical energy in today's data centers.

Infrastructure virtualization softwares, like VMware, support to reliably run multiple business applications on a single physical server. In addition, such software allows to dynamically relocate running business applications to different physical servers by re-allocating the virtual server to a different hardware device. Thereby, it becomes possible to adaptively pack virtual servers to physical machines in a way that these machines are optimally used to capacity. Figure 4.28 shows the usage profile of single physical servers, whereas Figure 4.29 displays the result from a server packing by virtualization. In order to decide on this packing, it is necessary to understand the load profiles of the different business applications under consideration. Such load profiles can be derived from information gathered in IT operations via specialized control units targeting physical and virtual servers. In addition, in-depth information about the prospective interactive tasks assigned to a business application as well as about batch jobs, like backups or database materializations are required to decide on middle term load peaks.

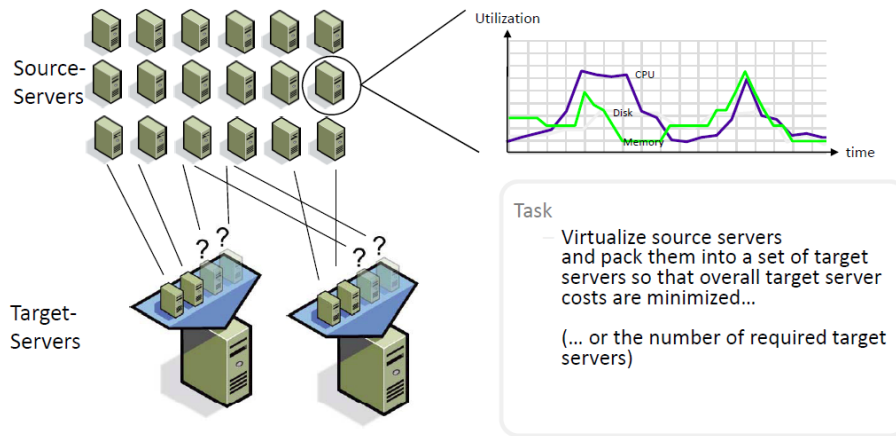


Figure 4.28: Business applications running on dedicated physical servers

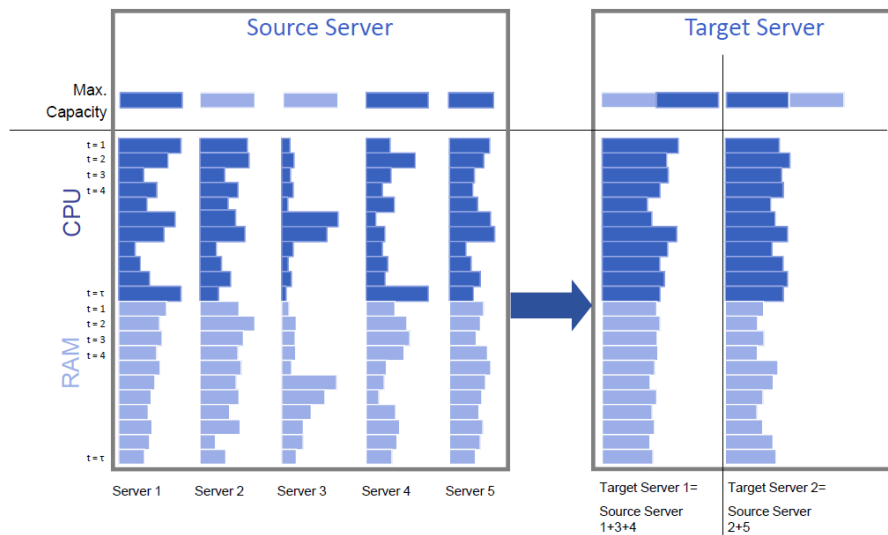


Figure 4.29: Business application running on packed virtual servers

Detailed information on service level agreements regarding different business processes and functions are needed to optimally distribute the virtual machines in respect to latency. Further, current load profiles of business applications have to be aligned with upcoming transformations of the application landscape but also of the business models. Thereby, it is ensured that none such changes critically affect the capacity planning in a way that single physical servers reach their capacity limit. For example, information about upcoming promotions of certain customer-facing web-portals provide valuable input to decide that the corresponding server should not be packed with other virtual servers due to expected increase in load. All aforementioned information has to be drawn from different sources, which are as of today distributed over a wide range of tools. Future EA management acts as central information repository and brings together the information needed to decide on dynamical adaptations of the virtual infrastructure. In particular, the EA management tool is expected to store

information about SLAs and present it to IT service managers responsible for deciding which policies of resource allocation should be implemented in the automated control and migration facility. Thereby, the EA management method of a using company (cf Figure 4.30) has to be adapted regarding the actual implementation of architectural solutions:

Phase G: Implementation governance During the technical deployment of the business applications considerations and measurements regarding the design of a virtual infrastructure have to be undertaken.

Phase H: Architecture change management Monitored utilization statistics from IT operations provide valuable input of development and evolution of the EA.

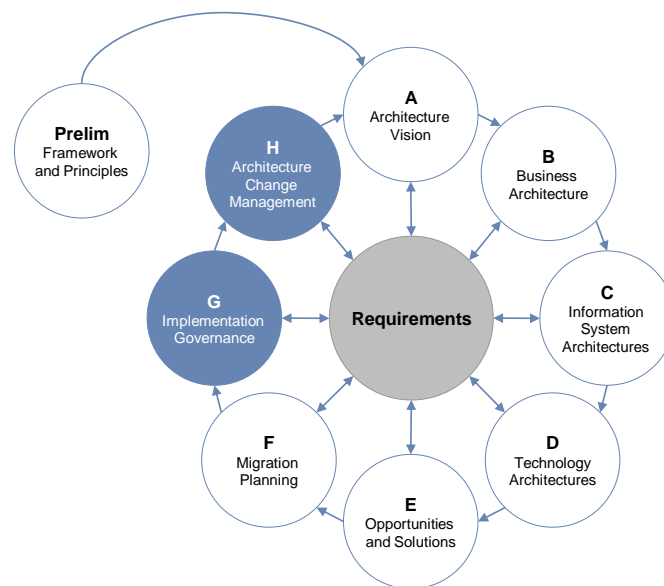


Figure 4.30: ADM phases relevant for scenario *Virtualization for Data Centers*

Following layers and cross-cutting functions according to BEAMS, see also Figure 4.31, are affected by this scenario:

- Infrastructure & Data layer - How green IT is embedded into this layer, and
- Principles & Standards - Definition of standards and principles for green IT.

Opportunities

Availability: Having automated virtualization support, high system availability can be achieved.

Cost savings: The reduction of physical hardware and the better utilization of existing hardware resources leads to cost savings.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

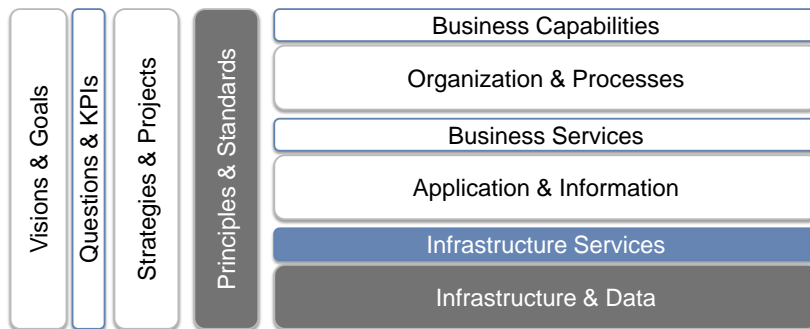


Figure 4.31: EA aspects relevant for scenario *Virtualization for Data Centers*

Threats

Higher IT related business risk: The usage of automated virtualization mechanisms leads to higher IT related business risk since the crash on one physical machine affects many different virtual servers deployed on this machine.

Low availability: Low availability is expected during the initial phase of this scenario.

Initial investment New hardware and virtualization software can lead to high initial investment costs for this scenario.

Classification in the scenario portfolio

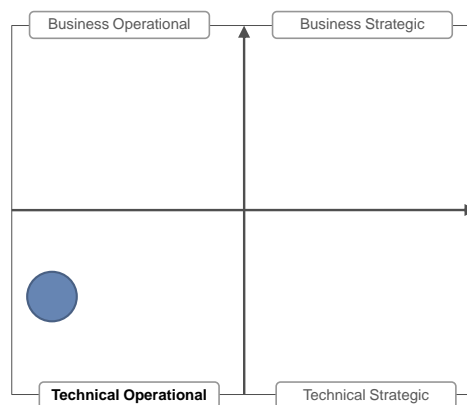


Figure 4.32: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.13. The tool vendors' prioritization is detailed in Table 4.14.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Branch	Priority (-3 low to 3 high)
Consulting	-1
Education	-1.5
Finance	-1
Government	0
Healthcare	-0.5
IT Products & Services	0
Manufacturing	-1
Telecommunication	-0.5
Transportation & Logistics	-1
Other	-2

Table 4.13: Partner prioritization of *Virtualization for Data Centers*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	1
BOC Information Technologies Consulting AG	-1
Enterprise Architecture Solutions Ltd.	-1
iteratec GmbH	1
MEGA International	0
Software AG	-3
SparxSystems GmbH	2
<i>Median</i>	0

Table 4.14: Vendor prioritization of *Virtualization for Data Centers*

4.3 Trends for future knowledge work

Knowledge management is a core challenge for modern organizations. The implicit knowledge of employees need to be made transparent in order to foster knowledge exchange between different departments and employees. Means and techniques to support knowledge exchange between different parts of an organization or between employees is the central topic of the following scenarios. Typical fields of interest for future trends of knowledge work are:

Enterprise 2.0 and social computing that provide innovative technologies to foster information exchange

Mobile devices and universal availability of information enable employees to provide and receive information

Workplace of the future details how an organization can provide a working environment for employees that enables mobility and information exchange

4.3.1 Enterprise 2.0 and Social Computing

According to Forrester Analysts [Le10], the mode of work is shifting more and more from a document-centric to a people-centric approach. Especially with increased automation and expert knowledge that is necessary to perform certain tasks, a centrally stored and easily accessible database of people, skills, and roles delivers important insights. Furthermore, knowledge management is gaining increased importance with the shift from life-long employment with one employer to regular changeovers. As a consequence, knowledge must be formalized and stored in order to avoid too much loss of intellectual capital due to employees leaving. These are specific demands which can be met with enterprise 2.0 and social computing concepts. Those concepts are based on web 2.0 technologies and can be used in various ways, e.g. organizations can use open web 2.0 platforms to receive and gather information from their customers,

respond to their customers in the same way, or progressively communicate with them via web 2.0 platforms. This scenario mainly focuses on the usage of web 2.0 technologies within the enterprise. Thereby, web 2.0 technologies can serve multiple purposes, e.g. networking (especially over far distances in a distributed organization), staff planning, collaboration, and communication and therefore facilitate knowledge management and social cohesion. In addition, web 2.0 technologies facilitate to increase efficiency of internal processes. Since more and more employees communicate via web 2.0 applications in their private life, companies should adapt such applications in their working environment. EA management can be used to implement the necessary guidelines and to address governance aspects which are important in this context. Besides this, EA management provides a structured approach to design and implement the necessary data, application and technical architectures.

Indications

The more popular the application of social computing like Facebook and Twitter became to build up social networks using computational systems, the more companies strove to adapt these technologies and concepts in their internal communication e.g. using wikis, the “CEO-blog”, personal employee blogs, employee profiles etc. In the future, the whole enterprise may be interpenetrated with web 2.0 and social computing technologies and permanently change the way of working. With this increasing popularity of social computing and web 2.0 platforms, employees strive to use this technology not only in their spare time but also in their work environment. Employees want no paradigm change when accessing corporate and external information. This scenario also refers to the general trend towards web 2.0 technology and new communication paradigms. The scenario enterprise 2.0 and social computing is especially interesting for organizations that

- are under cost pressure on markets and an increasing thrive for efficiency leading to a demand for creating a more efficient and connected working environment,
- are struggle with technological innovations like high-speed Internet, innovative end-user devices, and the trend towards an “anywhere” workplace, and
- that are open for the use of new technologies like enterprise 2.0 technologies.

However, today’s enterprises must keep in mind is that beside the decision for intentionally using web 2.0 technology in the internal communications or for marketing purposes, companies must be aware that people discuss about them in the Internet and in web 2.0 media, e.g. when somebody posts about them on Twitter, Facebook etc. Therefore, in today’s digital world, hardly any organization can avoid to think about its position towards social computing and web 2.0 technologies.

Contra-indications

The scenario enterprise 2.0 and social computing may be impeded by organizations that

- have a strong culture of face-to-face meetings. Even if social computing and enterprise 2.0 facilitate electronically networking over far distances, the face-2-face meeting in the company’s coffee corner is still regarded more valuable than any virtual meetings in order to foster creativity and establish close networks. It must be kept in mind that

many aspects of communication lie in body language, mimic, inflection etc. which mostly can only limited or not at all delivered via web 2.0 technologies. Therefore, misunderstandings and tensions can arise which e.g. might not have been an issue in a face-2-face meeting.

- has a 'political' culture, i.e. an organization must be ready to use social computing and web 2.0 technologies not only from an IT perspective, but much more from an organizational perspective including the corporate culture, which must be fit for open discussion, open feedback and the acknowledgment of the value-add of the active usage of social computing and enterprise 2.0.
- deal with strongly sensitive information. An obstacle to apply web 2.0 technologies lies in the field of security and compliance. Since the underlying paradigm is based on a certain degree of openness, where almost everyone can read, create and edit everything, ensuring the correctness, consistency, confidentiality, security and compliance of information is a critical aspect. In fields, where the required data security and compliance cannot be ensured, this scenario is rather unlikely to apply. E.g. enterprises in the defense sector require very high security standards. In those parts of the company, where information is highly sensitive, this scenario might not be applicable, since the value-add of openly shared information cannot be achieved due to the necessity to highly restrict information exchange.

Solution

Web 2.0 with its community functionality, social networking facilities and communication facilities is one tool to provide appropriate functionality to interconnect people and knowledge within an enterprise. It offers capabilities for profiling, establishing communities, tagging, collaboration, networking and communication to a large number of people including the opportunity to interact and therefore enables people in an enterprise to work more closely together – even over far distances. web 2.0 technologies including Social Software and Social Media can be used for different purposes, but it must be designed in an appropriate way due to the desired goals. As shown in Figure 4.33, without web 2.0, the management of an organization could e.g. publish official information on its static intranet sites to its employees as a classical one-way communication where only few people publish content to many. Applying the web 2.0 paradigm, this unidirectional way of communication changes to a bidirectional communication in which e.g. the management publishes official briefings in a formalized manner on a blog, giving their employees the chance to comment on the blog-Posts. Going one step further, each employee could receive his own personal blog where he can freely publish his thoughts and ideas within the organization in a very informal manner. Therefore, the information flows within the company increase significantly. The additional usage of micro-blogging, wikis etc. offers the chance to fasten up collaboration over far distances. Furthermore, the link of people with their profiles describing their individual expertise, interests, their current occupation, their current location etc. offers a compact and centrally accessible overview of staff occupation and skills. This gathered information can be searched and therefore supports staff planning in the corporation. Besides this, networking will support the flow of information and knowledge within the enterprise. These aspects also allow more efficiency in staffing, better

communication in a more appreciated way due to the possibility of leaving comments on communiques, faster communication and better collaboration over long distances including the enablement of BPM (Business-Process-Management) supported by web 2.0 technologies.

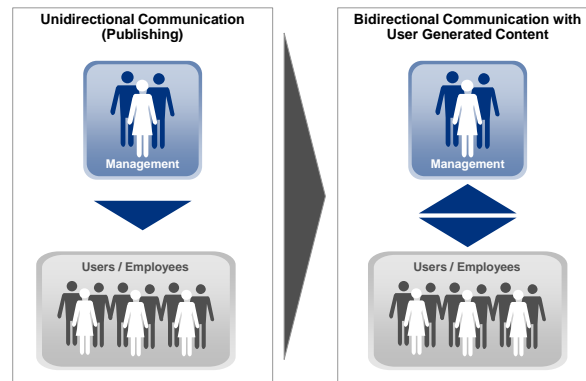


Figure 4.33: Change of communication paradigms

Because of this as well as the fact that enterprise and web 2.0 can be used in multiple ways, this scenario affects all industries and all types of organizations from non-profit to whole corporations. Rather agile, young companies offering products focusing on fashion and trends are more likely to adapt such new communication technologies than companies focusing on tradition and offering products which request high reliability and quality. The main reason for this tendency is that one prerequisite for establishing an enterprise 2.0 and social computing successfully is the cultural readiness and openness to the full range of these technologies which is more likely found in a marketing agency than a more traditional company. But in general, knowledge management and communication issues are gaining more attention, while less focus will be put on traditional communication methods like document-centric collaboration platforms.

To establish an enterprise 2.0 and social computing technologies, the TOGAF[®] ADM can be used. Once, web 2.0 platforms and applications are in place after an initial run through the ADM, especially the activities in the following phases will be affected when iterating through the ADM cycle for different architecture projects not necessarily focusing on web 2.0 (cf. Figure 4.34):

Phase C: Information systems architecture The Information Systems Architectures with the aspects of data and application architectures are affected, since there is the question whether or not to use web 2.0 applications. Moreover, in a highly distributed network of smaller applications, the data architecture gains importance, because data access must be ensured and secured.

Phase D: Technology architecture In the phase Technology Architecture, enterprise 2.0 specific platforms are defined.

Phase G: Implementation governance The Implementation Governance gains importance, since enterprise 2.0 and social computing require a strong governance and compliance checks in order to keep the diverse landscape manageable.

Phase H: Architecture change management Among other activities during the Architecture Change Management phase, the governance process is managed, performance targets are addressed, and risks are managed. These activities also gain importance with the introduction of web 2.0 technologies in the enterprise.

Other activities like addressing the business processes as performed during the business architecture phase, assigning business value to single projects in the migration planning phase and actively managing upcoming and changing requirements in the requirements management are also affected by the scenario, but not as significant as the above mentioned.

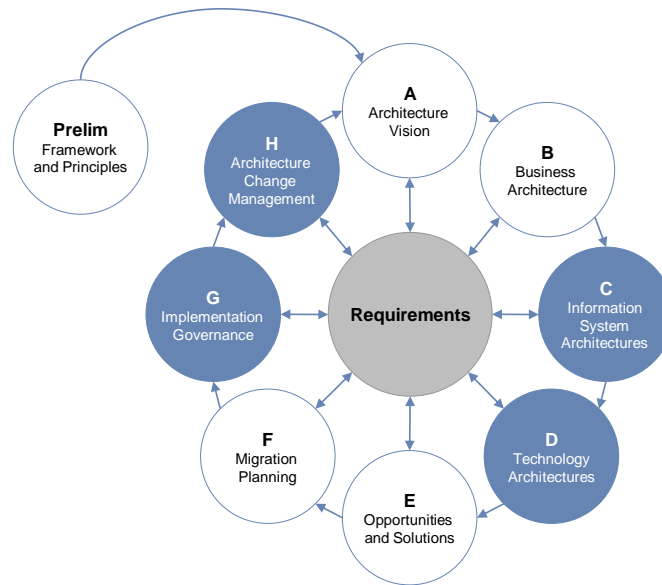


Figure 4.34: ADM phases relevant for scenario *Enterprise 2.0 and Social Computing*

Enterprise 2.0 and social computing affects all layers and cross-cutting functions, since it describes a whole new basic paradigm how IT can support the business. But even though, those areas especially affected by this scenario are pointed out in the following section.

Web 2.0 and all the freedom it offers for its users must be structured and governed in some way. The underlying data storage must be designed and provided as well as an integrated landscape of web 2.0 applications needs to be set up. The challenge is to create a highly linked network of applications for communities, blogs, networking etc. to make the most of web 2.0. Therefore, application architecture, data architecture, but also platform design, standardization and governance are challenges to be met by EA in order to provide web 2.0 technologies in an enterprise. The corresponding layers and cross cutting functions are highlighted in Figure 4.35.

The scenario of enterprise 2.0 and social computing affects mostly the supportive domains in the enterprise, like all communication related domains, especially the internal communication instruments, the knowledge management, e.g. in terms of mining of unstructured information to create knowledge, project management, e.g. in order to tag project documentation and collaboration platforms, and document management as cross-enterprise supporting domain. Furthermore, communication management, innovation management to foster innovation by

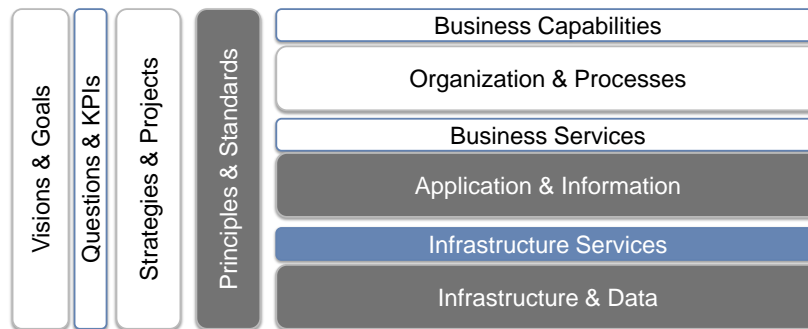


Figure 4.35: EA aspects relevant for scenario *Enterprise 2.0 and Social Computing*

collaboration, and marketing management addressing the external appearance of a corporation, are affected by this scenario.

Opportunities

Enable collaboration: Enterprise 2.0 and social computing provide collaboration platforms being able to serve people from different organizational areas and facilitate a holistic approach. One result may lead to competitive advantage through improved collaboration and the ability to achieve cost savings as well as increasing resource utilization. EA even enables web 2.0-like collaboration, because EA principles are appropriate to establish a useful web 2.0 collaboration. They help to prevent the design of application silos and make sure that a holistic approach to communication and collaboration means is established.

Improve communication: Besides improving the communication of news about business successes, canteen plans etc., with web 2.0 technologies established in the enterprise, the communication of results of the architecture work and at the same time governance can be improved.

Improved stakeholder management: Using web 2.0 communication and networking functionality, stakeholders feel better involved in the business as well as in the architecture work when they have the ability to communicate directly and in an easy way.

Foster innovation and development: Potential for innovation and a more dynamic development of various business and EA areas due to a more dynamic spread of results is offered. This leads to an increased organizational responsiveness to business changes and it supports fostering of innovation.

Simplify interaction environment for users: When using web 2.0 technologies, a very simple environment can be created with which every user can easily use the applications designed in this manner. Especially when using these technologies to realize the user-interface of an EA-Tool, users might enjoy working with it. Therefore, it is possible to establish a distributed maintenance process in which everyone is able to maintain EA data in the EA management tool. It must be considered that at the same time, all essential

EA management tool functionality, as e.g. Business Support Maps or Architecture-Planning-Functionality, must be provided.

Improve Recruiting: Recruiting in the web 2.0 (Internet) facilitates easy access to information, as it helps to address the digital natives and using the information people publish about themselves.

Staff retention: Rather closely linked to the cultural changes which are part of establishing an enterprise 2.0, is the development of using incentives instead of control, which would be highly appreciated by employees.

Improve Marketing: Web 2.0 Technologies can be used for branding and to strengthen the own brand and corporate identity.

Threats

Data loss and security leaks: In the context of web 2.0 technologies, information security must be ensured and data protection legislation must be enforced in the organization. Since users can generate content on their own, these aspects must be thoroughly planned and put in place. EA management offers the opportunity to achieve a conscious treatment of information security issues in the enterprise 2.0 and social computing context. Besides this, the holistic EA approach also fosters integration of enterprise 2.0 and social computing tools into the processes. Furthermore, securing the information within web 2.0 applications is a very essential aspect, since it is important to facilitate the creation and the access to information in the network from many places and at the same time prevent any unauthorized access. In this case, EA can be used to foster security architecture, since enterprises which work according to EA principles are able to plan appropriate means to support information security.

Bad news travels fast: While offering the opportunity to communicate fast and reach a wide spread community, web 2.0 technologies also bare the threat that bad news travels fast. Besides this, people could comment negatively on the enterprise especially in the external web 2.0.

Content Quality: User generated content cannot be controlled in the same manner than highly formalized content. This can be mitigated by restricting the publishing of information to a selected circle, e.g. the CEO writes in the CEO blog. In this scenario, the advantages of user generated content and the classic web 2.0 excitement cannot be accessed. But the question remains, when e.g. using a wiki as EA management tool: how can the correct connection knowledge be stored and contained? The challenge is to find the right balance between control and agility.

Contrary paradigms: Processes and web 2.0 can be seen as contrary paradigms, since processes are very structured and driven by efficiency and web 2.0 on the other hand implies less structural boundaries and more freedom. When using social computing and web 2.0 technologies in processes, enterprises must overcome this paradigm gap.

Information overflow: When there are so many authors who constantly publish content: who should read it? Is it possible to find the necessary information when you need it? At the same time, a wiki as Knowledge-Management-Tool needs targeting and structure in order to gain benefits.

Unsuitable corporate culture: If web 2.0 technologies and the mindset behind it are not supported by the majority of the employees, there will be no benefit. It could even lead to conflicts within the enterprise due to a clash of generations.

Lack of commitment by users: Without the employees striving to establish a simple structure and to commit to liable information, enterprise 2.0 and social computing initiatives are threatened to fail. On the other hand, there must be trust in the correctness of the information published as well as the reliability of the users.

Increase overhead: E.g. in terms of communication or synchronization.

Decreased control and policy enforcement capabilities

Classification in the scenario portfolio

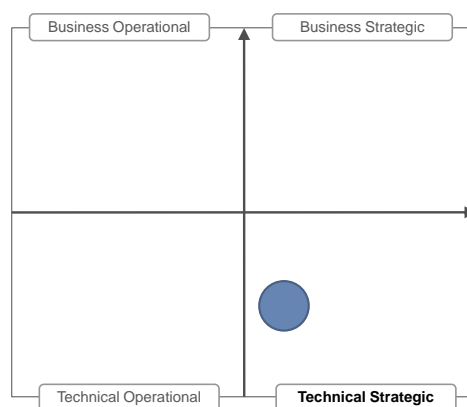


Figure 4.36: Classification of the scenario

Differentiated classification:

- Presentation technology for EA management artifacts is technical-operative
- The decision to use web 2.0 Technologies in processes and workflows in the enterprise and the corresponding decision how things are done is business-strategic
- The decision to use a wiki as an EA management tool is seen technical-strategic

The partners of the survey prioritized the scenario as shown in Table 4.15. The tool vendors' prioritization is detailed in Table 4.16.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Branch	Priority (-3 low to 3 high)
Consulting	-2
Education	-0.5
Finance	-1
Government	-1
Healthcare	0
IT Products & Services	0
Manufacturing	0
Telecommunication	1
Transportation & Logistics	0
Other	0

Table 4.15: Partner prioritization of *Enterprise 2.0 and Social Computing*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	0
BOC Information Technologies Consulting AG	-1
Enterprise Architecture Solutions Ltd.	-1
iteratec GmbH	1
MEGA International	0
Software AG	1
SparxSystems GmbH	-2
<i>Median</i>	0

Table 4.16: Vendor prioritization of *Enterprise 2.0 and Social Computing*

4.3.2 Mobile Devices and Universal Availability of Information

In today's fast living markets, companies in many industries strive for customer centricity, continuous process improvement, cost efficiency, failure avoidance and increase of quality, flexibility and agility. This scenario describes, how an architecture facilitating the access of distributed data from everywhere can be used to gain process improvements, lower costs and at the same time increase quality, flexibility and being as customer-oriented as possible.

Since companies strive to gather, consolidate, and centrally provide distributed data from different data sources like RFID-stations, suppliers, customers, distributors, warehouses, data bases, knowledge bases etc., they might use mobile devices. These provide real time access to a consolidated information base and therefore help to increase speed, efficiency, flexibility, customer service, and customer satisfaction, which lead to competitive advantage. EA management provides the capabilities to implement a business centric information and data base, an infrastructure that is fit for various kinds of end user devices, and an application landscape to support the business.

Indications

Indicators for this scenario are organizations that

- experience an increasing number of users of mobile devices and Smartphones [Ci], e.g. first partial implementations of the setting described in scenario by the German University Hospital Jena regarding usage of PDAs and RFID technology throughout the nurse staff or the Deutsche Bahn in terms of mobile tickets.
- investigate increasing usage of mobile devices in the consumer and enterprise market. As a consequence, the diversity through introduction of mobile devices in the company's infrastructure needs to be addressed. This diversity management can be achieved through

EA. Besides this, the usage of mobile devices is only possible because of the constant growth and improvements of mobile network connections [Le10]. As IDC published in 2009, the total global mobile data connections are forecasted to grow 18% between 2009 and 2014 [OML11]. Supporting this, according to Cisco, mobile network connection speed and average smartphone usage were doubled from 2009 to 2010 [Ci].

- are open to the use of mobile devices due to the popularity of this technology. Of course, it reveals its advantages in those industries and business models, where the employees are most of the time not sitting on their desks. E.g. field workers, sales representatives who need to access information when they are at a customer, or nurses, which are most of the time traveling from one hospital room to another and from one patient to another.

Contra-indications

There are two aspects to be considered when thinking about contra-indications for this scenario. Firstly, there are aspects addressing the need for mobile access to networks where data and information are stored and secondly, it must be considered whether there is a need to provide data and information everywhere and which security issues arise.

Therefore, this scenario is unlikely to be applicable for organizations that

- are located in regions, where mobile internet is not available with a certain level of quality of service, since sufficient availability, reliability and bandwidth are key factors for mobile device usage. E.g. in more rural regions or developing countries, where a stable mobile internet connection via UMTS or 4G cannot be guaranteed in sufficient quality, Mobile devices and universal availability of information cannot be used effectively. Of course, with local installations of Wifi-networks, mobile devices can also be used in a limited space in regions with bad or even no UMTS or 4G availability.
- require workplaces and applications requesting high-speed access to company networks or the internet. Therefore, the scenario “Mobile devices and universal availability of information” will not apply where rather big amounts of data, e.g. videos or pictures, are pulled, but proves its advantages where only smaller traffic is requested, e.g. when mostly data in terms of text is needed.
- that have high demands regarding security issues. One basic prerequisite for this scenario is to ensure data security throughout the whole communication at the specified security level, where the access of data through mobile devices is often a weak point.

Solution

This scenario covers the aspect of using mobile devices to access, gather and edit data within the enterprise, whereas data, functionality and infrastructure is centrally provided as shown in Figure 4.37. Therefore, the goal is to make information available throughout the whole corporation with minimized redundancy, less latency between data capturing and availability as well as making information access as fast and comfortable as possible.

For example, in a hospital's accident surgery unit, nurses could be equipped with PDAs which enable them to enter data next to the patient's bed and in real time into the central information system. Therefore, higher accuracy of data, a decreasing amount of overhead activities, fast ordering of material, as well as fast access of patient's master data, date of hospitalization, and results of diagnoses, risk factors, bed occupancy or service schedules and lists of drugs can be achieved.

Besides this healthcare industry specific example, mobile devices can be used in many industries for e.g. surveillance, remote control, information access, and information capturing, localization and navigation purposes. Besides field workers being enabled to work with their mobile devices everywhere as if they were in the office, mobile devices can be used for tracking, to facilitate toll collection, mobile ticketing or traffic information system.

With increasing popularity of Smartphones and corresponding easy to use applications for iPhone, Android etc., mobile commerce, mobile payment and a whole variety of other functionality available on private and corporate mobile devices are demanded. E.g. in the context of smart metering, there are already such mobile applications available to monitor and control the own power consumption.

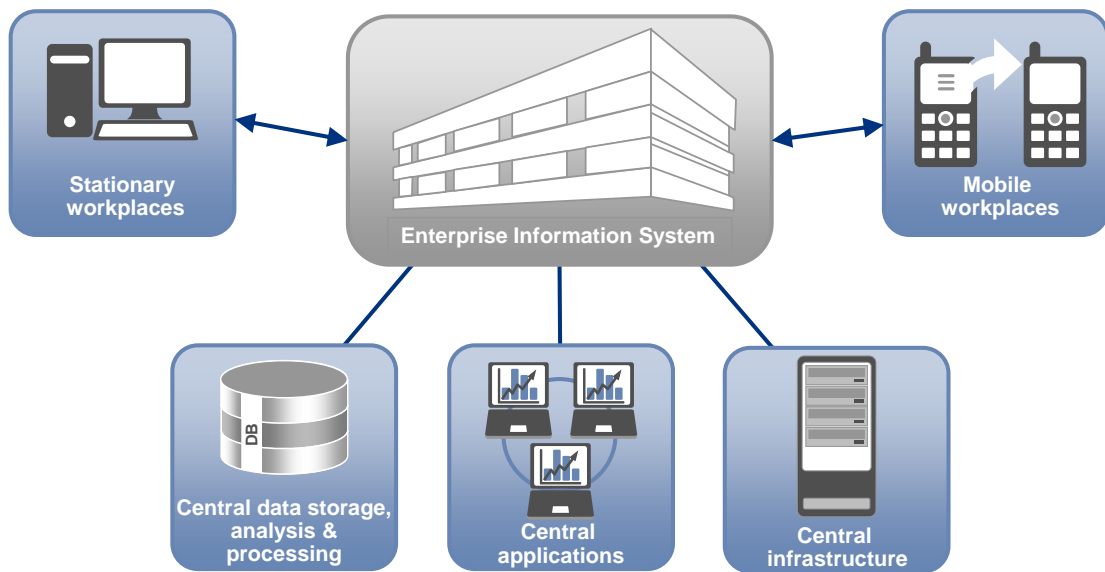


Figure 4.37: Distributed access of central data and applications.

In order to integrate mobile devices in the enterprise's infrastructure, several topics must be addressed. Besides carefully planning, which business capabilities should be available on mobile devices, the whole application, information and technology architecture must be designed (c.f. Figure 4.38). The mainly to be considered phases of the TOGAF[®] ADM are:

- Phase B: Business Architecture concerning Mobile Business Models (description of the roles and relationships of an organization, its customer, partners and suppliers and stakeholders, as well as the flows of goods, and information between these parties and the main benefits for those involved).

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

- Phase C: Information Systems Architecture in terms of mobile applications that are identified at this level in the EA framework. Mobile applications can be broadly categorized as communication applications, information applications, entertainment applications and commerce applications. Main application types were identified: e.g. mobile information, mobile office applications and so on.
- Phase D: Technology Architecture which includes wireless communication technology, wireless middleware technology, information exchange technology, wireless network & application protocols and mobile security technology.

Furthermore, usability and availability must be ensured, keeping in mind that mobile devices might have different user interfaces with different usage paradigms compared to a desktop PC. E.g. when providing an application for the iPhone, the lack of a mouse and a full-sized keyboard, as well as its small display size, must be considered. Another challenge the integration of mobile devices bears is to ensure security and the conformity of functionality provided for mobile and stationary devices, in order to avoid implementing two parallel information systems landscapes which will lead to increased diversity, complexity, maintenance costs, development and change efforts, and decreased efficiency in business and IT processes. These aspects are addressed in the TOGAF[®] ADM in the Architecture Requirements Management and the phases Implementation Governance and Architecture Change Management. Besides this, stakeholder analysis, definition of architecture principles and standards to enable mobile data and function access, as well as capability assessment in order to determine which business capabilities must be supported on the mobile device and which IT capabilities are needed to facilitate this.

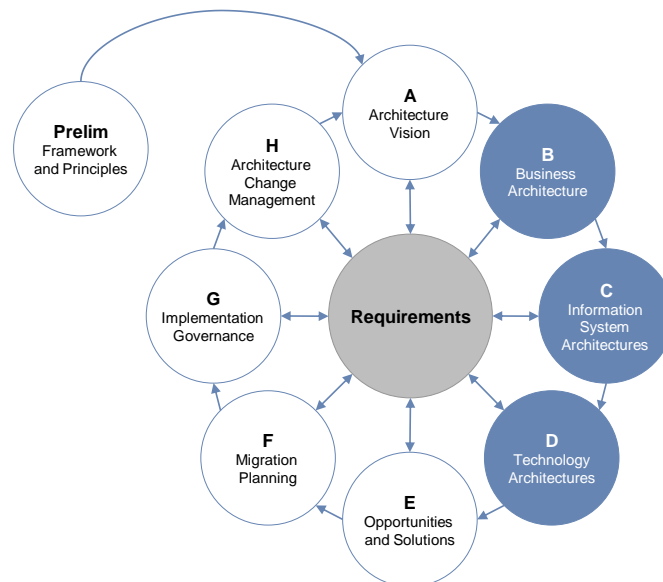


Figure 4.38: ADM phases relevant for scenario *Mobile Devices and Universal Availability of Information*

The scenario Mobile devices and universal availability of information mainly affects the layers Business Capabilities, Infrastructure Services and Infrastructure Elements, since the main

focus lies in providing the infrastructure for new end user devices and specifically enabling certain business capabilities (cf. Figure 4.39). Concerning the cross-cutting functions, Principles & Standards are very important, since they are highly important especially when integrating multiple kinds of end user devices and making distributed data and information wide spread available. Secondly addressed are the layers Organization & Processes, Applications & Information as well as cross-cutting functions in the area of Strategies & Projects.

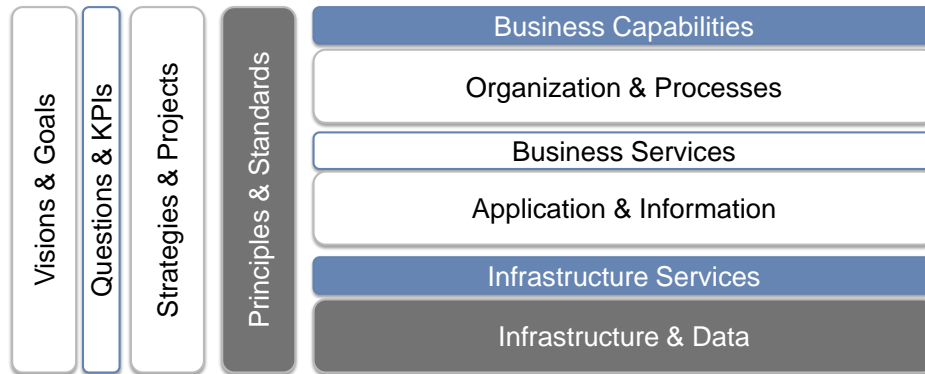


Figure 4.39: EA aspects relevant for scenario *Mobile Devices and Universal Availability of Information*

In this scenario, transparency where is the data used and stored, transparency over data access and the execution of basic tasks (CRUD: Create, Read, Update, Delete), as well as secure, lossless, legally admissible and audited archiving of all data, high Availability of all data and data exchange via cryptographic secured channels is required. Therefore, Security and Compliance as well as Risk Management must be involved, since highly confidential data are processed and stored.

Since the scenario has a high EA business impact, because business processes will be extended to the mobile workforce, bringing greater efficiency and compliance, the Operations Management is affected. Likewise, because of the challenge for IT to add mobile support to applications and to manage and secure mobile devices and networks, this scenario has a high EA IT impact and requires attention of the IT Infrastructure Management in the corporation. At present, this is a technology area where firms are likely to have little or no knowledge or experience, because mobile-aware business processes are very new, with few vendors directly addressing them. On the other hand, the management of mobile infrastructure and devices is not new, but will continue to face new challenges.

Besides this, Controlling is involved, because this new technology and paradigm will also affect the costing structures and will require changes in the field of controlling, especially IT controlling.

Besides this, the complexity of the scenario is high: IT and business managers must decide on which applications to mobile-enable while telecom sourcing will need to be revisited and device standards, provisioning, and management will need to mature.

The stakeholders affected by the scenario are mostly the customers, since it satisfies efficiency, accuracy, cost saving and quality improvement aspects. Therefore, not only the controlling

department, but also employees in the sales, production, and customer service department profit from the described scenario. Employees in these departments are motivated since they receive new technology to perform their tasks accurate, efficient and in high quality, which increases customer satisfaction due to high quality products and outstanding customer service provided by the employees. In terms of the implementation of the scenario, business process experts, enterprise architects, and IT staff from IT architect, software designer to maintenance staff are involved.

Opportunities

Increase Competitive Advantage: As described above, customer centricity, process improvement, cost efficiency, failure avoidance and increase of quality, flexibility and agility can be achieved. Usage of EA management amplifies this opportunity, since it facilitates a fast and at the same time high quality realization of the scenario and therefore the described opportunities for the business.

Quality Improvements: E.g. by avoidance of failures, the quality of goods and services can be improved by implementing mobile devices and universal availability of information. Besides this, when using EA management for the related implementation, a high quality architecture and implementation will be facilitated, since the holistic approach of EA management ensures that business as well as its needs and requirements are met. The structured and mature methodology of EA management guarantees that no relevant aspects are neglected and a sound and stable implementation is achieved.

Threats

Data Loss: The loss of data due to failures, e.g. caused by an instable network connection or attacks, can be mitigated by EA management since e.g. applying TOGAF[®], already when developing the architecture described in this scenario, security and many other aspects are addressed in order to establish an efficient and stable environment.

Security Leaks: Recent attacks on enterprise networks of various companies, where customer data were stolen, prove how much damage security leaks can provoke. Due to a more complex infrastructure with an increased variety of end user devices, security leaks are more likely to occur than in a more homogenous infrastructure. As well as for the threat of data loss, EA management could help to avoid security leaks through good architecture design, implementation and maintenance.

Lower costs: It is questionable, if lower costs could be realized, because of integration efforts for different devices and the constant development of those devices causing change efforts and increasing the infrastructure diversity within the enterprise.

Non adequate usage of data: E.g. personal health data for insurance companies which are used to develop criminal profiles. This must be prevented in order to gain customers' trust and prevent image damage.

Classification in the scenario portfolio

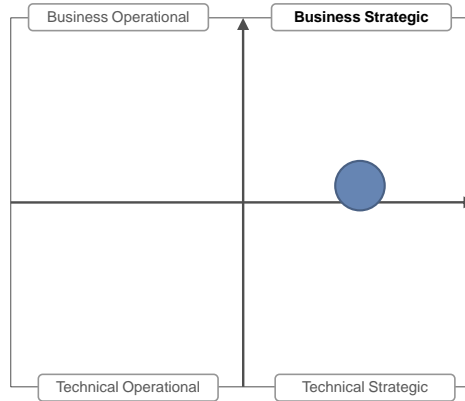


Figure 4.40: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.17. The tool vendors' prioritization is detailed in Table 4.18.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	-1
Finance	0
Government	0
Healthcare	-0.5
IT Products & Services	1
Manufacturing	1
Telecommunication	1
Transportation & Logistics	2
Other	0

Table 4.17: Partner prioritization of *Mobile Devices and Universal Availability of Information*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	0
BOC Information Technologies Consulting AG	0
Enterprise Architecture Solutions Ltd.	-3
iteratec GmbH	2
MEGA International	0
Software AG	0
SparxSystems GmbH	3
<i>Median</i>	0

Table 4.18: Vendor prioritization of *Mobile Devices and Universal Availability of Information*

4.3.3 Workplace of the Future

The ways we work as well as the working environment itself will change dramatically in the future. Technical innovations as virtualization and virtual reality provide new opportunities to design the working environment and to foster communication as well as collaborative work among employees. Especially, decentralized decision making and flexibility in work processes poses a particular challenge to the organization of the enterprise. A holistic EA management function entails potential to support an organization in a smooth transition to a modern working place.

Indications

The scenario is in particular interesting for organizations that

- are globally-distributed,
- want to support their employees to be mobile, or that
- experienced troubles with high fluctuations in their employee base.

Contra-indications

The scenario should not be applied, if

- the organization is a small to medium-sized organization with one location only, or
- the employees need expensive equipment to perform their work.

Solution

The ways we work and the environment in which we work will change dramatically in the future. Virtualization brings new ways of packaging client computing applications and capabilities. As a result, the choice of a particular hardware platform, and eventually the OS platform, becomes less critical. Enterprises should pro-actively build a five to eight year strategic client computing roadmap outlining an approach to 1) device standards, ownership, and support; 2) operating system and application selection, 3) deployment and update; and 4) management and security plans to manage diversity.

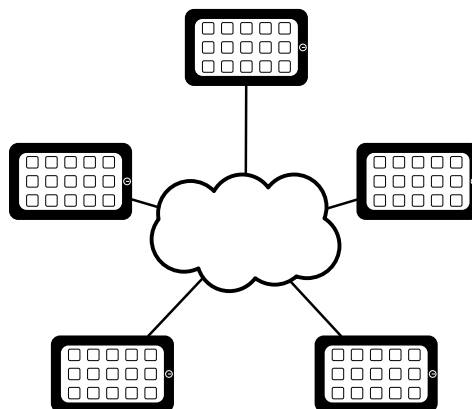


Figure 4.41: Workplace of the Future

Examples for expected change in our workspace environments are:

- Transformation from rigid work processes, which are determined centrally to flexible work systems, self-directed, and with local variation.
- Instead of top-down centralized planning interactive planning both from top-down and bottom-up (*democratic middle-out management*).

- De-routinization of work will change the activity profile of IT professionals. Centralized service desks will be established as well as optimized and self-service options for employees.
- Technology and software will be perceived as a service, which is delivered location and time independent.
- Virtual meetings will replace business travel and 'cyber implants' will be used for telecommunication and video display.
- Virtual reality will make things out of nothing to ease imagination of not-yet built products and other things.

Especially for the context of business process design, the transformation from rigid to flexible processes poses a particular challenge. Two extensions to classic business process modeling can help to control flexibility: business rule modeling and goal modeling. The former imposes constraints on the flexibility by demanding that particular rules of execution are obeyed, while other process steps can be dynamically re-arranged. Goal modeling links the processes to the expected outcomes. This in turn allows for a dynamic re-prioritization of process steps in response to changing goals. Both kind of modeling need to be performed of a holistic modeling of the EA to provide the basis for business process flexibility.

Mobile devices equipped with software providing intuitive user interfaces can help to bring IT support to workplaces that are currently non-technical. Ubiquitous access to knowledge bases in the company, for example, can support employees to handle exceptional cases in company operation more effective. Furthermore, lowering the entry barrier for information provision and exchange in the company may help to detect process exceptions earlier.

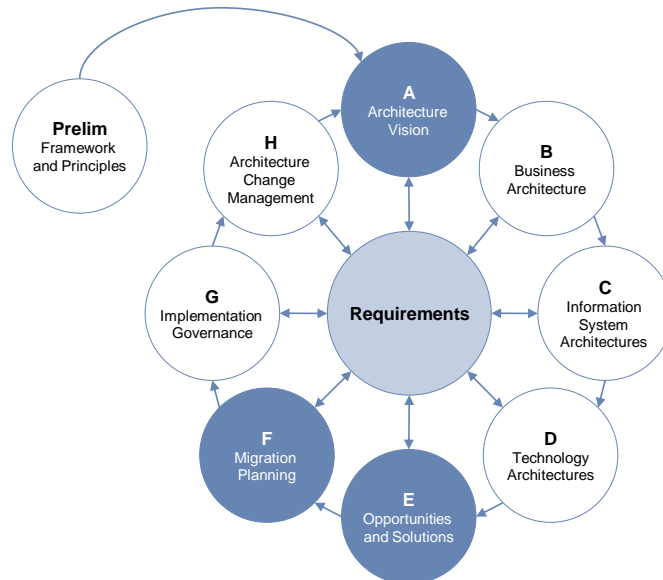


Figure 4.42: ADM phases relevant for scenario *Workplace of the Future*

In terms of the ADM of TOGAF[®], the most affected phases are the following phases (see Figure 4.68:

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Phase A: A strategic vision of how the EA should look like in the future, e.g. how the workplace of the employees should look like has to be created in this phase.

Phase E: Different technical and organizational opportunities should be evaluated and the solutions to be realized have to be selected in this phase.

Phase F: In this phase the migration planning is performed which step by step transforms the enterprise and thereby in particular the technical and organizational aspects of the workplaces of the employees towards the strategic vision developed in phase A.

The scenario *workplace of the future* may affect all layers ranging from organizational re-organization to infrastructure elements that are changed to enable virtualization. In a similar vein, the cross-cutting functions have to be adapted. Figure 4.43 illustrates the layers and cross-cutting functions which are accordingly all highlighted.

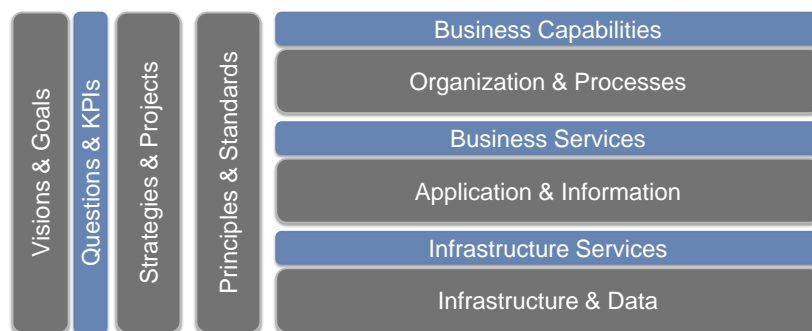


Figure 4.43: EA aspects relevant for scenario *Workplace of the Future*

Opportunities

Reduced technology dependencies virtual infrastructures reduce the vendor lock-in as they facilitate interoperability of different infrastructures

Cost savings virtual infrastructures support load balancing on IT level, mobile workplaces enable the same on facility level – companies are not longer required to provide peak capacities of both

Enablement to knowledge workers knowledge workers, especially the generation of digital natives, are encouraged to shape their working environment

Threats

Higher IT related business risks in a highly IT-supported workplace, IT failures are more likely to have serious business impacts

Monitoring and controlling of employees especially mobile devices may allow to track employee behavior

Preclusion of digital immigrants older and highly skilled (knowledge) workers can be reluctant of adopting new infrastructures

Classification in the scenario portfolio

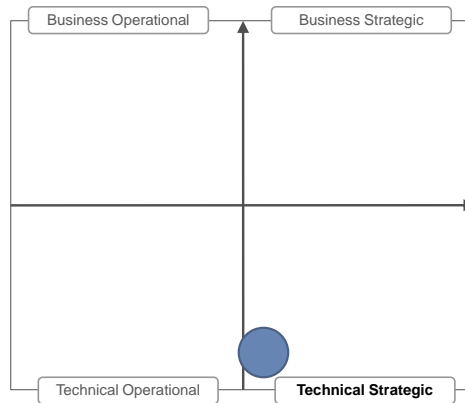


Figure 4.44: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.19. The tool vendors' prioritization is detailed in Table 4.20.

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	-0.5
Finance	1
Government	0
Healthcare	0
IT Products & Services	0
Manufacturing	1
Telecommunication	0
Transportation & Logistics	-1
Other	0

Table 4.19: Partner prioritization of *Workplace of the Future*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	1
BOC Information Technologies Consulting AG	1
Enterprise Architecture Solutions Ltd.	0
iteratec GmbH	1
MEGA International	2
Software AG	0
SparxSystems GmbH	3
<i>Median</i>	1

Table 4.20: Vendor prioritization of *Workplace of the Future*

4.4 Trends in holistic management

Managing an enterprise and its evolution from a holistic perspective is a major challenge for the upper management today. Further analyzing local optimization possibilities from a holistic perspective, side-effects on other parts of the organization can be investigated and

improvement potential for the organization as a whole can be identified. Typical fields of interest for a holistic management are:

Strategic IT human resource planning analyzes the demands for IT experts from a strategic long-term perspective.

Corporate performance management provides a measurement of the actual business performance.

Corporate risk management enables the early investigation of risks and therefore fosters the mitigation of them.

4.4.1 Strategic IT Human Resource Planning

Today's enterprises operate multiple business applications building on a highly diverse and heterogeneous technology basis. Each of the used technologies, but also infrastructure components such as operating systems or database management systems require a particular skill-set that the administrators and operators have to provide. From this perspective, technological development and migration projects do not only rise technical implications but also imply demands for skilled human resources in the IT staff. Having learned from notorious lacks of skilled developers for aging technologies, enterprises seeking to keep their competitive advantage must align strategic human resource planning and EA transformation planning.

Indications

Strategic IT human resource planning is especially interesting for enterprises that

- use technologies to provide business support, which are older than six years, i.e. that have an aging EA infrastructure,
- have a “long tail” of technologies that are only used for very few or just one business process, and
- organizations that experience the need for a heavy buildup of IT skills.

Contra-indications

The realization of a strategic IT human resource planning may be impeded by enterprises that

- follow a strong outsourcing strategy,
- have only a low number of used technologies, and
- rely on standard software or use SaaS (software as a service) applications.

Solution

Having identified a long tail of exotic technologies providing support only to few business processes, it is necessary to identify the people responsible for maintaining and operating the associated business applications. At the most coarse-grained level of planning IT human resources, the particular responsibility of these people has to be documented. Building thereon, comparisons between the intended retention time of the particular business applications and the expected period of activity of the human resource have to be performed. For doing so, information from HR management has to be imported to EA management. This information nevertheless is confidential such that the EA management facilities must keep the information confidential. Major changes in the IT infrastructure as well as in its particular setup must also be reflected in the required skill profile of the enterprise. With every change in the utilization level for a particular technology, the availability as well as the utilization rate for the corresponding skill resources have to be checked. Increasing the utilization rate of a human resource providing a specific set of skills should be carefully monitored such that an upcoming shortage of the corresponding skill resource is anticipated. At this point information on the potential shortage has to be communicated to the HR team and decisions on hiring have to be taken. The outcome of the decisions are fed back to the skill planning in EA management and a planned skill resource is added to the skill model complementing the EA model.

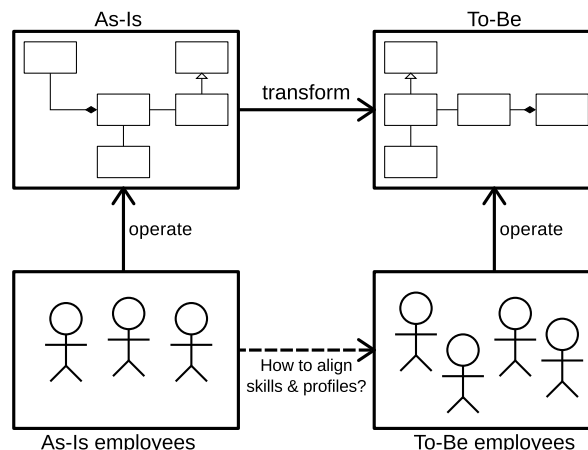


Figure 4.45: Strategic IT Human Resource Planning

The newly created ties between planning the IT evolution and the development of the organization's HR expert influences to both the strategic planning of the EA as well as the EA transformation planning. In the context of transformation planning, any planned state of the EA has to be cross-checked with the expected skill resource availability of the organization at the planned point in time. If a shortage of a particular skill-set is identified, a decision on the resolution strategy has to be taken:

- the company can decide to adapt the planned EA in a way, that the lacking skill is not longer needed,
- the company can decide to initiate training on the required skill (either internal or external), and
- the company can decide to start hiring or “body-leasing” required experts.

Similar ties apply regarding the development of target states for the EA. In particular intended standardization activities have to be aligned with skill-plans resulting from the HR strategies. Furthermore, the skill-plans can act as input to the process of establishing standards. In particular, technologies for which a solid skill-basis is available should be converted to standards, whereas long tail technologies are to be retired by corresponding standardization constraints.

Skill management as part of strategic IT HR planning establishes several links to different phases of the ADM:

Requirements management Requirements management has to cross-check skill resources, in particular, when non-functional requirements regarding the technologies are considered.

Phase C: Information systems architecture During the planning of the information architecture cross-checks are also necessary.

Phase D: Technology architecture Similar cross-checks need to be performed during the development of a technology architecture.

Figure 4.46 summarizes the relationships to the ADM.

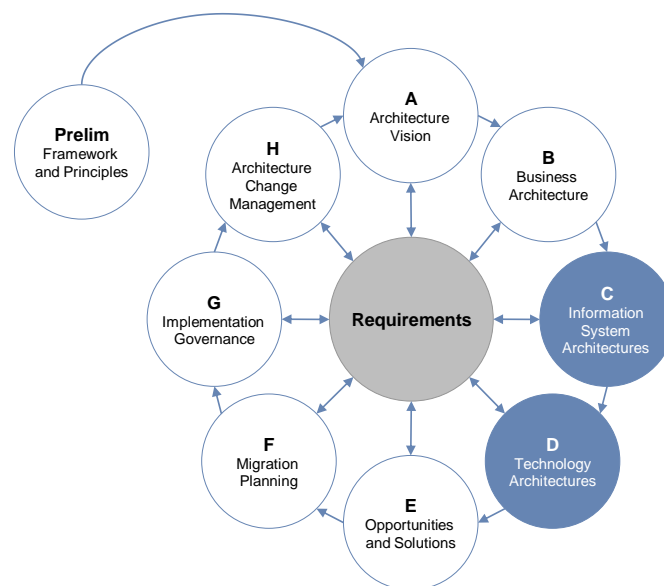


Figure 4.46: ADM phases relevant for scenario *Strategic IT Human Resource Planning*

The EA is affected in different ways by the more sophisticated type of modeling that is required to understand the interplay between skills and technology. Following layers and cross-cutting functions according to BEAMS are affected by this scenario:

Application & Information Layer depending on the defined level of detail on which the skill set should be defined information on applications and the used information is required.

Infrastructure & Data Layer depending on the defined level of granularity information on the used technologies as e.g. database systems and the underlying data is required.

Strategies & Projects current and future projects and strategies are influenced and influence the skill set available today and in the future.

Principles & Standards have to reflect the intended skill set.

Figure 4.47 summarizes the aforementioned relationships.

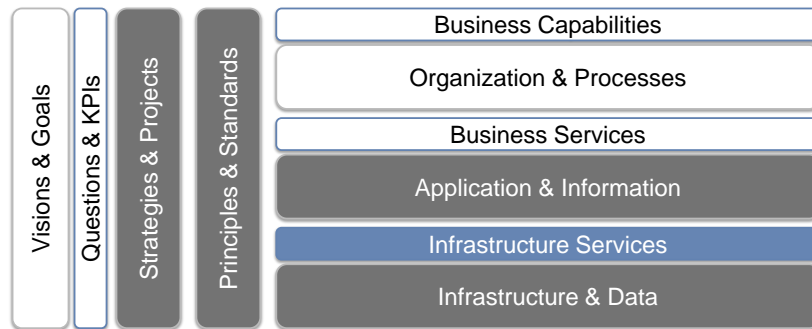


Figure 4.47: EA aspects relevant for scenario *Strategic IT Human Resource Planning*

Opportunities

Availability of critical IT-relevant skills Companies benefit from a strategic IT human resource planning aligned with EA management, as this decreases the risk of running out of critical IT-relevant skills.

Alignment of business and organizational development with IT human resource development Long-term development of the business support as well as its technical underpinnings is aligned with the organizational and human resources development.

Reduction of dependencies from external contractors In the long run, strategic IT human resource planning can reduce the dependencies from external contractors that fill the gap of missing human resources in the IT environment.

Threats

Tensions An integrated HR and EA development requires information exchange between management functions that cover diverse management subjects.

Sensitivity of information Due to the sensitivity of HR-related information this scenario may also rise concerns regarding security.

Classification in the scenario portfolio

The partners of the survey prioritized the scenario as shown in Table 4.21. The tool vendors' prioritization is detailed in Table 4.22.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

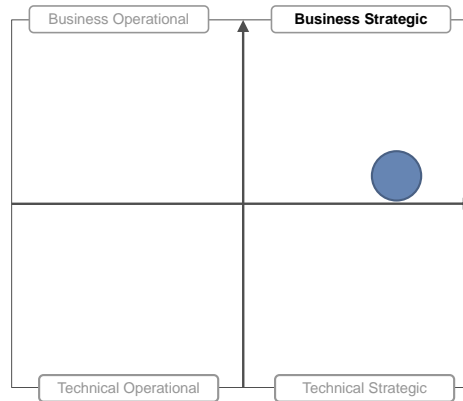


Figure 4.48: Classification of the scenario

Branch	Priority (-3 low to 3 high)
Consulting	-1
Education	-0.5
Finance	0
Government	0
Healthcare	-1.5
IT Products & Services	-1
Manufacturing	0
Telecommunication	-1
Transportation & Logistics	-1
Other	0

Table 4.21: Partner prioritization of *Strategic IT Human Resource Planning*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	0
BOC Information Technologies Consulting AG	0
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	-1
Software AG	-3
SparxSystems GmbH	3
<i>Median</i>	0

Table 4.22: Vendor prioritization of *Strategic IT Human Resource Planning*

4.4.2 Corporate Performance Management

Measurement of the actual business performance is relevant to ensure that the defined objectives and business goals specified are achieved. In recent years, corporate (Business) performance management (CPM) [Wi11] has established a framework to identify, articulate, and manage the achievement of strategic goals of a company. EA management is a crucial enabler of this method in enterprises, since it ensures a holistic perspective on the enterprise operation including business and IT perspective.

Indications

There are several indications or drivers which motivate the enterprises to take the advantage of a holistic CPM solution:

- In a volatile business environment, where product life cycles are shortening and where global markets make it easier for new competitors to capture market share, the search for service, business methods, or a unique way of using technology that will move the company ahead of their competitors and reward them with increased profits becomes critical to the organization's survival. CPM as a performance management solution can help to achieve this goal by improving return, cut costs, manage risk and act on new opportunities.
- Companies with the need to use a balanced scorecard framework to clarify the goals of an organization, to identify how to track them, and to structure the business processes by which interventions will be triggered.
- Companies with the need to define strategic goals and then measure and manage performance against those goals.
- Large organizations with the need to collate and report large volumes of data.

Contra-indications

- Yet most organizations will fail to realize the full benefits of CPM and will not apply the holistic CPM method due to missing maturity and skills to proactively manage performance to achieve business goals.
- Companies with no need to define and track their strategic goals (e.g. very small companies).
- Companies with no need to drive strategy down and across their organizations transform these strategies into actionable metrics and use analytics to expose the cause-and-effect relationships.

Solution

In the past, many enterprises were hindered by a set of business and IT constraints that prevented a full transformational effect on business to react on new market conditions because the business processes are too inflexible. Companies that can clearly identify, articulate, and execute their strategy and strategic goals are well positioned to compete and succeed. But while developing and communicating a strategy and its goals is one thing, successfully executing it is another one. Fortune magazine studies show that in more than 70 percent of cases where businesses fail, it is not the strategy but the execution that went awry. In fact, fewer than 10 percent of developed strategies and its goals are effectively implemented.

To ensure that they execute their goals successfully, companies must articulate the goals and its metrics, measure and manage actual business performance against those goals in a highly coordinated manner by:

- Clearly communicating both strategy and goals (because you can not estimate reaching your goals if no one knows and accepts them).
- Fostering a culture of accountability.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

- Meeting all data access and information delivery requirements.
- Involving as many people as possible in a closed-loop performance management process.

Corporate (Business) performance management is a convergence of technology that removes these hindrances through integration and enhanced technology. Corporate performance management comprises activities as business intelligence, business process integration (BPI), and business systems management collaboration (human interaction) illustrated in Figure 4.49:

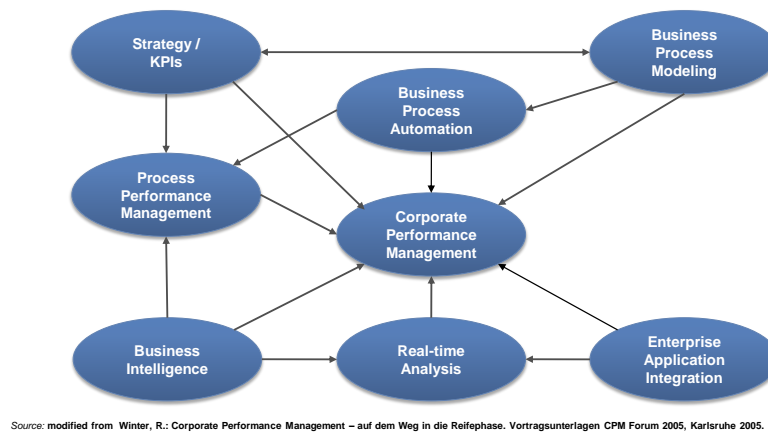


Figure 4.49: CPM – factors of influence.

Corporate performance management is the sum of the processes, methodologies, metrics, and technology used to carry out the tasks listed above. These capabilities provide tight integration of operational and analytical environments, business and IT environments, and strategy with daily operations. Corporate performance management combines business processes, information, and IT resources, aligning your organization’s core assets – people, information, technology, and IT-processes – to create a single integrated view, with real-time intelligence, of both its business measurements and IT system performance. This integration of resources allows a company to obtain business information faster, respond more quickly to market trends and competitive threats, and improve operational efficiencies and business results.

CPM can be applied to all architectural layers and the cross-cutting function of questions & KPIs as shown in Figure 4.50.

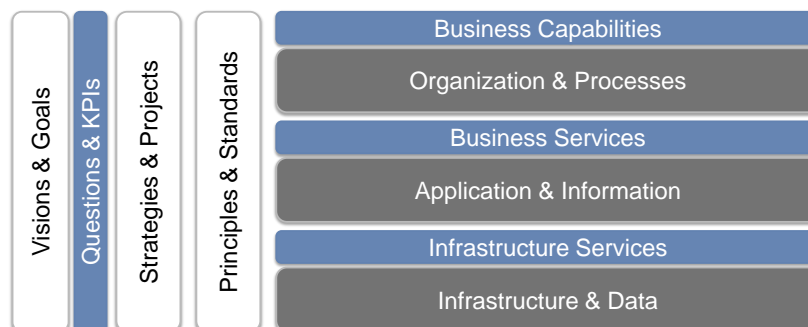


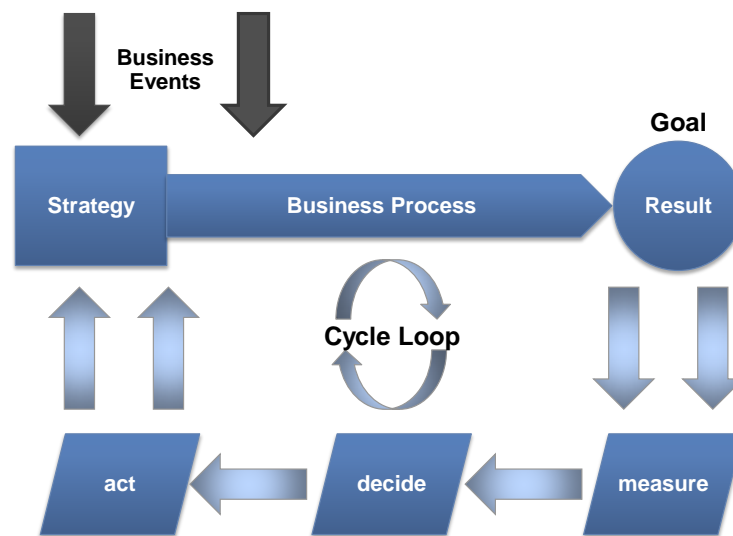
Figure 4.50: EA aspects relevant for scenario *Corporate Performance Management*

Strategic performance management systems allow for the definition, monitoring, and management of strategic business measures. These systems provide KPIs and scorecard capabilities. They include amongst others the following reporting capabilities:

- Financial performance management
- Process performance management
- Customer performance management
- Employee development performance management

Having this in mind, CPM is more than just a MIS (Management Information System) and consists of more than a classical MIS solution i.e. Business Process Integration, Business Intelligence, Enterprise Application Integration and even more (see Figure 4.49). So where to define the boundary to a Business Intelligence (BI) solution? In general, BI incorporates the entity of all analysis techniques and comprehends data warehouse and ETL-technologies (Extraction, Transformation and Load).

In the sense of a controlling instrument, CPM is vital to continuously re-design and re-align the business processes with the strategic goals of the company (see Figure 4.51).



Source: Martin W.: Corporate Performance Management, 2005

Figure 4.51: CPM – Control Cycle

In order to run a CPM solution inside the business successfully, there is very often a need to establish new roles and competencies because the existing business units and roles do not have the knowledge and skills needed. One of these new roles for example could be the “Performance Manager”. This role could use the concept and the advantages of an Enterprise Architecture domain / capability map to:

- Prepare an enterprise-wide performance measurement plan.
- Identify key performance indicators and measurement points.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

- Key Performance Indicators (KPI) are financial and non-financial measures used to define and evaluate how successful an organization is, typically in terms of making progress towards its long-term organizational goals.
- Identify all business functions relevant to fulfill the reporting capabilities mentioned above.

There are no specific industry sectors or types of organizations that most likely benefit from CPM. CPM can be considered across industry and across sector.

The drivers of success, i.e. the facilitators of achieving strategic objectives and initiatives, must be made explicit. This means that all dependencies are identified and their relationships to the goals are clearly understood. Therefore, an actual dependency map and assigned accountability for results are necessary.

A unifying view of the enterprise answers questions like

- “What are we trying to accomplish and why?”
- “What does a specific service or product cost?”
- “What are the costs of a single business process step or a sequence of process steps?”
- “How much is the price for a complete business process?”
- “How much is the price for a complete solution comprising different systems, applications, and operating costs?”

CPM establishes several links to different phases of the ADM:

Phase A: Architecture vision During the architecture visioning phase the strategies of the organization should be operationalized in measurable goals.

Phase B: Business architecture As part of the business architecture to be developed, KPIs should be defined to measure the achievement of objectives.

Phase C: Information systems architecture As part of the information systems architecture to be developed KPIs should be defined to measure the achievement of objectives.

Phase D: Technology architecture As part of the technology architecture to be developed, KPIs should be defined to measure the achievement of objectives on the technology layer.

Phase E: Opportunities and solutions In Phase E, specific KPIs should be defined that enable traceability of management decisions and enable comparison of different opportunities in terms of planned EAs.

Phase H: Architecture change management Specialized KPIs to measure the success of enterprise transformation and evolution should be defined that enable the identification of potentials for improvement in the EA management function itself.

Figure 4.52 summarizes the relationships to the ADM.

Financial Models, Risk Management, Operation Processes, Vendor Management, IT deployment cost, Optimization and strategic right-sourcing are enterprise-level management functions which particularly apply in this scenario.

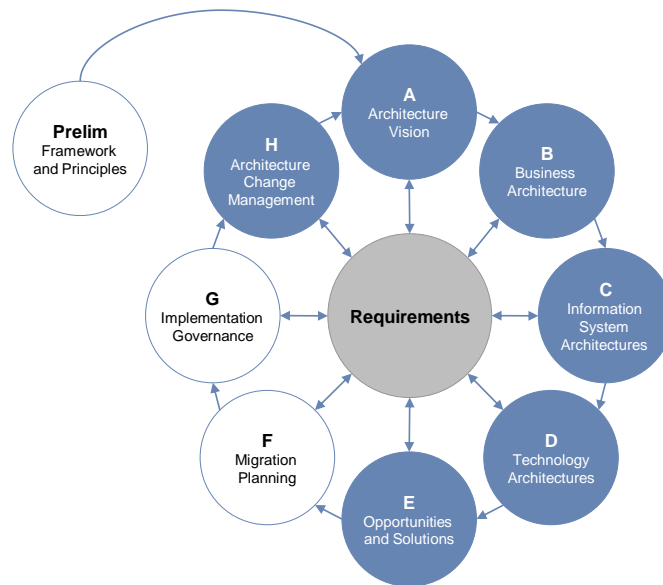


Figure 4.52: ADM phases relevant for scenario *Corporate Performance Management*

Opportunities

Opportunities of conducting CPM according to the holistic EA management method are as follows:

Market advantage New ideas and market innovations can be adapted and implemented more easily due to clear and operationalized strategies.

Increased profits The establishment of a KPI systems to measure success of organizational change enables the identification of possible savings and potentials for improvement.

Flexibility for change Due to clear operationalization of strategies and objectives decisions can be taken faster and new innovations realized in shorter time-frames.

Collaboration between different parts of the organization or with other companies is enabled by clearly defined objectives and KPIs to measure the collaboration.

Better analytics if strategic objectives and initiatives are achieved

Increased communication of strategic objectives and initiatives due to the operationalization of strategies and goals.

Threats

Should the company not be able to apply the described scenario, it faces:

New competitors capturing market share Innovative small competitors may have a more flexible structure that does not contain a KPI overhead and can therefore react faster to market changes.

Lower competitiveness The overhead of detailing and operationalizing strategies and measuring the overall performance of the organization may result in delays regarding time-to-market.

Classification in the scenario portfolio

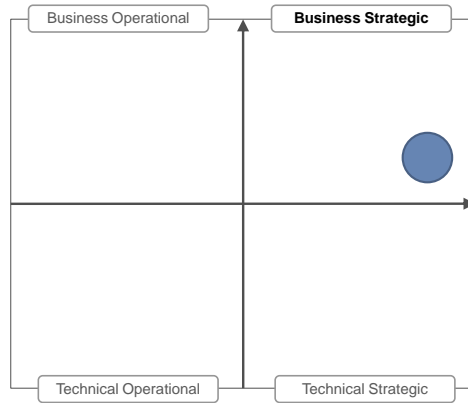


Figure 4.53: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.23. The tool vendors' prioritization is detailed in Table 4.24.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	0.5
Finance	0
Government	0
Healthcare	0
IT Products & Services	0
Manufacturing	-0.5
Telecommunication	0
Transportation & Logistics	1
Other	0

Table 4.23: Partner prioritization of *Corporate Performance Management*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	2
BOC Information Technologies Consulting AG	3
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	1
Software AG	3
SparxSystems GmbH	3
<i>Median</i>	2

Table 4.24: Vendor prioritization of *Corporate Performance Management*

4.4.3 Corporate Risk Management

Risk management has gained importance in the last years, because it allows a company to early identify risks and therefore enables to mitigate them. Going one step further, risk management

on a corporate level allows identifying relationships and implications between different risks. Especially the financial services industry and their customers are facing increasing pressure to comply with many new and changing regulations¹²³. With EA management it is possible to provide an integrated description of an organization's structure, business and IT processes and its underlying IT landscape. This helps to bridge the business-oriented and technical viewpoints to justify investments and to report as well as analyze the related risks and compliance requirements for the enterprise.

Indications

There are several indications or drivers which could motivate an enterprise to take the advantage of a holistic risk management solution:

- External drivers are new and varying regulations such as the US Patriot Act⁴, Basel II⁵ (Basel III⁶ is expected in 2012), Sarbanes-Oxley Act⁷ (SOX), RegNMS (Regulation National Market System)⁸, and now MiFID (Markets in Financial Instruments Directive)⁹. Each of them requires its own specific reporting and record keeping requirements.
- The Sarbanes-Oxley Act is a US law that came in the wake of a series of corporate financial scandals, including those affecting Enron and Worldcom. Initiatives to fulfill all requirements of Basel III are still in progress by (international acting) banks and many potential customers.
- All (international acting) banks and all financial services institutions have to implement Basel II and III by law.
- Companies willing to reduce their capital costs should implement a holistic risk management solution in order to improve their credit rating.

Contra-indications

- Small, medium and also large companies with very low external finance need.
- Companies having no possible risks of not getting credit approvals from their bank because of a low credit score.
- No necessity to identify and know operational risks of the business and to proactively manage the performance to achieve business goals.
- Companies without major financial issues in case of losing data, stop of production, paying higher credit costs, etc.

¹Handelsblatt: <http://www.handelsblatt.com/unternehmen/banken/banken-drohen-lasten-von-bis-zu-300-milliarden-euro/3357200.html>

²Frankfurter Allgemeine Zeitung Jul., 7th, 2011, page 12 "Banken wollen weniger offenlegen"

³Frankfurter Allgemeine Zeitung Jul., 12th, 2011, page 12 "Austrias Banken fehlt Eigenkapital"

⁴Wikipedia: http://de.wikipedia.org/wiki/Patriot_Act

⁵Wikipedia: http://de.wikipedia.org/wiki/Basel_II

⁶Wikipedia: http://de.wikipedia.org/wiki/Basel_III

⁷Wikipedia: http://de.wikipedia.org/wiki/Sarbanes-Oxley_Act

⁸Wikipedia: http://en.wikipedia.org/wiki/Regulation_NMS

⁹Wikipedia: <http://de.wikipedia.org/wiki/MiFID>

Solution

The financial services industry is on the one hand facing increasing pressure locally and internationally to comply with many new and varied regulations such as the US Patriot Act¹⁰, Basel II¹¹ (Basel III¹² is expected in 2012), Sarbanes-Oxley Act¹³, RegNMS (Regulation National Market System)¹⁴, and now MiFID (Markets in Financial Instruments Directive)¹⁵ ¹⁶¹⁷. Each of them requires its own specific reporting and record-keeping efforts.

On the other hand, regulators are tightening up and applying their existing rules with increasing tenacity, including large fines, penalties and even the jailing of company executives. These compliance pressures have led to reactive, short-term focus on particular regulations. In some financial institutions, this has resulted in individual regulation silos and suboptimal implementations. Perhaps the fear of going to jail has led many to react quickly. Several financial company executives admit that an adequate architecture (for Business and IT) is needed.

Keeping this in mind the old way of managing operational risks has become insufficient. The management of operational risks has always been part of a financial institution's internal requirements. However, with increased industrialization of the financial value chain, operational risks have become dynamic and interconnected. The old way of managing operational risks is not sufficient anymore. With Basel II / Basel III ¹⁸ this strong internal desire to better understand and manage operational risks becomes a regulatory necessity, which creates demand for EA, business intelligence and analytics solutions to help improve capital allocation and provide metrics as well as performance indicators to better monitor how the institution is performing. These sophisticated solutions need well thought out architectures, or otherwise will only add additional uncertainties to the already complex risk relations.

- The compliance requirements (Basel II / Basel III) affects all (international acting) banks and all financial services institutions and also implicitly the lending especially for small and medium companies. Superficial, Basel II / Basel III are mainly important for banks as they represent an international standard. Banking regulators can use this standard when creating regulations about how much capital banks need to put aside to guard against the typical types of financial and operational risks . But for potential credit user the compliance to Basel II / Basel II is also essential. Basel II / Basel III is a real important point for small and medium companies as banks determine the height of interest on borrowings based on the level of compliance the potential customer can demonstrate.
- Sarbanes-Oxley Act¹⁹ is an US law that came in the wake of a series of corporate financial scandals, including those affecting Enron and Worldcom. The act was designed with the goal to protect investors by improving the accuracy and reliability of corporate financial disclosures. One key element of the act is to require adequate internal controls to ensure

¹⁰Wikipedia: http://de.wikipedia.org/wiki/Patriot_Act

¹¹Wikipedia: http://de.wikipedia.org/wiki/Basel_II

¹²Wikipedia: http://de.wikipedia.org/wiki/Basel_III

¹³Wikipedia: http://de.wikipedia.org/wiki/Sarbanes-Oxley_Act (Jul . , 11th, 2011)

¹⁴Wikipedia: http://en.wikipedia.org/wiki/Regulation_NMS

¹⁵Wikipedia: <http://de.wikipedia.org/wiki/MiFID>

¹⁶Frankfurter Allgemeine Zeitung Jul., 12th, 2011, page 12 "Banken wollen weniger offenlegen"

¹⁷Frankfurter Allgemeine Zeitung Jul., 12th, 2011, page 12 "Austrias Banken fehlt Eigenkapital"

¹⁸Jeanne W. Ross, Peter Weill (2006) "Understanding the Benefits of EA"

¹⁹Wikipedia: http://de.wikipedia.org/wiki/Sarbanes-Oxley_Act (accessed 2011-07-11)

accurate and reliable financial reporting. Due to the importance of information systems for financial reporting, the focus of this scenario is set on internal controls in IT systems and related IT-processes. Sarbanes-Oxley Act is valid for all enterprises if their securities are traded on a stock-exchange under the control of the SEC (US Securities and Exchange Commission). According to the act, management should use a risk management method to implement and assess internal controls in IT-processes.

To address the challenges described above different functions, business units and departments have to react in different ways. The examples below give you an overview of the different business areas where EA Management could help the business functions to create deliverables, provide transparency, and supply documentation supporting the method of a holistic risk management. The examples focus on two regulations (Sarbanes-Oxley-Act and Basel II/III) and detail which business functions under which responsibility are affected implementing a risk management solution.

- Sarbanes-Oxley Act (SOX): The CEO and the CFO have certain questions that are concerned with the business process description. These questions can be answered from an EA perspective. Exemplary requirements are e.g. documentation of business processes and capabilities as well as monitoring of business processes. This helps the business creating the transparency needed to identify possible risks during the execution of business processes. Further questions are e.g. how is the business object/business entity created and how is it used, who creates the business object/business entity, when is it used (modified), who deletes the business object/business entity and when?
- Basel II / Basel III: The CIO and the enterprise architect have certain questions that relate to the EA documentation of cross-cutting concerns as IT security, business continuity management, disaster recovery management, considerations of non-functional requirements of the whole EA, and IT security issues as availability, confidentiality, or integrity.

Risk management solutions^{20 21 22} provide an integrated and flexible risk management framework. It allows the documentation and assessment of risks, the definition of controls, management of audits, identification of issues and the implementation of recommendations and remediation plans. The listing below provides a short overview which areas of business are mostly affected by this scenario. These are the focus areas where the implementation of a risk management solution should start.

- Business & Resource Administration
- Marketing & Business Development
- Product Development
- Customer Management
 - Retail Relationship & Credit Risk Oversight, Customer Portfolio Analysis & Planning (Cross-Selling)
 - Credit Administration, Credit Policy & Assessment

²⁰Risk Management Solutions: <http://www.rms.com/>

²¹MetricStream: http://www.metricstream.com/solutions/risk_management.htm

²²Schleupen AG: http://www.schleupen.de/cms/Software_Risikomanagement_schleupen.html;jsessionid=AE9D2CBEC9DCDDBD755A40E85E80AAFB

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

- Retail Product Fulfillment, Wholesale Product Fulfillment
- Shared Services
- Financial Management
 - Financial Planning, Financial Policies, Financial Control
 - Account Reconciliation, Account Receivable, General Ledger
 - Major stakeholders affected by the SOX scenario are the CEO, CFO, CIO/CTO, COO, IT-Security, Enterprise Architects, and Controlling (all roles which are responsible for financial reporting).
 - Major stakeholders affected by the Basel II scenario are the CEO, CFO, CIO/CTO, COO (all either from bank and/or customer), IT-Security (bank and/or customer), Enterprise Architects, and Controlling (all roles which are responsible for the lending process).

To support the control objectives requirements, the EA management framework has to support “Control Frameworks” like COSO, CobiT, and ITIL.

In order to support the needed business continuity and risk management requirements, the EA management framework needs to support the establishment of a complete business continuity and criticality management concept. This concept consists of solutions for business continuity management and disaster recovery management and fulfills obligations to assess and secure business critical services end-to-end.

Ideally, business continuity management (BCM) and disaster recovery management (DRM) should be considered at different stages along the development of an EA. Figure 4.54 shows some activities during the implementation of a BCM and DRM solution:

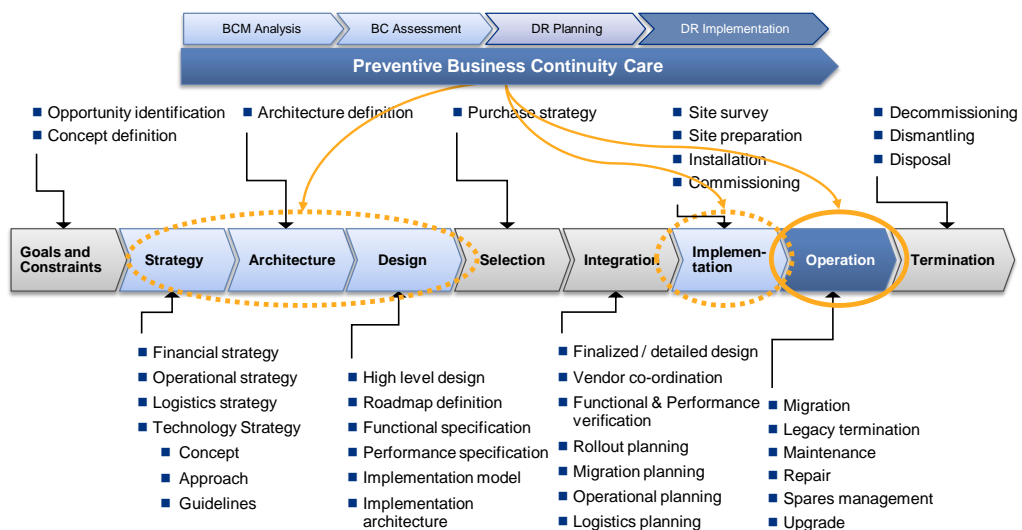


Figure 4.54: Business Continuity Management and Disaster Recovery Management

All IT security requirements could be addressed by the EA management framework if support for the following steps would be established:

- Structure analysis: Organization, infrastructure, network components, systems, applications, roles, responsibilities
- Definition of protection requirements
- Risk analysis: Threat assessment, as-is gathering of existing security measures, risk assessment
- Recommendations (like best practices, lessons learned, and so on. . .)

The EA management framework must also provide all functionality to address the following requirements:

- Providing control over your systems landscape visualizing all relationships between the different systems and applications, building the foundation for re-use and consolidation opportunities, and the chance to add specific risk-attributes with your systems.
- Therefore an EA management tool needs the functionality to model risk aspects and to visualize them in specific views.
- Provide all functionality to establish governance over your systems (like lifecycle information, checklists for architecture compliance, information about application owners and so on. . .) and to control and record them. For EA program management you need to have the names of responsible owners of systems and controls for information gathering, communication and program management.
- Provide all functionality to document and maintain access rights of users against your business systems.
- Provide all functionality to establish a rigorous documentation and maintenance process for your business and IT systems and controls, projects and user guides especially for business continuity or disaster recovery.

To achieve this unified view of risk management in the enterprise (including security and regulations) the use of an enterprise capabilities model (domain model) supports the establishment of transparency inside the (extended) enterprise. To create this view of an enterprise capabilities model all TOGAF® ADM phases are involved and deliver supportive methods and techniques as illustrated in Figure 4.55. In particular the following aspects need to be considered during the different phases:

Preliminary phase Security regulations, relevant laws and judicial decisions, security team, and framework conditions

Requirements Consideration of security regulations and standards as requirements

Phase A: Architecture vision High-level security requirements as part of the architecture vision, disaster recovery, and business continuity concepts

Phase B: Business architecture Security processes, design of security in consideration of costs and business goals have to be documented

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Phase C: Information systems architecture Security elements of the IS architecture, event handling, risk management

Phase D: Technology architecture Security elements of the technology architecture, especially security regulations, monitoring methods, and metrics

Phase E: Opportunities and solutions Re-use of security services and solution building blocks

Phase F: Migration planning Early implementation of security measures and compliance with disaster recovery and business continuity plans

Phase G: Implementation governance Consideration of security aspects during the monitoring of correct implementation

Phase H: Architecture change management Inclusion of changes relevant for security in requirements management

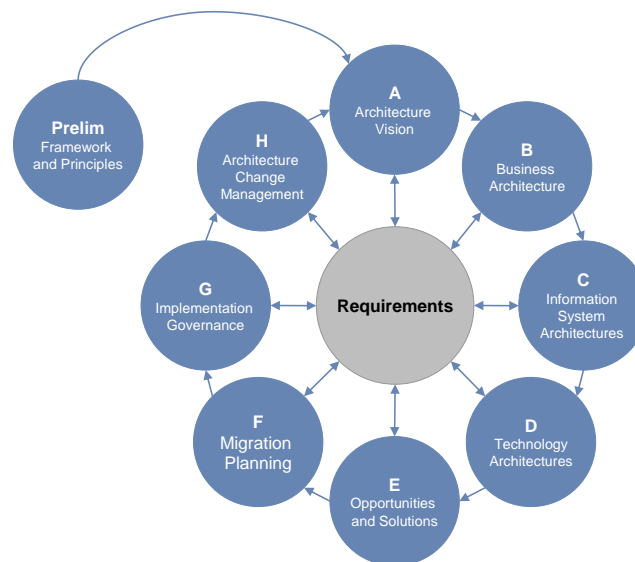


Figure 4.55: ADM phases relevant for scenario *Corporate Risk Management*

The scenario corporate risk management may affect all layers ranging from organizational reorganization to infrastructure elements which has to be analyzed. In a similar vein, the cross-cutting functions have to be adapted. Figure 4.56 illustrates the layers and cross-cutting functions which are accordingly all highlighted.

Opportunities

Opportunities of conducting Risk Management according to the holistic EA management method are the following:

Jeanne W. Ross and Peter Weill [RWR06] discussed benefits of an EA in a Research Briefing of MIT from July 2005. They argued that cleaning up the IT infrastructure, sharing data

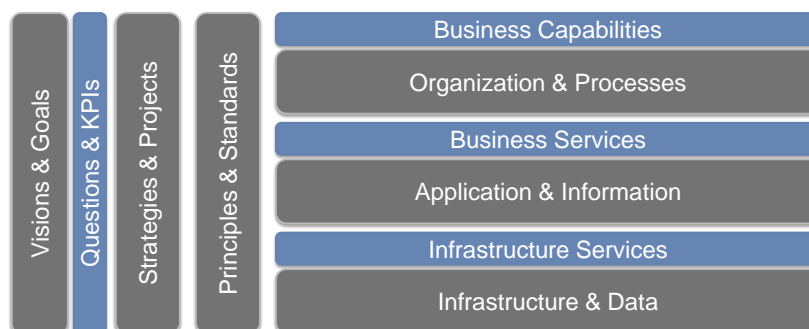


Figure 4.56: EA aspects relevant for scenario *Corporate Risk Management*

and the usage of enterprise applications leads to a more manageable IT environment which contributes to at least four risk-related benefits:

Reduced business risk: The extent to which systems are consistently and reliably up and running as need to support the business.

Improved regulatory compliance: Accessibility of accurate data to respond to government requirements.

Increased disaster tolerance: The ease and speed with which backup and recovery services are rendered to minimize business losses.

Reduced security breaches: Avoidance of computer viruses and inappropriate access (both internal and external) to private or confidential data.

Focusing on the aspect of regulatory compliance please find below a more detailed listing of possible opportunities and threats analyzed by different stakeholder groups and their specific viewpoints:

Opportunities:

- Implementing EA management for Compliance (Basel II / Basel III) **for banks**^{23 24}:
 - International banks have to achieve Basel II / Basel III (without exception)
 - Compliance to Basel II / Basel III helps a bank to separate operational risk from credit risk
 - Provides transparency about operational risk in the own enterprise
 - Rigorous risk and capital management requirements ensure that a bank holds capital reserves appropriate to the risk the bank exposes
 - Documented control measures and precautions if bank is Basel II / Basel III compliant
- Implementing EA management for Compliance (Basel II / Basel III) **for customers**:
 - Lower Credit Costs because credit rating will be better

²³Wikipedia: http://de.wikipedia.org/wiki/Basel_II

²⁴Wikipedia: http://de.wikipedia.org/wiki/Basel_III

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

- Transparency about operational risk in the own enterprise
- Documented control measures and precautions if customer is Basel II / Basel III compliant
- Implementing EA management for Compliance (SOX):
 - The securities of the enterprise can be traded on a stock-exchange under the control of the SEC

Threats

- Possible drawbacks **not** implementing EA management for Compliance (Basel II / Basel III) **for banks**:
 - Regulators will deny to continue the business
- Possible drawbacks **not** implementing EA management for Compliance (Basel II / Basel III) **for customers**:
 - Higher credit costs
 - Maybe no credit approval from the bank
 - Operational risks are not identified and known
 - No precautions in place
- Possible drawbacks **not** implementing EA management for Compliance (SOX):
 - The securities of the enterprise can **not** be traded on a stock-exchange under the control of the SEC

Classification in the scenario portfolio

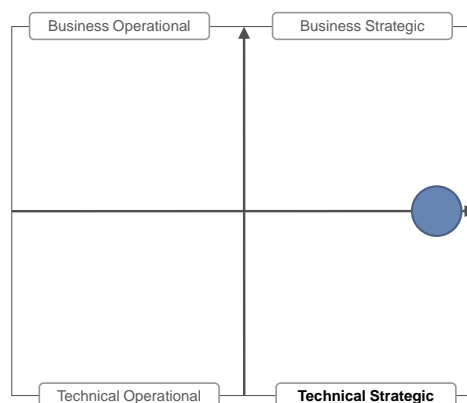


Figure 4.57: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.25. The tool vendors' prioritization is detailed in Table 4.26.

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	1
Finance	1
Government	0
Healthcare	1
IT Products & Services	0
Manufacturing	0
Telecommunication	0
Transportation & Logistics	-1
Other	0

Table 4.25: Partner prioritization of *Corporate Risk Management*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	1
BOC Information Technologies Consulting AG	3
Enterprise Architecture Solutions Ltd.	3
iteratec GmbH	1
MEGA International	3
Software AG	2
SparxSystems GmbH	2
<i>Median</i>	2

Table 4.26: Vendor prioritization of *Corporate Risk Management*

4.5 Trends in decision support

Today's enterprise architects still complain about the lack of decision support and are taking decision regarding the development of their EA instinctively. Novel arising ideas and techniques, will provide more decision support in the future. In particular the following three paradigms are of special interest:

Analytics and KPIs for EA Management provide decision support by the definition of organization specific performance indicators .

Strategic Allocation of Open Source Solutions provides decision support by the usage of open source standards and technologies.

Improving Security via Activity Monitoring provides decision support by interlinking existing monitoring data in order to identify threats and security issues.

4.5.1 Strategic Allocation of Open Source Solutions

The current maturity level reached by Open Source Solutions (OSS) 4.58 makes it possible to consider them as a real alternative for optimizing return on investment and as a real alternative for improving the level of software standardization in a company. Nevertheless, the usage of this kind of solutions implies several risks, as for example lack of differentiation from competitors or the big amount of OSS licenses having different requirements and restrictions for the end users, e.g. the general public license (GPL), the lesser general public license (LGPL), and the Mozilla public license (MPL).



Figure 4.58: Strategic Allocation of Open Source Solutions

Indications

- Pursuing the EA management goals *Increase Homogeneity*, *Increase Standardization* and *Reduce IT-related Costs* at the same time is a well-known indicator that this scenario may apply for the company in the near future.
- In our workshops, especially the industry partners from the public sector were very interested in applying this scenario for their enterprises as soon as possible.
- The continuous pressure on IT budgets and the tougher competition on the world markets are two commonly named external drivers for change.

Contra-indications

- Companies having an individual business processes require individual software. The usage of OSS may cause higher adaptation and migration efforts than developing a customized solution. In addition, external software suppliers provide always technical support for their systems.
- If the EA management goals *Increase Homogeneity*, *Increase Standardization* and *Reduce IT-related Costs* are not pursued by the company, it indicates that this scenario probably will not apply for the given enterprise.
- In our workshops, especially the industry partners from the financial sector were the least interested in applying this scenario for their enterprises due to different license and compliance issues.

Solution

This section provides a detailed description of the method to be applied in order to plan the strategic allocation of open source solutions 4.59. Following activities according to the TOGAF® ADM cycle are affected by the scenario:

Phase A: Define what is the role of OSS in the architecture vision and define OSS enterprise policy.

Phase C: Which OSS can / must be used in existing and future information systems?

Phase D: What is the impact of the OSS policy on the technology standards?

Phase E: How can OSS solve problems and what opportunities arise while using OSS as solution.?

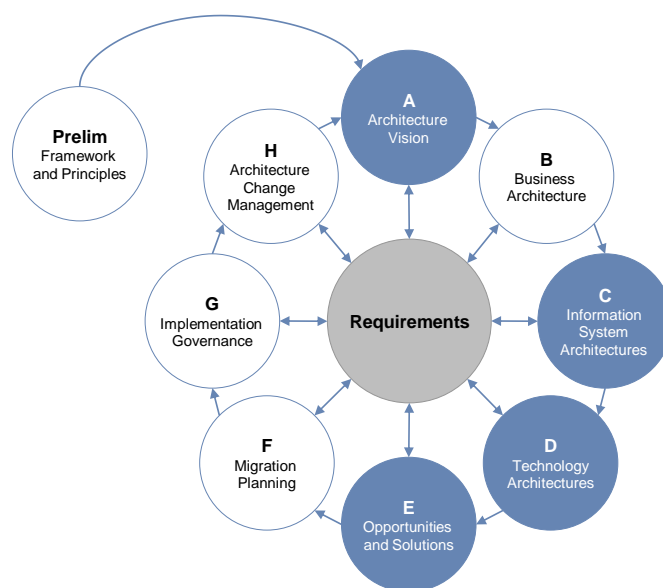


Figure 4.59: ADM phases relevant for scenario *Strategic Allocation of Open Source Solutions*

Following layers and cross-cutting functions according to BEAMS are affected by this scenario:

Application & Information layer: depending on the defined role of OSS in the Architecture Vision, adaptations of applications and information are expected.

Infrastructure & Data layer: depending on the defined role of OSS in the Architecture Vision and the defined Technology Architecture, adaptations of data and infrastructure elements are expected.

Visions & Goals: depending on the defined architecture Vision, an OSS vision and corresponding goals can be defined.

Strategies & Projects: depending on defined OSS goals, OSS related projects & strategies may arise.

Principles & Standards: OSS may affect both - existing principles and standard.

While defining and implementing open source software strategies, multiple enterprise level management functions, e.g. risk, compliance and project portfolio management have to be considered.

Opportunities

Level of standardization: OSS are well known for correct and complete implementation of IT standards.

Level of homogeneity: Defining OSS technological standards can significantly reduce the number of technologies used (Java, MySQL, JEE, etc.).

License cost savings: OSS is available to everybody, enabling anyone to copy, modify and redistribute the source code without paying royalties or fees.

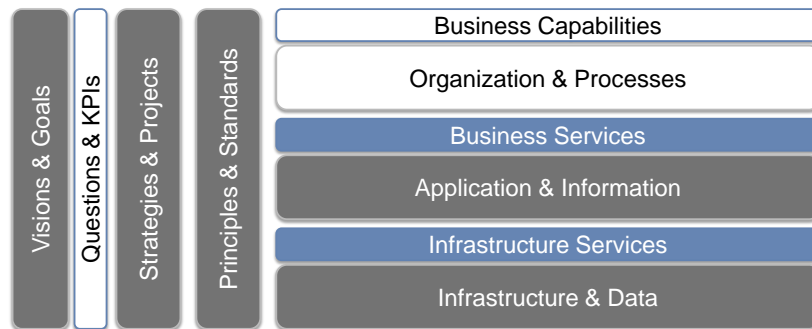


Figure 4.60: EA aspects relevant for scenario *Strategic Allocation of Open Source Solutions*

Staffing costs: Prominent open source solutions are developed in a larger community of experts, from which the using company may be able to recruit future employees.

Threats

Lacking support: In contrast to customized software, OSS does not provide support.

License variety: There are plenty of different OSS licenses available, e.g. the general public license (GPL), the lesser general public license (LGPL), and the Mozilla public license (MPL).

Higher maintenance effort: Due to lacking provider support, the company has to provide care about system maintenance by itself.

Classification in the scenario portfolio

The scenario was classified as technology-oriented addressing the strategic role of EA management in a company by the participating industry partners.

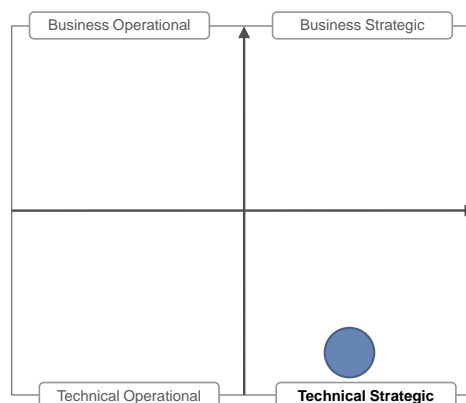


Figure 4.61: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.27. The tool vendors' prioritization is detailed in Table 4.28.

Branch	Priority (-3 low to 3 high)
Consulting	-1
Education	-0.5
Finance	-1
Government	-1
Healthcare	-0.5
IT Products & Services	-1
Manufacturing	-1
Telecommunication	0
Transportation & Logistics	-1
Other	-2

Table 4.27: Partner prioritization of *Strategic Allocation of Open Source Solutions*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	0
BOC Information Technologies Consulting AG	0
Enterprise Architecture Solutions Ltd.	2
iteratec GmbH	1
MEGA International	-1
Software AG	-3
SparxSystems GmbH	3
<i>Median</i>	0

Table 4.28: Vendor prioritization of *Strategic Allocation of Open Source Solutions*

4.5.2 Analytics and KPIs for EA Management

The EA forms a complex system composed of static and behavioral components, which evolve over time. Changes to the static components influence the interaction behavior and can have unforeseen impacts on the performance of the enterprise as a whole. In order to facilitate decision makers in understanding the implications of proposed changes, simulation algorithms can be applied to predict the behavior of the planned architectures. In addition, enterprise-specific EA management performance indicators can be employed to support the enterprise performance measurement.

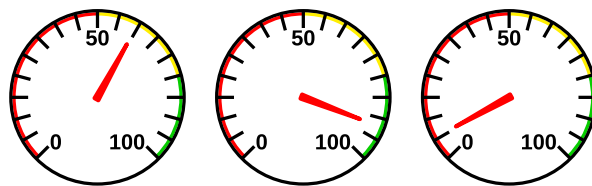


Figure 4.62: EA aspects relevant for scenario *Analytics and KPIs for EA Management*

Indications

- Companies having mature EA management initiatives will be interested to predict aspects of their EA and to use concrete EA management related KPIs.
- Enterprise architects looking for additional decision support will be interested in EA management related KPIs.

Contra-indications

- Companies, having no, or a novel EA management initiative are unlikely to be interested in EA analytics.

Solution

During the evolution of an EA, future architectural scenarios are created and have to be decided upon. In this context, assessing the quality attributes of these scenarios is beneficial. This is nevertheless not possible to the same extent as a current architecture assessment would go, especially as no information on the behavior of a future state architectural scenario are available.

EAs are complex, dynamic systems, characterized via two types of properties:

- static properties, e.g. information on the structure, and
- behavioral properties, e.g. information on latency or throughput.

Data about both types of properties can be measured in a current, i.e. operated, EA. Having already defined current, target and corresponding planned states of their EA, companies establish prediction methods for their EA and companies define KPIs to measure their EA management performance.

In a complex dynamic system such as the EA, many effects (and immediate cause-effect-relationships) may occur on the microscopic level, e.g. during code execution in the business applications. These effects, regardless of the question, if they could be observed, are likely to be too numerous to describe in detail. Nevertheless, they cause the macroscopic behavior of the system, which is observable in the behavioral properties. For making valid and sensible predictions, EA analytics builds on an intermediate level of description for a system and its causal dependencies, i.e. a mesoscopic model of the system.

Enterprise specific performance indicators can be applied on all three architectural layers (cf. Figure 4.24). Furthermore, analytics can be used to enable aggregation of measurement results from one architectural layer to another. For example, the availability of used hardware resources on infrastructure & data layer can be aggregated to the using business applications on the application & information layer. The availability of used business applications on the application & information layer can be aggregated to the supported business process on the organization & processes layer.

Following activities according to the TOGAF[®] ADM cycle are affected by the scenario:

Phase A: analyze different EA scenarios regarding the architecture vision.

Phase B: analyze different EA scenarios regarding the business architecture.

Phase C: analyze different EA scenarios regarding the information systems architecture.

Phase D: analyze different EA scenarios regarding the technology architecture.

Phase E: apply analytics to discover new opportunities and to define new solutions.

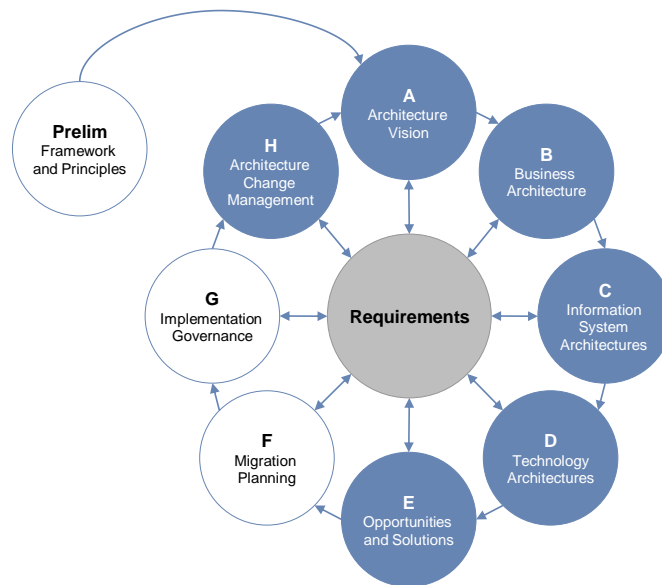


Figure 4.63: ADM phases relevant for scenario *Analytics and KPIs for EA Management*

Phase H: analyze different EA scenarios regarding the current state of the architecture.

EA analytics predictions and KPIs can be applied to all architectural layers and cross-cutting functions as shown in Figure 4.24.

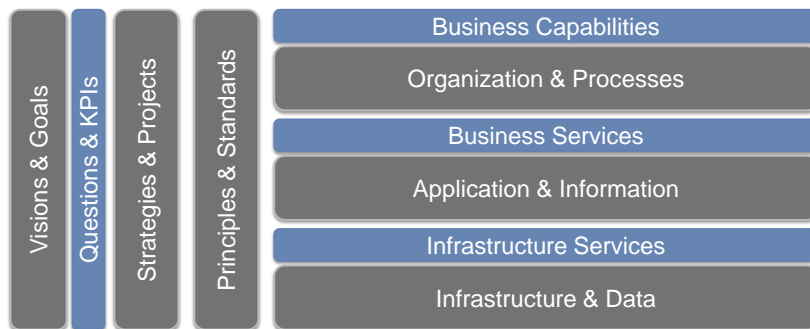


Figure 4.64: EA aspects relevant for scenario *Analytics and KPIs for EA Management*

This scenario affects several enterprise level management functions, e.g. enterprise performance management, EA management, and IT management.

Opportunities

Enterprise architecture prediction: Predict future evolution of the EA, get an understanding of the “unpredictable behavior” of the EA (the ability to predict what can, or will happen may support management decisions).

Decision support: EA analytics is a good support for decision making.

Organization-specific performance indicators: Can provide important decision support to the involved stakeholder

Threats

Sensitivity: Predictions on incorrect or outdated information.

Classification in the scenario portfolio

The scenario *Analytics and KPIs for EA Management* is classified as a technical scenario with a strategic orientation (see Figure 4.65).

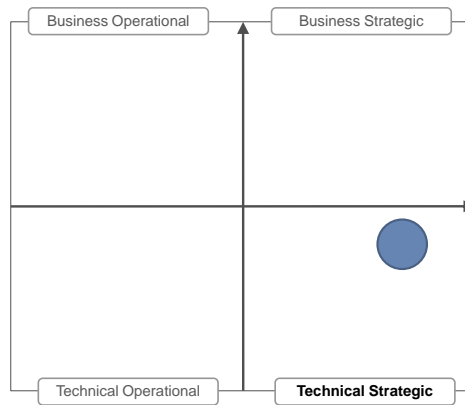


Figure 4.65: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.29. The tool vendors' prioritization is detailed in Table 4.30.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	1.5
Finance	1
Government	-2
Healthcare	0.5
IT Products & Services	2
Manufacturing	0
Telecommunication	2
Transportation & Logistics	0
Other	0

Table 4.29: Partner prioritization of *Analytics and KPIs for EA Management*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	2
Avolution	3
BOC Information Technologies Consulting AG	0
Enterprise Architecture Solutions Ltd.	3
iteratec GmbH	-2
MEGA International	3
Software AG	2
SparxSystems GmbH	3
<i>Median</i>	2.5

Table 4.30: Vendor prioritization of *Analytics and KPIs for EA Management*

4.5.3 Improving Security via Activity Monitoring

Today, security is a critical factor for each enterprise. Security thereby traditionally focuses on putting up a perimeter fence to keep threats away. In the future, organizations might improve security by monitoring activities to identify threat patterns, i.e. recurring circumstances and activities which lead to security issues. With customers increasingly requesting trust and reliability, security issues gain importance in the organization. Using EA management, necessary adjustments to infrastructure and application layer elements can be evaluated, planned with respect to security issues and finally implemented and monitored in a structured manner.

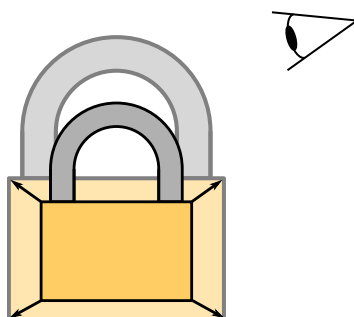


Figure 4.66: Improving Security via Activity Monitoring

Indications

The scenario is in particular interesting for organizations that

- experienced troubles with security issues in the past,
- possess descriptions of old security issues and information in which contexts they originated to extract suspicious activity patterns,
- observed an increasing number of security issues, and that
- are not able to solve the security issues by putting up a perimeter fence to keep threats away.

Contra-indications

The scenario cannot be applied, if

- activity monitoring cannot be put in place in an organization due to legal regulations,
- the culture of the organization is a highly political one in which activity monitoring could be regarded as employee monitoring, or if
- such an endeavor would require an approval from the works council, which does not support this intention.

Solution

Security traditionally has focused on putting up a perimeter fence to keep others out. A new trend for organizations towards a new handling and even prevention of security issues is to monitor activities and identify patterns that would have been missed before. Information security professionals face the challenge of detecting malicious activity in a constant stream of discrete events that are usually associated with an authorized user and are generated from multiple network, system, and application sources. Using activity monitoring, organizations are enabled to analyze security issues that have occurred and identify the circumstances which have lead to the incident. Further, activity monitoring uses the identified patterns to recognize a threat prior to the realization of its potential damage.

Figure 4.67 details the tasks and participants involved to perform the scenario *improving security via activity monitoring*.

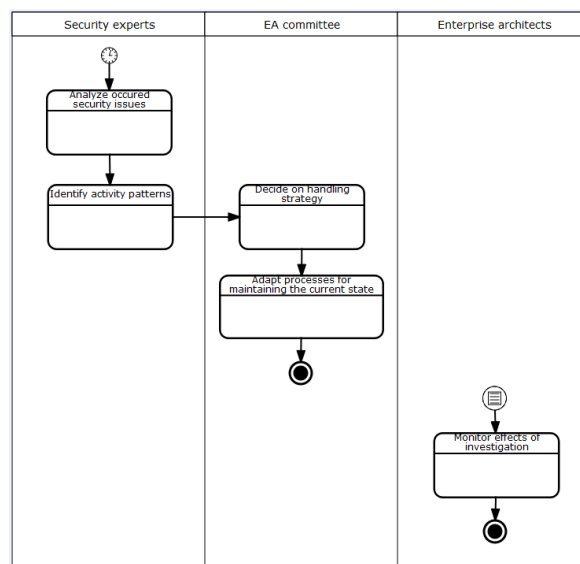


Figure 4.67: Detailed task description of the scenario *improving security via activity monitoring*

In terms of the ADM of TOGAF®[®], the most affected phases are the following phases (see Figure 4.68:

Phase B to D: In these phases the different states of the architecture (current, planned, and target state) are developed. In particular, the activity to maintain the documentation of the current architecture has to be adapted to incorporate methods and means to monitor activities and alerting mechanisms have to be set up to handle suspicious activities.

Phase E: The identified threats should be further investigated in this phase to find out opportunities and solutions which prevent the re-occurrence of the threat.

Phase H: In this phase, occurred security issues should be analyzed for new activity monitoring patterns. Based on these new patterns, methods and measurements to document the current architecture should be revised to handle these patterns.

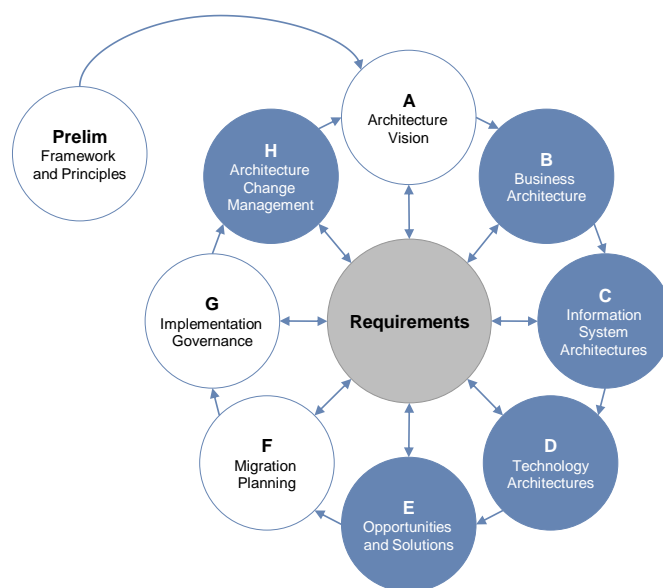


Figure 4.68: ADM phases relevant for scenario *Improving Security via Activity Monitoring*

Security departments are therefore facing increasing demands for ever-greater log analysis and reporting to support audit requirements. A variety of complimentary (and sometimes overlapping) monitoring and analysis tools help enterprises to better detect and investigate suspicious activities -- often with real-time alerting or transaction intervention. By investigating the strengths and weaknesses of these tools from an enterprise-wide perspective as provided by EA management, enterprises can better understand how to use the identified data, map it to a certain structure of their enterprise and to defend the organization and meet audit requirements. At the same time, the holistic perspective enables a prioritization with respect to the data gathered by identifying critical structures in the overall make up of the organization. Thus, the scenario *improving security via activity monitoring* in particular affects the following layers and cross-cutting functions of the BEAMS model:

Infrastructure & data: The infrastructure and data layer enables the monitoring of changes performed on data by the users and the used infrastructure elements.

Application & information: On the application and information layer details are gathered on the activities of the users which support the identification of patterns.

Questions & KPIs: Questions and KPIs facilitate the identification of suspicious activities by defining limits, boundaries, or critical values.

The amount of data gathered about the behavior nevertheless reveals its true benefits only, if the isolated information sources and log-files are connected and related to enable an overall picture. Benefits of activity monitoring are:

- Key business activities can be monitored real-time to identify overload, bottlenecks, process failures, errors, etc.

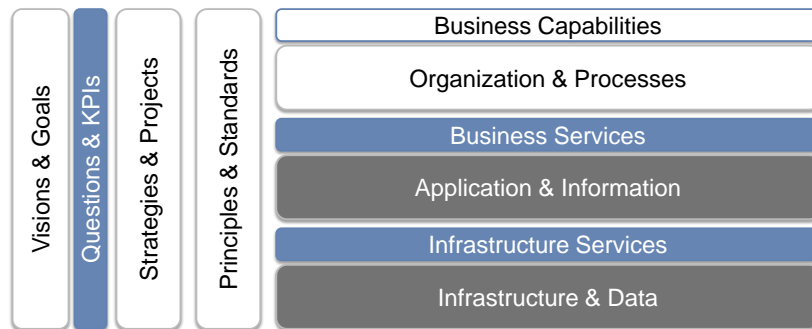


Figure 4.69: EA aspects relevant for scenario *Improving Security via Activity Monitoring*

- The interconnected information base supports drill down of information and enables the creation of a broad variety of stakeholder-specific views.
- Event-correlations can be detected and impending problems can be exploited and addressed prior to their occurrence.
- Notifications in cases of troubles can be send immediately to the responsible stakeholders.
- The impact of new or changing regulatory requirements can be estimated and analyzed.
- Security or compliance issues are reported immediately.

Based on the information gathered during activity monitoring planned and target states can be adapted to better suit the current situation, e.g. overloaded processes can be provided with a better technical infrastructure to reduce workload. Changes on other architectural layers can be considered, although the impact on the infrastructure and data layer is assumed to be the one with the best cost/benefit ratio. To limit the amount of data to be gathered and therefore, the produced costs, the activity monitoring should be supported by information from the strategies and goals management, i.e. the enterprise-level management function which is concerned with the definition and prioritization of the objectives of EA management.

This scenario affects several enterprise level management functions, e.g. risk management, data management and security management.

Opportunities

Improved security: IT security will strongly benefit from applying monitoring techniques and in particular from interlinking of differnt monitoring results.

Improved compliance audit support: Interlinked monitoring data will improve the capability of detecting IT related threts and will therefor support complience audits.

Reduced IT related business risk: Improved IT security and novel monitoring techniques will reduce the overall IT related business risk.

Threats

Higher IT efforts The interlinking of existing monitoring data and the evaluation of the inter-linked data will cause higher IT efforts.

Classification in the scenario portfolio

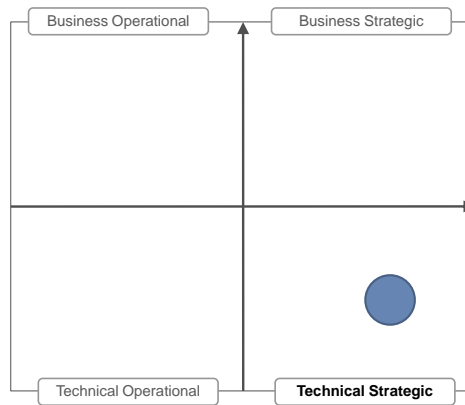


Figure 4.70: Classification of the scenario

The partners of the survey prioritized the scenario as shown in Table 4.31. The tool vendors' prioritization is detailed in Table 4.32.

Branch	Priority (-3 low to 3 high)
Consulting	0
Education	-1
Finance	0
Government	0
Healthcare	-0.5
IT Products & Services	0
Manufacturing	0
Telecommunication	-0.5
Transportation & Logistics	0
Other	-1

Table 4.31: Partner prioritization of *Improving Security via Activity Monitoring*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	1
BOC Information Technologies Consulting AG	0
Enterprise Architecture Solutions Ltd.	-1
iteratec GmbH	0
MEGA International	-1
Software AG	-2
SparxSystems GmbH	3
<i>Median</i>	0

Table 4.32: Vendor prioritization of *Improving Security via Activity Monitoring*

4.6 Trends for mergers and acquisitions

Especially the finance industry has undergone a wave of mergers and acquisitions in the past. Either on the way of forming bigger companies from smaller ones or the other way round breaking up bigger companies by carve-outs into smaller typically more specialized ones. While this changes in the organizational structure raise diverse challenges to an enterprise one typically underestimated challenge relates to the data and information exchange within one or between the borders of different organizations. The following scenario is dedicated to this challenge on the data and information layer and is called *data consolidation* which emphasizes on the identification of redundant information sources and providing decision support for rearranging the information and data architecture from a holistic perspective.

4.6.1 Data Consolidation

Today's enterprises are confronted with the challenges of data migration and consolidation due to different reasons, such as fundamental business transformations or technological renewal. Translating data from one data source to another crucially relies on mapping definitions on all levels of the EA, ranging from business level mappings that translate business object types, over application level mappings that relate logical data structures used by applications, to infrastructure level mapping, where concrete data objects and data repositories are mapped. The holistic perspective taken by EA management is expected to facilitate the identification of transformation requirements as well as the development of actual mapping rules.

Indications

Manifold reasons for migrating and consolidating data exist in today's ever changing business, legal, and technological environment. This raises the recurring need in industry to migrate data between different ways of business process execution, business application, or data repositories. In particular, the scenario of data consolidation is important for organizations that

- aim at business innovations facilitated by novel business capabilities and business processes, leading to an extended perspective on current business object types and their operationalization into information objects,
- are confronted with regulatory requirements that demand adaptations to existing business processes,
- are in the process of a merger & acquisitions (M&A) or carve outs,
- are under cost pressure, e.g. maintenance costs and cost saving potentials of a consolidated IT landscape, and
- face consolidation projects that seek to reduce the number of business applications concerned with certain business object types. Technological innovations and changing technological paradigms that facilitate different ways of processing information objects, pertaining also to infrastructure level data repositories.

Contra-indications

This scenario becomes obsolete when the data of an enterprise is already consolidated and harmonized.

Solution

Consolidation and migration endeavors have impact on the EA on many different levels, but can – due to their low frequency – not be considered routine tasks. Migration endeavors are furthermore often connected to business level transformations, such as mergers & acquisitions. This adds additional complexity by demanding urgent and immediate processes with only limited preparation. Therefore, data migration and consolidation has to combine the perspectives of business object management with more technically oriented perspectives. Such perspectives target the interfaces over which information objects are exchanged and data repositories, that persistent the logical data structures. Typical steps of a data consolidation project include identify usable data elements, define architecture target states, and implement migration plans.

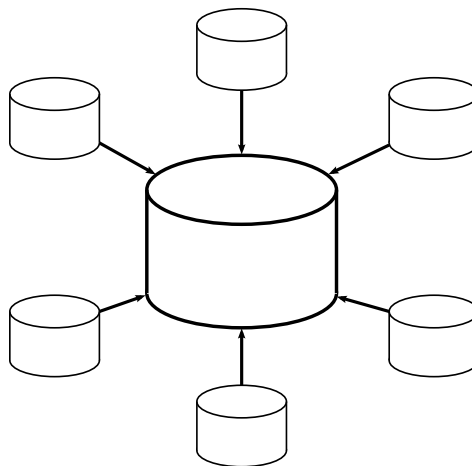


Figure 4.71: Data Consolidation

In contrast to mergers, that are driven by business, data consolidation is done in the aftermath thereof. Consequently, the scenario has an impact on a more technical level. However, data consolidation affects a part of the management activities of TOGAF®'s ADM:

Preliminary phase In the preliminary phase principles which data should be consolidated must be defined

Phase A: Architecture vision High-level consolidation requirements must be documented as part of the architecture vision

Phase C: Information systems architecture The information systems architecture must be developed to handle the consolidated data

Phase D: Technology architecture A technology architecture must be defined that operates on the consolidated data and ensures its maintenance

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

Phase E: Opportunities and solutions Different scenarios for data consolidation must be analyzed and a decision on the realization must be met

Phase F: Migration planning Early implementation of the data consolidation while ensuring business continuity

Phase G: Implementation governance Consideration of data consolidation aspects during the monitoring of correct implementation

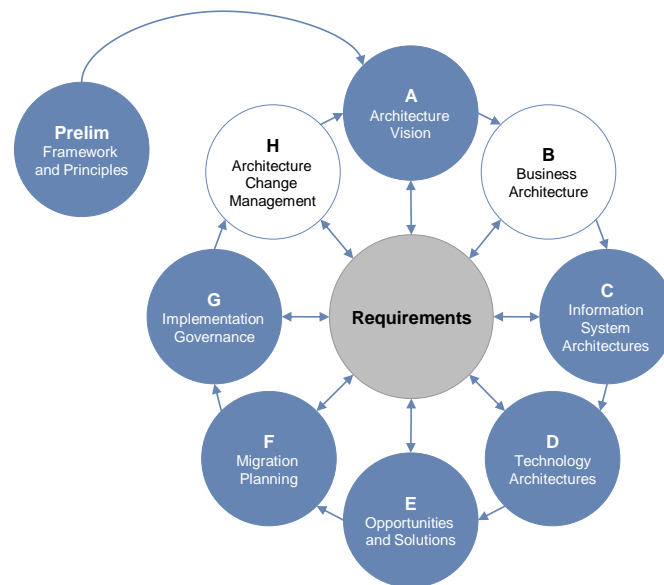


Figure 4.72: ADM phases relevant for scenario *Data Consolidation*

Following layers and cross-cutting functions according to BEAMS are affected by this scenario (cf. Figure 4.73):

Application & information to ensure that the applications operate effectively and efficiently on the consolidated data, the applications and their operations on the information have to be documented

Infrastructure & data the central elements, i.e. the data that needs to be consolidated is documented

Visions & goals in particular goals as well as KPIs that measure requirements as redundancies or costs

The affected enterprise-level management functions and contexts are project portfolio management, risk management, demand management, IT deployment costs, operation processes, vendor management, optimization and strategic right-sourcing. Affected parts of the management subject (EA) are, increase disaster tolerance, increase homogeneity, reduce operating cost, increase management satisfaction, improve capability provision, and ensure compliance.

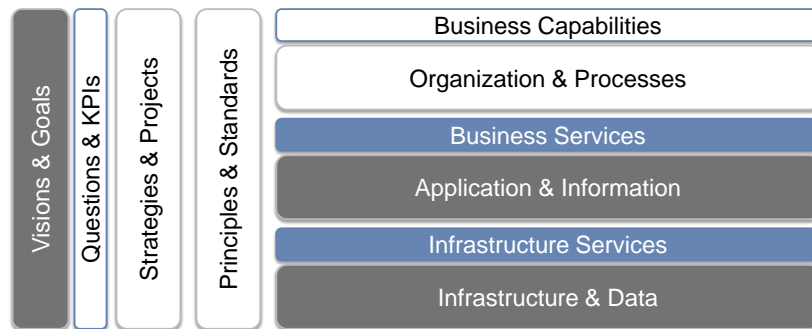


Figure 4.73: EA aspects relevant for scenario *Data Consolidation*

Opportunities

Cost savings A data consolidation can uncover cost savings via reduction of data redundancies.
Dissolving of redundancies A data consolidation endeavor reduces redundancies and clarifies data sovereignty.

Threats

Higher business risk A data consolidation project brings in a higher IT related business risk due to disasters during the process.

Classification in the scenario portfolio

On the one hand, the data consolidation scenario is more technology-oriented, but however could also have business impact, e.g. concerning data/information compliance aspects. Data consolidation has a strategic impact, e.g. on maintenance costs or compliance.

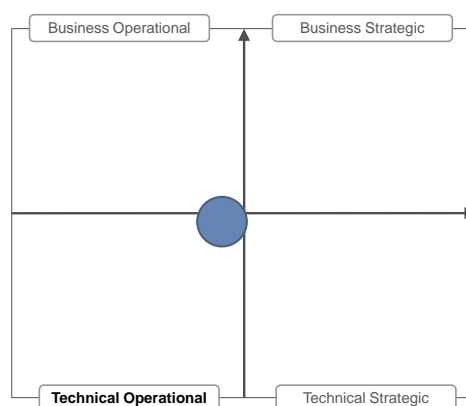


Figure 4.74: Classification of the scenario

4. Scenarios of the Trends in Enterprise Architecture Management Tools Survey

The partners of the survey prioritized the scenario as shown in Table 4.33. The tool vendors' prioritization is detailed in Table 4.34.

Branch	Priority (-3 low to 3 high)
Consulting	1
Education	1
Finance	0
Government	1
Healthcare	2
IT Products & Services	1
Manufacturing	1
Telecommunication	1
Transportation & Logistics	1
Other	2

Table 4.33: Partner prioritization of *Data Consolidation*

Tool vendor	Priority (-3 low to 3 high)
alfabet AG	0
Avolution	0
BOC Information Technologies Consulting AG	2
Enterprise Architecture Solutions Ltd.	-2
iteratec GmbH	1
MEGA International	2
Software AG	2
SparxSystems GmbH	-3
<i>Median</i>	0.5

Table 4.34: Vendor prioritization of *Data Consolidation*

5.1 ARIS

Tool Vendor's Profile/Company Profile

Software AG is the global leader in Business Process Excellence. Our 40 years of innovation include the invention of the first high-performance transactional database, Adabas; the first business process analysis platform, ARIS; and the first B2B server and SOA-based integration platform, webMethods. We offer our customers end-to-end Business Process Management (BPM) solutions delivering low Total-Cost-of-Ownership and high ease of use. Our industry-leading brands, ARIS, webMethods, Adabas, Natural, CentraSite and IDS Scheer Consulting, represent a unique portfolio encompassing: process strategy, design, integration and control; SOA-based integration and data management; process-driven SAP implementation; and strategic process consulting and services.

Tool Description

How to get clear insight into your complex enterprise - Does your ICT strategy match your business strategy?

- Is your budget spent primarily on keeping the "lights on", leaving no resources for innovation?
- Were different technologies acquired over time without any effort toward standardization or harmonization?
- How much information risk do you have, and what threats do you need to address?

5. Tool Vendors' Profiles

- Are the roadmaps of your business-critical ICT solutions and supporting technologies aligned?
- Have you avoided redundancies in processes and supporting ICT?

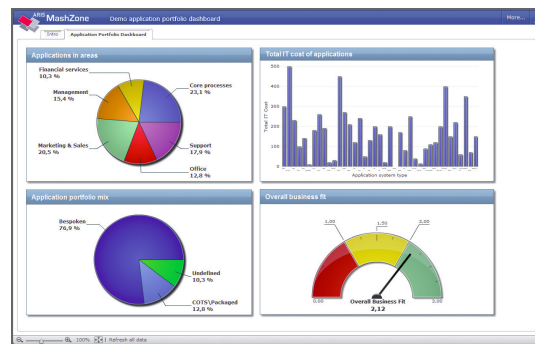
See clearly how to meet business goals with our complete solution

If you've lost sight of the big picture of your enterprise, here's good news. Software AG's Enterprise Architecture Management Solution can give you clear insight in to every aspect of your business and IT.

You'll have the information you need to get your enterprise from where you are today to your target state. You'll know what changes to make so IT supports business in the most flexible, future-proof and cost-efficient way.



(a) Strategic Application Portfolio Planning



(b) Enterprise Application Dashboard

Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract
Operational view	Check if available	Health	Deliverable net price	Create contract	Define contract det.	Enter customer sh.	Send contract docu.	Send original contract

(c) IT Landscape Planning for Applications or Services

Our fully integrated solution combines the market-leading software for enterprise architecture management, along with proven methodology, best practices and expertise so you can:

- Analyze, optimize, plan and manage your enterprise
- Synchronize IT change with business needs
- Create the right roadmap for your business products, services and ICT solutions
- Harmonize how ICT supports your business
- Define and track your enterprise-wide standards

- Optimize your IT budget and risk management
- Support business process analysis, requirements engineering, solution development, service, application and technology portfolio management—and more

Proof of success

Leading enterprises around the world rely on our solutions to optimize their enterprise architecture. In fact, our customers include $\frac{2}{3}$ of the Global 2000. For example:

Harmonizing IT and processes—A complex IT infrastructure at Océ made it difficult to make fast decisions. So the printing company deployed our solution to harmonize processes and roles as well as standardize applications and infrastructure. The company now has a comprehensive ICT strategy and enormous insight into its application portfolio. Processes were designed jointly between business and IT. The number of variations for certain processes was reduced by as much as 30 percent. That led to substantial savings in management and the implementation of the uniform processes at a lower cost.

Documenting the architecture—Piraeus Bank needed a well-documented, comprehensive enterprise architecture with a portal in English and local languages. First, processes were documented using ARIS methodology and tools. Information contained in the framework was re-used and the ARIS portal was published using ARIS Business Publisher. The project transformed the Piraeus Bank's methods and saved 30 to 80 percent.

Common challenges	Solution benefits
<p>Tighter IT budgets</p> <ul style="list-style-type: none"> • Greater efficiency required in day-to-day IT operation • Cost drivers must be identified and eliminated 	<ul style="list-style-type: none"> • Gain deeper insight into the IT cost of business products and services • Reduce the cost to develop, maintain and upgrade IT • Standardize technologies to reduce costs • Assure faster, realistic ICT solutions budgeting
<p>Greater alignment of IT and business</p> <ul style="list-style-type: none"> • IT needs to better understand and meet business requirements • Need to deliver better ROI and reduce risks 	<ul style="list-style-type: none"> • Increase your understanding of how business demands align with IT capabilities • Better communicate the value of ICT investments • Deliver high-quality solutions—faster—that address business needs

<p>Need to increase business productivity while reducing costs</p> <ul style="list-style-type: none"> • Innovations are needed to improve business operational efficiency 	<ul style="list-style-type: none"> • Optimize and harmonize IT to free up resources for innovation • Increase availability and reliability of mission-critical business applications
<p>Meeting security and confidentiality requirements</p> <ul style="list-style-type: none"> • Need to ensure compliance with legal regulations • Must provide a secure and reliable IT environment that supports business operations 	<ul style="list-style-type: none"> • Achieve greater transparency of data privacy and IT availability • Increase your insight into information security risks and threats • Improve compliance with industry standards
<p>Need to increase agility and speed</p> <ul style="list-style-type: none"> • Lack of insight into complex enterprise prohibits business model innovation • Scalable, flexible IT needed to support business innovation and growth • Fast changing market conditions demand quick implementation of new or updated solutions 	<ul style="list-style-type: none"> • Increase insight with a "single point of the truth"—one place for all information on processes, organizational structures, applications, data and infrastructure • Make better and faster decisions • Speed up your time-to-market • Make enterprise-wide changes—faster • Count on a scalable solution for growing enterprises

The software AG difference

Our solution supports a holistic enterprise architecture management practice—integrating:

- ARIS Platform, relied on by companies worldwide to centrally analyze, plan and optimize business processes, organizations, applications, data and IT infrastructure
- Proven architecture development methodologies (such as TOGAF®) supported by ARIS Platform to provide clear guidance and create benefits at every stage
- Best-practice reference models, standard frameworks and notations to jump-start enterprise architecture initiatives

- Valuable expertise from certified consultants with industry-specific, enterprise architecture and product knowledge (See how high analysts rate our capabilities at: www.softwareag.com/awards Strategic Application)

Learn more success stories at www.softwareag.com/customers.

5.2 BOC

Tool Vendor's Profile/Company Profile

The BOC Group is the technological leader in IT-based management tools and offers consulting services in the fields of Strategy and Performance Management, Business Process Management, Risk Management, IT Management, Enterprise Architecture Management and the alignment of business and IT. The BOC Group operates internationally with offices in Germany, Austria, Ireland, Poland, Spain, Greece, and Switzerland. Furthermore, it relies on a large network of international partners, strong business connections and a worldwide growing customer base.

Tool Description

Tool Philosophy

EA management is often regarded as a large, all-or-nothing approach seeking to cover the needs of an entire organisation on all architecture levels at once. This usually requires a large staff, a large budget and a long time frame. *ADOit* does not strive to implement EA management in a “big bang” approach but rather in a step-by-step approach. It provides all necessary tools to implement EA management step by step focusing on establishing corporate sustainability and competitive advantage, increasing value creation and gaining buy-in from the stakeholders. **EA Scenarios**

ADOit's tool features leave you with the decision, whether to start off with master planning, business capability management or rather launch application and technology portfolio management or demand management. At the end of the day, *ADOit* provides you not only with the right tools to launch those scenarios (cf. Figure 5.1). By making available numerous dashboards for particular roles, it also creates instant value for each stakeholder.

These out-of-the-box best practice scenarios allow *ADOit* users to get started with their EA program instantly: No long setups, no complicated programming.

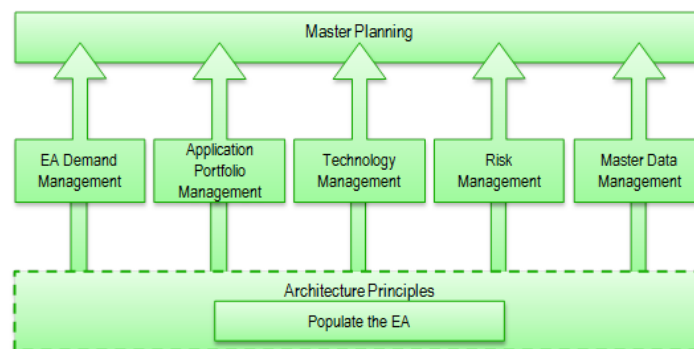


Figure 5.1: Best practice EA Scenarios supported by *ADOit*

The EA suite *ADOit* is part of the BOC Management Office (cf. Figure 5.2). By combining the powerful Rich Client and the easy-to-access Web Client, *ADOit* provides the right tools for each situation. It supports stakeholder roles by providing different dashboards specially

tailored to each scenario and role. By using the Web Client, stakeholders can log in to their personalized page and have access to various views, reports and charts all of which are tailored to their particular role. All the information the stakeholder needs is available in just a few clicks.

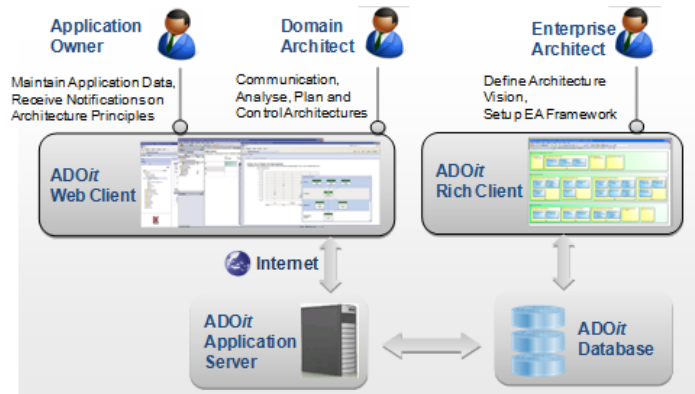


Figure 5.2: ADOit as part of BOC Management Office

Key facts:

- Gather EA information in one place and access your EA information through role-specific dashboards.
- High usability due to intuitive user interface (e.g. through persistent drag&drop philosophy in rich and web client).
- Support informed decision making by configuring your own views and reports (e.g. Gantt, Portfolio, Matrix, Business Impact).
- One click analysis and reports: stop wasting time explaining; show the stakeholders the created value.
- Use the outstanding time traveling feature to support architecture change management and master planning and to design, analyze and compare your current, intermediate and future architectures.
- Collaborate with other stakeholders via the powerful workflow-based task lists and e-mail notification system.
- Use ADOit as an integrative tool for bringing together various enterprise architecture information from different tools via flexible interfaces.

For further information please visit BOC's website (<http://www.boc-group.com>) or ask for the ADOit Method Manual 'practical guide to Enterprise Architecture Management with ADOit'.

5.3 The Essential Project—sponsored by Enterprise Architecture Solutions Ltd

The **Essential Project** is the collective name for a free open source toolkit specifically designed to support Enterprise Architecture. The toolkit is framework independent and focuses solely on providing only those capabilities that are “essential” to maximizing the value of enterprise architecture; helping organizations manage and analyze the knowledge needed to make decisions that impact or are impacted by their enterprise architecture.

In the best traditions of open source, the components of the Essential Architecture Manager have been created using a number of well-established and proven open source technologies:

Software Platforms Protégé Ontology Editor; Apache Tomcat, any other Servlet Engine; MySQL, MS SQLServer, Oracle RDBMS (optional)

Customization XML; XSLT; JSP/SVG (optional)

Essential Architecture Manager is a knowledge repository and reporting tool for capturing and then querying information based on the **Essential Meta-Model**. Fundamentally, these features can be grouped into two areas of functionality; functions that support users in the modeling of an enterprise, and functions that provide users with discrete views of this model in support of reporting and analysis. This grouping is reflected in the underlying design of the tool-set in that it comprises two main components (cf. Figure 5.3 and Figure 5.4), which separate the capture of information from the analysis:

Essential Modeller providing support for capturing and maintaining the enterprise architecture model via a simple, primarily form-based method.

Essential Viewer provides a flexible and extensible means of generating reports and views that allow users to view and analyze the enterprise architecture model. A number of standard reports are provided by default, however, the Essential Viewer is explicitly designed to allow organizations to define and publish custom views and reports to meet their individual needs.

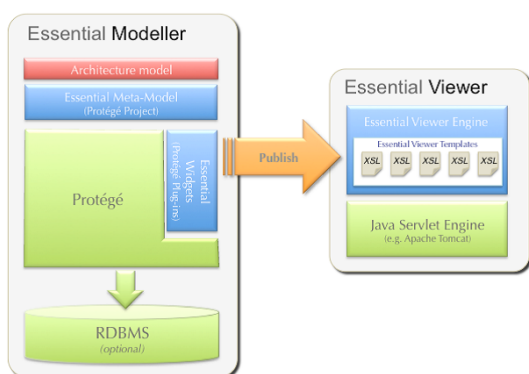


Figure 5.3: Essential Modeller and Essential Viewer

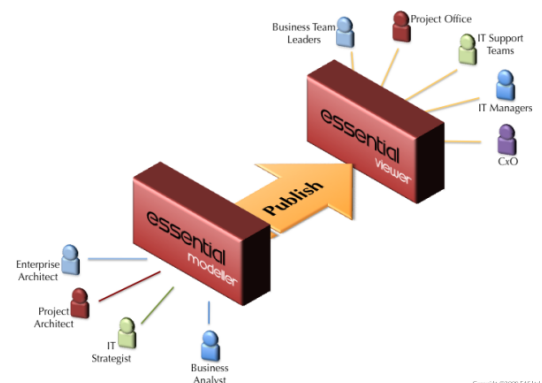


Figure 5.4: Publishing from Essential Modeller to Essential Viewer

The **Essential Meta-Model** is, in effect, an ontology for the domain of Enterprise Architecture that has been developed from over ten years of applying enterprise architecture practices with a variety of EA frameworks and tools. The meta-model is framework independent and provides a comprehensive and extensible set of concepts and relationships, with clear semantics that can be easily mapped to the concepts, activities and tools of the industry standard frameworks.

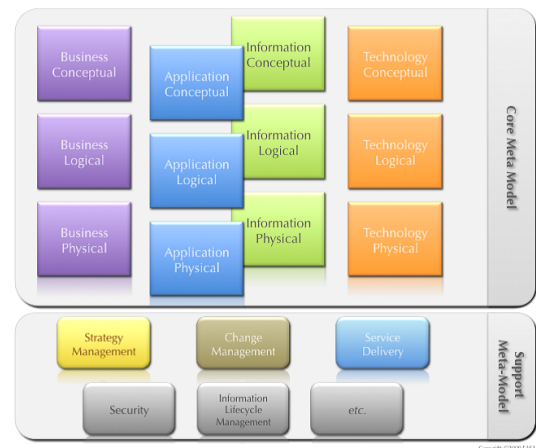
The Core Meta-Model concepts and relationships are based on what is fast-becoming a standard twelve-box grid; with layers representing the areas of architecture to be understood and rows representing the levels of abstraction from which this understanding is to be viewed. More specifically, the architecture layers defined are:

Business the objectives, capabilities, people and processes of an enterprise

Application the functional behavior provided by technology systems in support of business processes

Information the structured and unstructured information and data that support business processes, is managed by applications and is transmitted/-stored using technology

Technology the software and hardware technology used to implement applications and transmit/store information



The abstraction levels defined are:

Conceptual View the capabilities and concepts that represent the fundamental elements needed to meet the objectives of an enterprise

Logical View the approaches taken to realize the capabilities and concepts of the Conceptual View

Physical View the implementation of the approaches described in the Logical View

In addition, there are a number of **Support Meta-Model** concepts and relationships provided that support management and governance processes that make use of the knowledge in the Core Meta-Model, as shown above.

New Releases

A number of innovative releases have been recently implemented or are planned:

Information and Data Pack separates the capture and management of information from the capture and management of data, putting Essential at the forefront of information and data strategy and architecture management – released June 2011.

Essential as an EA Content Hub refining Essential's integration capabilities to allow information from disparate sources to be combined in one place, aggregating meta-data from various vertical silos and producing views that address decision support needs of a variety of stakeholders – due for release Q3 2011.

Essential Viewstation although a number of standard reports and views are delivered with the base Essential download, the Viewstation will provide a dedicated web-site for users to publish and access custom-built Views that have been developed by the Essential Project Community as well as more specialized views provided by the Essential Project Team – due for release Q3 2011

Essential SaaS partnership discussion underway to develop Essential as a cloud service (initially for US gvt) – release date tbd

Compliance/Risk Extensions partnership discussion underway to create Support Meta-Model extensions and Views to support Global Compliance and Risk Management activities

Company Profile

Enterprise Architecture Solutions Ltd is a specialist enterprise architecture consultancy, formed in 2000, providing EA Capability Development and Consulting to large global organizations. It has a small team of experts and uses affiliated partners for ancillary activities and international reach. EAS sponsors The Essential Project and, in addition to its EA services, provides Essential support services, such as view development, modeling, integration services and training.

Further details can be found at <http://www.enterprise-architecture.com> and <http://www.enterprise-architecture.org>.

5.4 iteraplan

Tool Description

iteraplan is the first Open Source tool for Enterprise Architecture Management. It is based on the IT landscape management methodology developed by iteratec, a Germany-based software and consulting company. A good general overview of the IT landscape management methodology is provided in the book "*Strategic IT Management*" by Inge Hanschke (Springer, 2010).

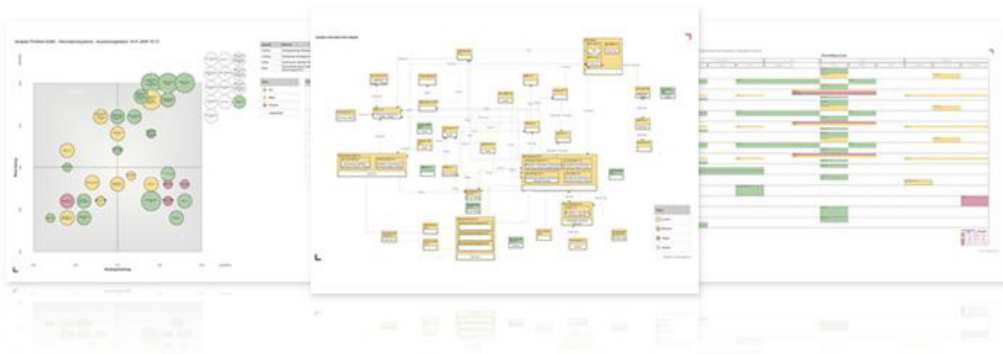


Figure 5.5: iteraplan - The Open Source EA management tool

iteraplan delivers support on all fronts to help you install and embed Enterprise Architecture Management practices in your company.

- **Industrial-strength out-of-the-box solution**
 iteraplan is based on best-practice architecture distilled from numerous tried-and-tested installations. It provides a set of essential structures which you choose from to fit your requirements.
- **Industrial-strength out-of-the-box solution**
 iteraplan is based on best-practice architecture distilled from numerous tried-and-tested installations. It provides a set of essential structures which you choose from to fit your requirements.
- **Flexible extensions via attribute system**
 The user-configurable system of attributes makes it easy to enrich the best-practice architecture with your own extensions.
- **Intuitive point-and-click functionality**
 The iteraplan software is engineered to be as easy and intuitive as possible, bringing maximum simplicity to tasks such as data upkeep, analysis and visualisation.
- **Distributed working in role-specific views**
 Being a web application, iteraplan can be used simultaneously by multiple stakeholders inside and outside the enterprise. It is also possible to define specific views of the application for each of the user roles you configure.

- **Custom-crafted visualisations**

Graphics-based evaluations are the great strength of iteraplan. Working with the landscape data you have entered, iteraplan can instantly generate landscape diagrams, information flow diagrams, master plans, cluster graphics, and portfolio diagrams – providing you with up-to-date views of the landscape within moments. There is a rich array of options for configuring the content and presentation of these graphics, and you can also save the configurations as prepared queries for later reuse. By bookmarking these queries you can provide access to the current data stored in iteraplan from any tool of your choice. Graphics can be output in Microsoft Visio format, enabling you to edit and include them in your presentations. Since release 2.8 you have the possibility to transfer layout you once fixed to new generated graphics or to make an impact analysis of your information systems in Vision format (provided as optional add-ons). Alternatively, you also export diagrams directly to PDF, JPG, PNG or the vector-based graphics format SVG.

- **Flexible reporting**

With features for versatile, dynamic querying, iteraplan provides a great number of analysis options that help you evaluate your enterprise architecture effectively. Since release 2.8 iteraplan supports you even more by providing a dashboard which gives you a quick overview of the current architecture.

- **Consistent data sets**

Benefit from data with substantially improved quality: iteraplan offers comprehensive consistency checks which you can select and run individually to suit the task in hand.

- **Efficient support for routine maintenance tasks**

Mechanisms such as notifications about changes on subscribed elements or mass editing of multiple elements add greater efficiency to IT landscape maintenance tasks.

- **Data import and export**

iteraplan features a Microsoft Excel interface via which you can import (Enterprise Edition only) and export data.

The right iteraplan edition for you

There are two versions of the iteraplan Open Source software available:

- **iteraplan Community Edition (CE)** can be downloaded free of charge from www.iteraplan.de.
- **iteraplan Enterprise Edition (EE)**: we supply this version as part of an IT landscape management rollout package and service contract. Further information is provided in the document IT landscape management – creating a strategic roadmap for your enterprise IT, which you can also download from www.iteraplan.de.

iteraplan Community Edition provides the core functionality expected of an EA management tool, but does differ from the iteraplan Enterprise Edition in certain respects:

- **Databases**: iteraplan Enterprise Edition can be used with either MySQL or Oracle databases, whereas the Community Edition ships only with Open Source database HSQLDB.
- **Users, roles, rights**: functionality for creating users and roles and for managing access privileges is provided in the Enterprise Edition only.

- **LDAP connection:** you can connect iteraplan Enterprise Edition to an LDAP server for authentication and authorization purposes.
- **Data import interface:** unlike the Community Edition, the Enterprise Edition offers a data interface via which you can load data you already have in application and process lists, for example. This speeds and simplifies the step of defining your EA management.
- **Migration scripts:** the Enterprise Edition ships with migration scripts, enabling you to update more easily to new iteraplan releases by transferring your data to the new version of the software.

For more information, to view an online demo or download the software, visit: www.iteraplan.de

5.5 MEGA - Executive Summary and Company Profile

MEGA was established in 1991, as a spin off from Cap Gemini Sogeti, and was launched as a separate company in 1992. Headquartered in Paris and with extended offices and representations around the world, MEGA is a global leader in Enterprise Architecture (EA), Business Process Analysis (BPA), and Governance—Risk—Compliance (GRC) Management. MEGA's mission is to provide solutions to visualize and improve a company's operations and business performance. MEGA helps companies increase operational excellence and agility, with mature Business Process Improvement and Enterprise Architecture practices, and holistic governance, risk and compliance programs. MEGA's vision is that today's nascent correlation between EA maturity and holistic GRC programs will strengthen over the next 3-4 years, all the more that the pressure of regulation and the complexity and volatility of business will increase.

MEGA is recognized as a leading provider of solutions for Enterprise Architecture, Business Process Analysis, IT Architecture, Strategic Planning, Operational Risk, Internal Control and multi-regulatory Compliance. This market position relies on 3 principles that have underpinned the company's vision, development and strategy since inception:

- Support business transformation with leading-edge visualization and management tools,
- Help companies analyze and solve complex issues, using modeling techniques based on standard methods, frameworks and proven best practices,
- Understand clients' and partners' requirements via a strong customer intimacy.

MEGA's customers include Fortune 500 companies in nearly all industry sectors. MEGA Customers include Australian Dept of Justice, USDA, US Dept of Homeland Security, US Dept of Transportation, Airbus, Alstom, BAE Systems, Michelin, Renault, NISSAN, EADS, EnergiNet, Enel, NASA, AT&T, AXA, CITIBANK, Deutsche Bank, EUROCLEAR, Morgan Stanley, Société Générale, Crédit Lyonnais, Unicredit Group, Sanofi Aventis, GlaxoSmithkline, Henkel, MEDCO Health Solutions, Novartis, Syngenta, Wyeth, Aetna, Allianz, Legal & General, New York Life, Unipol, Winterthur, Auchan, Carrefour, Metro, Colruyt, Henkel, Cox Enterprises, Direct TV, RAI, Axtel, SFR, CArPhone Warehouse, DNA Finland, Nextel Mexico, Pipex Communications, SNCF, EUROSTAR, SBB, ...

Since inception, MEGA's business is based on the development and distribution of software suites for Business Process Analysis (BPA), Enterprise Architecture (EA) and Governance, Risk and Compliance (GRC). The MEGA Suite has been used by large public and commercial organizations to clarify and understand operations and optimize business performance. The Suite has evolved through the years to provide new resources to organizations, most notably valued capabilities for Strategic and IT Planning, Business Architecture, reporting, dashboarding, EA Governance and Risk and Compliance management.

Sustained relationship with international standards bodies, professional associations, and market analyst firms such as Gartner and Forrester have become vital for the company. This allows MEGA to build and offer standard-based solutions to help customers stay on the forefront of methodology.

Solutions for Business Transformation and EA Management

MEGA solutions help organizations understand and reduce operational complexity, so that they can achieve performance improvements and add value to their business. The company has pioneered a holistic approach to BPA and EA by creating a visual understanding of the enterprise's vital assets. By gaining complete insight into the organization's broad range of resources, executives can make decisions that improve the company's performance and efficiency.

Mapping and Inventory

You can't change what you can't see. For 20 years MEGA has developed enterprise architecture modeling and system-thinking approaches to help organizations understand their business, processes and systems, and manage the effects of change. Actively engaged into enterprise architecture and design methodologies, MEGA has integrated them into architecture frameworks to provide a common perspective to each depending on their roles, projects and approaches.

Planning business transformations, supporting change management decisions

The ever growing complexity of business and technology requires new approaches to manage large transformation projects, describe effective paths from current to future targets, and organize change management accordingly, including for the information system. To do this, MEGA complements strategic planning with road mapping, dashboarding, portfolio management and arbitration.

Extending communication and collaboration to all stakeholders

Because Enterprise Architecture initiatives involve more and more various roles within the organization, addressing the different needs and viewpoints of each is critical to supporting effective collaboration. This materializes into the ability to perform modeling activities via the web – MEGA Anywhere Modeling and EA Management Product Series – and to allow different types of users to interact: the core EA team with the 1st and second circles of users, including end-users, e.g. with the MEGA Advisor portal.

As a result, over the past decade, Mega's modeling Suite has turned into a complete Enterprise Architecture Management suite, supporting the major standard architecture frameworks and covering EA Governance.

Solutions for Governance, Risk and Compliance

MEGA GRC Solutions address the requirements of Operational and Enterprise risk management programs, including day-to-day operations across the main enterprise control functions: risk management, internal control and compliance, internal audit. Companies use MEGA's GRC Solutions to design and execute risk management policies and procedures, and control their efficiency.

Consulting Services

MEGA has more than 20 years of consulting and professional service expertise in business process excellence and enterprise architecture management. MEGA's expertise is based on the close collaboration with government agencies, Fortune 500 companies, and industry standards bodies in BPA, EA, and GRC.

Strategic Directions and Major Differentiators

Today, the EA market expresses 2 major needs: solutions for EA governance, and need for next generation EA methodology. MEGA is willing to lead the EA market and strengthen its differentiators:

Unique Software MEGA is the only company that offers integrated EA, BPA and GRC capabilities

International Presence MEGA provides high standard solutions via offices and channels worldwide

Customer Network More than 2600 customers, 75000 users in more 40 countries

Strong Financial Independence MEGA has tripled in 10 years, and is profitable and debt-free.

5.6 planningIT - Executive Summary and Company Profile

alfabet's planningIT is an integrated software suite to harmonize and support the different tasks of a Business IT Management approach. All information and functionality is provided from a single, role-sensitive interface that allows streamlined, collaborative processes throughout the IT management lifecycle from demand and strategy to managing the program portfolio and the enterprise architecture. The management of IT finances and IT risks are adjacent and increasingly important tasks that make planningIT relevant to a wide range of stakeholders.

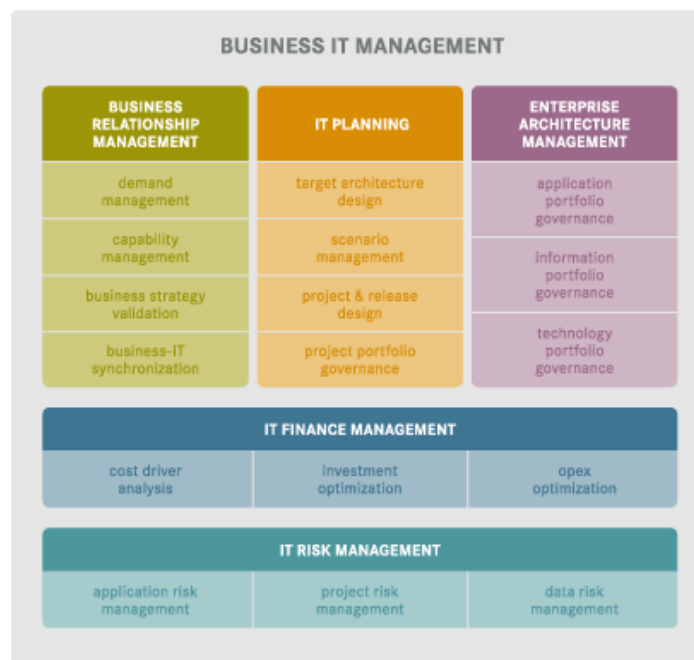


Figure 5.6: Business Relationship Management - Avoiding the Expectation Gap

IT departments often struggle to understand what business wants or where it is going. planningIT provides a language and a set of processes that help business and IT communicate with each other. It turns business strategy and projects into concrete actions that IT can implement. planningIT allows users to document and inventory demands and strategies, prioritize them according to business needs, relate them to specific technologies, applications and projects - and clearly signposts the cost implications. planningIT then manages the process of approval, implementation and conclusion, tracking progress and providing documented business justification for IT decisions.

IT Planning - Making Effective Decisions

IT often struggles to deliver plans that fulfill business demands, comply with the required standards and give best value for money. planningIT's superior data, and the sound business-IT dialog it facilitates, help organizations to plan their future IT landscape. Understanding of business strategy, planningIT brings good governance and the ability to test and project different scenarios to the planning process. By combining real-time information and an understanding of business strategy, planningIT allows coherent planning of a future state architecture, along with the necessary projects to implement that architecture. These projects

can then be prioritized, approved, and a roadmap towards the new architecture be drawn up. Each stage of the process can be tracked and the ramifications of any proposed change in the architecture can be identified.

Enterprise Architecture Management - Gaining Transparency in a Complex Environment

planningIT allows organizations to effectively and consistently map their applications to business processes so they can assess the performance of their current IT landscape. planningIT's powerful inventorying capabilities are the foundation of everything it does. They help companies understand their current IT landscape. By mapping applications to business processes and showing which applications depend on which technologies, planningIT helps Enterprise Architects manage application, technology and information portfolios effectively. Such an understanding provides the best possible basis on which to plan an IT landscape that is agile, cost-effective, low risk and fit for the future. planningIT distributes responsibility for maintaining a real-time view of applications and technologies across all business functions.

IT Finance Management - Measuring the Value

Business needs cost transparency to determine the business value of IT investments and make decisions on cost optimization. Keeping control of IT costs is essential for IT to play a full role in business strategy: IT investment is always measured against the business value it brings. When inventorying, performing portfolio analysis or planning projects, planningIT makes cost implications a fully visible, integral part of the decision-making process. It brings together people, processes and information to ensure good financial governance and the best possible value for money from IT.

IT Risk Management - Performing in a Confusing Environment

IT is the mainstay of every large company today. It must be protected from risks to ensure business continuity, project delivery and data security. planningIT implements an information-gathering process that creates a detailed picture of which applications and technologies have the highest risk exposure. It helps the IT, or the risk and compliance department understand the implicit risks in the IT portfolio, and how to mitigate them when planning future IT investment. This helps keep the associated costs down and enables companies to fulfill their regulatory obligations.

In Summary

planningIT empowers organizations to plan, invest and perform effectively. It is unique in tightly coupling business priorities and IT returns with current and future initiatives. Its innovative, data-driven approach supports the change management of business and IT architectures in a collaborative planning process comprising automated, full architecture lifecycle support, "what-if" scenarios and rich simulation of future states for any period of time for all stakeholders in IT, Business and Finance.

5.7 Sparx System

Tool Vendor's Profile/Company Profile

Enterprise Architect is a visual platform for designing and constructing software systems, for business process modeling, and for more generalized modeling purposes. Enterprise Architect is based on the latest UML 2.3 specification (see www.omg.org). UML defines a visual language that is used to model a particular domain or system (either proposed or existing). Enterprise Architect is a progressive tool that **covers all aspects of the development cycle**, providing full traceability from the initial design phase through to deployment, maintenance, testing and change control.

With over 250,000 licenses sold, Enterprise Architect has **proven remarkably popular** across a wide range of industries and is used by thousands of companies world-wide. From large, well-known, multi-national organizations to smaller independent companies and consultants, Enterprise Architect has become the UML modeling tool of choice for developers, consultants and analysts in over 130 countries. Sparx software is used in the development of many kinds of software systems in a wide range of industries, including: aerospace, banking & finance, defense, electrical engineering, medicine, transport, research & academia, retail and utilities. It is also used effectively for UML and business architecture training in many prominent colleges, training companies and universities around the world. Actual implementations range from single users to companies with over 1000 seats working on large, distributed projects.

Tool Description

Model and Manage Complex Information

Enterprise Architect helps individuals, groups and large organizations model and manage complex information. Often this relates to software development and IT systems design and deployment, but it can also relate to business analysis and business process modeling as well as higher level Enterprise Models. Enterprise Architect integrates and connects a wide range of structural and behavioral information, helping to build a coherent and verifiable architectural model, either what-is or what-will-be. Tools to manage versions, track differences, audit changes and enforce security help control project development and enforce compliance with standards.

Enterprise Architect ships with a number of **predefined model and application patterns** to assist in the creation of new projects and models. Each pattern contains useful notes, references and starter elements that together provide a framework on which you can build your model. For example, Enterprise Architect includes Java and .Net application patterns that get you started with a basic implementation model, generated code and appropriate scripts to build, run and debug your application.

Enterprise Architect supports a number of mechanisms for **exporting and importing models** using industry standard XMI. This allows modelers to use information created in other tools, to copy information between Enterprise Architect models and even to write and use custom tools that take XMI directly as input.

Enterprise Architect supports **version control** of packages and their component sub-packages to a central repository. This repository is maintained by third-party version control applications that control access and record revisions.

Add-ins enable you to add functionality to Enterprise Architect. Enterprise Architect's Add-in framework builds on the Automation Interface, enabling you to extend Enterprise Architect's user interface. Add-ins provide several key advantages over stand-alone automation clients, including the ability to define additional Enterprise Architect menus and receive notifications about various Enterprise Architect user interface events, such as menu-clicks and user selections.

Enterprise Architect provides support for **managing your project**. Project managers can use Enterprise Architect to assign resources to elements, to measure risk and effort and to estimate project size. Enterprise Architect also supports change control and maintenance.

UML Profiles provide a means for **extending the UML Language**, which enables you to build UML models in particular domains. Enterprise Architect has a generic UML Profile mechanism that allows users to create, import and use profiles as seamless extensions to the core modeling environment. For example, the UML Profile for XML Schema defined by David Carlson in *Modeling XML Applications with XML* is available for Enterprise Architect. This profile describes a set of extensions to basic UML model elements to enable accurate modeling of XSD Schemas Implementations of profiles.

MDG Technologies encapsulate a logical collection of resources (such as UML patterns and profiles) that pertain to a specific technology or modeling domain. These are 'pluggable' resources for Enterprise Architect that reside either in a physical directory or URL. Users may create their own MDG Technologies, or take advantage of technologies built into the Enterprise Architect Installer, such as ICONIX and Mind Mapping. Free plug-in technologies that support such activities as CORBA code engineering and BPMN model validation are available for download from: http://www.sparxsystems.com/resources/mdg_tech. In addition, licensed solutions for systems modeling (SysML), Distributed Data Services (DDS) and others are also available – see <http://www.sparxsystems.com/products/#MDGTech>.

The production of documentation is essential to realizing the full benefit of Enterprise Architect. Enterprise Architect outputs high quality documentation in either **RTF**, **PDF** or **HTML** format. You can modify the RTF formatting directly with RTF Style templates to alter the look and feel of generated output. Using Microsoft® Word® you can further enhance the output by connecting and interweaving model output in linked documents.

Enterprise architecture framework support

Sparx Systems supports industry-standard architectural frameworks to facilitate enterprise modeling projects. Framework implementations in Enterprise Architect are based on the UML and its related specifications, which maximizes architectural rigor and allows users to exchange enterprise model information using standards such as XMI. The following architectural frameworks are available as plug-in extensions to Enterprise Architect:

- The Zachman Framework (see <http://www.sparxsystems.com/zachman>)
- DoDAF (see <http://www.sparxsystems.com/dodaf-modaf>)
- MODAF (see <http://www.sparxsystems.com/dodaf-modaf>)

- UPDM (see <http://www.sparxsystems.com/updm>)
- The Open Group's TOGAF® (see <http://www.sparxsystems.com/togaf>).

Including the Federal Enterprise Architecture Framework (FEAF) reference model.

About Sparx Systems

Sparx Systems is an Australia-based company with a solid history of innovation and development within the modeling tools market. Sparx Systems is a Contributing Member of the Object Management Group (OMG), the standards body responsible for defining and maintaining the UML and related specifications.

Ongoing commitment to enterprise modeling tools

Sparx Systems has been developing enterprise modeling tools for over ten years, and has been active in developing the capabilities of Enterprise Architect to reflect the needs of enterprise modeling. In addition, Sparx has been diligent in listening to requests and suggestions from its extensive user base, implementing many features critical to developing useful and well-rounded models. Sparx Systems is committed to the ongoing development both of its UML modeling tool, Enterprise Architect, and of the numerous plug-in technologies that address domain specific requirements.

Contact details SparxSystems GmbH Central Europe

an independent Sister Company of SparxSystems PTY

Internet German: www.sparxsystems.de

Internet English: www.sparxsystems.eu

In this survey, the future development of EA management is discussed. Together with a group of industry partners, we analyzed existing trends in the business and IT which are likely to appear in the next three years and projected them on the EA management and supporting tools. In the following, we reflect on the portfolio of trends and predict the development in the field of EA Management. We further summarize the results from both the vendors' and the partners' prioritization of the different trends.

6.1 Summary of the survey results and the main findings

The trends identified in this survey can be classified along the dimensions *business – technical* and *strategic – operational*. Thereby, the portfolio of scenarios is divided into four quadrants, which are not equally filled with scenarios, as explained in the following.

The least scenarios are both *technical* and *operational*. This may owe to the fact that today's EA management is quite well-positioned in addressing this aspect of an enterprise. Especially, small and medium-sized companies have their EA management anchored in the IT departments, resulting in a strong focus of EA management on IT related tasks. In addition, larger companies often start their EA management initiatives from an IT perspective, which leads to an EA management for application and technology architects.

A majority of scenarios can be considered both *technical* and *strategic*. These scenarios target IT planning, especially strategic planning of the application portfolio. Such scenarios are relevant for companies that have established strong roles of data architects and enterprise architects, as with increasing maturity of EA management particularly the data architecture becomes increasingly important.

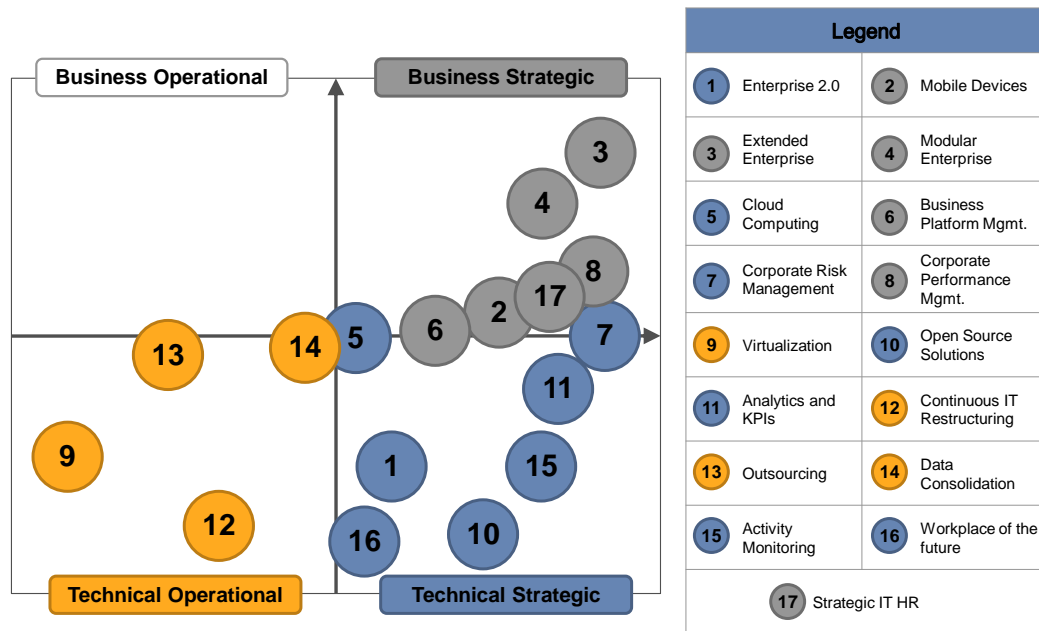


Figure 6.1: Portfolio matrix for EA management scenarios

A considerable number of scenarios are positioned in the *business strategic* quadrant. These scenarios are typically interesting for enterprises that have a strong anchoring of EA management in the organization. In particular, a mandate to support business transformation initiatives is necessary. The roles of enterprise architects and domain architects are especially important in such enterprises, as a holistic approach to enterprise transformation with a clear business focus is to be implemented.

In the course of this survey we did not identify *business operational* scenarios. There may be two reasons for this: firstly, day-to-day business operations are not considered to benefit from the holistic perspective, that EA management provides. Secondly, business-centric management responsables are not aware or willing of the benefits that EA management can provide. The second reason can be supported from our practical experience, where companies successfully reduced redundancies regarding business operations by using EA management methods. This nevertheless required strong marketing for EA management in business divisions.

Scenarios of the first two types are well-supported by today's EA management tools, as for example the analyses of Matthes et al. [Ma08] revealed. Support for scenarios with a stronger business perspective is still developing. We nevertheless expect this development to continue, as a holistic coverage of both IT and business aspects can be considered an ideal state for future EA management. Such embracing management method needs to cover the modeling of business strategic aspects, they usually do not offer appropriate functionalities supporting the analysis, simulation and planning.

As part of the analyses, we asked both partnering enterprise and tool vendors to prioritize the scenarios according to the likelihood to appear in the future. From the individual prioritisations, we derived aggregated prioritizations over all partnering enterprise, per branch, and per

6. Summary

geographic region. Being prioritisations on a seven step Likkert scale, we applied the *median* to compute the aggregated priorities for the scenarios.

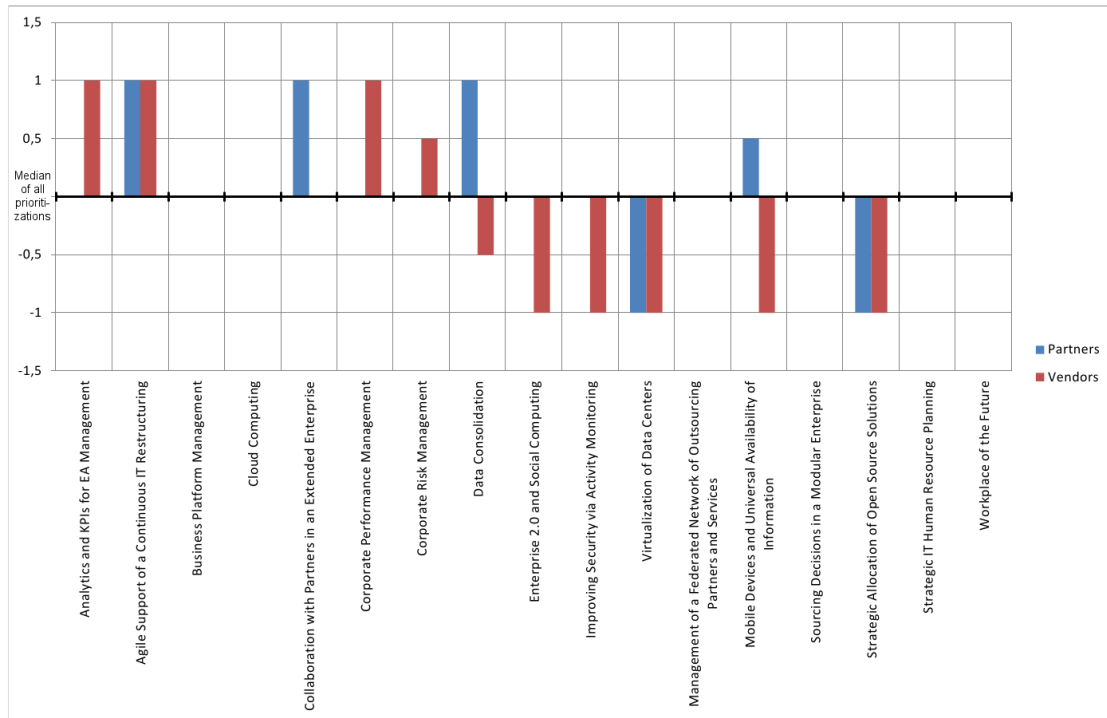


Figure 6.2: Relative priorities of the scenarios compared to median priority

Figure 6.2 shows the relative priority of the scenarios as indicated by both partner and vendors. The displayed priority is not the absolute value of priority given in the answers. The provided relative priority shows, whether a scenario is more important than the median of all scenarios, or less important. The median priority is thereby computed per group, i.e. one median for the vendors' prioritization and one for the partners' prioritization. We observe some discrepancies between the relative priorities of the two groups of participants. One the scenario *Agile Support for a Continuous IT Restructuring* (see Section 4.2.2) is considered important by both groups, whereas for scenarios *Virtualization of Data Centers* (see Section 4.2.3) and *Strategic Allocation of Open Source Solutions* (see Section 4.5.1) both groups agree on minor importance. For two other scenarios, *Data Consolidation* (see Section 4.6.1) and *Mobile Devices and Universal Availability of Information* (see Section 4.3.2) the expectations of the partners outnumber the ones of the vendors. This mismatch may be especially interesting for tool vendors to seek to align their roadmaps with prospective customer expectations. Contrariwise, future tools are likely to cover scenarios as *Corporate Performance Management* (see Section 4.4.2) and *Corporate Risk Management* (see Section 4.4.3). Enterprises in particular branches may well be interested in tool support for these fields.

The analysis of the relative priorities aggregated by geographic regions reveals that in general the relative priorities do not depend on the region. There is, in particular, no “turn” in the priority of a scenario between different geographic regions. Notably exceptions in this context are the scenarios *Enterprise 2.0 and Social Computing* (see Section 4.3.1), *Improving Security*

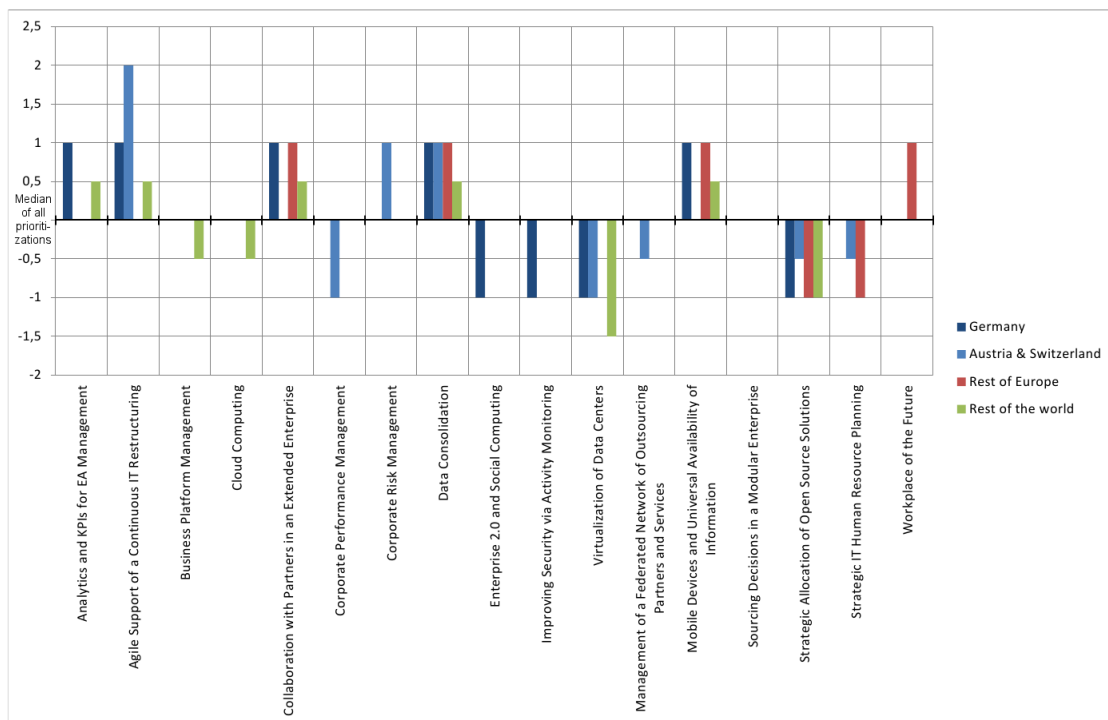


Figure 6.3: Results of the scenario prioritization by geographic regions

via *Activity Monitoring* (see Section 4.5.3), and *Workplace of the Future* (see Section 4.3.3), which are significantly regionalized. The regional importance of scenario *Corporate Performance Management* (see Section 4.4.2) does contrariwise not denote a regional exception, but results from the distribution of the participating partners from Austria and Switzerland in the different branches. The regional differences may provide input to consulting companies that seek to focus their EA management consulting portfolio in different countries.

Last of all, some interesting statements can be made about the result of this survey pro business branch. The scenarios chosen to be relevant for the financial sector are, not surprisingly, oriented to on the analytical and KPI-oriented approach to EA management which highlights the aspect of value of the EA. The sector transport is, in turn, interested and sees potential for the scenario *Mobile Devices and Universal Information Access* (see Section 4.3.2). The government branch, finally, favors the scenario *Cloud computing* (see Section 4.1.1), which was evaluated as neutral in general.

6.2 Management recommendations

The results of this study are relevant for the enterprise architecture departments as well as for the general management interested in an integrated treatment of the business strategy, business processes, applications and data. Herewith we tease some ways in which this study can be used in companies. To start with, the identified scenarios may be an input for the development roadmaps of the enterprise architecture in the companies. We observe that

the enterprise architecture is still often misunderstood in the organizations by being limited to the notion of IT architecture. The integrated holistic approach is seldom considered at all, or regarded solely by the IT departments. The findings of this study show that the EA management is well applicable in numerous business management topics. We provide a guideline which concrete methods and techniques can be used to solve the challenges resulting e.g. from market dynamics. These findings may support the companies to move forward from applying EA management only in tactical IT-related cases towards employing it in strategic business scenarios.

Having raised the necessary awareness, the setup of the business and IT projects might have to be rethought. The EA function and in particular the enterprise architects will need to be involved in further initiatives than it may be in the current stage of maturity of the organization. This paradigm change from isolated consideration of business and IT to a holistic view requires certainly some organizational changes. The processes and roles may need to be adjusted to facilitate the new mandate of the architects. In the subsequent section we make a recommendation on the future research which could handle the details of this new organizational setup.

Finally, the results of the tool vendors' survey show how current EA management tools are capable of supporting the extended EA application in the future scenarios. Managers can apply this information firstly in the EA management tool choice decisions and secondly as a trigger for the roadmaps of the tool application in the companies. The survey among the tool vendors shows that the EA management tools currently available on the market do support the most of the future scenarios relevant for EA management. This should trigger the companies to apply these tools in further scenarios exhausting their capabilities as opposed to extending the tool landscape ("one tool for one scenario").

6.3 Potential for future research

This study brings certainly a lot of new light on the enterprise architecture management and its development. It surely as well uncovers new horizons potentially interesting for the further research and definitely relevant and interesting for the practice. At this point, we would like to elaborate on some possible research directions resulting from this paper. We have described how EA management supports different scenarios and pointed out which methods and subjects of EA management apply in each of them. Partly we showed how the EA management can be coupled with the typical business management analysis and decision taking approaches. It will be certainly a great contribution to the development of the EA management to have a deeper look on the EA management capabilities supporting the identified scenarios and to describe how the EA management capabilities interplay with the running processes relevant in a given scenario. It would be interesting to identify, where the gaps in the current available EA management methods are and how to close them to increase responsiveness to future trends. A picture in which the EA management approach is coupled with the common business management methods and processes will surely create new potential to increase acceptance on the business side and may be a trigger for a stronger integration of the EA management in the organization.

Moreover, we do recommend the analysis of how the EA management function needs to be positioned in the organization in order to optimally support the future scenarios. It is to analyze what mandate is necessary to enable coupling of the EA management with other processes applying in the described scenarios. Should the enterprise architects support business management decisions, they need to gain respective skills and knowledge. A development of the necessary organizational setup will be of a significant interest for the companies facing or participating in the identified scenarios. Finally, one could further research in the area of EA management tools. It would be beneficial, if future amendments to this study analyzed the development roadmaps of prominent EA management tool vendors more in detail, e.g. pointing out concrete capabilities which will need to be provided to address future scenarios. Also, the definition of the exact information needs in each of the scenarios in terms of the underlying metamodel would be a valuable input for the development of the tool roadmaps. Going further, one may be interested in the definition of views which are typical or helpful in these scenarios for the involved stakeholders. This input can be then considered by the tool vendors in the further development of reports or other functionalities.

Bibliography

- [ARW08] Aier, S.; Riege, C.; Winter, R.: *Unternehmensarchitektur – Literaturüberblick Stand der Praxis*. *Wirtschaftsinformatik*. 50(4):292–304. 2008.
- [AS09] Aier, S.; Schelp, J.: *A Reassessment of Enterprise Architecture Implementation*. In *Trends in Enterprise Architecture Research*. pages 53–68. 2009.
- [Bu10] Buckl, S.; Matthes, F.; Roth, S.; Schulz, C.; Schweda, C. M.: *A Conceptual Framework for Enterprise Architecture Design*. In (Aalst, W.; Mylopoulos, J.; Sadeh, N. M.; Shaw, M. J.; Szyperski, C.; Proper, E.; Lankhorst, M. M. et al., Ed.): *Trends in Enterprise Architecture Research*. volume 70 of *Lecture Notes in Business Information Processing*. pages 44–56. Springer Berlin Heidelberg. 2010.
- [Bu11a] Buckl, S.; Matthes, F.; Monahov, I.; Roth, S.; Schulz, C.; Schweda, C. M.: *Towards an agile design of the enterprise architecture management function*. In *6th Workshop on Trends in Enterprise Architecture Research (TEAR 2011)*. Helsinki, Finland. 2011.
- [Bu11b] Buckl, S. M.: *Developing Organization-Specific Enterprise Architecture Management Functions Using a Method Base*. PhD thesis. Technische Universität München. München, Germany. 2011.
- [Ci] Cisco, V.: *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update*. *Cisco White Paper*[Online]. Available: http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.html.
- [Ga75] Gadamer, H.-G.: *Wahrheit und Methode – Grundzüge einer philosophischen Hermeneutik*. J.C.B. Mohr. Tübingen, Germany. 3rd edition. 1975.
- [GW91] Gurbaxani, V.; Whang, S.: *The impact of information systems on organizations and markets*. *Communications of the ACM*. 34(1):59–73. 1991.

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- [In07] International Organization for Standardization: *ISO/IEC 42010:2007 Systems and software engineering – Recommended practice for architectural description of software-intensive systems*. 2007.
- [La05] Lankhorst, M. M.: *Enterprise Architecture at Work: Modelling, Communication and Analysis*. Springer. Berlin, Heidelberg, Germany. 2005.
- [Le10] Leganza, G. e. a.: *The Top 15 Technology Trends EA Should Watch: 2011 To 2013*. http://www.forrester.com/rb/Research/top_15_technology_trends_ea_should_watch/q/id/56871/t/2. 2010.
- [Ma08] Matthes, F.; Buckl, S.; Leitel, J.; Schweda, C. M.: *Enterprise Architecture Management Tool Survey 2008*. Chair for Informatics 19 (sebis), Technische Universität München. Munich, Germany. 2008.
- [OML11] Owen, E.; Munroe, C.; Lewis, C.: *Worldwide Telecom Services Database, 2H10 - 227079*. <http://www.idc-mi.com/getdoc.jsp?containerId=227079>. february 2011.
- [Po98] Porter, M.: *Competitive strategy: Techniques for analyzing industries and competitors*. Free Pr. 1998.
- [RWR06] Ross, J. W.; Weill, P.; Robertson, D. C.: *Enterprise Architecture as Strategy*. Harvard Business School Press. Boston, MA, USA. 2006.
- [Sc11] Schweda, C. M.: *Development of Organization-Specific Enterprise Architecture Modeling Languages Using Building Blocks*. PhD thesis. Fakultät für Informatik, Technische Universität München, Germany. 2011.
- [Si96] Simon, H. A.: *The Sciences of the Artificial*. MIT Press. Cambridge, Massachusetts, USA. 3rd edition. 1996.
- [Th09] The Open Group: *TOGAF “Enterprise Edition” Version 9*. <http://www.togaf.org> (cited 2010-02-25). 2009.
- [Wa05] Wagter, R.; van den Berg, M.; Luijpers, J.; van Steenberg, M.: *Dynamic Enterprise Architecture: How to Make IT Work*. John Wiley. 2005.
- [Wi11] Wikipedia: *Business Performance Management*. http://en.wikipedia.org/wiki/Business_performance_management. July 2011.

