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Richard Messnarz (Eds.)

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Software Process Improvement

12th European Conference, EuroSPI 2005
Budapest, Hungary, November 2005
Proceedings

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Preface

This volume is intended for SPI (software process improvement) managers and researchers, quality managers, and experienced project and research managers. The papers constitute the research proceedings of the 12th EuroSPI (European Software Process Improvement, www.eurospi.net) conference held in Budapest, 9–11 November 2005, Hungary. Conferences have been held in 1994 in Dublin, 1995 in Vienna (Austria), 1997 in Budapest (Hungary), 1998 in Gothenburg (Sweden), 1999 in Pori (Finland), 2000 in Copenhagen (Denmark), 2001 in Limerick (Ireland), 2002 in Nuremberg (Germany), 2003 in Graz (Austria), and 2004 in Trondheim (Norway). EuroSPI established an experience library (library.eurospi.net) which will be continuously extended over the next years and will be made available to all attendees. EuroSPI also created an umbrella initiative for establishing a European Qualification Network in which different SPINs and national initiatives join mutually beneficial collaborations.

From 2005, through EuroSPI partners and networks, in collaboration with the European Union (supported by the EU Leonardo da Vinci Programme), a certification body will be created for the IT and services sector so as to offer SPI knowledge and certificates to industry, establishing close knowledge transfer links between research and industry. The biggest value of EuroSPI lies in its function as a European knowledge and experience exchange mechanism between SPI research institutions and industry.

September 2005

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R. Messnarz, P. Abrahamsson, and I. Richardson

EuroSPI , c/o ISCN LTD, Bray, Co. Wicklow, Ireland
http://www.eurospi.net

Abstract. This book constitutes the refereed research proceeding of the 12th European Software Process Improvement Conference, EuroSPI 2005, held in Budapest, Hungary in November 2005. The 18 revised full papers presented were carefully reviewed and selected from 40 submissions. The papers are organized in topical sections on agile methods, SPI studies, improvement methods, engineering and development, and quality and knowledge concepts.

1 EuroSPI

EuroSPI is a partnership of large Scandinavian research companies and experience networks (SINTEF, DELTA,STTF), the ASQF as a large German quality association, the American Society for Quality, and ISCN as the co-coordinating partner. EuroSPI collaborates with a large number of SPINs (Software Process Improvement Network) in Europe.

EuroSPI conferences present and discuss results from improvement projects in industry and research, focusing on the benefits gained and the criteria for success. Leading European universities, research centers, and industry are contributing to and participating in this event. This year's event is the 12th of a series of conferences to which international researchers contribute their lessons learned and share their knowledge as they work towards the next higher level of software management professionalism.

The biggest value of EuroSPI lies in its function as a European knowledge and experience exchange mechanism where researchers, industrial managers and professionals meet to exchange experiences and ideas and fertilize the grounds for new developments and improvements.

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2 How to Read the Proceedings

Since its beginning in 1994 in Dublin, the EuroSPI initiative outlines that there is not a single silver bullet to solve SPI issues but you need to understand a combination of different SPI methods and approaches to achieve real benefits. Therefore each proceeding covers a variety of different topics and at the conference we discuss potential synergies and combined use of such methods and approaches. This proceeding contains selected research papers for 5 topics:

SPI and Agile Methods & Soft Issues (3 papers)
SPI and Improvement Methods (3 papers)
SPI Studies (3 papers)
SPI and Quality & Knowledge Concepts (3 papers)
SPI in Engineering and Development (6 papers)

2.1 Recommended Further Reading

In [1] we integrated the proceedings of 3 EuroSPI conferences into one book which was edited by 30 experts in Europe. In [2] you find the most recent EuroSPI research proceeding published by Springer andbased on EuroSPI 2004.

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Framework of Agile Patterns

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Abstract. The variety of agile methods and their similarity could be a problem for software engineers to select a single or a number of methods and to properly execute them in a project. A pattern describes a problem, which typically occurs under certain circumstances and a basic approach to solve it providing opportunities to adapt the solution to the problem. The agile patterns, described herein, are based on the principles and practices of the best known agile methodologies. While individual practices included in any of these methods vary, they all have particular objectives and related to them activities. Therefore, every pattern is described as to show the core solution to a particular problem. Special attention is paid to the rationale for applying the agile patterns: what are the business drivers to adopting them; in what cases do they bring benefits; how could they be introduced in an organization.

1 Introduction

Nowadays lots of organizations face the need to adapt quickly to modifications requested by their customers, changes on the market or challenges from competitors. This happens in small as well as in large organizations, in ones following standard (ISO 9001:2000, CMMI) or their own processes. These business needs force the companies evaluate how the agile methods could address their necessities.

Agile methods recognize that any project, team and organization has its unique peculiarities and respond to the specific needs via business value based prioritization, short feedback cycles and quality-focused development. When appropriately applied the agile practices bring a number of business benefits as better project adaptability and reaction to changes, reduced production costs, improved product quality and increased user satisfaction with the final solution.

The agile methods differ in the approaches to software development and management they propose. Some focus more heavily on project management and collaboration practices. These include Adaptive Software Development (ASD) [6], Scrum [7], Lean Development (LD) [10] and DSDM [8]. Others, such as eXtreme Programming (XP) [3], Feature-driven Development (FDD) [9] and Agile Modeling (AM) [5], focus more extensively on software implementation practices. Nevertheless, all the methods stick to the principles of maintaining good understanding of the project

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objectives, scope and constraints, developing software in short, feature-drive iterations, receiving constant feedback from the customer and the developers, and focusing on the delivery of business value.

An important issue in defining an organizational process is that all the elements it consists of reflect properly the specifics of the environment, in which the process will be implemented. When selecting an agile method, the business and organizational context, in which it will be applied, determines the benefits that could be achieved for a project and for an organization. In their book [1] B. Boehm and R. Turner have defined the "home grounds" in which agile and disciplined methods are most successful. Additionally, they define five factors, which help the organization determine whether they are in either the agile or disciplined area, or somewhere in between. These are size, criticality, personnel, dynamism, and culture.

Our work on applying agile practices in different organizational contexts inspired the development of the framework of agile patterns, presented in this paper. The idea is instead of providing a complete method, which might not be fully applicable in any situation, to provide a set of patterns addressing different aspects of the software development process, which could be combined in such a way as to fit to the peculiarity of a project. The patterns are derived from the most widely known lightweight methods XP, Scrum, FDD, AM, LD, and ASD.

Implementing a software development process based on patterns has several advantages:

- The patterns address activities performed by software engineers and project managers who are accustomed to using well structured information like pattern definitions.
- Patterns describe individual practices in a general enough way to be applied in different situations. Therefore they can be easily tried out and included in definitions of new processes. Adopting a small set of new practices gives a more profound understanding of the practices themselves and of the benefits from applying them together, which facilitates the continuous process improvement.
- As each pattern is selected and adapted as to best fit a project and organizational context, the whole process will be more suitable for that context than any general one.

We describe the framework of agile patterns in section 2 and in section 3 we present lessons learnt from applying the patterns in the industry.

2 Framework of Agile Patterns

A pattern describes a problem, which typically occurs under certain circumstances. It also describes a basic approach to solve the problem providing opportunities to adapt the solution to the particular problem context. In general, a pattern has three essential elements: problem, solution and consequences. Each solution consists of activities that, when collectively applied, resolve the problem. The solution is abstract enough to make it possible to apply it in different situations. The consequences are results and trade-offs of applying the pattern.

Three key terms take part in the agile methods: *practices*, *concepts* and *principles*. *Practices* describe specific actions that are performed in the whole process of software development, e.g. create product backlog (SCRUM). *Concepts* describe the attributes of an item, e.g. a project plan. *Principles* are fundamental guidelines concerning software development activities, e.g. empower the team (LD).

To be coherent with the agile methodologies the framework of agile patterns (FAP) includes definitions of three types of patterns: practice patterns, concepts and principles.

2.1 Practice Patterns

In the FAP each agile pattern is described by means of the following attributes:

- **Intent:** a short description of what the objective is;
- **Origin:** methodologies, from which the pattern originates;
- **Category** to which the pattern belongs. With respect to the type of issues addressed, the patterns are grouped in the following categories: *Project and Requirements Management, Design, Implementation and Testing, Resource Management, Contract Management* and *Software Process Improvement.*
- **Application scenario:** context, in which the pattern is to be applied;
- **Roles:** people involved in carrying out the pattern and their responsibilities;
- Main and alternative **Activities** that constitute the pattern. Activities can invoke other patterns;
- **Tools** that support the pattern execution;
- **Guidelines** for performing the activities including suggestions for making a decision about which alternative solution to choose when.

This structure is closest to the one proposed by E. Gamma in [2]. Compared to the classic pattern definition (problem-solution-consequences), Intent and Application scenario correspond to the problem attribute. Activities matches to solution. Some patterns provide alternative solutions to the same problem. This typically happens when the problem is addressed by more than one agile method and different solutions to it are proposed. Guidelines include hints for performing the activities and the consequences from them. An example of a pattern is:

CodeIntegrator

Intent: To have working code at the end of every day. In a software development environment with collective code ownership, the idea is to build the system every day, after a very small batch of work has been done by each of the developers.

Origin: LD: Synch and Stabilise (Daily build and smoke test); XP: Integrate often

***Category*:** Implementation & Testing

***Application scenario*:** After implementing a piece of code

***Roles*:** Developers

Activities

- Check out source code from the configuration management system.
- Put together the newly implemented and the existing code.

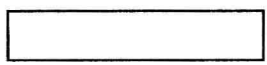
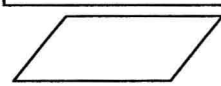
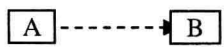
- Check to see, if anyone else has made changes to the same code, and if so, resolve the conflicts by applying CodeImplementer.
- Apply AcceptanceTester.
- Check in the new code.

***Tools*:** Version control tools support this activity.
Guidelines:

- Continuous integration avoids or detects compatibility problems early. If changes are integrated in small batches, it will be infinitely easier to detect and fix problems.
- A single integration point (computer) has to be defined.
- Every developer is responsible for integrating his/her own code always when there is a reasonable break. This could be when all the unit tests run at 100% or some smaller portion of the planned functionality is finished. Only one developer integrates at a given moment and after only a few hours of coding.
- All the tests have to pass successfully after integrating the system. Each integration results in a running system. Integration happens every 1-5 hours, at least once a day.

Apart from the natural language description of the patterns, every category is graphically illustrated showing which patterns, concepts and principles it includes, and the relationships between them.

On the graphics the following symbols are used:

Symbol	Meaning
	Principle
	Pattern
	Concept
	*"invokes"*
	Pattern A supports B, but it is optional to use A when implementing B

As an example, let's consider the *Implementation and Testing* category (Fig.1).

The patterns and their intents, which belong to this category, are the following ones.

Code Implementer: Implement code
FDDCoder: Implement defect-free code following FDD
XPCoder: Implement defect-free code following XP
SoftwareInspector; Find out defects in project work products