St. Petersburg University
Graduate School of Management

WORKING PAPER

D. Kudryavtsev, M. Kubelskiy

USING ENTERPRISE ARCHITECTURE MANAGEMENT METHODS AND TECHNOLOGIES FOR KNOWLEDGE STRUCTURING IN STRATEGIC MANAGEMENT

 # 8 (E) – 2018

Saint-Petersburg

2018

D. Kudryavtsev, M. Kubelskiy. Using Enterprise Architecture Management Methods and Technologies for Knowledge Structuring in Strategic Management. # 8 (E) – 2018. Graduate School of Management, St. Petersburg University: SPb, 2018.

Keywords and phrases: knowledge structuring, strategic management, enterprise architecture management, conceptual modelling

Abstract: Today, in the era of digital economy and the need for constant digital business transformation, the relevance of Enterprise Architecture (EA) tools and methods to strategic management tasks increases. According to the latest research, strategic decision-makers face a significant number of problems, which potentially can be successfully resolved with the help of EA This paper is a review of potential application of EA methods and technologies to support strategic management process. The main research method for this paper is an exploratory literature review focused on the evolution, classification and functionality of EA methods with subsequent analysis of relevant problems from the field of strategic management. This result is an intermediate point for the further research which may add considerable value to both researchers and practitioners.

D. Kudryavtsev — Associate Professor, Graduate School of Management, St. Petersburg University
e-mail: d.v.kudryavtsev@gsom.pu.ru

M. Kubelskiy — Doctoral student, Graduate School of Management, St. Petersburg University
e-mail: st057456@student.spbu.ru

Содержание

1. Introduction

Developments in the field of information science are used successfully in many fields of management such as financial, operations or supply chain management, but in the field of strategic management IT-based methods and technologies are used not so widely.

In the era of the knowledge economy, the volumes of information that need to be processed in order to make the most accurate strategic decisions have significantly increased. In addition, the problem of making a strategic decision is complicated by the high degree of uncertainty in changes in the external environment, the increasing variation of the ways for doing business, and the accelerated pace of scientific and technological progress. All these means a difficult task for the modern strategic management: for keeping an organisation competitive, it is necessary to fit the strategy quickly and flexibly.

This problem could be resolved by increasing the degree of involvement of information technologies in the strategic decision-making process. This research considers the potential application of such IT-based discipline as Enterprise Architecture (EA) to facilitate strategic management.

In the course of this research, the main challenges of strategizing process that can be facilitated with the help of EA will be described. Next, a brief overview of the main concepts and points from the field of EA will be given, and the term of modeling as a way of studying systems will be defined. The last part decribes how exactly Enterprise Architecture can facilitate a strategic management process.

2. Strategic management

2.1. Strategic management process

One of the first researchers in the field of management, who gave one of the first definitions of the term strategy, is Alfred Chandler. In his book Strategy and Structure (Chandler 1962) he defines strategy as "the determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals". In this interpretation, the term strategy is based on the presumption of a formal, systematic planning process.

Later the concept of strategic planning was subject to criticism (Mintzberg 1994). Subsequently, several areas of management science were developed, some of which focus less on strategic planning and more on strategy content, such as competition, competencies and resources (Porter 1985). Other areas pay special attention to the process a strategy formation, and focus on concepts such as "organizational learning" and "strategic thought" (Huff 2002; Reger and Huff 1993).

There is also a well-established opinion that the process of strategic management can be divided into four main steps (Thompson and Strickland 2003): strategic analysis, strategic choice, strategy implementation and strategy evaluation.

In the 1990s, the opinion was rooted that the true definition of the strategy could vary greatly depending on the context. The development of this idea is a framework called "strategy palette" (Reeves et al. 2015), according to which it is possible to identify five approaches to the formation of the strategy depending on the context and environment: classical, adaptive, renewal, visionary and shaping. According to this classification, it can be assumed that different types of strategic analysis tools should be used for a different type of strategy. Partially this hypothesis can be confirmed by the materials of Gartner (McGregor 2016), which distinguish five possible roles of EA in the process of strategy formation depending on the context and the external environment (see below).

2.2. Challenges of strategic management

Strategic planning process is one of the most difficult issue which managers face today. It can be an overwhelming challenge – at the same time to take into account the development of new technologies and social trends, and the behavior of competitors, customers and regulatory authorities, changes in the legal, environmental and financial base. The problem is compounded by the limited time, market uncertainty, the constant changes and internal tensions (Kudryavtsev et al. 2016). According to (Eppler and Platts 2009), it is possible to identify three types of challenges relevant to the strategic management, which can be facilitated by EA: cognitive, social and emotional.

Cognitive. Firstly, strategic analysis creates a massive amount of information that is difficult to absorb and analyze by any individual manager or group. Managers confront with information overload. Secondly, strategizing requires the comparison of multiple strategic options based on various parameters without taking mental shortcuts and relying only on select criteria, but this comparison can be biased. Thirdly, the development of strategic options often requires novel perspectives and divergent thinking, but stakeholders often can be stuck in old view points. Finally, paralysis by analysis, i.e. omission of strategic information due to the large flow of information relating to daily operations.

Social. Firstly, diverging views or assumptions between team members. Strategy development and formulation requires collective sense making processes and input from various team members. Secondly, incomplete communication of basic assumptions, which need to be elicited and aligned. Managers need to assure that their reasoning is properly understood by employees. Finally, coordination difficulties. Strategizing requires coordination both in communications and actions. This is especially true for globally dispersed teams.

Emotional. Firstly, lacking identification with strategy, i.e. all involved managers should be able to identify with the strategy process and result and feel involved. Secondly, creating identification with (abstract) strategy, i.e. employees should perceive the strategy as something worthwhile pursuing, something that aspires and motivates them. Finally, the strategy needs to be communicated to employees convincingly.

Simon with colleagues (2014) also highlighted challenges and concerns in strategic management and emphasized the calling from corporate strategic management for a greater cross-fertilization of the field with other disciplines (Furrer et al. 2008). Specifically, systems thinking, which can be considered a basic principle of EA, is recognized as a promising means to facilitate the examination of the cause-and-effect-relationships between different strategic measures (Wang and College 2006). Such activity as modeling decomposition is also related to EA and it can be used for a procedure for evaluating different strategies against a set of objectives using decomposition to a level where relatively easy judgments can be made (Goodwin and Wright 2001). Strategy implementation (including ongoing execution) in particular suffers from difficulties in achieving success in practice (Cater and Pucko 2010)

and there is a gap strategy and everyday practice or strategy execution (Knoppen and Saenz 2014). Moreover, among the most critical obstacles to successful strategy implementation recently identified are weaknesses in communicating strategy to lower organizational levels; again, this is an interesting finding given that one of the main functions associated with EA is to communicate organizational objectives.

3. Enterprise Architecture

3.1. Description and structure

Enterprise Architecture (EA) is an emerging cross-disciplinary field concerned with the design, management and transformation of a modern enterprise as complex system (business and IT) to ensure values of the key stakeholders (Op't Land et al. 2009; Lankhorst 2009; Buckl et al. 2011). EA is based on enterprise modeling and implies documentation of enterprise strategies, business capabilities, business processes, organizational structures, and information technologies, and especially their interaction and dependencies. From representation perspective EA models include catalogs, matrices and diagrams (TOGAF 2011). Originally, EA was developed as a tool for information systems management. During the previous decades the concept has evolved more towards an instrument for business IT alignment (Simon et al. 2014). EA has included business goals, value chain, business capabilities etc. as elements since it was first introduced by Zachman (Zachman 1987) in the late 1980s. Now EA is more and more attached to enterprise transformation (Labusch and Winter 2013) and strategic management (Aldea et al. 2016; Simon et al. 2014).

The phrase "Enterprise Architecture" means a discipline, as well as some object of management, which provides a common picture in business and an agreement of parts into a whole. According to ISO 15704 the enterprise architecture should include the roles of people, the description of processes (functions and behavior), and the representation of all supporting technologies during the entire enterprise lifecycle. The EA model is used to design the future status of the company, to analyze the current status, as well as for the presentation of alternative development scenarios. An engineering approach underlying of the EA has a great value in its integrating role, as well as such inherited traits as a system approach, modeling, re-use of knowledge, solving practical problems on the basis of scientific knowledge. Some practicioners (Khudobin 2014) extends EA structure and includes the following elements: motivation architecture, transformation architecture, market architecture, financial architecture, operational architecture, and infrastructure architecture.

3.2. Enterprise Aarchitecture Management tools

For modeling, analysis and design of enterprise architecture, there are special tools which called enterprise architecture management tools (Enterprise Architecture Management tools, EAM-tools). These tools are described in detail in the following publications (Matthes et al. 2008; Short and Wilson 2011; Bittler 2012).

This class of software integrates the developments in the field of Computer-Aided Design (CAD). In the 80s years of XX century, the idea of CAD-systems have led to the emergence of tools to support information systems design (Computer-Aided Software / System Engineering, CASE). CASE-tools can be considered as the parent of EAM-tools, which determined their basic functionality. Subsequently, the idea of CAD-systems have led to the emergence of tools for design and reengineering of business processes (Business Process Reengineering, BPR-funds) (Bradley et al. 1995; Spurr et al. 1994), for design of structure and functions of enterprises (Orgware) (Grigoriev 2001), and then for design of strategy (Strategy design tools) (Osterwalder and Pigneur 2013). All these categories of software are integrating into EAM-tools at the same time expanding the coverage area of the latter.

EAM-tools provide the following opportunities:

- Description of the main components of the enterprise (processes, structures, goals, information, etc.) in a single model and their interrelations. The ability to work with a single database (repository) and store information about an enterprise "in one place";
- Visible and convinient representation of the knowledge of the company to different stakeholders (management, employees, analysts, IT specialists, partners, controlling and certifying bodies) by automatically generating reports from a single model in text, tabular or graphical form;
- Analysis of models (quantitative and qualitative, static and dynamic);
- Maintain a unified system of terms, concepts and their relationships, which improves the effectiveness of intra-company communications.

In accordance with the analytical overview of Gartner (McGregor 2016), the leaders in the category of management tools of the EA are MEGA, ARIS (Software AG), Enterprise Studio (BiZZdesign).

For management tasks, tools that make it possible to work effectively (simulate, analyze and design) with business architecture (component of EA) are especially relevant. To do this, it is possible to use universal graphics editors, for example, Microsoft Visio or Smart Draw. And at a certain level, they are quite enough. However, as the scale and complexity of tasks grow, the need for specialized tools begins to arise.

4. Potential for using Enterprise Architecture to support strategic management

One of the motives or drivers for applying EA is the need for constant changes in the continuous transformation of business. In this context, in business and scientific literature, the relationship of EA with the organization's strategy and with the result of strategic activity - the transformation of business - is increasingly being considered. It should be assumed that this is the "highest role" of the architectural approach, which has been going from computer architecture to a comprehensive view of managing the development of organizations over the past 50 years.

In this sense, it becomes increasingly urgent to discuss not so much the current architecture and search for optimization opportunities, as much as the target (to be) architecture that needs to be implemented. The gaps between the target and present states and turn into the development projects of the organization.

The architecture of a particular enterprise as a whole is the embodiment of its business capabilities and answers the question: how they are implemented. The target architecture is the embodiment of the strategy and vision of the organization that corresponds to the strategic notions of the future on different horizons, and the process of designing the future architecture is part of strategic planning.

Since the EA is responsible for integration, its application involves, among other things, the task of achieving synergies from the assets and business competencies of the organization. Providing integrity and consistency (coherence) at various levels of EA is able to create a competitive advantage through coordination and ensuring the coherent operation of the elements.

4.1. What can Enterprise Architecture offer for strategic management?

Enterprise Architecture is based on different types of modeling, on which the practice of EA is built. In the field of EA management and business engineering a lot of expertise in modeling has been accumulated. This expertise is based on such disciplines as conceptual modeling, “design science research”, design theory, requirement engineering. The ability to make different types of "schemas" (diagram, table etc) for different stakeholders allows the formation of "added value" for strategic and tactical decisions. Modern research extends the possibilities of EA modeling methodologies in the part related to strategic management: concepts from strategic management appear in EA modeling languages ("Abilities", "Resources",

"Factors of influence") (Aldea et al. 2015; Iacob et al. 2014); methods and tools of strategic management are formalized (Bock et al. 2016); the modeling methods become available not only to narrow specialists (Sandkuhl et al. 2016); the ways of presenting information about the enterprise structure are optimized (Kudryavtsev et al. 2016).

The Enterprise Architecture is based on engineering basis and it allows to solve the most important task for strategic management - the generation of alternatives. An architectural thinking facilitates the solution of this problem as it is the main element of the design approach in strategic management (Winter 2014; Winter 2016). Architectural thinking is a lightweight (e. g., less formalized), utility-centred approach, that is aimed at supporting non-archetects and people outside the IT function to understand, analyze, plan, transform and communicate fundamental structures and design/evolution principles of what they perceive as their work system, i.e. to adopt holistic, long-term considerations in their daily decisions.

In (Osterwalder and Pigneur 2013) instrumental support is seen as an independent direction, rapidly developing in recent years. Traditional EA modeling tools have ceased to be highly specialized and are developing as support tools for managers (Sandkuhl et al. 2016). Forrester analysts point to the formation of a new software market for strategic planning, and the tools of enterprise architecture management are part of this market (Barnett and Visitacion 2015). Examples include tools to support the development and analysis of business models, which have already become a popular product on the market (for example, strategyzer.com) and are the subject of research (Fritscher 2014). In (Kudryavtsev et al. 2016) the possibility of integrating different ways of presenting information for strategic management tasks in EA modeling tools is demonstrated, as well as the potential of application of ontologies as a mechanism for integrating information and transformation between information / knowledge formats (from table to graphics, form graphics to tables, etc.).

In addition, certain methods and techniques that are mature in the EA can enhance the processes of strategic management - for example, working with stakeholders and with resources oriented towards them (information representation) (TOGAF 2011) or capability-based planning (TOGAF 2011; Aldea et al. 2016).

4.2. For what tasks of strategic management EA can be used?

In practice, EA has very different coverage and scope of activity in different organizations. It is possible to distinguish two different variants of involving EA in the tasks of development management: 1. EA interacts with the strategy, but does not "cover" the objects and information needs of strategic management; 2. Strategic management is built on an architectural approach.

In the first case, the EA provides information about the current state of the organization for strategizing and takes the results of strategizing to build the appropriate architecture. The architecture, in this case, according to the Open Group standard (TOGAF) (TOGAF 2011), can solve three tasks (three options for involving the EA in solving strategic management tasks): 1) Identification of the need and potential for changes (when there is a driver for changes, but no target state is defined); 2) Identification of necessary changes (when the target state is defined in the strategy language, but the design of the target architecture is required); 3) Implementation of the necessary changes (EA performs audit and supervision of the changes being carried out for their conformity with architectural plans).

In the second case, the EA practice includes working with the objects of strategic planning and development management. For example, (Simon et al. 2014) proposed a business architecture framework that includes the necessary elements of strategic management, as well as detailed scenarios for the use of EA at all stages of the strategic management process: strategy formulation, strategy implementation, strategy monitoring. For example, in "Strategic Analysis" scenario, EA can be used to analyze the company's internal environment (except for "soft" aspects: culture, values, etc.), and within the "Strategy Review" scenario, EA will allow

to see how the strategy is embodied in the operational model ("strategy traceability").

4.3. Variations of the EA role depending on the type of business strategy of the company

The role of EA in general and in strategic management in particular depends on the type of business and the company's strategy. Analysts of Gartner proposed to consider 5 types of strategy and 5 corresponding roles of EA (Blosch and Burton 2016; Smirnov 2017). Each of the types of strategy corresponds to a certain external environment and has its own characteristics, including critical factors of business success. These features generate unique requirements for EA (see Table 1).

Table 1: The relationship between the type of business strategy and the role of EA

Strategy type	**Grow**	**Experiment**	**Orchestrate**	**Adapt**	**Reinvent**
Environment	Stable and predictable	Unpredictable	N/A	Changing quickly	N/A
Features of strategy	Structured analysis; Implementing competitive advantage	Search and creation of innovations	Integration into and influence the ecosystem	Flexibility, developed dynamic capabilities	Existing products, services and processes no longer work; Need a transformation
Factors of success	Size, differentiation or capabilities	Experimentation	Orchestration and collaboration	Ability to adapt quickly	N/A
EA role	**Analyst**	**Innovator**	**Connector**	**Conductor**	**Tactician**
Main focus of EA	Detailed analysis, planning and monitoring of changes	Search for ideas for innovation, support for innovation processes	External focusing, establishing connections, integrating	Identification of areas for change, support for changes	Development and evaluation of change options, transition planning

Source: McGregor 2016

Typically, companies combine the presented types of strategies. Traditional architectural approaches were invented for strategies of the first type. They are not completely applicable because number of situations in which they can bring organizations an essential value, is becoming less and less.

For example, the relationship with management and development of IT can be considered. EA is important in order to take full advantage of emerging technological opportunities, because it allows to connect business strategy and IT strategy, assess the value of technological innovations for a particular organization, understand the areas that are priority for innovation, and vice versa, where it is required to apply standard solutions. This relationship is most evident in the scenario of the use of EA "Aligning business and IT" (Henderson and Venkatraman 1993) and is considered in detail in many works (Pereira and Sousa 2005; Bradley et al. 2011). EA allows to identify key areas (in terms of functional areas, capabilities or groups of business processes) that require IT support, identify the most significant data, form an IT strategy or an IT implementation plan based on the company's strategy. The specification of business needs and IT opportunities is due to the availability of information about the business architecture and IT architecture.

In addition, the EA creates a different perspective for considering various management disciplines - not through functional areas, but through EA objects in their interrelationships: goals, indicators, business processes, organizational structure, information, information sys-

tems, etc.

5. Conclusion

Enterprise Architecture over the past 30 years has overcome the way from solving technological problems to complex support of the development of organizations. Possessing a set of properties inherited from system engineering and the ability to represent various objects of control with the help of knowledge engineering and ontological engineering, the EA has acquired an important integrating role. It is the ability to integrate (areas of activity, disciplines) and the representation of the organization as a whole that turns EA into a link for other disciplines and allows us to talk about the architectural approach to management. A well-built EA allows an organization to be more receptive to changes at the strategic level. Mature practice of EA management allows to switch to the warning control of changes through designing and "programming changes", which is especially important in the logic of shifting the center of added value towards design and projecting in many areas. A major role in EA is assigned to knowledge management in the field of management and organizational design in order to reuse best practices both external and internal the organization itself. To do this, the EA uses such concepts as reference models, architectural templates, building blocks, etc.

Further research involves the analysis of existing methods and techniques of decision-making and problem solving, both domain-specific, from the field of strategic management, and universal, based on such disciplines as knowledge management, decision theory, systems approach and systems analysis, with following their formalization and integration on the basis of EA methods to overcome existing limitations. In addition, it is possible to carry out an empirical study to investigate the problems and tasks in the field of strategic management, in practice solved with the help of EA, as well as assessing the effectiveness of using EA.

References

Aldea, A., Iacob, M., Lankhorst, M., Quartel, D., and Wimsatt, B. 2016. Capability-Based Planning: The Link between Strategy and Enterprise Architecture. *The Open Group, White paper.*

Aldea, A., Iacob, M., Hillegersberg, J. van, Quartel D., and Franken, H. 2015. Capability-based planning with ArchiMate. *17th International Conference on Enterprise Systems (ICEIS), 27-30 April 2015, Barcelona:* 352 - 359.

Barnett, G., and Visitacion, M. 2015. The Forrester Wave: Strategic planning Emerging Market. *Forrester Research.*

Bittler, R. 2012. Magic Quadrant for Enterprise Architecture Tools, *Gartner, G00234030.*

Blosch, M., Burton, B. 2016. Using EA to Support a Palette of Business Strategy Approaches, *Gartner report, 25 March 2016, G00291302.*

Bock, A., Frank, U., Bergmann, A., and Strecker, S. 2016. Towards Support for Strategic Decision Processes Using Enterprise Models: A Critical Reconstruction of Strategy Analysis Tools. *IFIP Working Conference on The Practice of Enterprise Modeling, Springer International Publishing:* 41-56.

Bradley, P. et al. 1995. Business process re-engineering (BPR) – a study of the software tools currently available. *Computers in Industry,* 25(3): 309 – 330.

Bradley, R. V., Pratt, R. M. E., Byrd, T. A., and Simmons, L. L. 2011. The role of enterprise architecture in the quest for IT value. *MIS Quarterly Executive,* 10(2): 73-80.

Buckl, S., and Schweda, Ch. M. 2011. *On the State-of-the-Art in Enterprise Architecture Management Literature,* 136 pp.

Case, A. 1985. Computer-aided software engineering (CASE): technology for improving software development productivity. *ACM SIGMIS Database,* 17(1): 35 – 43.

Cater, T, and Pucko, D. 2010. Factors of effective strategy implementation: empirical evidence from Slovenian business practice. *J East Eur Manag Stud,* 15(3): 207–236.

Chandler, A.D. 1962. *Strategy and Structure*, MIT Press, Cambridge.

Chen, M., Nunamaker, J., and Weber, E. 1989. Computer-aided software engineering: present status and future directions. *ACM SIGMIS Database:* 20(1), 7 – 13.

Eppler, M., and Platts, K. 2009. Visual strategizing: the systematic use of visualization in the strategic-planning process. *In: Long Range Planning*, 42(1): 42-74.

Fritscher, B. 2014. Computer-Aided Business Model Design, PhD thesis. *Université de Lausanne, Faculté des hautes études commerciales, Pigneur Y. (dir.)*

Furrer, O., Thomas, H., and Goussevskaia, A. 2008. The structure and evolution of the strategic management field: a content analysis of 26 years of strategic management research. Int J *Manag Rev,* 10(1):1–23.

Goodwin, P., and Wright, G. 2001. Enhancing strategy evaluation in scenario planning: a role for decision analysis. *J Manag Stud,* 38(1):1–16.

Grigoriev, L. 2001. «Orgware» – Novyy klass programm dlya upravleniya organizatsiyey. «Ekspress-Elektronika», 06-08.2001. [Electronic source] URL: http://www.bigc.ru/instruments/bigmasterpro/basic_concepts/orgware_orgmanagement.php (Accessed 30.03.2015) (In Russian)

Huff, A.S. 2002. *Mapping Strategic Knowledge*, Thousand Oaks.

Iacob, M., Meertens, L., Jonkers, H., Quartel, D., Nieuwenhuis, L., and Van Sinderen, M. 2014. From enterprise architecture to business models and back. *Software & Systems Modeling:* 13(3), 1059-1083.

Iacob, M., Quartel, D., and Jonkers, H. 2012. Capturing business strategy and value in enterprise architecture to support portfolio valuation. *Enterprise Distributed Object Computing Conference (EDOC), 2012 IEEE 16th International, 11-20*

Khudobin, E. 2014. Enterprise Architecture System Methodology (EASM*), «Center for Effective Organizations» Ltd.*

Knoppen, D., and Saenz, M.J. 2014. Purchasing: Can we bridge the gap between strategy and daily reality? *Business Horizons:* 58 (1), 123-133.

Kudryavtsev, D., Menshikova, A., and Gavrilova, T. 2016. Representing Strategic Organizational Knowledge via Diagrams, Matrices and Ontologies. *International Journal "Information Theories & Applications":* 23(1), 48-66.

Labusch, N., and Winter, R. 2013. Towards a Conceptualization of Architectural Support for Enterprise Transformation. *Proceedings of the European Conference on Information Systems (ECIS) 2013, Utrecht, NL.*

Labusch, N., Aier, S., and Winter, R. 2014, b. A Reference Model for the Information-Based Support of Enterprise Transformations. International Conference on Design Science Research in Information Systems. *Springer International Publishing:* 194-208.

Labusch, N., Aier, S., Rothenberger, M., and Winter, R. 2014, a. Architectural Support of Enterprise Transformations: Insights from Corporate Practice. *Tagungsband Multikonferenz Wirtschaftsinformatik 2014, Universität Paderborn, Paderborn:* 1048-1060.

Lankhorst, M. et al. 2013. *Enterprise Architecture at Work. Third edition*. Springer-Verlag Berlin Heidelberg.

Matthes, F., Buckl, S., Leitel, J., and Schweda, C. 2008. *Enterprise Architecture Management Tool Survey*, TU München.

McGregor, M. 2016. Magic Quadrant for Enterprise Architecture Tools. *Gartner research report.*

Mintzberg, H. 1994. *Rise and Fall of Strategic Planning*, Free Press, New York.

Op't Land, M., Proper, E., Waage M., Cloo, J., Steghuis, C. 2009. *Enterprise architecture: Creating value by informed governance*, Springer.

Osterwalder, A., and Pigneur, Y. 2013. Designing business models and similar strategic objects: the contribution of IS. *Journal of the Association for Information Systems:* 14(5), 237-244.

Porter, M.E. 1985. *Competitive Advantage*, Free Press, New York.

Reeves, M., and Haanaes, K. 2015. *Your Strategy Needs a Strategy: How to Choose and Execute the Right Approach*, Harvard Business Review Press.

Reger, R.K. and Huff, A.S. 1993. Strategic groups: a cognitive perspective, *Strateg. Manag. J.:* 14(2), 103–123.

Ross, D. T. 1961. *Computer-Aided Design: A Statement of Objectives*. MIT USAF 8436-TM-4.

Sandkuhl, K., Fill, H. G., Hoppenbrouwers, S., Krogstie, J., Leue, A., Matthes, F., and Winter, R. 2016. Enterprise Modelling for the Masses–From Elitist Discipline to Common Practice. *IFIP Working Conference on The Practice of Enterprise Modeling, Springer International Publishing, 225-240.*

Short, J., and Wilson, C. 2011. Understanding the Eight Critical Capabilities of Enterprise Architecture Tools. *Gartner research report, 6 April 2011*

Simon, D., Fischbach, K., and Schoder, D. (2014). Enterprise architecture management and its role in corporate strategic management. *Information Systems and e-Business Management:* 12(1), 5-42.

Smironov M. 2017. Variativnost' arkhitektury predpriyatiya. [Electronic source] URL: https://mxsmirnov.com/2017/03/15/ea-palette/ (Accessed 13.05.2017). (In Russian)

Spurr, K. et al. 1994. *Software assistance for business re-engineering*, John Wiley and Sons Ltd.

Thompson, A.A., and Strickland, A.J. 2003. *Strategic Management: Concepts and Cases*, 13th Edition.

TOGAF – The Open Group Architectural Framework. 2011. [Electronic source] URL: http://www.opengroup.org/subjectareas/enterprise/togaf (Accessed 07.03.2016)

Wang, J.C., and College, H.W. 2006. Corporate strategic management and business re-engineering effort analyzed by the balanced scorecard model. *J Am Acad Bus* 10(1):102–109.

Winter, R. 2016. Establishing ‘architectural thinking’ in organizations. Proceedings of 9th IFIP WG 8.1. Working Conference on the Practice of Enterprise Modeling, PoEM 2016; Skovde; Sweden; 8 November 2016. *Lecture Notes in Business Information Processing, Volume 267, 2016, 3-8.*

Winter, R. 2014. Architectural thinking. *Business and Information Systems Engineering:* 6(6), 361-364.

Zachman, J. A. 1987. A framework for information systems architecture, *IBM systems journal:* 26(3), 276-292.