Lecture Notes in Computer Science 2959

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

Springer
Berlin
Heidelberg
New York
Hong Kong
London
Milan
Paris
Tokyo

Rick Kazman Dan Port (Eds.)

COTS-Based Software Systems

Third International Conference, ICCBSS 2004
Redondo Beach, CA, USA, February 1-4, 2004
Proceedings

Springer

Series Editors

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

Volume Editors

Rick Kazman
Dan Port
University of Hawaii
Department of Information Technology Management
Honolulu, HI, 96825, USA
E-mail: {kazman, port}@hawaii.edu

Library of Congress Control Number: 2004104869

CR Subject Classification (1998): K.6.3, D.2, J.1

ISSN 0302-9743
ISBN 3-540-21903-X 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 to prosecution under the German Copyright Law.

Springer-Verlag is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2004
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH
Printed on acid-free paper SPIN: 10997864 06/3142 5 4 3 2 1 0

Preface

In the short space of about a decade, Commercial-Off-the-Shelf (COTS) software has evolved through being a relatively minor aspect of software development; a top-management-endorsed silver bullet solution for software development; a disruptive technology requiring people and organizations to extensively rethink their approaches to software development; to an increasingly well-understood software phenomenon for which effective solutions are being developed.

Part of this understanding has been to recognize that different COTS application sectors can be at different stages of this evolution. Some sectors are just beginning to become COTS-intensive. Some have evolved COTS solutions that are very well matched to their problem domain. Others, including most large-scale applications, still involve their developers in rethinking how to adapt their traditional software architectures, processes, management practices, and personnel skills to accommodate economically attractive but complex combinations of powerful but incompletely compatible and independently evolving COTS products.

The series of International Conferences on COTS-Based Software Systems (ICCBSS) has been established as a continuing forum for bringing together CBSS developers, suppliers, and researchers to summarize and discuss progress toward understanding and resolving CBSS problems. This year's conference theme, "Matching Solutions to Problems," reflects this objective. We have been fortunate to have three outstanding keynote speakers, David Carr, Tricia Oberndorf, and Douglas Schmidt, who have contributed significantly both in analyzing CBSS problems and developing better CBSS solutions.

The contributed papers and summaries of workshops, panels, and tutorials in these Proceedings give a good understanding of the nature and directions of evolution of CBSS problems and solutions. As has been my experience with previous ICCBSS Proceedings volumes, I believe that you will find lasting value in the content of the Proceedings.

I would like to express a special note of thanks to all of the members of ICCBSS 2004 organizing committee, program committee, and individual committees listed in the Proceedings. Their capable and dedicated volunteer efforts are what continues to make the ICCBSS series a timely and useful experience and contribution toward improved CBSS practices. I would also like to thank the Northrop Grumman Corporation for its sponsorship of ICCBSS 2004, and the overall sponsoring organizations of the ICCBSS series: the Canadian National Research Council, the CMU Software Engineering Institute, the European Software Institute, and the USC Center for Software Engineering.

January 2004 Barry Boehm, General Chair

Editors' Introduction

Welcome to the Proceedings for the 3rd International Conference of COTS Based Software Systems. The conference is still young, but it is vital and growing fast. This year there were a total of 57 submissions on all aspects of COTS, with about 60% of these coming from the United States and the remainder from Europe, and Asia. Equally encouraging, we had about equal numbers of submissions coming from academia and industry. This shows that ICCBSS is hitting our target audience-both practitioners and researchers interested in the effective use of COTS.

The specific program statistics are as follows:

4 tutorials submitted
3 tutorials accepted

4 panels submitted
3 panels accepted

10 experience presentations submitted
8 experience presentations accepted

39 refereed papers submitted
17 refereed papers accepted

2 invited workshops

We were uniformly impressed with the high quality and broad scope of these submissions. There were about an equal number of technically focused and managerially oriented submissions whose topics generally fell into three tracks: COTS Product Evaluation and Selection, COTS-Based System Definition and Development, and COTS-Based System Evolution and Management.

The superb quality of the submissions and the invited workshops continues to indicate the importance and interest in COTS based system development and issues. With this trend, ICCBSS 2005 will prove to be even more exciting!

Dan Port, Rick Kazman
ICCBSS Proceedings Editors

Organization

ICCBSS 2004 Conference Committee

Planning Committee

General Chair	Barry Boehm (University of Southern California)
Program Chairs	Ceci Albert (Software Engineering Institute)
	Dan Port (University of Hawaii)
Proceeding Chairs	Rick Kazman (University of Hawaii)
	Dan Port (University of Hawaii)
Tutorial Chair	Sergio Bandinelli (European Software Institute)
Panels Chair	Ioana Rus (University of Maryland)
Posters Chair	Hakan Erdogmus (National Research Council Canada)
Publicity Chairs	Lisa Brownsword (Software Engineering Institute)
	David Morera (European Software Institute)
	Mark Vigder (National Research Council Canada)
Finace & Local Arrangements	Hal Hart (Northrop Grumman)
Chair Emeritus	John Dean (National Research Council Canada)

Program Committee

Cecilia C. Albert – Software Engineering Institute, USA
Sergio Bandinelli – European Software Institute, Spain
David M. Bennett – POWERflex Corporation, Australia
David P. Bentley – South Carolina Research Authority, USA
Ljerka Beus-Dukic – University of Westminster, UK
Jørgen Bøegh – DELTA Danish Electronics, Light, & Acoustics, Denmark
Pere Botella – Universitat Politecnica de Catalunya Barcelona, Spain
William G. Chismar – University of Hawaii, USA
Daniel Dumas – IBM Belgium Software Group, Belgium
Anthony Earl – Sun Microsystems Inc, USA
Suellen Eslinger – The Aerospace Corporation, USA
Rose F. Gamble – University of Tulsa, USA
Suzanne M. Garcia – Software Engineering Institute, USA
Anatol Kark – National Research Council Canada, Canada
Rick Kazman – University of Hawaii and SEI, USA
David Klappholz – Stevens Institute of Tech.& New Jersey CSE, USA
Ron Kohl – R.J. Kohl & Associates, USA
Lech Krzanik – University of Oulu, Finland
Grace A. Lewis – Software Engineering Institute, USA
Fred Long – University of Wales, Aberystwyth

Mike Looney – University of Portsmouth, UK
Ray Madachy – University of Southern California, USA
Jean-Christophe Mielnik – Thales Research & Technology, France
Maurizio Morisio – Politecnico di Torino, Italy
Diane Mularz – MITRE Corp, USA
Michael Ochs – Fraunhofer-Institute for Experimental Software Engineering, Germany

Table of Contents

Tutorials

Using eCots Portal for Sharing Information about Software Products on the Internet and in Corporate Intranets 1
Jean-Christophe Mielnik, Vincent Bouthors, Stéphane Laurière, Bernard Lang

Testing Component-Based Software – Issues, Challenges, and Solutions 2
Jerry Zeyu Gao, Ye Wu

All You Have to Know When Using Commercial Components to Build Your Software Systems 3
David Morera

Workshops

COTS Terminology and Categories: Can We Reach a Consensus? 4
Betsy Clark, Marco Torchiano

First International Workshop on Incorporating COTS into Software Systems 6
Alexander Egyed, Dewayne Perry

Panels

Panels Introduction 8

Posters

COTS Components for Spacecraft Ground Systems 9
Judy Kerner

Do We Need Requirements in COTS-Based Software Development? 11
Xavier Franch

The Added Dimension: Information Security in COTS-Based Software Systems 13
Carol Sledge

Poster Sessions

Poster Title: Systemic Quality of the Component-Based Development Process 14
Maryoly Ortega

Poster Title: COTS Services 15
Pearl Brereton

Poster Title: AIAA (Draft) Guidebook "Managing the Use of Commercial Off-the-Shelf (COTS) Software Components for Mission Critical Systems" 16
Ronald J. Kohl

Poster Title: CMMI Compliance in COTS-Based Development 17
Rick Hefner

Papers

Security in Large System Acquisition 18
Marshall Abrams, Joe Veoni, R. Kris Britton

On the Measurement of COTS Functional Suitability 31
Alejandra Cechich, Mario Piattini

A Case Study in COTS Product Integration Using XML 41
Grace A. Lewis, Lutz Wrage

COTS Product Selection for Safety-Critical Systems 53
Fan Ye, Tim Kelly

Driving Component Selection through Actor-Oriented Models and Use Cases 63
Vijay Sai, Xavier Franch, Neil Maiden

Managed Technology Adoption Risk: A Way to Realize Better Return from COTS Investments 74
Suzanne Garcia, John Robert, Len Estrin

Understanding Services for Integration Management 84
L. Davis, R. Gamble

Migrating Application Integrations 94
D. Flagg, R. Gamble, R. Baird, W. Stewart

Web-Based COTS Component Evaluation 104
Franck Barbier

Software Fault-Tolerance with Off-the-Shelf SQL Servers 117
P. Popov, L. Strigini, A. Kostov, V. Mollov, D. Selensky

ImpACT: An Alternative to Technology Readiness Levels for Commercial-Off-The-Shelf (COTS) Software 127
James D. Smith II

COTS-Based Systems – Twelve Lessons Learned about Maintenance 137
Donald J. Reifer, Victor R. Basili, Barry W. Boehm, Betsy Clark

A Wish List for Requirements Engineering for COTS-Based Information Systems 146
Vito Perrone

From System Requirements to COTS Evaluation Criteria 159
Grace A. Lewis, Edwin J. Morris

Empirical Analysis of COTS Activity Effort Sequences 169
Dan Port, Ye Yang

Assessing COTS Assessment: How Much Is Enough? 183
Dan Port, Scott Chen

Experience Reports

Legal and Contractual Implications in the European Union 199
Ignatio Delgado Gonzales

Best Practices for the Acquisition of COTS-Based Systems: Lessons Learned from the Space System Domain 203
Richard J. Adams, Suellen Eslinger

Managing Vulnerabilities in Your Commercial-Off-The-Shelf (COTS) Systems Using an Industry Standards Effort (CVE) 206
Robert A. Martin

Costing COTS Integration 209
Linda Brooks

U.S. Coast Guard, Differential GPS, Nationwide Control Station 210
Frank Klucznik, Kristi McRacken, John Killers, Jason Judy

Requirements Analysis and Management (RAM) of COTS-Based Systems – A "Success Story" 211
Gail M. Talbott

COTS Selection and Adoption in a Small Business Environment: How Do You Downsize the Process? 216
William B. Anderson

Managing the COTS Chaos: Experiences from the Trenches Using the Evolutionary Process for Integrating COTS-Based Systems 217
Lisa Brownsword, Minton Brooks

Author Index 219