## Lecture Notes in Computer Science

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

1756

# Springer Berlin

Berlin
Heidelberg
New York
Barcelona
Hong Kong
London
Milan
Paris
Singapore
Tokyo

### Günther Ruhe Frank Bomarius (Eds.)

# Learning Software Organizations

## Methodology and Applications

11th International Conference on Software Engineering and Knowledge Engineering, SEKE'99 Kaiserslautern, Germany, June 16-19, 1999 Proceedings



#### Series Editors

Gerhard Goos, Karlsruhe University, Germany Juris Hartmanis, Cornell University, NY, USA Jan van Leeuwen, Utrecht University, The Netherlands

Volume Editors

Günther Ruhe Frank Bomarius Fraunhofer Institut, Experimental Software Engineering Sauerwiesen 6, 67661 Kaiserslautern, Germany E-mail: {ruhe/bomarius}@iese.fhg.de

Cataloging-in-Publication Data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Learning software organizations: methodology and applications; proceedings / 11th International Conference on Software Engineering and Knowledge Engineering, SEKE '99, Kaiserslautern, Germany, June 16 - 19, 1999. Günther Ruhe; Frank Bomarius (ed.). - Berlin; Heidelberg; New York; Barcelona; Hong Kong; London; Milan; Paris; Singapore; Tokyo: Springer, 2000 (Lecture notes in computer science; Vol. 1756) ISBN 3-540-41430-4

CR Subject Classification (1998): D.2, K.6, H.5.2-3, I.2.4

ISSN 0302-9743 ISBN 3-540-41430-4 Springer-Verlag Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

Springer-Verlag Berlin Heidelberg New York a member of BertelsmannSpringer Science+Business Media GmbH © Springer-Verlag Berlin Heidelberg 2000 Printed in Germany

Typesetting: Camera-ready by author

Printed on acid-free paper SPIN: 10719601 06/3142 5 4 3 2 1 0

#### **Preface**

Today we see many industrial companies that extend their Software Process Improvement activities to explicitly capture the knowledge gained and make it available to the entire enterprise. Organizational Learning, Organizational Memories, Knowledge Management, Data Warehouse, and Experience Factory have become important topics in industrial practice.

The 11<sup>th</sup> International Conference on Software Engineering and Knowledge Engineering (SEKE'99) was held from 16 to 19 June, 1999 in Kaiserslautern, Germany. As in the previous ten years, the conference provided a unique, centralized forum for academic and industrial researchers and practitioners to discuss the application of either software engineering methods in knowledge engineering or knowledge-based techniques in software engineering. Due to the valuable contribution of the international program committee a very attractive scientific program was presented. After a rigorous review process, 19 full-paper presentations, 19 short-paper presentations, and 16 poster presentations were held during the conference.

The workshop on Learning Software Organizations (LSO'99) brought together practitioners and researchers to discuss ongoing activities regarding the set-up of learning organizations in software industries. In order to foster interdisciplinary approaches, contributions that extend into and integrate the fields of social sciences, psychology, management science, AI, and computer science were presented.

This book provides an overview of current activities, approaches and trends in building LSOs. The first part of the book gives an overview of the topic of Learning Software Organizations. This includes the foundations of organizational learning in the Software Engineering domain, enabling techniques for organizational learning, and techniques to support learning. The most interesting papers regarding LSO issues from SEKE'99 and the adjunct workshop LSO'99 were selected and compiled into the second and third part of this book. The papers are improved and extended versions of the conference or workshop contributions. They deal with the question of how to build and run LSOs for software development organizations. Some investigate the question more from a practitioner's point of view, i.e. reporting from practical experience in industry. Others take a more academic perspective, i.e. reporting applied research results in this area.

We wish to thank DaimlerChrysler, Deutsche Telekom, Ericsson Finland, IBM Germany, Insiders, Q-Labs, sd&m, Softlab and tecinno for sponsoring the conference. We are also grateful to the authors for providing high-quality papers, and to the program committee, including all the reviewers, for their effort in ensuring the quality of the contributions.

Last, but not least, many thanks to Kornelia Streb, Fraunhofer Institute for Experimental Software Engineering (Germany) for copyediting this volume.

## **Table of Contents**

## **Chapter 1: Overview**

Introduction and Motivation	3
Learning Organizations in the Software Engineering Domain	4
Knowledge Management Terminology	4
The Quality Improvement Paradigm	6
The Experience Factory Organization	8
Organizational Knowledge Creation	10
Enabling Techniques for Learning Organizations	11
Experimentation	12
Measurement	12
Modeling	13
Reuse	15
Computer Supported Collaborative Learning (CSCL)	15
Outlook	17
The Contributions from SEKE'99 and LSO'99 to this Book	18
Methodology	18
Applications	19
References	20
Chapter 2: Methodology	
Systematic Population, Utilization, and Maintenance of a Repository for Comprehensive Reuse	25
Klaus-Dieter Althoff, Andreas Birk, Susanne Hartkopf, Wolfgang Müller, Markus Nick, Dagmar Surmann, Carsten Tautz	
On Developing a Repository Structure Tailored for Reuse with Improvement	51
Raimund I., Feldmann	

Systematically Diagnosing and Improving the Perceived Usefulness of Organizational Memories	72
Klaus-Dieter Althoff, Markus Nick, Carsten Tautz	
Technical Requirements for the Implementation of an Experience Base Mikael Broomé, Per Runeson	87
Proactive Knowledge Delivery for Enterprise Knowledge Management  Andreas Abecker, Ansgar Bernardi, Michael Sintek	103
Goal-Oriented and Similarity-Based Retrieval of Software Engineering Experienceware	118
Christiane Gresse von Wangenheim, Klaus-Dieter Althoff, Ricardo M. Barcia	
A Knowledge Management Lifecycle for Experience Packages on Softwar Engineering Technologies Andreas Birk, Felix Kröschel	<b>re</b> 142
Chapter 3: Applications	
Knowledge Management at a Software House An Experience Report Peter Brössler	163
"Talk to Paula and Peter - They Are Experienced" - The Experience Engine in a Nutshell Conny Johansson, Patrik Hall, Michael Coquard	171
Push or Pull: Two Cognitive Modes of Systematic Experience Transfer at DaimlerChrysler Eva Wieser, Frank Houdek, Kurt Schneider	186
Collecting, Storing and Utilizing Information about Improvement Opportunities: A Discussion of the Non-Technological Barriers to Success Henrik M. Giæver	205
Transferring and Evolving Experience: A Practical Approach and Its Application on Software Inspections  Frank Houdek, Christian Bunse	210