ENTERPRISE INFORMATION SYSTEMS AND BUSINESS PROCESS MODELLING IN TRAINING AND RESEARCH

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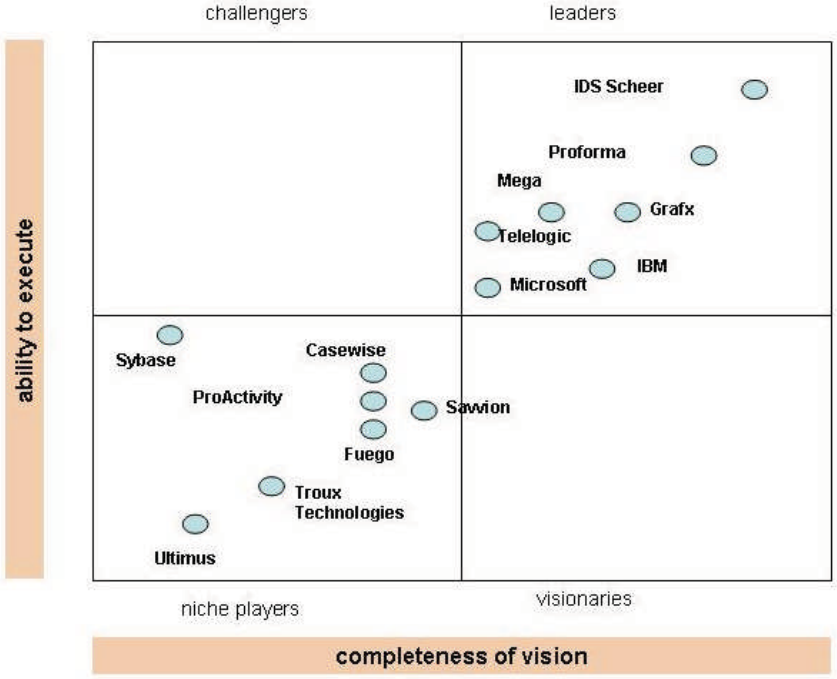
1. Introduction: State of the art in Business Process Management

Many organizations have at least started Business Process Management (BPM) initiatives, but some are still blueprinting their processes on brown paper while others are building up sophisticated model repositories comprising thousands of process models in different variants and releases. On the other hand, countless academic proposals emerge for the next generation of Business Process Management, defining and providing means to measure different stages of BPM maturity, proposing governance structures for business processes, developing process aware information systems, and so on and so forth. Enter the next player in the game – standardization organizations. While the last two or three decades provided us with numerous techniques, methods, tools, and methodologies for the modelling and management of business processes, a very recent trend tries to consolidate these developments by streamlining Business Process Management, starting with a number of proposals for standardized business process modelling and execution. They seem exist a lot of variants, fashions, and styles. Many of these have been developed for a specific modelling purpose. Unified Modelling Language (UML) activity diagrams can be used to model processes, sure, but they come from a software engineering background and were not designed for business modelling in the first place. Petri nets are fantastic when it comes to simulation and deadlock analysis. Quite to the contrary, Event-driven process chains are easily understood by business representatives. Yet, systems designers start to moan when it comes to inferring workflow specifications from these models.

2. Modeling tools

Finding the right technique is very important. Even in the 21st century, where a seemingly unlimited range of sophisticated process design and execution solutions are available, you would be perplexed by how many initiatives rely on the brown paper approach (or its Microsoft-sponsored digitalized version, MS Visio). Visio is *not* a process modelling but a drawing tool – even though a very handy drawing tool. But try using Visio or similar tools for a large-scale modelling initiative where the number of models in your "repository" easily exceeds a couple of thousands. And we haven't even talked about release management or versioning yet. Modelling tools should support the utilization of process models for various purposes – for instance,

simulation, analysis, reporting, performance management, execution, and god knows what else. The leader solutions are show by Fig 1. (Blechar - Sinur, 2006)



Source: Gartner (January 2006)

Fig 1: **Magic Quadrant for Business Process Analysis Tools**

2.1. The ARIS architecture

The design of *Ar*chitecture of integrated *I*nformation *S*ystems (ARIS) is a based on an integration concept which is derived from a holistic analysis of business processes. The first step in creating the architecture calls for the development of a model for business processes which contains all basic features for describing business processes. The result is a highly complex model which is divided into individual views in order to reduce its complexity. Due to this division, the contents of the individual views can be described by special methods which are suitable for this view without having to pay attention to the numerous relationships and interrelationships with the other views. Afterwards, the relationships between the views are incorporated and are combined to form an overall analysis of process chains without any redundancies. A second approach that also reduces the complexity is the analysis of different descriptive levels. Following the concept of a lifecycle model the various description methods for information systems are differentiated according to their proximity to information technology. This ensures a consistent description from business management-related problems all the way down to their technical implementation. Before the individual descriptive objects within the ARIS architecture (views and levels) can be modeled, the initial semantic

business process, i.e. the business problem, must already exist. In this context, the weak points of the information systems in use are described as far as the support of the business processes and the target concept's essential contents of the projected system are concerned. The weak points thus found also mirror the objectives that new information systems will have to attain. The model expressing this problem description therefore needs to cover as many facts as possible from the data, function and organizational structure views including the interrelationships existing between them. Moreover, the model must allow the target concept to be specified to such an extent that this specification can serve as a starting point for the rest of the modeling process. Thus, the development process of the requirements definitions triggers the division into views corresponding to the ARIS architecture.

2.2. Models in ERPs

Together with the business model of the specific organization, the reference model is customized, resulting in a process model. This process model is used in the implementation phase to configure a specific information system, such as SAP R/3. The SAP reference model is one of the most comprehensive models. Its data model includes more than 4000 entity types and the reference process models cover more than 1000 business processes and inter-organizational business scenarios. In the early nineties, two companies SAP and IDS Scheer, have developed an intuitive process modelling language, which resulted in the process modelling language Event-driven Process Chains (EPCs). This language has been used for the design of the reference process models in the ARIS for MySAP database. EPCs also became the core modelling language in the Architecture of Integrated Information Systems (ARIS). In the ARIS for MySAP reference databases, there are hundreds of EPCs that can be used in many different situations, from “asset accounting” to “procurement” and “treasury”. The procurement is a set of some 40 EPCs. They describe processes for (i) internal procurement, (ii) pipeline processing (iii) procurement of materials and external services, (iv) procurement on a consignment basis, (v) procurement via subcontracting, (vi) return deliveries, and (vii) source administration (Dongen – Jansen, 2005).

3. ARIS, SAP/R3 and other ERP systems in the education and research

The aim of the different levels of training is to train experts for developing and managing informatics systems related to agricultural and linked area in the knowledge based information society. The graduates have to be able to understand the real production, operation and business model and they have to be able to make information models, develop the informatics systems and run them. They can solve the problems related to informatics and information system with rapid developing and changing computing and telecommunication tools. The ability of modeling and creating or finding the suitable solver algorithms is also necessary.

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The compulsory subject are the following: Information technology, Database systems, Communication networks, Software development, Infrastructure management, Information system development, GIS, Expert systems, Multimedia, Internet, Informatics in extension (Herdon, 2005). In orientation students have to learn *Integrated information systems* and *Information system development* subjects. In these subject we use *the SAP R/3* system and the *ARIS Toolset 7.0* systems (Rózsa 2008). In the specialization they can learn the following subjects: Agricultural information systems: FADN, IACS, Market Information Systems, Statistical System; Internet application development; Information management; Management and organisation; IT in food quality management; Expert systems; Project management; Remote sensing; Sector specific solutions.

On this course there are two specializations (two training directions) in the 3 academic years. Students can learn specialised knowledge in the public administration and informatics. In the informatics specialization they can learn the following subjects: Agricultural information systems: FADN, IACS, Market Information Systems, Statistical System; Internet application development; Information management; Management and organisation; IT in food quality management; Management information systems; Expert systems; Project management; Remote sensing; Sector specific solutions.

An important objective is that the professionals can understand the agricultural, economic and administration flows supported by informatics systems and can corporate with experts of other area. This gives convertible informatics knowledge which can be used in different area in agriculture and rural development. The share of subject can be seen on Fig 2.

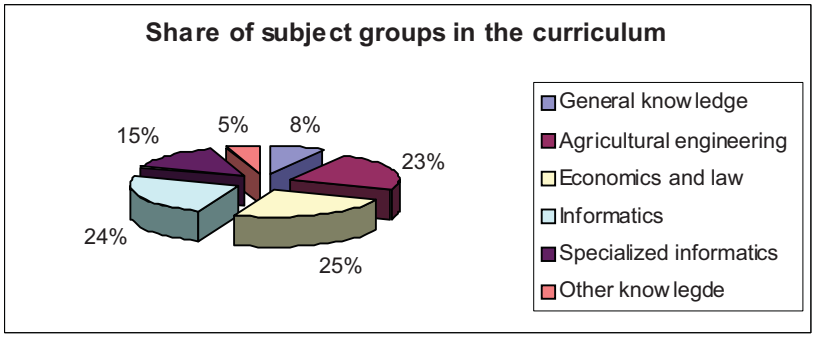

Fig 2. **Share of subject in agri-informatics curriculum**

In Hungary 3 universities, the University of Debrecen, Budapest Corvinus University and Szent István University have developed a BSc curriculum, namely an "agricultural engineer for informatics and administration". In the training students have to get 180 credits. The rates of the credits are the following: a. General knowledge 20%, b. Agronomy knowledge 16%, c. Administration 18%, d. Economics and related subjects, 13%, e. Informatics and specialised informatics knowledge, e.33%.

3.2. Using ARIS and ERPs in education and research

Within the curricula there are more subjects related to organisation management, business management and information systems such as Information sytem development, information mangement, Integrated enterprise information systems etc. Based on this subjects more students are doing research work related to information system. The features of training programs demand industrial (agri-food) specific systems and functions for their business processes (Herdon M. – Füzesi, 2006). For exemple the food quality and tracebility require specific equipment, technologies and solutions. In the food industry is vital to use enterprise information systems but the agricultural sector (farmers) needs other specific solutions. For example the Partnerships of Production and Sales (TÉSZ) representing 12% of the horticultural production output, the majority of sector production is provided by producers outside of the integration with weak bargaining position on the market, changing product quality and technologies requiring modernization. A further enhancement of the role of processing integration is required also in the vegetable-fruit sector. Despite the strengthening of producer partnerships over the recent years, one of the greatest problems of the Hungarian food economy is a low level of organization (weak market position) between the farmers, the lack of harmonized relationships between farmers, processors and merchants (Herdon – Rózsa, 2007). The ideal flow depends on the infrastructure facilities of the organisation. These co-operatives are usually very small, but some of them were growing in the past. In these cases the organisations had to expand their infrastructure. This means that they had to re-engineer their business processes (Rózsa, 2006). At the examined co-operative the situation is very similar. The organisation reached a size where strong informatics support necessary is for managing the business processes. The targets of our research to study the ERP in cooperatives and create business and information system models by ARIS.

References

Blechar M. J. - Sinur J. (2006): Magic Quadrant for Business Process Analysis Tools, 2006. *Gartner RAS Core Research Note G00137850,*. http://www.proformacorp.com/Downloads/files/proforma1713.pdf

Dongen B.F. - Jansen Vullers M.H. (2005): EPC Verification in the ARIS for MySAP reference model database. http://ftp.informatik.rwth-aachen.de/Publications/CEUR-WS/Vol-167/epk2005-paper2.pdf

Herdon M. - Füzesi I. (2006): Quality control and product tracing in ERP systems, Computers in Agriculture and Natural Resources. Proceedings of the 4th World Congress. Orlando Florida, 2006. 518-521 p. ISBN 1-892769-55-7.

Herdon M. - Rózsa T. (2007): Functional evaluation of enterprise information systems in co-operatives, *6th EFITA/WCCA 2007 2-5 July 2007*, Glasgow Caledonian University, Scotland, CD-ROM Proceedings. 2007 ISBN 972-669-646-1, 1-6 p.

Herdon M. (2005): Experiences in Curriculum Development for Agricultural Informatics Specialists at BSc and MSc level – Towards European Masters. *EFITAWCCA2005 Conference. Vila Real Portugal. Proceedings.* Published by Universidade de Tras-os-Montes e Alto Douro. Edited by J. Bouventura Cunha and Antonio Valente.Vila Real Portugal, July 25-28, 2005. 733-738 p.

Rózsa T. (2006): Economic evaluation of ERP investments for SMEs. SEFBIS JOURNAL, Professional Journal of the Scientific and Educational Forum on Business Information System ISSN: 1788-2265

Rózsa T. (2008): ERP rendszerek oktatása az informatikus agrármérnök szakon. Informatika a felsőoktatásban konferencia, Debrecen, 2008.08.27-29 ISBN: 978-963-473-1239-0

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Summary

The University of Debrecen introduced the five year "informatics agricultural engineer" course in the 2002/2003 academic year. In the 2006/2007 the „informatics and agricultural administration engineer" BSc course has been introduced. The courses are run by the Agricultural Economics and Rural Development faculty. Starting of this course is demanded by the Hungarian agro-food sector, Governmental offices, Institutes, which need the applications of wide range informatics tools and systems. The business process modelling and management is becoming important part of implementing and running information systems. The ARIS is one of the leader products in modelling. The other important system is the SAP in the ERP market. In our education program we are using these products. The ARIS toolset is very useful for research on business modelling in agri-food companies too.