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Preface

Software process technology emerged as an identified research and development activity in the early 1980's, initiated by European colleagues. Since this period, several international workshops (8^{th} ISPW will be held in spring 1993) and conferences (ICSP2 is coming also) have heavily contributed to the creation of an international community and to progress towards a common understanding of concepts, the depth of exchanges. And a lot of prototypes and/or tools are appearing to support the software process life cycle.

A truly European forum was perceived in 1991 as justified, due to the increasing interest and the volume of research in the field. The first European Software Process Workshop held during May 1991 at Cefriel in Milano, has permitted us to concretize this European community.

One of the results of this workshop was the emergence of cooperative work, oriented to comparison, common technology and common work on models. Another was the creation of the working group on software processes of the Esprit III program in Basic Research, called BRA-WG "Promoter", which aims at promoting this common activity. EWSPT '92 is the first event of this three-year working group that starts in September 1992. EWSPT '92 will be held in Trondheim, 7-9 September 1992, organized by Reidar Conradi and the Norwegian Institute of Technology.

We wish to thank NIT and all our supporting organizations, and LNCS who agreed to publish these proceedings. Thanks also to the program committee, the reviewers and all the authors who have provided either long papers or position papers. They contribute to five sessions organized around Concepts (S1), Process Engine (S2), Models (S3), Human Aspects (S4) and Process Life Cycle (S5).

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Concepts and Reference Frameworks

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Towards a Reference Framework for Process Concepts

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Abstract

This paper discusses the importance of process support for business activities. A reference framework for process concepts and technology support is sought. The general requirements and properties of the process domain are first discussed. Then, four process sub-models are presented to describe activities, products, tools and organisations, respectively. Five process model phases are also introduced, as well as meta-processes and related human roles to handle process models and their transformations. The process concepts are applied to a bank example.

Keywords: (software) process, process modeling, process improvement, meta-process, roles.

1 Introduction

Business[1] activities carried out in our society are becoming more and more complex and difficult to manage. The reasons for this are rooted in the rapid evolution of social and economic activities during the last decades, and the diffusion of information technology in many new areas. These two factors are strongly interrelated: advances in the technology enable creation of new products, services and activities, or modification of old ones. These will again change our life, and produce new needs, feedbacks, and requirements to technology providers.

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[1] By business we mean any professional activity or enterprise, covering both technical and administrative aspects. There is no bias to the commercial side in our use of the term.

Business activities with many interacting humans put hard demands on management. Examples of such activities can be found in a bank, where hundreds of employees cooperate to produce the bank's product, i.e. to provide its customers with flexible and efficient financial services. In most of these activities, humans rely on various computerised tools, which support (part of) their work. Typically, these tools automate a specific task, or manage large quantities of business-related information.

The insight that the quality of products and services intrinsically depends on the quality of the associated process has steered work on quality towards improvement of processes. Especially in these partly computerized businesses, the opportunities to support the process through software has led to increasing efforts in the industrial and academic communities to provide techniques, methodologies and tools to assist the process part of businesses. In particular, researchers are concentrating on the following topics:

- How can we describe a business, to understand it and to facilitate communication and teaching of the business's rules and procedures?
- How can we better manage, control and thus improve the business?
- How can we have humans and computerised tools cooperating in a coordinated and controlled way to support the business?

Software production represents an important business activity, where humans and computerised tools interact to deliver products to an end-user. We denote the activities, rules, procedures, techniques, and tools used within this business by *software process*. This term has recently gained popularity among researchers and practitioners.

Around *software process management*, several recent initiatives have been launched:

- *Industrial* initiatives to improve software processes have been adopted within software development organizations. Cooperations between academia and industry have also been established. A well-know initiative in this area is DARPA's Software Engineering Institute, created at Carnegie Mellon University in Pittsburgh in 1983.
- A new *research* area have grown up, and many scientific events have been established to facilitate the exchange and discussion of results, problems and early experiences gained during these years. See [FCA91] [IEE91a] [IEE91b].
- Outside the area of software production, similar efforts have emerged within the area of office automation, usually under the common heading of *workflow support* [HL91].

Efforts have sofar been restricted within their specific areas (software engineering, office automation). Two aspects therefore deserve further attention:

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- Software and office processes are not the only production processes. We should aim at reusing the experience and research from other disciplines, such as Information Systems, or CIM systems for VLSI design and production.

- The recent intensive work on software processes has led to terminology and definitions for software processes which generally are confusing. Many different terms are used for the same or similar concepts, and vice versa.

It therefore seems worthwhile to establish a *reference framework* of process concepts. This can be used within the software process community as a common set of terms and concepts. It can also be used to exploit commonalities with related application disciplines or research areas. Other clarification efforts of PM concepts have been done by Mark Dowson et al. [DNR91] and by Watts Humphrey et al. at SEI [Hum88].

This paper is structured as follows: Section 2 describes in more details the systems we want to support. Sections 3 and 4 present the basic terminology and concepts we are introducing. Section 5 applies these concepts to a bank example.

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2 Human oriented systems

We have previously used the terms "complex business activities" and "(software) processes" to denote a system where humans and computerised tools interact to achieve a common goal. In such systems, humans play a crucial and active role. Furthermore, proper management and coordination of the interactions among humans and between humans and computerised tools are critical and complex activities. We call such systems *human oriented systems*. Their requirements and properties can be summarised as follows:

- It is difficult to formalise human behaviour, since it is intrinsically non-deterministic. Thus, human activities are difficult to coordinate and control.

- Different humans or components of the systems may have conflicting goals.

- The (human) understanding of the actual application is often weak.

- Humans are intrinsically goal-driven and can rarely be forced to use a particular procedure or computerised tool, when other tools or manual procedures can be used to achieve the same goal.

- Humans are creative and continuously seek to enhance and optimize the way they carry out activities.

Typical examples of human oriented systems are a bank (as mentioned before), an engineering center, or a software factory. In the last case, the computerised