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The Research Group Business Information Systems at the University of Rostock

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Abstract: The paper presents the general orientation, research topics and contribution to the EMISA special interest group of Rostock University's research group on Business Information Systems, which is part of the Institute of Computer Science in the Faculty of Computer Science and Electrical Engineering.

Keywords: Enterprise Modelling, Capability Management, Enterprise Architecture Management, Digital Business, Knowledge Management, Smart Process Management, Mobile Computing, Wearable Computing, Reference Modelling.

1 General Orientation

For many years the modelling of processes, enterprises and knowledge forms the frame of business information systems (IS) research in Rostock. In general, this research field is concerned with the systematic process of capturing, representation, analysis and evolution of domain knowledge aligned towards pre-defined enterprise goals. Therefore, it combines traditional topics of IS research (e.g. IS modelling) with work from computer science (e.g. knowledge representation) and approaches from the field of industrial organization (e.g. enterprise engineering). In the following, more detailed information is given about our research topics.

2 Research Topics

2.1 Capability Management

Nowadays, enterprises and organizations are confronted with rapidly changing situations in their environment when it comes to changing regulations, globalization of market structures, time-to-market pressures and advances in technology. In many industrial sectors, efficient and effective value creation and service delivery processes are considered as the key factors to competitiveness in a globalized market environment. In this context, the systematic management of capabilities of an enterprise is considered an important activity

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in organizations. The capabilities of an enterprise often are reflected in the business services offered to customers and the technical services associated to them. The notion of capability has received a lot of attention as the enabler of business/IT alignment in changing environments. The term is used in various industrial and academic contexts with often different meanings. Most conceptualizations of the term agree that capability includes the ability to do something (know-how, organizational preparedness, appropriate competences) and the capacity for actual delivery in an application context. Our work in the area of capability management currently focuses on capabilities in enterprise architecture management and capabilities in service-oriented organizations [SS18].

2.2 Reference and Enterprise Architectures

Enterprise Architecture Management (EAM) is an established function in many enterprises responsible for a systematic and coordinated development of business, information systems and IT technology. Many enterprises frequently are forced to modify their business models or their established business architectures because of new market demands, changes in regulations or new technologies. IT often is not only a key resource to facilitate these changes but also essential for daily operations. Enterprise Architectures help to visualise the dependencies within and between the different architectures, develop and analyse alternative options for change, supervise the current status of the architecture or plan changes and roadmaps.

In the field of business information systems, the research group conducts a number of research activities related to EAM methods and to Reference-Enterprise Architectures (R-EA). Methods concern the management of capabilities in EAM, the integration of EAM and Enterprise Modelling, policies and notations in EAM, and EAM use in small and medium-sized enterprises. Reference architectures aim at identifying and capturing typical and recurring architecture elements, their structures and relationships in a defined application domain, e.g., an industry sector. The research group has been working on a R-EA for IT-based compliance for financial industries (project COFIN [TS18]) and medium-sized utility companies (project ECLORA [WTS15]). In the context of these R-EA development projects not only the actual R-EA were constructed but also the methodology for developing R-EA has been subject of research [TS18].

2.3 Digital Business Models

The business model of an enterprise defines, in a nutshell, what products and services are offered by an enterprise for what customer groups to achieve defined business goals and a viable economic situation. In a digital business model, the products and/or services of an enterprise and the way they are provided and delivered are largely digital, i.e. based on IT, often involving mobile devices, collecting data using sensors, and new services and user experience. Analysis and development of business models are a core competence of the research group and require a much more detailed and differentiated understanding of

business models than indicated by the above simplified description [WS17]. Typical perspectives to be taken into account in business models are what value creation happens in an enterprise, what services and products are offered based on this value creation, what suppliers are required, how the market situation looks like (demand structure and competitive situation), how revenues are generated and what the distribution model for the products and services is. In addition to business model analysis and development, implementation of business models is another important aspect of our research. This includes the effects and changes in enterprise architectures and technology building blocks for new business models and digital transformation, such as interactivity, availability, contextualization, mobility, networking, user experience or scalability.

2.4 Knowledge and Context-based Systems

Knowledge-based systems (KBS) are used in various applications areas for, e.g., providing decision support, supporting organizational knowledge management, capturing and implementing business rules, etc. From a technical perspective, KBS require capturing the relevant knowledge in a knowledge base (knowledge engineering). The research group has experiences from a number of projects in both, knowledge engineering and knowledge-based systems [SS19]. From research perspective currently our research topics are ontology design patterns, ontology quality metric (e.g. [LS15]), semantic technologies and their application in small and medium-sized enterprises. Context-based systems use all relevant information from the environment of a user or an application system for adapting functionality, behaviour or user interface to the actual context. Examples for context-based systems are, e.g., e-learning systems adapting to the learner, digital services adapting to their deployment environment or business models adapting to changes in the technical/organizational infrastructure (e.g. [Sa12]). Context-based systems often used a knowledge base to store and evaluate context information. From a research perspective, the research group investigates methods for context modelling, situation-based information supply based on context and context as part of digitization solutions.

2.5 Smart Process Management

Process models play a vital role for the design and implementation of enterprise information systems. In the research field "smart process management", we develop methods and intelligent assistance systems that are tailored to the respective application context and also regularly organize workshops in this context (e.g. [Fe18b]). With this, a more adequate support of the model-based design and the management of process-oriented systems is envisioned. In more detail, in the subject area of business process modelling we explore how recommender systems can be applied to simplify and accelerate the design of models while maintaining a high model quality [Fe17]. Further, we analyse the contribution of patterns and templates to facilitate modelling [Fe18a]. In the subject area of modelling and execution of processes, we investigate to what extent new approaches and tools for case management can contribute to the provision of personal services (e.g. [La18]). In addition,

approaches for individual process management are being developed to better reflect the characteristics of the employees executing a process. Furthermore, the challenges of mining personal service process data for process analysis are in focus. Characterized by unstructured, often incomplete data traces, ad-hoc workflows, human interaction, and soft goals, these processes demand for new process analysis approaches.

2.6 Mobile & Wearable Information Systems

Mobile and wearable information systems are omnipresent. Smartphones are an indispensable part of everyday life and smartwatches and fitness trackers enjoy an increasing popularity. In the research field "Mobile & Wearable Information Systems", we investigate how sensor data, analytics and feedback that build on such devices can be integrated into personal and organizational ways of working [LFS18]. The aim of this integration is to help individuals and organizations to do more productive work – and at the same time increase the well-being of the actors. A particular focus of our research is personal time and task management. In general, when designing such methods and corresponding assistance systems, care must be taken to ensure that a balance is found between the protection of personal data and the functionality of the system. Furthermore, control over the disclosure of personal data should always remain with the user.

3 Relevance for the EMISA Special Interest Group

Our work in the research topics described in section 2 is based on a number of core competencies contributing to the area of enterprise modelling and information systems architecture. Our core competences include the development of modelling methods, tools that support the modelling process, user participation during the model development, modelling practices and the value of modelling. Furthermore, we aim at contributing to the overall development of the topic by investigating future topics and potential roadmaps for addressing them. [Sa18]

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