Preface

This book presents the reader with an exploration into industrial informatics. Each chapter presents the reader with an in-depth investigation regarding the actual – or potential – role of information technology in the context of the industrial setting. In the introductory chapter – "Industrial Informatics: What We Know and What We Don’t Know" – Holmström, Wiberg and Lund discuss how today’s industrial informatics research at Umeå university is deeply immersed in its historical roots. They argue that the history is very much playing a part as industrial informatics looks towards the future. A recurring theme in industrial informatics is that of openness. In “From Closed to Open: ICT as an Enabler for Creating Open Innovation Systems in Industrial Settings”, Nylén presents a study of Open Innovation in the forestry industry. Specifically, he is concerned with potential barriers for establishing open innovation in an industry typically committed to more closed approaches to innovation. Moreover, he presents ICT as a potential means for overcoming these barriers.

Organization of innovation is a key issue in industrial informatics. Nylén is but one example of an author indicating that. In “Industrial Informatics and the Ecology of Innovation: IS Innovation Processes”, Levén presents the notion of ecologies of innovation to frame potentials for innovation and value create in industrial contexts. Drawing on the empirical base of a large scale project, Levén makes a strong case for how industry and academia can come together in open innovation systems, in order to enhance innovation, research and education.

The success or otherwise of ICT as an enabler of innovation and value creation depends largely on the ubiquity of services in industrial contexts. In “Making IT Visible: The Paradox of Ubiquitous Services in Practice” Jonsson presents a seemingly contradictory situation concerning service ubiquity. On the one hand, ubiquity calls for a certain kind of ‘invisibility’ on part of services and the technology delivering services. On the other hand, service providers face a difficult challenge in bringing invisibility to the market. Drawing on an empirical case study, Jonsson presents a case for the need of coping with this paradox.

The current digitalization in our society is of course a focal concern for the area of industrial informatics. In the chapter “Interactive Architecture as Digital Texturation: Transformed Public Spaces & New Material Integration,” Wiberg looks into some of these digitalization processes. Further on, with a point of departure taken in current research on ubiquitous computing he then illustrates how the notion of textures, a concept historically rooted in material science and architecture, can be applied to a discussion of the character of new digitalized materials. This theoretical discussion is then illustrated through an empirical case followed by a discussion on the texturing of digital technologies in physical spaces. The chapter ends with a discussion on the implications of this study for industrial informatics. In particular, the chapter looks into possible integrations between traditional industrial design thinking and informatics via the guiding notion of textures.
Another important aspect of digitalization is of course to understand IT support for chains of activities, and to understand, not only digitalization of the production line, but also to understand digitalization of back-office routines, administration, and warehouses. In the chapter “Not Stronger Than the Weakest Link: An Empirical Study of Coordination Work in an Industrial Context,” Harr looks into the domain of warehouse digitalization with a specific focus on the coordination work in an industrial setting. The focal problem tackled in this chapter is the challenge of success in streamlining production, including efficient warehousing. Through a detailed empirical study Harr is capable of illustrating both the impact of the physical outline of the warehouse, as well as the warehouse IT support for the management of the warehouse as an efficient component in the production chain.

Speaking about complex chains of activities, then the chapter “The Crux of Integration: Exploring Infrastructure Evolution in the Process Industry” is a central piece of research in this book on industrial informatics. In this chapter Rönnbäck looks into some critical challenges for the process industry in IT infrastructure and adaptation. Through a focus on issues related to complexity, installed base, and integration processes Rönnbäck contributes an important perspective on IT strategies for the process industry which includes an evolutionary strategy for dealing with risk in the paper industry.

Related to issues of IT infrastructures and integration we find the key challenge of IT implementation and adaptation. In the chapter “Coping with Complexity: Exploring Modularity and Flexibility in IT Infrastructure Adaptation” Sandberg presents a study on ERP implementation in a process industry organization. In this study, a special focus is set on the inherent tension between control and flexibility in IT infrastructures. Through a qualitative study Sandberg is capable of demonstrating the alignment process between organizational elements and the ERP system at the site. Through this research Sandberg contributes to the current body of knowledge on IT infrastructures by suggesting that reducing the inherent standardization that an ERP system convey allows organizations to take advantage of quality assured data while at the same time enabling incremental improvement of systems.

An important challenge for industrial informatics is to arrive at that sweet spot of research where practical relevance and academic rigor meet. As discussed by Augustsson and Holmström in this volume (“Living on the Edge: Balancing Rigor and Relevance Within an Action Research Context”), this is a challenge not only for research in industrial contexts, but for IT and IS research in general. However, as Augustsson and Holmström maintain, the specifics of industrial contexts call are largely unknown concerning how to strike a balance between rigor and relevance in action research. Departing from that observation, Augustsson and Holmström present a tentative agenda of issues that ought to be addressed in order to push the envelope of industrial informatics.

Westergren’s chapter – “Managing an Outsourcing Partnership: Important Stages in the Process” – Important stages in the process – is focused on the process of managing an outsourcing partnership. It considers the role of information technology and the importance of establishing interorganizational trust in order to provide a deeper understanding of the partnership outsourcing phenomenon. In her chapter Westergren shows how understanding and managing the role of IT is crucial in maintaining a successful partnership. In addition, she argues for the need to include trust in technology as yet another dimension in establishing inter-organizational trust.

Hanseth argues in his chapter “From Systems and Tools to Networks and Infrastructures - from Design to Cultivation: Towards a Design Theory of Information Infrastructures” that the kind of IT solutions we are developing today – which are increasingly integrating a number of heterogeneous systems across organizational and geographical borders – are significantly different from than information systems of yesterday. To succeed with the establishment of such solutions new understandings and development
approaches are needed. Hanseth argues that such new understandings should be based on a perspective seeing such solutions as information infrastructures – not information systems. Since infrastructures evolve over long periods of time new infrastructural elements have to fit with what already exist. In this process the existing infrastructure, the installed base, influences heavily how the new elements can be designed. As the installed base grows its development and further growth become self-reinforcing. Successful development of infrastructures requires, first, the creation of such a self-reinforcing process, second, managing its direction.

The aim of the chapter by Tetzlaff and Holmström – “Organizational Effects of Information Technology: Investigating Information Technology Use in the Context of Lean Manufacturing” – is to better understand the enabling and inhibiting impacts IT has on lean manufacturing. This chapter provides a rich picture of a paper mill producing liner reels and the impact of a reel administration system on the manufacturing process. It is important that an IT tool supporting lean manufacturing reflects its organization. When it does the IT tool can act as an enabler of organizational change that in turn increase productivity and the production quality, when it fails to do so it inhibits organizational change and hampers the quality of production. The conclusion is that framing the definition of high production quality regarding product and process is important and that teambuilding would be a contribution to this end by enhancing perspective taking among the employees.

In their chapter “Technology, Agency, and Community: The Case of Modding in World of Warcraft”, Nardi and Kallinikos consider whether and to what extent digital technologies enable people to accomplish expressive activities of personal or social value by examining customization and extension of software artifacts. In doing this they go beyond existing practices in industrial informatics contexts and approach their topic within the context of multiplayer online games. Such environments provide a radical departure from the studies of organizational technologies that dominate the field. By confronting the central issue of the malleability of these artifacts and their power to shape human agency, Nardi and Kallinikos present findings that are likely to have a radical impact on industrial informatics setting in coming years.

Holmström, Sandberg, Mathiassen and Wimelius investigate the role of ICT in dealing with environmental challenges facing contemporary industrial organizations. In their chapter “Green IS: Steps Towards a Research Agenda” they show how green IS research can essentially be divided into two groups, focusing on technology per se or on providing tools that decreases environmental impact. Building on a planned research project the authors propose innovation of ICT-based services, and especially collaborative services, as useful strategies for providing firms with sense and respond capabilities in relation to environmental challenges. They also argue research that research relevance and multi-disciplinary competencies are key themes that IS researcher needs to acknowledge in order to contribute to practitioners efforts.

We believe the result of this book project is a rich series of chapters that review what we know about industrial informatics, and point directions for the future. We hope this volume achieves several goals. First, for those not familiar with industrial informatics we hope it provides a sound grounding in what industrial informatics is and in what directions the field is moving. Second, for researchers already working in the field, we hope it provides a broad state-of-the-art review and shows connections and gaps in knowledge that may not have been obvious in the past. Third, although it is not a management handbook, we hope it provides some guidance to those who design and use information technologies in industrial settings, and makes it easier for them to base their decisions on our results.