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# Metrics And Models In Software Quality Engineering 2nd Edition

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*Metrics And Models In Software  
Quality Engineering 2nd Edition*

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## TOWNSEND HANEY

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**Software Metrics** Institute of Electrical & Electronics Engineers(IEEE)

Software Quality Assurance in Large Scale and Complex Software-intensive Systems presents novel and high-quality research related approaches that relate the quality of software architecture to system requirements, system architecture and enterprise-architecture, or software testing. Modern software has become complex and adaptable due to the emergence of globalization and new software technologies, devices and networks. These changes challenge both traditional software quality assurance techniques and software engineers to ensure software quality when building today (and tomorrow's) adaptive,

context-sensitive, and highly diverse applications. This edited volume presents state of the art techniques, methodologies, tools, best practices and guidelines for software quality assurance and offers guidance for future software engineering research and practice. Each contributed chapter considers the practical application of the topic through case studies, experiments, empirical validation, or systematic comparisons with other approaches already in practice. Topics of interest include, but are not limited, to: quality attributes of system/software architectures; aligning enterprise, system, and software architecture from the point of view of total quality; design decisions and their influence on the quality of system/software architecture; methods and processes for evaluating architecture quality; quality assessment of legacy systems and third party applications; lessons learned and

empirical validation of theories and frameworks on architectural quality; empirical validation and testing for assessing architecture quality. Focused on quality assurance at all levels of software design and development Covers domain-specific software quality assurance issues e.g. for cloud, mobile, security, context-sensitive, mash-up and autonomic systems Explains likely trade-offs from design decisions in the context of complex software system engineering and quality assurance Includes practical case studies of software quality assurance for complex, adaptive and context-critical systems

Software Development Metrics Prentice Hall

PART I: FUNDAMENTALS OF MEASUREMENT AND

EXPERIMENTATION 1. Measurement: What Is It and Why Do It? 2.

The Basics of Measurement 3. A Goal-Based Framework for

Software Measurement 4. Empirical Investigation 5. Software

Metrics Data Collection 6. Analyzing Software-Measurement Data

PART II: SOFTWARE-ENGINEERING MEASUREMENT 7. Measuring

Internal Product Attributes: Size 8. Measuring Internal Product

Attributes: Structure 9. Measuring Internal Product Attributes 10.

Software Reliability: Measurement and Prediction 11. Resource

Measurement: Productivity, Teams, and Tools 12. Making Process

Predictions PART III: MEASUREMENT AND MANAGEMENT 13.

Planning a Measurement Program 14. Measurement in Practice

15. Empirical Research in Software Engineering APPENDIXES: A.

Solutions to Selected Exercises / B. Metric Tools / C. Acronyms

and Glossary / ANNOTATED BIBLIOGRAPHY / INDEX

**Lessons Learned in Software Testing** IGI Global

""This is the single best book on software quality engineering and metrics that I've encountered."" --Capers Jones, from the

Foreword"Metrics and Models in Software Quality Engineering, Second Edition," is the definitive book on this essential topic of software development. Comprehensive in scope with extensive industry examples, it shows how to measure software quality and use measurements to improve the software development process. Four major categories of quality metrics and models are addressed: quality management, software reliability and projection, complexity, and customer view. In addition, the book discusses the fundamentals of measurement theory, specific quality metrics and tools, and methods for applying metrics to the software development process. New chapters bring coverage of critical topics, including: In-process metrics for software testing Metrics for object-oriented software

development Availability metrics Methods for conducting in-

process quality assessments and software project

assessments Dos and Don'ts of Software Process Improvement, by

Patrick O'Toole Using Function Point Metrics to Measure Software

Process Improvement, by Capers Jones In addition to the

excellent balance of theory, techniques, and examples, this book

is highly instructive and practical, covering one of the most

important topics in software development--quality engineering.

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**Software Metrics** Institute of Electrical & Electronics Engineers(IEEE)

MenascT (computer science, George Mason U.) and Almeida

(computer science, U. of Minas Gerais, Brazil) provide a

quantitative analysis of Web service availability and a framework

for understanding and planning Web services. They discuss

benchmarking, load testing, workload forecasting, and performan

**Capacity Planning for Web Services** Springer Science & Business Media

This tutorial presents a new, quantitative approach to software management and software engineering that has taken shape over the past few years.

*Applying Software Metrics* Simon and Schuster

Practical approach to software measurement Contains hands-on industry experiences

Tutorial on Models and Metrics for Software Management and Engineering Franklin Classics

This book introduces the concept of software architecture as one of the cornerstones of software in modern cars. Following a historical overview of the evolution of software in modern cars and a discussion of the main challenges driving that evolution, Chapter 2 describes the main architectural styles of automotive software and their use in cars' software. Chapter 3 details this further by presenting two modern architectural styles, i.e. centralized and federated software architectures. In Chapter 4, readers will find a description of the software development processes used to develop software on the car manufacturers' side. Chapter 5 then introduces AUTOSAR – an important standard in automotive software. Chapter 6 goes beyond simple architecture and describes the detailed design process for automotive software using Simulink, helping readers to understand how detailed design links to high-level design. The new chapter 7 reports on how machine learning is exploited in automotive software e.g. for image recognition and how both on-board and off-board learning are applied. Next, Chapter 8 presents a method for assessing the quality of the architecture –

ATAM (Architecture Trade-off Analysis Method) – and provides a sample assessment, while Chapter 9 presents an alternative way of assessing the architecture, namely by using quantitative measures and indicators. Subsequently Chapter 10 dives deeper into one of the specific properties discussed in Chapter 8 – safety – and details an important standard in that area, the ISO/IEC 26262 norm. Lastly, Chapter 11 presents a set of future trends that are currently emerging and have the potential to shape automotive software engineering in the coming years. This book explores the concept of software architecture for modern cars and is intended for both beginning and advanced software designers. It mainly aims at two different groups of audience – professionals working with automotive software who need to understand concepts related to automotive architectures, and students of software engineering or related fields who need to understand the specifics of automotive software to be able to construct cars or their components. Accordingly, the book also contains a wealth of real-world examples illustrating the concepts discussed and requires no prior background in the automotive domain. Compared to the first edition, besides the two new chapters 3 and 7 there are considerable updates in chapters 5 and 8 especially.

Object-Oriented Metrics in Practice McGraw-Hill Companies

Object-oriented (OO) metrics are an integral part of object technology -- at the research level and in commercial software development projects. This book offers theoretical and empirical tips and facts for creating an OO complexity metrics (measurement) program, based on a review of existing research from the last several years. KEY TOPICS: Covers moving through

object-oriented concepts as they related to managing the project lifecycle; the framework in which metrics exist; structural complexity metrics for traditional systems; OO product metrics; and current industrial applications. MARKET: For software developers, programmers, and managers.

Accelerate CRC Press

In recent years the management of business processes has emerged as one of the major developments to ease the understanding of, communication about, and evolution of process-oriented information systems in a variety of application domains. Based on explicit representations of business processes, process stakeholders can communicate about process structure, content, and possible improvements. Formal analysis, verification and simulation techniques have the potential to show deficits and to effectively lead to better and more flexible processes. Process mining facilitates the discovery of process specifications from process logs that are readily available in many organizations. This volume of Springer's Lecture Notes in Computer Science contains the papers presented at the 2nd International Conference on Business Process Management (BPM 2004) which took place in Potsdam, Germany, in June 2004. From more than 70 submissions BPM 2004 received, 19 high-quality research papers were selected. BPM 2004 is part of a conference series that provides a forum for researchers and practitioners in all aspects of business process management. In June 2003, the 1st International Conference on Business Process Management took place in Eindhoven, The Netherlands. Its proceedings were published as Volume 2678 of Lecture Notes in Computer Science by Springer-Verlag. A previous volume

(LNCS1806) on Business Process Management was based on four events devoted to this topic.

Metrics for Software Conceptual Models CRC Press

Partial Contents: Architectural Metrics; Program Understanding; Program Analysis; Software Process Improvement; Error Models & Measures; Object-Oriented Measures; Program Management Measures; Formal Models; Testing Measures

Software Quality IT Revolution

Presents a novel metrics-based approach for detecting design problems in object-oriented software. Introduces an important suite of detection strategies for the identification of different well-known design flaws as well as some rarely mentioned ones.

**Software Quality Assurance** MIT Press

The idea that "measuring quality is the key to developing high-quality software systems" is gaining relevance. Moreover, it is widely recognised that the key to obtaining better software systems is to measure the quality characteristics of early artefacts, produced at the conceptual modelling phase. Therefore, improving the quality of conceptual models is a major step towards the improvement of software system development. Since the 1970s, software engineers had been proposing high quantities of metrics for software products, processes and resources but had not been paying any special attention to conceptual modelling. By the mid-1990s, however, the need for metrics for conceptual modelling had emerged. This book provides an overview of the most relevant existing proposals of metrics for conceptual models, covering conceptual models for both products and processes. Contents: Towards a Framework for Conceptual Modelling Quality (M Piattini et al.) A Proposal of a

Measure of Completeness for Conceptual Models (O Dieste et al.) Metrics for Use Cases: A Survey of Current Proposals (B Bernárdez et al.) Defining and Validating Metrics for UML Class Diagrams (M Genero et al.) Measuring OCL Expressions: An Approach Based on Cognitive Techniques (L Reynoso et al.) Metrics for Datawarehouses Conceptual Models (M Serrano et al.) Metrics for UML Statechart Diagrams (J A Cruz-Lemus et al.) Metrics for Software Process Models (F García et al.)

Readership: Senior undergraduates and graduate students in software engineering; PhD students, researchers, analysts, designers, software engineers and those responsible for quality and auditing. Key Features: Presents the most relevant existing proposals of metrics for conceptual models, covering conceptual models for both products and processes Provides the most current bibliography on this subject The only book to focus on the quality aspects of conceptual models

Keywords: Conceptual Model; Quality; Metrics; UML; OCL; Empirical Research

Business Process Management Springer Science & Business Media

Going where no book on software measurement and metrics has previously gone, this critique thoroughly examines a number of bad measurement practices, hazardous metrics, and huge gaps and omissions in the software literature that neglect important topics in measurement. The book covers the major gaps and omissions that need to be filled if data about software development is to be useful for comparisons or estimating future projects. Among the more serious gaps are leaks in reporting about software development efforts that, if not corrected, can distort data and make benchmarks almost useless and possibly

even harmful. One of the most common leaks is that of unpaid overtime. Software is a very labor-intensive occupation, and many practitioners work very long hours. However, few companies actually record unpaid overtime. This means that software effort is underreported by around 15%, which is too large a value to ignore. Other sources of leaks include the work of part-time specialists who come and go as needed. There are dozens of these specialists, and their combined effort can top 45% of total software effort on large projects. The book helps software project managers and developers uncover errors in measurements so they can develop meaningful benchmarks to estimate software development efforts. It examines variations in a number of areas that include: Programming languages Development methodology Software reuse Functional and nonfunctional requirements Industry type Team size and experience Filled with tables and charts, this book is a starting point for making measurements that reflect current software development practices and realities to arrive at meaningful benchmarks to guide successful software projects.

*Metrics and Models for Evaluating the Quality and Effectiveness of ERP Software* Brooks/Cole

Winner of the Shingo Publication Award Accelerate your organization to win in the marketplace. How can we apply technology to drive business value? For years, we've been told that the performance of software delivery teams doesn't matter—that it can't provide a competitive advantage to our companies. Through four years of groundbreaking research to include data collected from the State of DevOps reports conducted with Puppet, Dr. Nicole Forsgren, Jez Humble, and

Gene Kim set out to find a way to measure software delivery performance—and what drives it—using rigorous statistical methods. This book presents both the findings and the science behind that research, making the information accessible for readers to apply in their own organizations. Readers will discover how to measure the performance of their teams, and what capabilities they should invest in to drive higher performance. This book is ideal for management at every level.

**Reliability Growth** Springer-Verlag

This is the digital version of the printed book (Copyright © 2003). To succeed in the software industry, managers need to cultivate a reliable development process. By measuring what teams have achieved on previous projects, managers can more accurately set goals, make bids, and ensure the successful completion of new projects. Acclaimed long-time collaborators Lawrence H. Putnam and Ware Myers present simple but powerful measurement techniques to help software managers allocate limited resources and track project progress. Drawing new findings from an extensive database of software project metrics, the authors demonstrate how readers can control projects with just Five Core Metrics -Time, Effort, Size, Reliability, and Process Productivity. With these metrics, managers can adjust ongoing projects to changing conditions-surprises that would otherwise cause project failure.

*Software Metrics* Springer Nature

This application-oriented book shows how to apply proven software metrics and methods to efficiently manage software development and maintenance--to help boost productivity, efficiency, and quality of software projects at every stage of the

process. Detailing practical methods throughout, the book covers tips to best measure and present progress, a useful model for understanding organization limitations, possible problems in process improvement illustrated by examples, evidence of what works and what doesn't work, and more. An ideal reference for project managers and professionals responsible for process improvement.n

**Tutorial on Models and Metrics for Software Management and Engineering** John Wiley & Sons

Enterprise resource planning (ERP) is a class of integrated software that uses software technologies to implement real-time management of business processes in an organization. ERPs normally cut across organizations, making them large and complex. Software researchers have for many years established that complexity affects software quality negatively and must therefore be controlled with novel metrics and models of evaluation that can determine when the software is at acceptable levels of quality and when not. Metrics and Models for Evaluating the Quality and Effectiveness of ERP Software is a critical scholarly publication that examines ERP development, performance, and challenges in business settings to help improve decision making in organizations that have embraced ERPs, improve the efficiency and effectiveness of their activities, and improve their return on investments (ROI). Highlighting a wide range of topics such as data mining, higher education, and security, this book is essential for professionals, software developers, researchers, academicians, and security professionals.

*ROI of Software Process Improvement* J. Ross Publishing

As tech giants and startups disrupt every market, those who master large-scale software delivery will define the economic landscape of the 21st century, just as the masters of mass production defined the landscape in the 20th. Unfortunately, business and technology leaders are woefully ill-equipped to solve the problems posed by digital transformation. At the current rate of disruption, half of S&P 500 companies will be replaced in the next ten years. A new approach is needed. In *Project to Product*, Value Stream Network pioneer and technology business leader Dr. Mik Kersten introduces the Flow Framework—a new way of seeing, measuring, and managing software delivery. The Flow Framework will enable your company's evolution from project-oriented dinosaur to product-centric innovator that thrives in the Age of Software. If you're driving your organization's transformation at any level, this is the book for you.

*Proceedings, Fifth International Software Metrics Symposium, Metrics 1998* John Wiley & Sons

Summary Software Development Metrics is a handbook for anyone who needs to track and guide software development and delivery at the team level, such as project managers and team leads. New development practices, including "agile" methodologies like Scrum, have redefined which measurements are most meaningful and under what conditions you can benefit from them. This practical book identifies key characteristics of organizational structure, process models, and development methods so that you can select the appropriate metrics for your team. It describes the uses, mechanics, and common abuses of a number of metrics that are useful for steering and for monitoring

process improvement. The insights and techniques in this book are based entirely on field experience. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Book When driving a car, you are less likely to speed, run out of gas, or suffer engine failure because of the measurements the car reports to you about its condition. Development teams, too, are less likely to fail if they are measuring the parameters that matter to the success of their projects. This book shows you how. Software Development Metrics teaches you how to gather, analyze, and effectively use the metrics that define your organizational structure, process models, and development methods. The insights and examples in this book are based entirely on field experience. You'll learn practical techniques like building tools to track key metrics and developing data-based early warning systems. Along the way, you'll learn which metrics align with different development practices, including traditional and adaptive methods. No formal experience with developing or applying metrics is assumed. What's Inside Identify the most valuable metrics for your team and process Differentiate "improvement" from "change" Learn to interpret and apply the data you gather Common pitfalls and anti-patterns About the Author Dave Nicolette is an organizational transformation consultant, team coach, and trainer. Dave is active in the agile and lean software communities. Table of Contents Making metrics useful Metrics for steering Metrics for improvement Putting the metrics to work Planning predictability Reporting outward and upward *Metrics and Models in Software Quality Engineering* Morgan Kaufmann



Software Metrics is the first book to survey its subject, measuring its present extent, describing its characteristic features, and indicating directions of potential expansion.