

Polytechnic University of Bucharest
Faculty of Automatic Control and Computers

SUMMARY OF THE Ph.D. THESIS:

CONTRIBUTIONS IN THE DEVELOPMENT OF INFORMATICS SYSTEMS BASED ON DISTRIBUTED COLLABORATION

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I. Problem Statement and its Significance

Processing information is one of the most important human activities. Users of informatics systems require great performances, mobility and personalization of these systems, to reach their desired vision: getting the right piece of information anytime, anywhere. The further developments of these systems demand investigation of new architectures, frameworks and process models of the informatics systems' interconnectivity at different levels: social, organizational, team and personal.

The network computers enlarged the possibilities for collaboration between geographically distributed people. Computer-mediated collaboration can improve many types of activities: learning/teaching, research, design of products, using distributed work forces, avoidance of systems overloading, etc.

The Internet technologies provide a ubiquity infrastructure for CSCW applications, some of them with similar requirements for coordination, collaboration and informational management systems, though there is no structured architectural support to create and update these systems. This thesis is directed to the investigation of the mechanisms for the integration of CSCW Internet applications, to facilitate reusing and reconfiguring of the CSCW services.

II. Research Approach

The basic assumption of our investigation in the cooperative informatics systems is to provide additional components as an enhanced support for cooperation and coordination functions. This research field uses and interweaves different other fields, as: system integration, HCI (*Human Computer Interaction*), CSCW (*Computer Supported Cooperative Work*), CASE (*Computer-Aided Software Engineering*), work flow, business process, organizational information systems, requirements engineering, etc. Our interest in this domain is to explore and characterize diverse cooperation concepts and mechanisms, models of informatics systems, as an open door to the imminent changes in the emerging knowledge society.

The dissertation analyzes technological and socio-economical models for representation of information, knowledge and organizational "know-how" using some collaboration schemes that can be implemented by software tools of CSCW services.

As a study case, a modular system is configured, applied to the management of large projects, in a community of practice.

III. Review of Other Research Approaches and Results Related to the Problem Statement

As nodes constitute the Internet, and between them there is a step-by-step, point-to-point communication, the services to users were initially modeled by client-server architecture, in which a client communicates to one server at a time. The model of inter-human cooperation is more complex than this dialog. Therefore, a new necessity was born: to create a network support for providing adequate communication facilities, by an innovating usage of the existing technologies or by creating new ones.

The existent investigations in the area of development support technology for collaboration systems are guided to define standard models to facilitate interoperating different software solutions. The actual programming standards (<http://www.w3.org>) are improving and they evolved to a base of encapsulated software objects, with standard interchanges of information. The new paradigm of developing Internet applications is represented by distributed Web services.

The object-oriented technologies and Web frameworks are the current orientations in the design and implementation of large and complex informatics systems (SI). The recent theoretical investigations and industrial innovations in modeling SI, and the new Internet services converged to the conversion of the dealers of SI, from the providers of components to services suppliers.

The success of software implementation of a groupware product is assured only in case of considering cultural, economic and social features of this environment.

The supporting technologies and the models of collaboration network applications are in full evolution. In the near future, these kinds of products will be able to sustain organizations by an efficient knowledge management.

IV. Structure of the Thesis

The work contains an Introduction, seven chapters [(1) *Context Definition of Modeling Information Systems*, (2) *Introduction to Design of the Distributed Collaboration Systems*, (3) *Human Computer Interaction*, (4) *Present communication models between distributed software components*, (5) *Web Technologies in Sustaining Collaboration and Knowledge Management for Virtual Organizations*, (7) *Final Remarks*], *Bibliography* and *Annexes* (*Acronyms* and *The List of Figures and Tables*). It is about 200 pages.

V. Identification of the Contributions of the Thesis

As a first result, the author delivers a *synthetic theoretical document* on the problem of development distributed collaboration systems. It is an *attempt to enrich the semantics and functionality* of the interaction user interfaces and of the inter-human cooperation services, provided by network technology. The structures and architectures of different distributed collaboration systems are also presented. Every chapter has its own conclusions on the corresponding subject.

It is proposed a conceptual frame for the informatics system of the information collaboration system and a socio-technological model for *Project Management Information System*. It is also designed the architecture of the software applications in this model. The author implemented a part of this architecture, as a pilot system, an e-learning collaborative tool for assisting stakeholders in project management activities.

The results were materialized in scientific works, which are published in reviews and proceedings of national and international conferences, chapters of books (for details, see: <http://www.racai.ro/~ncristin/>).