Methodology of the Enterprise Architecture creating and the role of the Enterprise Architecture in rural development

Metodika tvorby podnikové architektury a role podnikové architektury ve vývoji zemědělství

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Abstract: This contribution deals with the concept of the Enterprise Architecture, the practice that tries to describe and control an organization structure, processes, applications, systems and technology infrastructure, software components, services and roles in enterprise. It links the goals, resources and rule in enterprise with the processes and activities in business organization and creates a large document for planning, investing and the enterprise information strategy. The aim of the article is the methodological approach, the common method for development of the Enterprise Architecture document. What is important in this document? All business managers must make sense of the architecture to optimize their activities according to the specific business goals and to develop a strategy for the innovation and for the introduction improvements in the current business situation and into the future. The Enterprise Architecture can serve as a basis of business knowledge. The description principles should be applied in every area of industry also in the Czech agriculture area. The conclusions of the paper evaluate the knowledge context and discuss the necessity of establishing the Enterprise Architecture in the company.

Key words: Enterprise Architecture, business process modelling, UML, business concept, knowledge management, information system, business goal, rural area development

Abstrakt: Článek pojednává o konceptu podnikové architektury a o manažerském přístupu ke komplexnímu podnikovému modelu, který popisuje a řídí organizační strukturu, procesy, aplikace a technologickou infrastrukturu, podporuje softwarové komponenty, služby a role v podniku. Spojuje podnikové cíle, zdroje a pravidla s procesy a aktivitami a vytváří rozsáhlý dokument pro plánování, investování a informační strategii podniku. Dokument podnikové architektury je tvořen metodicky tak, aby všichni manažeři a pracovníci rozuměli tomuto konceptu a mohli pracovat optimálně na její tvorbě, využívání a údržbě. Podle specifických cílů by pak mohli vyvíjet na jejím základě inovace a vylepšení do budoucna, respektive využít jej jako databázi znalostí. Principy jsou využitelné ve všech oblastech průmyslu a hospodářského života, zemědělství nevyjímaje. V příspěvku je popsán metodický přístup, obecná metoda pro vývoj a nasazení podnikové architektury ve společnosti. Závěrečná kapitola hodnotí souvislost s podnikovými znalostmi.

Klíčová slova: podniková architektura, modelování podnikových procesů, UML, řízení znalostí, informační systém, podnikový cíl, rozvoj venkova

At present, all organizations feel economic pressures that challenge them to be more efficient, therefore, one of the problems facing companies today is the ability to quickly and correctly answer the business questions. Organizations are strongly enforced to find a better, more efficient, and more cost-effective approach to using the competitive and commercial value of their information assets. The top management needs available technology services for the independently collected business knowledge that are still commonly found in the average enterprise today. For the end-users of information services, there is

important a strategic, enterprise-wide approach to the delivery of the key operational information, the performance management statistics, business governance, industry compliance and the corporate policy management information.

In fact, what the user community requires, are operational systems that deliver the right levels of information at the right time and in a format that suits the needs of all information users irrespective of their business or technology skills.

We can apply this situation to rural areas. There are many facets to the agriculture 'multifunctional' impact on rural development. It is difficult to evaluate precisely how the multifunctional nature of agriculture can influence the economic, environmental, cultural and social health of a particular region. The Method of Enterprise Architecture development can be a crucial part of the concept of multifunctional agriculture and the policy instrument to evoke the necessary change. It will identify and analyze its multiple functions in a range of rural contexts, quantifying the production relationships between the related public and private goods and services and assessing the linkages between these multiple functions and the development of rural areas, their quality of life and environment, and other important non-market functions and outputs. The Enterprise Architecture can give support to forming a key focus in the Rural Development Regulation and the future reforms in the agricultural industry.

We were inspired by (and gained the prime idea from) the research (Stella© software 2009) that will be used to assist with the building and explication of a Policy Model of Multifunctional Agriculture and Rural Development. The research will suggest how payments related to non-market outputs are forming a key focus in the rural development. The research assists the development of the EU agricultural, rural development, social policy and cohesion, together with the trade policy, and it provides a basic model that facilitates a more precise policy targeting and a structured examination of the relationships between the potential or actual policy changes and the (potential) changes in the multiple functions of agriculture and the sustainable development of rural areas. But the scope of our research is far smaller. We only apply the principle of one interesting discipline to the rural business.

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MATERIAL AND METHODS

Enterprise Architecture and notation for its presentation

In brief, we can define the Enterprise Architecture as a description of the architecture of an enterprise in question. An output of the Enterprise Architecture is an enterprise model that is a computational representation of the structure, activities, processes, information, resources, people, behaviour, goals and constraints of a business, government or other component of an enterprise. It can be both descriptive and definitional-spanning of what is and what should be.

The drive for more agile enterprises requires a degree of integration that is not possible without the use of a sophisticated information infrastructure. At the core of this infrastructure, there lies an enterprise model.

The unambiguous specification and description of business components and especially their relationships in the architecture require a coherent architecture modelling language that enables integrated modelling of the architectural domain and which is understandable by the people from the information technology domain and by the people from the business domain. There are many standards for enterprise modelling: BPMN (IDS Scheer 2010), SBVR (Business Rules group 2006), Zachman Framework (Zachman 2009) and others. Since the beginning, we have used the UML and its standard extension mechanism for business modelling. Our approach shows how to use the well established UML for modelling of the data and functions in information systems and especially for the business process modelling. We tried the UML also for enterprise model creating as consistent with Eriksson (Eriksson and Penker 2000).

In our opinion, the UML is not sufficient for the complex needs of the Enterprise Architecture development, although it is an important part of the overall methodology. Some methods and approaches use models and diagrams that explicitly include the non-UML artefacts such as business rules, data models, user interface flow diagrams and organization charts (Rábová 2005). Our suggestion is similar, to use the UML as a base collection of the modelling techniques and then to supplement it with other techniques to meet the projects unique needs. That does not mean that we will make diagrams difficult for the others to understand and thus reduce the communication in the project team. The language should be easily comprehensible with human notion and it requires a level of comprehensibility of the description language by all employees in the enterprise. But only the notation is not enough. We need the method, the

practice or the sequence of activities for our proceedings. In general, creating the business architecture involves three phases, the current state modelling, the future state modelling and planning of the way from the current state to the required state. Our approach is comprehensive; the phases are elaborated into activities with workers and the objective assigning. Because the Enterprise Architecture requires integration and storage of large amount of information from variant sources there are many reasons for an adequate tool for the modelling diagrams and the elements descriptions. The tool can help to standardize the semantics and notation of architecture models and to store all information into the repository.

Anyone knows that every system has architecture, every company has architecture. However, it may not necessarily have architectural models describing this architecture. For example a small business that is working together in the same room may not find any need to model their architecture and it doesn't provide sufficient value to it. The Enterprise Architecture has two models, the baseline architecture "as is" and the target architecture "to be".

Larger teams and companies, where employees are not located together, will find the greater communication challenges inherent in their environment and they will choose to create architectural models as guidance to how they should build their structure and their software. Fundamentally, the reason why architectural modelling is recommended is to address the risk of members in projects and in business. The diagrams and models are amended with textual parts, with definitions, business rules, derivations, and enumeration descriptions. The set of models and descriptions is the base of the Enterprise Architecture document.

Systematic approach to the Enterprise Architecture development

The fundamental benefit to be gained from the Enterprise Architecture is the ability to support decision making in changing businesses in the present environment. Because the Enterprise Architecture brings together business models and technical models, it is possible to trace the impact of the organizational change on the systems, and vice versa the business impact of changes to the systems. While the business models include process models, organizational charts, guidance, regulation and directions the technical models include system architectures, data models, state diagrams, sequence diagrams, deployment diagrams and information systems structure. These two kinds of models then have to be in consistence and one has to be contained in the other. The relationship is

the most important contribution in whole (Practical guide to Federal EA 2001).

The contribution describes the methodology of the Enterprise Architecture creating that was developed and applied in a number of case studies (but none in rural area) (Rábová 2008). It introduces in more detail (to business workers and IT workers) how the Enterprise Architect processes relate to the enterprise engineering, program management and planning and the investment process in business. We developed it as a one part of the information strategy in business. So the purpose of these models, descriptions and documents is to inform, guide and constrain the decisions for the enterprise, especially those related to the IT investments, but not only those. The true challenge of the enterprise engineering is to maintain the architecture as a primary resource for the enterprise planning and investing.

In rural areas, the concept of the Enterprise Architecture is not established and its value is not estimated. What might be its merit? Why the management should create and use this document? Why are we engaged in this discipline in connection with rural development? What gain does it bring now and in the future?

RESULTS AND DISCUSSION

Method of the managed development of the Enterprise Architecture

To have a viable and accepted architecture strategy for a project is absolutely critical to the business success, particularly in the complex situations. The following six stages include the recommended activities in the development and life cycle of the Enterprise Architecture. The whole methodology is more elaborate and it is still under development.

(1) At the beginning (point zero), we must appreciate that the creation and development of an actionable Enterprise Architecture is a project and so it has to consider the main laws for project management. The top management agrees on the need of the Enterprise Architecture and will support it.

(2) First step of the methodology is to create the core team of architects, modellers, analytics and members that are responsible for all activities involving the development, implementation, maintenance and management of the Enterprise Architecture. The general objective of these activities is not only developing the baseline and target architectures of the business concepts, but also to maintain its repository, performing quality assurance, risk management and configuration management,

guiding systems development and acquisition efforts and to define the performance measures. What are the recommended roles?

– Head of the project (*project manager*) governs the core team; directs the development of the actual and target architecture.

– *Business architects* create the strategy of architecture, analyze and model the business processes, goals, resources, actors, rules and scenarios, they use the UML and its business extensions, and they work with the CASE tools and create the diagrams and models.

– *Application architects* analyze the system, its internal or external interfaces control the data flows, the information flows, and they document the logical and physical business information and the associated relationships. They also use the UML with the CASE support.

– *Architect of the infrastructure* examines the system environment, the network communication, the components and nodes, the operating systems, the web, the portal servers and the middleware. The important part of the enterprise architecture is the security aspects. The member in team oversees and coordinates data and system security, access and authentication processes.

– *Risk manager* and *quality assurance manager* work in every project. In the methodology, we suggest the role that guarantees so that the whole documentation of the Enterprise Architecture is clear, pregnant, usable and in compliance with global standards and policy of the company a well as the government.

(3) Next step is the assessment of the acceptable tool (CASE as is mentioned above) and creating the repository. The repository is a database of metadata that allows the description and storage of the structure, definitions, validations, formulas and all constraints in the models and diagrams as well as in every element in the model. The reason of the existence of the repository is to have a business directory with the unambiguous meaning of business terms and facts. In the project team, the repository is unavoidable.

(4) With the tool, the modellers (business and application architects) create the business process models of the current stage "as it is". To every key process in the model, there are linked its goals, resources, workers and business rules as the supplements that can be obtained from the existing enterprise material that the business people organize for the project. The business process modelling takes its course through a number of weeks, maybe

even months. The outcome of this step is the one central model of all key business processes with a high level of abstraction. Every business process is remitted to evaluation from business people and business managers and it is linked information system solution and support to the processes according with real situation.

(5) The same model is then remodelled into the stage "to be" and there are entered the notes about the innovations and improvements to the processes that have to be realized. The documentation of how to implement the changes is the fundamental part of the Enterprise Architecture.

(6) In conclusion, the top management can begin using the Enterprise Architecture in the actionable state and the responsible managers have to extend and maintain it continually.

Need for the individual approach to information in the agriculture sector

The difficulties people can face with certain top-down rural policies cause that they do not have the sufficient know how and the capacities to adjust their business to this way of life, therefore, they fail and get into a lot of stress.

In the research of Kocmánková (2008), there were asked the central questions the contribution aimed at answering as follows: What is the role of extension and information services? How do the "potential workers of rural development perceive the role of extension and information in their activities?" Our models can give support to her research (The need of information and extension service for the countryside and its development), because of their multifunctional and the multilevel nature of our Enterprise Architecture concept.

As stated above, the development of rural areas is a complex and complicated issue. Therefore, it needs the interdisciplinary method. It plays an important role in education as a process of acquiring knowledge in the form of learning facts, certain abilities and practices. It is connected with the effort of integration into the given culture and society and the active contribution to its development. Education is a life-long process starting the "initial education" provided by the education system (Kocmánková 2008). And what is the connection with the Enterprise Architecture? It can be the guide in learning and education.

Figures 1 and 2 include two of many diagrams (from the concrete case studies) that I and my colleagues and students in their diploma theses created also in the terms of research (Klíma 2009). Some of them were published in Rábová et al. (2008). However, we have no diagrams from the rural area.

Based on the above mentioned, the business models provide ways of expressing business processes or the strategy in the term of business activities and collaborative behaviour so we can better understand the business structure, business behaviour and the participants in the process. The models are helpful for the complex documenting, comprehending and communication in business. By documenting business processes from various perspectives, business models help the managers to understand their competitive environment.

The company faces demands for new products and services, including the global support for the outsourced operations and integration with business partners and the customer applications.

An EA should describe all aspects of an organization – its mission, organizational structure, business processes, information exchanges, software applications, and underlying technical infrastructure – as well as the overarching need for the information security. A change in one of these dimensions may impact the other enterprise dimensions.

We completely agree with the authors of the publication Practical guide to Federal EA, (2001) that describe using of the Enterprise Architecture as follows:

– To capture the facts about the mission, functions, and business foundation in an understandable manner to promote a better planning and decision making,
– To improve the communication among the business organizations and IT organizations within the enterprise through a standardized business vocabulary
– To provide architectural views that help to communicate the complexity of large systems and facilitate the management of extensive, complex environments
– To focus on the strategic use of the emerging technologies to better manage the enterprises information and consistently insert those technologies into the enterprise improvement consistency, accuracy, timeliness, integrity, quality, availability, access, and sharing of the IT-managed information across the enterprise
– To highlight the opportunities for building a greater quality and flexibility into the applications without increasing costs
– To achieve economies of scale by providing mechanisms for sharing services across the enterprise
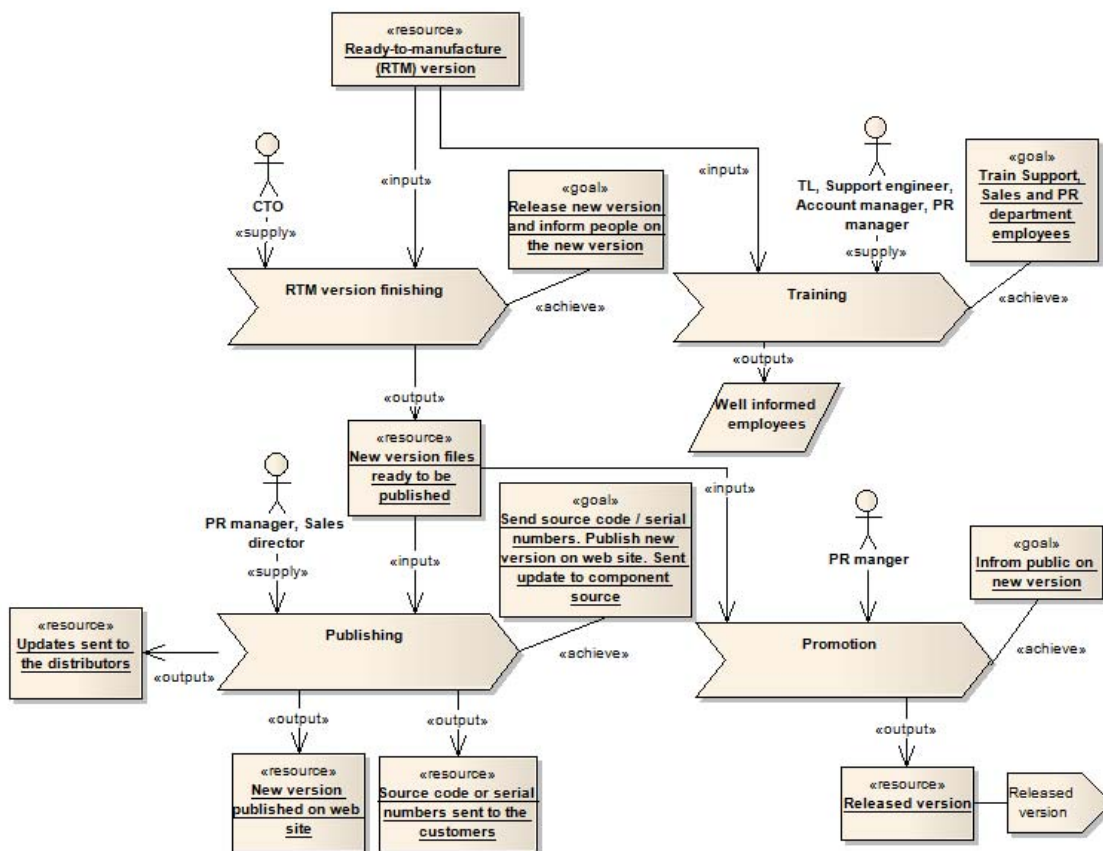– To ensure the legal and regulatory compliance.

Figure 1. Business process model of the new document version release (Klíma 2009)

In addition to these points, we join as follows (Rábová 2006):
– To incorporate the learning, feedback and knowledge/sharing in the whole business.
– To get the platform for the possible software system that supports the processes (for the specification of the requirements for new information systems).
– To get a basis for its improvement, optimization or process reengineering.
– To get the study, simulation and design of new concepts and process management.

– To get outsourcing possibilities and recognition of the processes that are suitable for outsourcing.
– To design or customize the supporting software products.
– To establish suitable mechanisms and responsibilities at all levels for the aligned and measured process performance that is traceable to strategic intent.
– To understand the respective roles of the process architecture, process analysis, system design, and organization design – and how to make them work together.

Figure 2. Business process model of the book reservation (Klíma 2009)

– To exploit the potential of technology to enable the initial process change and the ongoing adaptable process execution.

– It is possible to combine the results of the business modelling with the need for creating process documentation for the purpose of the ISO norm.

CONCLUSION

The role of the Enterprise Architecture is to achieve model-driven enterprise design, analysis, and operation. The article deals with the methodology of the creation and development of the Enterprise Architecture concept. It treats also the assets and using of the enterprise architecture in business with a special view to rural area.

According to Svoboda (2009), the procedure that makes it possible to predict a crisis or to deal with it can be divided into three stages, specifically the analysis of the degree of risk: (1), the formulation of a crisis strategy with specification of the degree of risk, or the elimination (2) or the realization of a crisis strategy, i.e. the reduction or removal of the cause of the crisis (3). The analysis of the degree of danger builds on the process of strategic decision-making, specifically on the methods of the management environment analysis. We can give support to the analysis and formulation of the strategy with the presented models and methodology.

Tomšík (2004) and Tomšík et al. (2008) are concerned with the diagnostics of the business health and find that the resulting diagnosis determined by diagnostic methods has to help reaching the goals, which – based on the activities of the business – leads to the generation of an appropriate reaction to the identified status of the diagnosed business. An information and knowledge, which is provided through advisory services and extensions, represents the crucial "know-how" of such rural/local actors. In this way, this paper addresses the issue of advisory services and extension. The connection with business knowledge was also explained in article.

REFERENCES

Business Rules group (2006). Available at http://www.businessrulesgroup.org/sbvr.shtml (accessed 8.5.2010).

Eriksson H., Penker M. (2000): Business Modeling with UML. John Wiley & Sons, Inc., New York; ISBN 0-471-29551-5.

IDS Scheer (2010). Available at http://www.ids-scheer.cz/cz/ARIS/modelovaci_standardy/BPMN/84412.html (accessed 1.5.2010).

Klíma C. (2009): Modelling of business processes and inovation of information system in Qisda Czech s.r.o. Company (in Czech). Diploma thesis. MENDELU, Brno. Available at https://is.mendelu.cz/auth/ucitel/zp_portal_vedouci.pl?zp_id=22412;historie=1

Kocmánková L. (2008): The need of information and extension service for the countryside and its development (the opinions of local actors). Agricultural Economics – Czech, *54*: 583–596.

Practical guide to Federal EA (2001). Available at http://www.gao.gov/bestpractices/bpeaguide.pdf (accessed 8.5.2010).

Practical guide to Federal EA (2001). Available at http://www.gao.gov/bestpractices/bpeaguide.pdf (accessed 8.5.2010).

Rábová I. (2005): The formalization of knowledge in agricultural industry business process. Agricultural Economics – Czech, *51*: 53–58.

Rábová I. (2006): The modelling and formalization of common business process knowledge in agricultural industry business process. In: International Scientific Conference BICABR 2005, Beijing, China, pp. 100–110; ISBN 7-900-177-73-6.

Rábová I. et al. (2008): Enterprise architecture- the strategic tool in hand of manager (in Czech). TribunEU, Brno; ISBN 978-80-7399-568-3

Stella©software (2009). Available at http://ec.europa.eu/research/fp6/ssp/top_mard_en.htm (accessed 10.5.2010).

Svoboda E. (2009): New approaches to the solving of economic crisis in business management. Agricultural Economics – Czech, *55*: 307–313.

Tomšík P. (2004): Approaches to the diagnostics of agricultural and food-processing subjects. Agricultural Economics – Czech, *50*: 552–555.

Tomšík P., Minařík B., Somerlíková S. (2008): Factors affecting the methods of employees management in agrobusiness companies in the region. Agricultural Economics – Czech, *54*: 293–300.

Zachman J. (2009): Available at http://zachmaninternational.com/index.php/ea-articles/100-the-zachman-framework-evolution (accessed 21.5.2010)

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