

HABILITATION THESIS

INFORMATION SYSTEMS INTEGRATION

Professor Mariana-Ionela MOCANU, Ph.D.

SUMMARY

The first section of the thesis is structured in three chapters regarding scientific, professional and academic achievements.

Achievements in scientific research

The first part of this section describes the necessity and importance of integrating information systems, due to the dependence of organizations on technology that is decisive in achieving business goals.

The contributions to the development of integrated computer systems are related to the following research directions:

1. Development of cyber-physical systems

The first results were achieved in cyberphysical systems for water resource management. Typical problems related to water, that require the support of complex information systems were identified. In the thesis there are presented aspects related to data acquisition and processing as well as to the development of models for water related processes. Based on these aspects, architectures for decision support systems to solve the identified problems are further described. The service oriented CyberWater platform, developed in a PNII project is described.

The second research direction is related to the development of a Cloud platform for the support of agricultural processes in greenhouses. The processes are both local (monitoring field parameters, direct action on the automation equipment) and remote via Internet, for information, economical and educational support. Some of the services are free accessible, while others require credentials.

For both directions, the integration related aspects are stressed out.

2. Integration of industrial and economical

The first contribution is related to the design of an IT architecture for a specialized bank. Core banking systems, external financial/banking applications and specialized modules build a heterogeneous landscape that require specific integration actions.

The second contribution refers to the method for re-engineering of an IT system after a business merge. The complexity of the procedure is stressed out, as technical, procesual and human aspects have to be taken in account.

3. Development of IT solution for the automotive field

The contributions in the automotive field follow three directions: integrating control devices on a vehicle to operate in real time; systems capable of integrating vehicles in the environment actions, and; devices based on integration of information technology for testing and diagnosing the vehicle functioning. The first area is exemplified by a field-bus solution using the CAN protocol. For the second direction the development of a CAN-bus solution is proposed to control the traffic between spots, using the secondary road network. For the third research direction, a computer based system for tyre testing is presented. The algorithm for setting the testing regimes is detailed.

4. The life cycle of integrated systems

The contributions in this area are theoretical and describe and expand the use of modern software engineering concepts. Approaches that contribute to the quality assurance processes of integration are analyzed. The contributions are exemplified by the extension of UML over rule modeling.

At the end of each chapter, the research outcomes are listed: papers published in journals or presented in conferences, participation in research projects.

The achievements in the professional field refer to activities within engineering profile and/or collaboration with companies:

- Collaboration with the Automotive Department and, for a short period of time with Registrul Auto Român, for solving some IT related problems;
- Local expert in the restructuring project of the Romanian Savings Bank, in a project rolled out by the Savings Bank Association from Germany;
- Internal auditor, ISMS auditor with TUV Rheinland-România;
- Collaboration with the National Authority for Qualifications – I was part of the team that developed the Methodology for the Romanian NQF. I was in charge with the implementation of the Romanian National Register for Qualifications.
- Organization of training and information events with World University Service – Romanian Committee, and EuroED Association.
- Identification and resolution of conflicts in education as authorized mediator.

The results in the academic field refer to the contribution in the teaching activity (lectures, practical activities, development of teaching materials, development of educational tracks) as well as to the support and coordination activities (participation in evaluation committees, accreditation or management activities as department manager).

The second section of the thesis presents the plan for future carrier evolution and development, structured on three directions: the research activity, the teaching activity and the managerial activity. The overarching goal, as well as the premises for future activities, are explained and the specific and operational objectives are detailed.