Call for Papers
ACM Transactions on Management Information Systems (ACM TMIS)
Special Issue on Complexity Systems Evolution: Requirements Engineering Perspective
Guest Editors: Matthias Jarke, Kalle Lytytinen

Introduction
Since its inception in the 1970s, much of the research in requirements engineering (RE) has focused on the development of formal notations and protocols to represent requirements and to analyze their properties, such as consistency, correctness, completeness, and validity. Some work has analyzed the impacts of these requirements on downstream development tasks (e.g., traceability), or managing and reconciling conflicts in the requirements process (e.g., negotiation). Much of requirements research has also assumed that the scope of RE is isolated to a specific project or even a specific stage of that project.

The motivation of this special issue is that many of these assumptions are now in suspect or related research delivers decreasing returns. The community has recognized for some time a need for a shift in RE focus which is also amplified by changes in computational paradigms and capabilities that draw upon platform strategies, web services, and virtualization of both application services and development platforms. These trends have significant implications for views of modularity and requirements evolution, complexity of RE tasks, and the economics and costs related to application and service use and development. The aim of the proposed special issue is to introduce, refine, validate models and theories around system complexity, evolution and requirements. In particular the special issue will focus on a series of interrelated issues such as:

- How to theorize and study complexity within RE tasks?
- New perspectives on RE complexity: biological systems, complexity evolutionary economics
- What theoretical perspectives can inform how and why complex requirements knowledge evolves as it is generated, validated, and distributed?
- How requirements, system evolution, and environmental change interact?
- How different types of knowledge interact to shape requirements and their evolution?
- What are the origins and flows of influence of requirements knowledge for complex evolving systems? How can non-linear influences be effectively managed in RE evolution?
- What is the effect of speed and scale in requirements processes?
- What is the role of goals and constraints and their complex interactions in RE?
- What are the effects of Governance on requirements complexity?

In this issue we in particular we seek better integration of theories of socio-technical systems, models of evolution, theories of distributed cognition, models of RE and design knowledge and their economic effects, and the impact of strategy and related knowledge endowments in RE processes (e.g., explorative vs. exploitative processes underlying different forms of requirements discovery). These all need to be studied where the role of ambiguity, uncertainty and complexity is recognized in managing requirements knowledge. Attention will also be placed on new research approaches and methods that can be brought to bear in addressing these problems.
The study of system complexity and evolution and how it relates to requirement knowledge is inherently interdisciplinary, crossing boundaries of policy and scholarly inquiry. Approaches can include economic, systems theory, organizational theory, economics, legal theory, and psychology, not to mention traditional technical perspectives in engineering, computer science, and design science. Yet published scholarship often stays within traditional disciplinary bounds of software evolution, economic evolution or process evolution.

This special issue on **Complexity Systems Evolution: Requirements Engineering Perspective** takes as its inspiration the IEEE TSE and CACM special issue on Requirements Engineering in the late 1990’s. Those special issues were interdisciplinary and innovative, and had high impact in shaping RE discourse.

The TMIS special issue has three distinguishing features in its effort to frame, influence, and direct the discourse around requirements engineering.

First, it examines RE as shaping “sociotechnical systems,” reflecting the emerging interactions of people and technology that need to be recognized in system requirements. This requires simultaneous understanding of both the social and the technical. Some research in IS research covering strategy and organization design has focused on the organizational elements of RE and discounted the essential role of design practice and technical innovation (cf. the *Organization Science* special issue on Digital Organizing from 2007, Zammuto et al 2007) while other research has emphasized the technological elements of RE (cf. classical RE conferences focusing on modeling). These efforts contribute to our understanding of both organizational and technical requirements as elements of RE, but there remains the need for a special issue that expressly encompasses the design of digital artifacts and platforms and the related organizational elements and behaviors in a balanced way.

Second, it addresses evolutionary and complexity aspects of RE that affect development, adoption, mutual-adaptation, and co-evolution of increasingly multifaceted sociotechnical systems. We are less interested in discussion of how great specific complex requirements methods are or will be, and more interested in the mechanisms that by which complex socio-technical RE activity comes to pass. The special issue will have a critical perspective on complex change and mechanisms that underlie it and how they are reflected in RE activities.

Third, the special issue embraces issues of scalability. Much work on RE has been limited to study of single applications and one time RE activity. Much less is known about work at large scale RE that spans time and space. Little is known about the organizational arrangements that support such activity, and whether our current tools and models can truly assist with such arrangements. There are some existence proofs that digital infrastructure can enable large-scale RE as for example experiences from open source software development testify. There is, as yet, little systematic investigation of how scalability occurs in RE.

**Editorial Guidelines for Submission**

We encourage submissions of high-risk, creative scholarship that include one or more of the following: strong theoretical contributions, attention to innovative design of design, solid quantitative studies, qualitative longitudinal case-based research on RE processes, and attention to challenges of scale and complexity (of people, of artifacts, of world-views, design
elements) relevant to the RE. A wide variety of topics might be considered appropriate. Examples include:

- New, alternative, or evolving forms of RE focused on scalability and evolution
- RE for knowledge-intensive, technical fields such as science and engineering, software development, and product design and development
- RE for and during organizational transformation
- RE for digital infrastructures, platforms, and standards
- RE for business innovations
- Organizing large-scale RE teams and related sociotechnical arrangements
- The interplay of institutional persistence and change related to large scale RE
- Role of digital infrastructures in organizing RE
- Public policy and RE for large-scale public-private projects
- Relationships between product and software architecture, and organizational and industrial structures and RE
- Organizing for RE associated with product design and development, research and development activity, or scientific collaboration
- Organizational and technological governance for large scale RE

**Production Plan**

Production of the special issue is part of an ongoing and loose research activity within the RE research community that has resulted in a recent manifesto for new research directions in RE (Jarke et al 2011) and a book that reviews research challenges for RE in decade 2010-2020 (Lyytinen et al 2009). This activity has focused on differentiating a new role for RE in shaping design requirements for complex sociotechnical systems that are increasingly important to the routine conduct of business, product development and engineering research. An interdisciplinary workshop focusing on RE and complexity and evolution will be held at Dagstuhl, Germany October 28-30, 2012, co-directed by Matthias Jarke, Kalle Lyytinen, Jane Huang, and Lin Liu.

**Important Dates**

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<td>October 28-30, 2012</td>
<td>Workshop at Dagstuhl</td>
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<td>February 28, 2013</td>
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**References**
