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Trends in the Research on Software Process Improvement in Scandinavia

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This volume of the Scandinavian Journal of Information Systems (SJIS) deals with 'Tends in the Research on Software Process Improvement in Scandinavia'.

Since its very beginning software development struggled with unfinished projects, budget and time overruns, erroneous systems and systems with lacking functionality. Numerous attempts to solve these problems by introducing methodologies and methods ranging from structured programming to object-oriented analysis and design -the term 'software engineering' itself was coined as a remedy - and by promoting technical support as provided by f. ex. CASE tools, have only lead to limited success.

Software process improvement (SPI) is a field of research and practice which as a consequence focuses on managerial and process-oriented aspects of software development. It emerged in the 1980ties as a result of an US Department of Defence initiative to get a methodology to evaluate the capability of their software contractors. The approach is based on the assumption that the quality of the development process has an influence on the quality of the product and got widely known through W. Humphrey's book from 1989 'Managing the Software Process' (Humphrey, 1989) which presented the capability maturity model (CMM) for software organisations to a broader audience. The basic idea is to apply the principles of total quality management (Dale et al., 1994) to software development by analysing software practices and planing and implementing improvements in a step wise manner as described in the (reference) model. More details about the model are included in most of the contributions to this volume.

Already shortly after its appearance the approach found wide acceptance in the Nordic countries in engineering oriented communities and especially in the telecommunications industry and has been deeply rooted there ever since and various, related, partly proprietary methods were developed. Thomsen & Mayhew (1998) give a good introduction into the various approaches. Research and technology transfer agencies like Delta in Denmark, Tieke in Finland, Sintef in Norway, IVF in Sweden - hardly known to the readers of this journal - promote these approaches in and beyond their countries and represent parts of a lively software process improvement community which however does not (very) actively participate in the research community interested in both software engineering and information systems issues as represented by the Information Systems Research seminar in Scandinavia (IRIS) and the SJIS. Finnish colleagues participated in the development of a European assessment and improvement approach called Bootstrap which was particularly directed towards small and medium sized software enterprises (Kuvaja et al., 1994). As a growing number of slightly differing approaches emerged, Finnish and Icelandic researchers got involved in the attempt to standardise these methodologies in a scheme called SPICE (Benediktsson & Nevalainen, 1995). Both academic and practitioner outlets in form of conferences -The International Conference on the Software Process, The (European) Conference on Software Process Improvement, The (European) Software Engineering Process Group Conference to name just a few - developed and journals like SOFTWARE PROCESS-Improvement and Practice and several special issues and feature articles f. ex. in IEEE Software are regularly devoted to the topic. In 1994 the Commission of the

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European Communities launched a special project called the European Software Process Improvement Training Initiative (ESPITI) in 17 Western European countries (Kautz & Larsen, 2000) to create awareness and support the uptake of SPI methodologies.

Early critique has been expressed concerning the applicability of the maturity models (see f. ex. Bollinger & McGovern, 1991 or Bach, 1994). Yet, the concepts underlying the approaches, are generally appreciated and supported by success stories – references of many of these can again be found in the contributions in this volume - and have although stemming from a world view, which in Dahlbom & Mathiassen's (1993) terms would be considered as largely mechanistic, not been questioned by the majority of the software process improvement community.

However in 1995 at a workshop at IRIS 18 (first) doubts concerning conventional software process improvement were articulated and its ideas based on traditional engineering and process control were challenged. Since then software process improvement has been a well established and controversially debated part of IRIS and especially Nordic researchers raise their critical voices also in other fora.

A government funded research project in co-operation with industry (Johansen & Mathiassen, 1998) in Denmark and its resulting, soon to appear main publication 'Learning to Improve' (Mathiassen et al., 2001) presents one evidence, but things also happen elsewhere.

Thus this volume contains six contributions from all Nordic countries - with the regrettable exception of Iceland where there, however, as mentioned above, exists a small, but active software process improvement community; when will we finally get our first contribution from Iceland in the SJIS. The contributions have different emphases, but what all have in common is that they take up issues which are little reflected in mainstream SPI research. The articles are ground in practice-based action research, laboratory experiments and thorough literature studies and thus represent a wide range of SPI research going on in Northern Europe.

Kautz, Westergaard and Thaysen discuss four different scientific paradigms and perspectives on software process improvement. These perspectives are expressed through four different metaphors for the work of process agents, qualifying them as technical experts, facilitating participants, political agents and individual therapists. It is argued that these perspectives do not preclude each other, but that they supplement each other and give a more comprehensive foundation for SPI theory and support a richer picture of SPI practice.

Nielsen & Nørbjerg support this argument and also put forward that maturity models provide only one single perspective on software processes. By looking at organisational contexts and conflicts identified through interviews with project managers, they uncover alternative interpretations of software practices which in the scope of maturity models might solemnly been seen as weaknesses, but which make perfect sense when seen in a political environment.

Abrahamsson discusses one of the most mentioned, but little researched concepts in SPI, namely the term commitment. Commitment is seen as the prerequisite for successful SPI, but current thinking about it is flawed and characterised by (at least) four misconceptions, these being that commitment develops in a cause-effect process, that this process is controllable, that commitment is a clear, singular construct and that is an all positive phenomenon. These misconceptions have serious implications for SPI research and practice.

Jørgensen & Sjøberg challenge the traditional assumption that the people are always a factor of uncertainty in software projects and show how human judgement strategies known as heuristics can under particular circumstances be used effectively, especially in estimation and prediction processes. They demonstrate, given a certain fit with its environment, how good results heuristic judgement based on little information and simple computation can produce as compared to more formal approaches. Contrasted with the identified weakness of human judgement heuristics, a strategy is presented of how to use them to improve software process.

Aen, Arent, Mathiassen & Ngwenyama provide the results of an extensive survey of the SPI literature combined with their own experiences from SPI practice. They offer a map of the characteristic features of SPI initiatives, their benefits and risks. The map emphasises management, approach and perspective as the main concerns of SPI and identifies and discusses three key ideas for each of these concerns, namely organisation, plan and feedback, evolution, norm and commitment, and process, competence and context. The map can be used both by practitioners to create,

conduct and strategically manage improvement endeavours, and by researchers to place existing knowledge and to identify and investigate further research questions.

Finally, Pourkomeylian delivers an experience report in which he describes how the map framework has been successfully used to analyse an ongoing SPI project. The map helped to understand the actual course of the project and pointed to experienced problems. On this basis the author argues that a map analysis should be made early in an SPI initiative to appreciate the most significant characteristics of a concrete SPI project. He recommends that at least the first SPI initiative in an organisation should be organised as a regular project and concludes that a novice organisation should focus on SPI as a concept rather then on the prescriptive recommendations provided by models like the CMM.

This volume of the SJIS consists of invited contributions. They have been thoroughly reviewed and are reprints and revised and further developed versions of work originally presented elsewhere, mainly at conferences. Thanks are due to the original copyright holders to support the further spreading of these research results and to the SJIS which does not claim exclusive copyright to hinder the diffusion of work performed in Scandinavia. Thanks are also due to all authors who put much effort in the writing process and who adjusted their working style to the tight production schedule of the journal. It has been a challenge and a pleasure for me to serve as a guest editor for the community which, after I moved to Scandinavia more than 10 years ago, provides me today with a professional (and private) homestead.

I am convinced that the results comply with the high quality standards of the journal. I believe that concepts like scientific paradigms, organisational context and politics, commitment, human judgement heuristics, strategical management, and practical applicability are fundamental and are all certainly also of interest and benefit for the wider IS community and not only for those focusing their research and work on the area of software process improvement. Enjoy the reading!

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