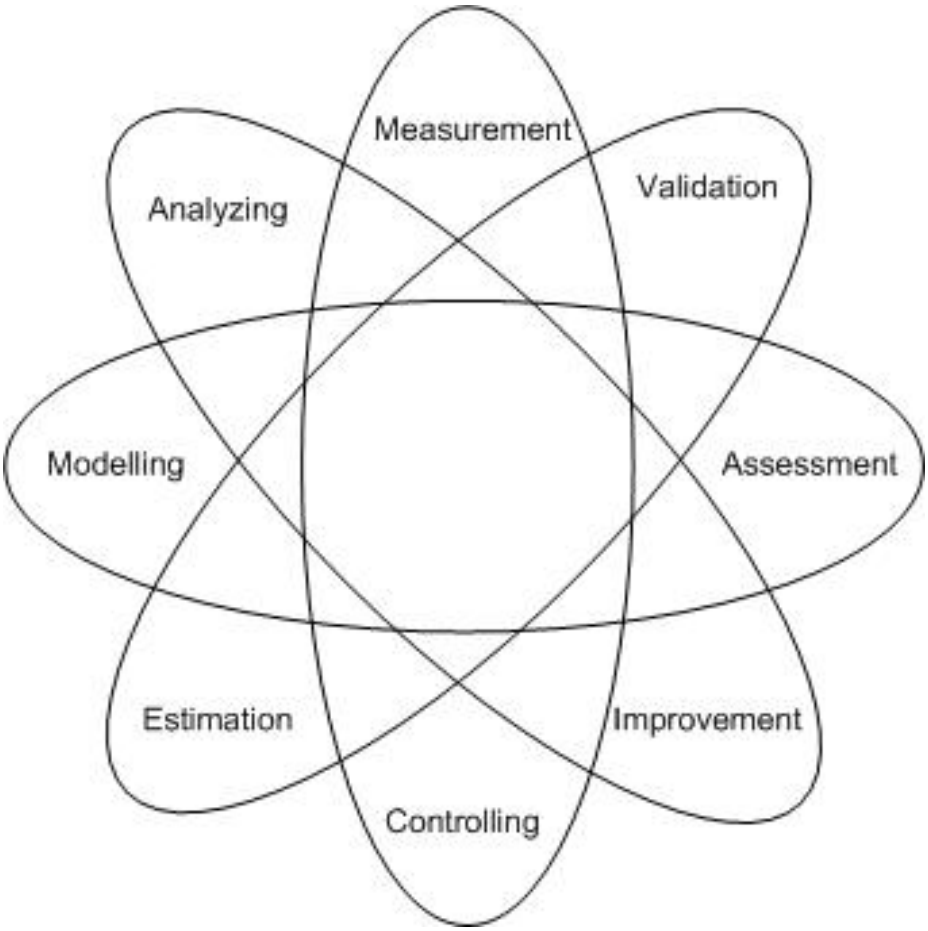
Volume 26, Number 2, September 2021

Software Measurement News

Journal of the Software Measurement Community



Editors:

Alain Abran, Manfred Seufert, Reiner Dumke, Christof Ebert, Cornelius Wille

Université du Québec
École de technologie supérieure

CONTENTS

Announcements 2
Frank Vogelezang: No IWSM conference this year 2
Andreas Schmietendorf: Ankündigung des ESAPI-Workshops 4

Conference Reports 7
Jens Heidrich:
Praxis-Workshop für Mittelständler: Industrielle Daten erfolgreich nutzbar machen 7
Andreas Schmietendorf:
Bericht zu den Ergebnissen des Online-Worlshops (e) trust 10

Community Reports 15
Frank Vogelezang: Software Cost Estimation Summit 15

News Papers 17
Christof Ebert:
Test-Driven Requirements Engineering (TDRE) 17
Reiner R. Dumke:
A Historical Overview of Software Measurement 24

New Books on Software Measurement 35

Conferences Addressing Measurement Issues 42

Metrics in the World-Wide Web 45

Editors:

Alain Abran
Professor and Director of the Research Lab. in Software Engineering Management
École de Technologie Supérieure - ETS, 1100 Notre-Dame Quest,Montréal, Quebec, H3C 1K3, Canada, **alain.abran@etsmtl.ca**

Manfred Seufert
Chair of the DASMA, Median ABS Deutschland GmbH
Franz-Rennefeld-Weg 2, D-40472 Düsseldorf,
manfred.seufert@mediaan.com

Reiner Dumke
Professor on Software Engineering, University of Magdeburg, FIN/IKS
Postfach 4120, D-39016 Magdeburg, Germany,
dumke@ivs.cs.uni-magdeburg.de, http://www.smlab.de

Christof Ebert
Dr.-Ing. in Computer Science, Vector Consulting Services GmbH
Ingersheimer Str. 20, D-70499 Stuttgart, Germany,
christof.ebert@vector.com

Cornelius Wille
Professor on Software Engineering, University of Applied Sciences Bingen
Berlinstr. 109, D-55411 Bingen am Rhein, Germany,
wille@fh-bingen.de

Editorial Office: University of Magdeburg, FIN, Postfach 4120, 39016 Magdeburg, Germany
Technical Editor: Dagmar Dörge
The journal is published in one volume per year consisting of two numbers.

No IWSM conference this year

The IWSM organization has decided not to organize a conference this year. Although the 2020 conference was a success, the continued effects of the COVID-19 pandemic are causing too many uncertainties for the country that is organizing the next edition of the IWSM conference.

But there is an alternative

For those of you that have an interest in Software Cost Estimation here is an alternative. With IT-budgets getting lighter and demands for new or better software on the rise reliable cost estimates for software projects are becoming more important than ever.

For that reason ***COSMIC*** and ***Nesma*** have decided to organize a summit on this topic.

Software Cost Estimation Summit SCES '21 is a dual-mode summit meeting where leaders in the field of software cost estimation from industry, government and research share their insights and experience in forecasting the cost and other resources needed to complete a software intensive project within a defined scope. Since almost everything devestimation is becoming increasingly important.
SCES '21 will be held on November 9 and 10. The physical part of this summit will take place in the beautiful Philharmonie in Haarlem (the Netherlands), where you can connect physically with the speakers and fellow software cost estimation professionals.

Since COVID restrictions limit the number of people that can safely be brought together, most of the summit will be also available online. In this way anyone who is not able to join this summit or does not feel comfortable to travel to the Netherlands can still share in the insights and experiences that will be shared.

More information can be found on nesma.org/sces21. Walk down memory lane

Those of you who have been to the IWSM conference in 2019 are already familiar with the Philharmonie. Relive that conference by watching the photos taken there.

During the **SCES '21** the finals of the Cost Estimation Challenge will be held. Just like last year practitioner teams can compete on making the best substantiated Software Cost Estimate. The teams get the specifications 4 weeks in advance and will present their results to a jury of Software Cost Estimation professionals.

Watch the conference website nesma.org/sces21 for more details or contact challenge@cosmic-sizing.org.

Best Research Award

We want to give the floor to the best Software Cost Estimation research of the past few years. Have you written a research paper on a standardized approach to Software Cost Estimation that has been published on January 1, 2018 or later, please send it in to awards@cosmic-sizing.org.

Do you know a paper written by someone else, you can also nominate that paper via the same address. An independent jury of Software Cost Estimation professionals and scholars will judge the nominated papers.

Frank Vogelezang, COSMIC chairman

Software Cost Estimation Summit 2021

In November COSMIC and Nesma will organize the Software Cost Estimation Summit (SCES '21).

SCES '21 is a dual-mode summit meeting where leaders in the field of software cost estimation from industry, government and research share their insights and experience in forecasting the cost and other resources needed to complete a software intensive project within a defined scope. Since almost everything developed or constructed today involves a significant software component, software cost estimation is becoming increasingly important.

SCES '21 will be held on November 9 and 10. The physical part of this summit will take place in the beautiful Philharmonie in Haarlem (the Netherlands), where you can connect physically with the speakers and fellow software cost estimation professionals. Since COVID restrictions limit the number of people that can safely be brought together, most of the summit will be also available online. In this way anyone who is not able to join this summit or does not feel comfortable to travel to the Netherlands can still share in the insights and experiences that will be shared.

More information can be found on https://nesma.org/sces21/

Ankündigung des ESAPI-Workshops
„Schwerpunkt KI-Web-APIs“

04. November 2021
Gastgeber: HS Köln – direkt oder virtuell

Motivation

In diesem Jahr soll sich der ESAPI-Workshop einer speziellen Themenstellung rund um Algorithmen der künstlichen Intelligenz, welche über cloudbasierte Web-APIs angeboten werden widmen. Insbesondere Algorithmen einer schwachen künstlichen Intelligenz sind Gegenstand derartiger Angebote. Typische KI-Lösungen beziehen sich z.B. auf Ansätze zur Bild-, Muster- und Spracherkennung aber auch Möglichkeiten zur Klassifikation von Dokumenten. Häufig werden entsprechende Angebote mit der Begrifflichkeit einer Demokratisierung der KI in Verbindung gebracht, d.h. potentielle Nutzer sollen auch ohne Detailkenntnisse in die Lage versetzt werden Algorithmen des maschinellen Lernens einzusetzen.

Die Idee von Marktplätzen für KI-Algorithmen (Algorithm Marketplaces) wurde durch den BITKOM in folgender Weise thematisiert[1]:

> ***„Algorithm Marketplaces haben das Potenzial, die Entwicklungsdynamik von Anwendungen im Bereich Maschinelles Lernen und KI deutlich zu steigern und viele Unternehmen an diesen technologischen Entwicklungen partizipieren zu lassen.“ (Quelle des Zitats: BITKOM 2017)***

Die ESAPI-Community bietet eine Plattform für den Erfahrungsaustausch zwischen Industrie und Wissenschaft. Dabei werden insbesondere die vielfältig benötigten Mess- und Bewertungsansätze, welche mit dem Einsatz von Web-APIs einhergehen fokussiert. Folgende Themenbereiche dienen der Anregung für potentielle Beiträge, selbstverständlich sind weitere Aspekte im denkbar.

Potentielle Themenbereiche:

- *Beispiele für über Web-APIs angebotene KI-Algorithmen.*
- *Branchenspezifische KI-Lösungen auf der Basis von KI-Web-APIs.*
- *Besonderheiten beim API-Management (KI-Anbieterseite).*

1 Quelle: Künstliche Intelligenz - Wirtschaftliche Bedeutung, gesellschaftliche Herausforderungen, menschliche Verantwortung, Bitkom e. V., DFKI, Berlin/Kaiserslautern, https://www.bitkom.org/sites/default/files/file/import/171012-KI-Gipfelpapier-online.pdf, letzter Zugriff 14. Juli 2021

- *Besonderheiten beim API-Management (KI-Konsumentenseite).*

- *Vertrauen, Sicherheit und Compliance von KI-Web-APIs.*
- *Spezifikationsansätze für KI-Web-APIs.*
- *Lowcode bzw. Codeless basierte KI-Lösungen.*
- *Risiken und Grenzen von KI-Web-APIs im Software Engineering.*

Workshop-Beiträge

Praktiker und Wissenschaftler, die sich mit den aufgezeigten Themenschwerpunkten bereits auseinandergesetzt haben, werden gebeten, Beiträge im docx- oder pdf-Format über die unten angegebene Webseite einzureichen. Der Umfang der Beiträge sollte 3000 Wörter nicht übersteigen.

Die Formatierungsrichtlinien werden ebenfalls auf der genannten Webseite veröffentlicht. Angenommene Beiträge werden mit Hilfe eines Vortrags (ggf. Impuls – im Falle eines virtuellen Workshops) präsentiert bzw. in Form eines Posters (Tagungsraum und/oder Internetpräsenz des Workshops) vorgestellt. Alle angenommenen Beiträge des Workshops erscheinen in einem Tagungsband beim Shaker-Verlag.

Termine

23.09.2021	Einreichung von Beiträgen (via Easychair)
03.10.2021	Annahme/Ablehnung (via Email)
09.10.2021	finales Workshop-Programm
10.10.2021	Abgabe der druckreifen Beiträge (unbedingt einzuhalten)
04.11.2021	Workshop (direkt oder virtuell)

Webseite zum Workshop

Weitere Informationen:

https://blog.hwr-berlin.de/schmietendorf/

Paper Submission:

https://easychair.org/conferences/?conf=esapi2021

Programmkomitee

S. Aier,
Universität St. Gallen

F. Balzer,
CA Deutschland

M. Binzen,
DB Systel GmbH

E. Dimitrov,
T-Systems

R. Dumke,
Uni Magdeburg

J. Marx Gómez,
Uni Oldenburg

W. Greis,
TPS Data & CECMG

J. Heidrich,
Fraunhofer IESE

A. Johannsen,
TH Brandenburg

S. Kosterski,
Toll Collect

M. Lother,
Robert Bosch GmbH

P. Mandl,
HS München

M. Mevius,
HTWG Konstanz

H. Neumann,
Deutsche Bahn AG

A. Nitze,
Ultra Tendency UG

M. Rothaut,
DT Security GmbH

A. Schmietendorf,
HWR Berlin

F. Simon,
Zurich Insurance Group

F. Victor,
TH Köln

C. Wille,
TH Bingen

M. Weiß,
HUK Coburg

T. Wiedemann,
HTW Dresden

M. Wißotzki,
HS Wismar

R. Zarnekow,
TU Berlin

Kontakt zur Initiative

Andreas Schmietendorf

HWR Berlin - Berlin School of Economics and Law

E-Mail: andreas.schmietendorf@hwr-berlin.de

Markus Bauer

ceCMG – Central Europe Computer Measurement Group: E-Mail: markus.bauer@cecmg.de

Praxis-Workshop für Mittelständler: Industrielle Daten erfolgreich nutzbar machen

Jens Heidrich

26.05.2021, IESE Kaiserlautern, Jens.Heidrich@iese.fraunhofer.de

Methoden der ***Künstlichen Intelligenz*** (KI) und ***Big Data*** ermöglichen neue Geschäftsmodelle – vorausgesetzt, Unternehmen verfügen über das nötige Bewusstsein sowie Fachwissen, um vorhandene Datenschätze zu heben. Worauf es ankommt, vermittelten die Gesellschaft für Informatik (GI) und die Plattform Lernende Systeme Ende Mai in einem gemeinsamen praxisorientierten Workshop für Vertreterinnen und Vertreter von Industrieunternehmen. Wichtige Erkenntnis: Eine klare Zielsetzung für die KI-Nutzung sowie ihre Einbindung in die Unternehmensstrategie können unnötiges Datensammeln verhindern, eine hohe Datenqualität sicherstellen und damit Anwendungen mit Mehrwert schaffen.

Big Data und KI versprechen neue Produkte und Lösungen, die scheinbar direkt auf Daten und intelligenten Diensten aufbauen. Übersehen wird dabei häufig, dass es klare strategische Ziele sowie fachliche Kompetenzen braucht, um aus vorhandenen Daten nutzenstiftende Anwendungen zu erzeugen. Zu Beginn des Workshops teilten die Referenten in Impulsvorträgen ihre Expertise und Erfahrung bei der Einführung von KI in Unternehmen.

Matthias Patz, Vice President & Senior Advisor Digital Platforms bei DB Systel, zeigte auf, wie die Deutsche Bahn bereits heute KI und maschinelles Lernen bei der Wartung und im Monitoring anwendet.

Michael Weyrich, Professor am Institut für Automatisierungstechnik und Softwaresysteme (IAS) der Universität Stuttgart, stellte dar, dass – wo reale Daten fehlen – auch synthetische Daten zur Verifizierung und Validierung von KI-Systemen eingesetzt werden können. Wie kleine und mittlere Unternehmen (KMU) von Big Data und KI profitieren können, skizzierte

Alexander Löser, Professor für Data Science an der Beuth Hochschule für Technik Berlin und Mitglied der Plattform Lernende Systeme. Die Dominanz amerikanischer B2C-Plattformen ist bereits so ausgeprägt, dass Deutschland und Europa dieses Niveau nicht mehr einholen können. Chancen bestehen aber insbesondere im Bereich der Innovationsplattformen, so Löser. Durch deren gemeinsame Nutzung mit Partnern ließen sich Investitionsausgaben für Datenprodukte senken, die Zusammenarbeit stärken und letztendlich Gesamtkosten reduzieren.

Klare Ziele als Voraussetzung für erfolgreiche Datennutzung

In den anschließenden drei virtuellen World Cafés diskutierten die KI-Experten mit den 34 Teilnehmenden des Praxis-Workshops folgende Fragestellungen:

- *Wie findet man geeignete Use Cases und woher bekommt man die Daten?*
- *Worin liegt der Wert der Daten und wie kann man diese greifbar machen?*
- *Wie erreicht man ein nachhaltiges Geschäftsmodell?*

Konsens herrschte darüber, dass eine klare Zielsetzung und die Einbindung der Digitalstrategie in die Unternehmensstrategie grundlegend für die erfolgreiche Einführung von KI sind. Nur wenn der erwartete Mehrwert einer Anwendung vorab klar definiert ist, lassen sich Daten sinnvoll und zielgerichtet erheben. Wichtig ist zudem eine Fehlerkultur in den Unternehmen. Sie müssten versuchen, am Beispiel zu lernen und aus Rückschlägen und Problemen ihren Nutzen zu ziehen, so die Erkenntnis. Um Use Cases erfolgreich umzusetzen, braucht es zudem entsprechende Kompetenzen. Das Profil und die Erwartungen an die Data Scientists muss dabei klar umrissen sein.

Daran schloss sich die Frage nach dem Wert von Daten an. Wichtig ist ein Bewusstsein dafür, welche Daten wirklich relevant sind und in welcher Form sie vorliegen müssen. Die Qualität der Daten wurde dabei vor der Quantität betont.

Ebenso wichtig: Daten- und IT-Expertise zusammen zu bringen, Datenschützer frühzeitig einzubinden und diese als Ermöglicher – und nicht als Verhinderer – zu sehen. Wenn KMU sich beim Einsatz von Big Data und KI an ihren Kernkompetenzen

orientieren und gemeinsam mit erfahrenen Partnern zusammenarbeiten, sind nachhaltige und erfolgreiche Geschäftsmodelle möglich, so ein Fazit der Diskussion. Insbesondere für den KMU-Standort Deutschland bestehen hier gute Chancen, mit KI neue Geschäftsmodelle dauerhaft zu erschließen.

World cafés Ergebnisse

Weitere Informationen

presse@plattform-lernende-systeme.de

Bericht zu den Ergebnissen des Online-Workshops (e) trust

Andreas Schmietendorf
HWR Berlin & OvG Universität Magdeburg
Andreas.Schmietendorf@hwr-berlin.de

1 Einführung und Motivation

Der Online-Workshop „(e) trust“ setzte sich am 05. Juli 2021 mit Aspekten des Vertrauens in digitale Dienste auseinander. Dabei sollten nicht nur die originären Interessen der Softwareentwicklung berücksichtigt werden, sondern auch die Interessen potentieller IT-Infrastrukturanbieter sowie die anforderungsorientierte Sicht der Benutzer digitaler Dienste. Aus Sicht der Teilnehmer muss bei der Bewertung des Vertrauens digitaler Dienste die komplette Interaktionskette der Serviceerbringung berücksichtigt werden. Darüber hinaus ist es nahezu unmöglich, Vertrauen in technische Systeme auf der Grundlage ausschließlich technischer Features zu bewerten. Gerade technikaffine Softwareentwickler sehen im Einsatz von sicherheitstechnischen Maßnahmen bereits eine ausreichende Lösung des Vertrauensproblems. Korrespondierende Techniken beziehen sich dabei insbesondere auf Ansätze zur Authentisierung, Authentifizierung und Autorisierung sowie auf die Gewährleistung der Vertraulichkeit, Integrität und Verfügbarkeit. Der Komplexität des Vertrauensaspekts wird diese Sichtweise aus Sicht des Autors allerdings nicht ansatzweise Weise gerecht.

Gerade die Verwendungen von KI-Lösungen bzw. analytisch geprägten Data Science-Lösungen haben der Fragestellung des Vertrauens eine weitere Facette hinzugefügt, da hier Ergebnisse nur sehr schwer bzw. ggf. überhaupt nicht nachvollzogen werden können. Wie alle Softwarelösungen sind auch digitale Dienste durch ihren soziotechnischen Charakter geprägt, d.h. erst die Verknüpfung zwischen Mensch und Maschine (hier Softwaresysteme) führt aus Sicht des Autors zur Determinierung des Vertrauensaspekts. In diesem Zusammenhang entscheiden maßgeblich die durch den Benutzer gesammelten Erfahrungen über die Einschätzung des Vertrauens. Dem entsprechend beeinflussen diese Bewertung vielfältige Kriterien wie z.B.:

- Erfahrungen im Umgang mit dem Serviceanbieter
- Negative Erfahrungen im Diskurs von IT-Services
- Marktpräsenz und wahrgenommene Stärke einer (Unternehmens-) Marke
- Ort der Leistungserbringung sowie geltende Gesetze und Regeln
- Standardisierungen und Zertifizierungen durch unabhängige Dritte
- Hinterlegte Kundenreferenzen
- Bewusstsein im Umgang mit potentiellen Risiken.

Dieser Multidimensionalität des Vertrauensaspekts sollte im Rahmen des Workshops durch unterschiedliche Diskussionsrunden Rechnung getragen werden. Im Detail setzten sich diese mit datenschutzrechtlichen Fragen, anforderungsorientierten/ integrativen Aspekten, softwaretechnischen Sachverhalten und soziologischen Implikationen auseinander. Insgesamt war das Interesse der Organisatoren darin begründet, die potentiellen Auswirkungen auf das System- und Softwareengineering zu identifizieren.

2 Inhalte der Vorträge

Die eingeladenen Keynotes setzten sich mit den überlappenden Themenstellungen des Data Science und der künstlichen Intelligenz auseinander.

- Die Keynote von ***Juan José Cuadrado Gallego*** *(University of Alcalá, Madrid, Spain)* beschäftigte sich mit den Ergebnissen eines durch die Europäische Union finanzierten Forschungsprojekts. Im Kern geht es dabei um ein so genanntes Data Science Framework. Dieses geht auf betroffene Kompetenzen, korrespondierende Wissensgebiete, benötigte Ausbildungspläne für Wissenschaft und Praxis sowie resultierende Skill-Profile bzw. Berufsbilder ein. Auf der Grundlage des Frameworks sollte es möglich sein, Ausbildungspläne (Curricula) im Data Science zu gestalten, existierende Weiterbildungsangebote zu bewerten aber auch die Etablierung entsprechender Teams und der dabei benötigten Know-How-Träger zu unterstützen. Insgesamt kann so eine Professionalisierung des Berufsbildes eines Data Scientists unterstützt werden, was letztendlich das Vertrauen in auf diese Weise gewonnene Erkenntnisse unterstützt.

- Die Keynote von ***Anja Fiegler*** *(Microsoft Deutschland GmbH)* beschäftigte sich mit der verantwortungsvollen Entwicklung und Bereitstellung von KI-Diensten. Insbesondere die Nachvollziehbarkeit und der diskriminierungsfreie Einsatz

derartiger Algorithmen bestimmen neben Fragen der Sicherheit und Vertraulichkeit die Akzeptanz konkreter Lösungen. Detailliert wurde auf Prinzipien, Techniken und Werkzeuge aber auch Regeln bzw. Gesetze Bezug genommen. Interessant ist u.a. der Bezug zu einer EU-Initiative[1], die sich mit der Themenstellung exzellenter und vertrauenswürdiger KI-Algorithmen auseinandersetzt. Unter anderem wird dort die Zielstellung der Bereitstellung einer europäischen KI-Informationsplattform verfolgt, über welche u.a. Empfehlungen für die Entwicklung und den Betrieb referenziert werden, aber auch Regularien für die Nutzung von KI-Lösungen bereitgestellt werden.

Neben den Keynotes erfolgte die Sensibilisierung der Teilnehmer hinsichtlich vertrauensrelevanter Einflussfaktoren durch korrespondierende Impulsvorträge. Auf dieser Grundlage sollte die Diskussion in den anschließenden World Cafés durch die Moderatoren angeregt werden.

- ***Kadir Ider*** *(Delivery Hero/HWR Berlin):* Aus der DSGVO (Datenschutz-Grundverordnung) resultieren individuelle Rechte im Umgang mit personenbezogenen Daten. Bekannte Aspekte beziehen sich z.B. auf die Informations- und Rechenschaftspflicht datenverarbeitender Unternehmen gegenüber betroffenen Personen oder auch den Anspruch auf ein nachhaltiges Löschen gespeicherter Daten.

- ***Steven Schmidt*** *(Deutsche Bahn AG/HWR Berlin):* Dem Anforderungsmanagement kommt bei der Entwicklung und Einführung digitaler Dienstleistungen in Bezug auf die Berücksichtigung des Vertrauensaspekts eine zentrale (d.h. integrative) Rolle zu. Es stellt sich allerdings die Frage, inwieweit sich diese nichtfunktionale Anforderung tatsächlich beim System- und Service-Engineering niederschlägt.

- ***Sandro Hartenstein*** *(HWR Berlin):* Die produkt-, prozess- und ressourcen-bezogenen Attribute digitaler Dienste können als Grundlage für die formale Bewertung der Vertrauenswürdigkeit selbiger herangezogen werden. Während sich eingesetzte Sicherheitstechniken (z.B. Mechanismus zur Autorisierung) metrisch erfasst werden können, fällt dieses bei Fragen der Compliance, Transparenz oder auch Korrektheit schwerer.

- ***Walter Letzel*** *(TU Berlin/HWR Berlin):* Der Begriff des Vertrauens ist originär soziologisch bzw. psychogisch determiniert, d.h. Vertrauensverhältnisse können zwischen agierenden Personen oder aber bei der Interaktion zwischen Personen

[1] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/excellence-trust-artificial-intelligence#documents

und Systemen entstehen. Das Vertrauen in digitale Dienste zeigt einen subjektiven Charakter, da es maßgeblich durch Erfahrungen und Erwartungen geprägt ist.

3 Ergebnisse und Ausblick

Durch die Moderatoren der World Cafés wurden die wesentlichen Ergebnisse der Diskussionsrunden zusammengefasst. Die entsprechenden Beiträge (vgl. [Schmietendorf et al. 2021]) reflektieren die bereits eingeführten Sichten auf den Vertrauensaspekt, wobei selbstverständlich kein Anspruch auf Vollständigkeit erhoben werden kann!

- *Compliance- bzw. datenschutzrechtliche Sicht: speziell DSGVO*
- *Anforderungsorientierte Sicht: System- und Service-Engineering.*
- *Technische Sicht: Produkt-, Prozess- und Ressourcenattribute.*
- *Soziologische Sicht: Komplexitätsreduzierend und Risikoorientiert.*

Die verwendeten Vortragsfolien der Moderatoren können über die im folgenden angegebenen Webseiten abgerufen werden. Ebenso abrufbar ist der Hinweis für den im Herbst geplanten ESAPI2021 Workshop.

Vortragsfolien (e) trust-Workshop

Hinweis zum ESAPI 2021-Workshop

4 Quellenverzeichnis

[Schmietendorf et al. 2021] Schmietendorf, A. (Hrsg.) et al.: *Online-Workshop (e) trust – Vertrauen in Digitale Dienste (Werte – Risiken – Prinzipien – Methoden – Techniken)*, 72 Seiten, in Berliner Schriften zu modernen Integrationsarchitekturen, Shaker-Verlag, Düren, August 2021, Band 25, ISBN 978-3-8440-8106-0

Anlage – Impression zum Online-Workshop

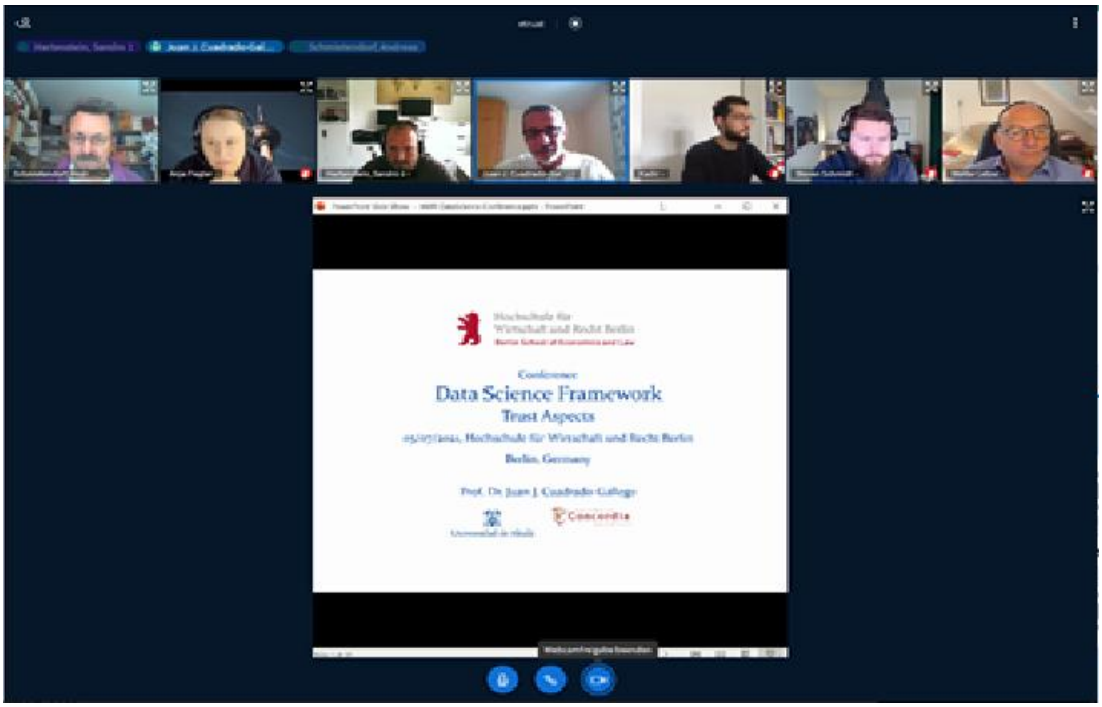


Abbildung 1: Keynote - Data Science Framework

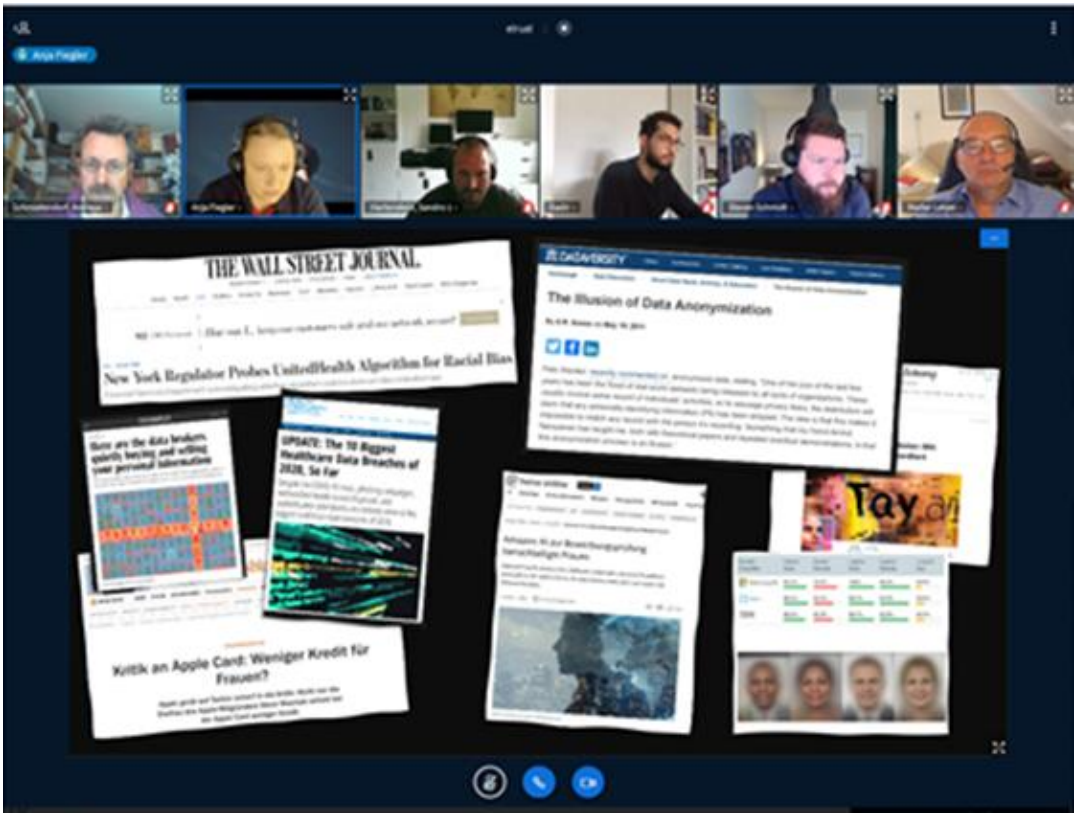


Abbildung 2: Keynote – Vertrauenswürdige KI

Software Cost Estimation Summit

For those of you that are interested in Software Cost Estimation there is an interesting event coming up, jointly organized by COSMIC and Nesma, the Software Cost Estimation Summit. It is a dual-mode event that will take place physically in the Netherlands, but will also be broadcasted on-line.

Leaders in the field of Software Cost Estimation from industry, government and research will share their insights and experience in forecasting the cost and other resources needed to complete a software intensive project within a defined scope. Since almost everything developed or constructed today involves a significant software component, software cost estimation is becoming increasingly important. Confirmed speakers come from EU-agencies, PMI and large software users. For more info, see nesma.org/sces21.

Part of the event is the Software Cost Estimation Challenge. This challenge was first held as part of the IWSM conference in Mexico last year. Teams of experts will receive the requirements four weeks before the conference and will present their estimates at the conference. See nesma.org/sces21 how your team can enter the competition.

Please **spread information** about this event to your network. When you share this on Linkedin, don't forget to tag **COSMIC** and **Nesma** and add the hashtags #software #cost #estimation.

New IAC members

We welcome two new members to the International Advisory Committee:

- **Christophe Ponsard** to represent COSMIC in Belgium; Christophe is researcher and consultant at CETIC. Within CETIC COSMIC is used for estimates of big data projects.
- **Raul Marca** to represent COSMIC in Peru; Raul is IT project manager at OSINFOR, the national authority on forest resources.

We are glad that Denis Krizanovic (Australia), Dylan Ren (China) and Luca Santillo (Italy) have extended their membership of the IAC with another term to represent COSMIC in their respective countries.

Ton Dekkers (the Netherlands) has indicated that he will not serve as an IAC member for another term. We thank Ton for all the efforts he has put in the propagation of the COSMIC method and we wish you good luck with your new ventures as photographer and concert organizer.

Annual meeting

As an organizational requirement we will organize the annual meeting in the last week of October. We will discuss progress, finances and ideas for the future. This event will be online

only. You will receive a Doodle poll this week to pick the best date so that we can meet as many of you as possible.

Certification

We have made it possible to do certification exams that are proctored on-line. So if you want to certify your professionalism, you can now get certified from any place in the world. See the website for more information.

You may already be familiar with the **COSMIC Certified Foundation Level** (CCFL) certification, for which we have over thousand certified professionals world-wide. Next to that, we also have developed the **COSMIC Early & Quick Sizing** (CEQS) certification. Since most budget decisions are taken on early software size measurements, it is increasingly important that these measurements are as accurate as possible. With the CEQS certificate you can now demonstrate your professionalism in that.

COSMIC User Group

This year a number of people joined the COSMIC User Group:

- Piotr Kołtun, IT Researcher at Seargin in Poland
- Natalia Lewandowska, IT Recruitment at Seargin in Poland
- Bram De Schouwer, cloud engineering lead at Deloitte in Belgium
- Marta Grącka at Puerta Logic in Poland
- Grant Fehling at Test Equipment Connection in the USA
- Frederik Smets at Gartner in Belgium
- Christopher Paiki at the International Training Institute in Papoea Nieuw-Guinea
- Mauro Daniele at Security Solutions Consultants in Italy
- Shima Masoumi at UQAM in Canada
- Sowmyaa Maruthanayagam at Renault Nissan Technology in India
- Donna Chin, Scrum Master at Trader Interactive in the USA
- Ananda Cerqueira, Tech Recruiter at INTERA Talent Hacking in Brazil
- Cristian Cruz Villanueva, Software measurement consultant at Spingere in Mexico
- Mihai Olaru, Software Developer at Genetec in Canada

Information about Germany

On the COSMIC website, there is a special page for information about the COSMIC method in Germany. Please check https://cosmic-sizing.org/ organization/local/germany/.

Frank Vogelezang, chairman

Test-Driven Requirements Engineering (TDRE)

Christof Ebert, Vector Consulting, christof.ebert@vector.com

1 Requirements Engineering and Test

Test has the unpleasant characteristic that it is always too expensive and usually wastes a lot of effort due to insufficient test methodology. In many projects more than half of the life cycle costs are allocated to verification and validation. More test is not necessarily worth more. Collecting test cases and constantly repeating them is useless if there is no suitable test strategy behind it. Our projects in various markets show that testing is often handled brute force, detached from critical application scenarios, and coverage gaps are detected late or not at all.

Only an agile balance of risk-oriented coverage and testable requirements can improve test effectiveness [1,2,3,4]. Such risk-oriented work also optimizes requirements engineering. Instead of paralysis by analysis in defining numerous requirements, test-driven requirements engineering (TDRE) focusses on specifying what is necessary and of high risk or high value. Agile testing technology with TDRE mitigates project risks. Clear advantage: Requirements are understandable, testable, and directly applicable as test case. Lead time and costs in testing are reduced by up to thirty percent. My colleague and friend Al Davis, former EIC of IEEE Software magazine, called this "Just enough requirements engineering" [3].

Requirements engineering and testing belong together. TDRE is straight-forward: Test cases are developed in parallel to the requirements (fig. 1). Thus, the feasibility of the requirements is analyzed much faster than in the traditional sequential approach, in which tests are specified relatively late. The test cases are initially described in the same structure as the requirements and as a supplement to the respective requirements. This shifts Test-Driven Development (TDD), which has already proven itself as relevant agile methodology, to the specification level. Regression tests are attributed in order to prepare for later automation. The effort required for testing can be better estimated on this basis, and project and quality risks are thus reduced.

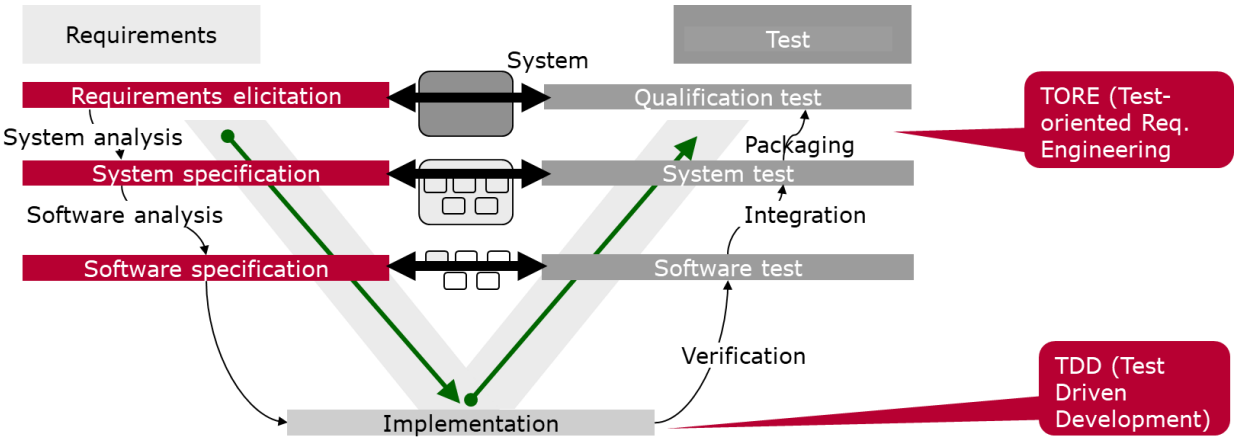


Figure 1: Test-Driven Requirements Engineering (TDRE)

Test-driven requirements engineering maps different types of requirements, such as functions, quality requirements and boundary conditions to suitable test cases already in the analysis. Focus on immediate testability of all types of requirements ensures that errors are found as early as possible. TDRE thus allows risk-based testing, because suitable test cases are derived directly from high-priority requirements and those with critical relevance.

2 The Triple Peak Model of Requirements, Design and Test

TDRE follows a triple peak model, which is connecting requirements (i.e., needs), design (i.e., solution) and test (i.e., the product). Fig. 2 shows the triple peaks and how they are connected to move from the abstract notions towards tangible results (bottom). Such close integration of RE and test improves the quality of requirements and makes the project leaner and more efficient from the very beginning. The reason is simple. For every requirement and scenario, a tester always asks first: “What if ...?” If the answer is clear and comprehensible, he will continue to ask until a situation occurs that is not yet sufficiently specified or even analyzed and agreed upon. Such result will satisfy the analysis as it contributes towards better requirements – and appropriate test cases.

The Triple Peak Model intertwines three perspectives:

- Market perspective: “How can I meet customer satisfaction and needs?”
- Design perspective: “How can I implement the solution to meet requirements?”
- Testing perspective: “How can I find a defect and cause the product to fail?”

In its dialectical method TDRE allows to highlight and reconcile opposing views. The three perspectives which are illustrated in fig. 2 are analogous to the three dialectical stages established by German philosopher G.F.W.Hegel, namely the triad of thesis, antithesis and synthesis which are a progression of three ideas. The thesis is the first step by deriving a design from initial requirements. The subsequent antithesis contradicts the thesis in trying to find test cases which validate the design as opposed to the initial requirements. Building upon these two contradicting steps, the synthesis resolves conflicts in improving the requirements.

With TDRE in the triple peak model, the design perspective is constructive whereas the testing perspective is destructive – as the goal of test it to make a system fail. This destructive mechanism helps in finding weakness in the product and helps to enhance the requirements to include appropriate measures to safeguard the product against such failures. The testing peak adopts the scientific falsification theory, as introduced by Karl Popper. Falsification is the action to contradict a hypothesis by evidence. The tester needs to adopt this theory as opposed to a verification method to identify the security weaknesses in the system.

The parallel development of requirements and test cases improves the requirements already in their development process. This reduces errors in the requirements and drastically reduces the coordination effort in the project due to misunderstood requirements. This ensures testability of the requirements as well as an early consideration of the feasibility and the necessary integration effort. Consistent testing, targeted test coverage and efficient regression tests are thus possible.

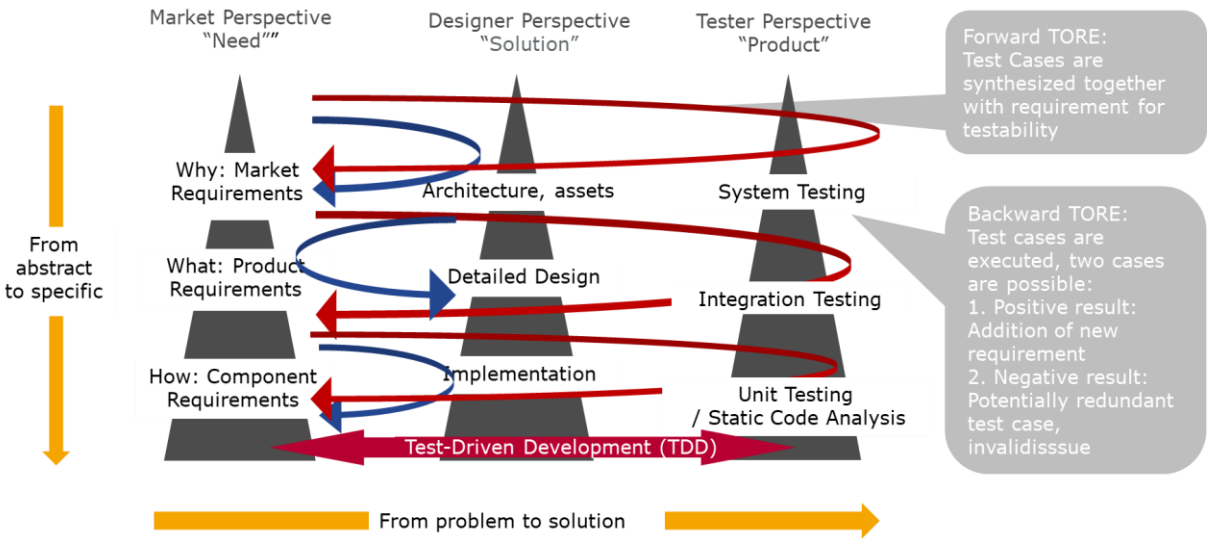


Figure 2: The Triple Peak Model for Requirements, Design and Test

3 Implementing TDRE

How to practically implement test-driven requirements engineering? Simply speaking, each requirement is specified as a test case – or a combination of use case and misuse and abuse cases. This can be done in different ways, which enrich each other, and are this not exclusive

1) Writing the requirement from the beginning directly as a test case. This resembles Test-Driven Development (TDD) where you first write the unit test case and then the code that fulfills this test.
2) Take the classic customer requirement as is and write one or more test cases that make this requirement immediately testable and cover the essential functionality.
3) Specify quality requirements hands-on and testable. Follow the triple peak method (fig. 2) to specify quality goals which are then translated to design constraints and made testable with appropriate test cases.
4) Consider critical correlations of requirements and specify negative requirements, such as misuse cases, abuse cases and confuse cases.

With structured requirements in tools such as DOORS, the test cases can be generated automatically and kept in the same repository. This is possible for requirements with a consistent structure, such as use cases with measurable pre- and post-conditions, using scripts, as we do for example in IT systems or when testing GUIs.

Here some guidance from our projects, which are also illustrated in parallel practice videos [6]:

- Every single functional requirement has at least one acceptance check, which is either fulfilled or not fulfilled and serves as the agile DoD (definition of done).
- Each individual quality requirement is described with numerical values that can be measured.
- Business rules are defined so that it can be determined whether they are true or false.
- Business and data objects are defined with all their attributes, types and states so that they can be set and validated at test time.
- System interfaces such as GUIs, reports and service interfaces are included in the requirements document so that values can be assigned to them.
- All use cases have pre- and post-conditions that can be generated and validated.
- All text is marked so that it can be automatically processed to generate test cases.

In our projects with customers from various industries, but also in Vector for our own software development, TDRE has shown several tangible benefits:

> **Completeness of requirements**. Testers immediately notice when there are undefined areas. They ask and test very pragmatically: How should I test? What is expected here? And what happens if the user enters "xyz"? What will non-specialists enter at this point? Where does this system get the file "abc" from?

> **Accuracy and clarity of the requirements**. Often requirements remain superficial because they contain a lazy compromise or because the details have not yet been fully agreed. You cannot design a system with this. At the very least, aspects that are still open must be described so that parameterization can be provided for if necessary. Testers notice such superficialities and demand more accuracy.

> **Testability of the requirements**. Requirements can be exact and complete and still not testable, because certain requirements are not yet quantitatively specified. Testers are mainly interested in finding the later acceptance criteria in the requirements. Only this precision allows them to optimize the test cases and not to make the product unnecessarily expensive with too many test cases.

> **Traceability made feasible**. Traceability though understood as necessary for consistency, is often neglected due to the high mechanical effort. TDRE facilitates a minimum traceability model and with current ALM/PLM tools also an efficient semi-automatic handling (fig. 3)

> **Mitigate boundary conditions**. The involvement of testers in the specification phase prevents over-specification and unnecessarily harsh boundary conditions which reduce the available solution space. Testers challenge boundary conditions and untestable quality as the yield too many unnecessary test cases.

> **Create true agile team spirit**. Most important, TDRE facilitates cross-functional team building. Classic development and test – even in feature driven development – always creates some sort of ping-pong between the three disciplines of RE, design and test. With TDRE, teamplay is mandatory, and ensures that all domains are on the same sheet.

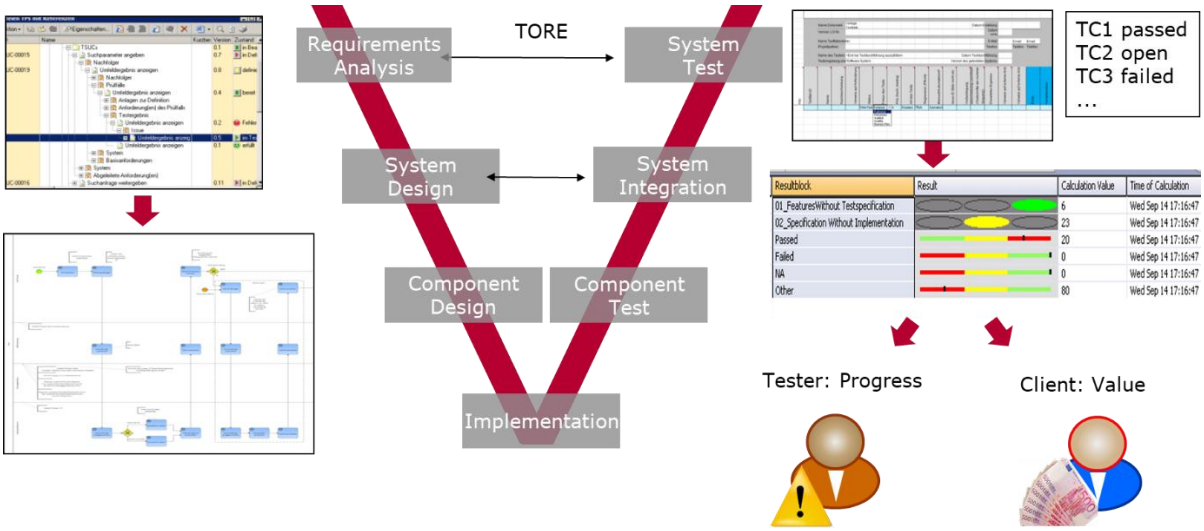


Figure 3: TDRE for Transparent and Value-driven Project Management

4 Conclusions

Two major ingredients pave the way to the project-cemetery: perfection and sloppiness. Agile testing technology with TDRE mitigates these project risks. Clear advantage: Requirements are understandable, testable, and directly applicable as test case. Lead time and costs in testing are reduced by up to thirty percent.

Requirements engineering and testing belong together. Most companies face skyrocketing test cost without tangible benefits in error detection effectiveness. Test effort is steadily increasing with a share of over 50% of life-cycle cost in critical systems. Yet there are rarely much tangible improvements in test effectiveness. Test-Driven Requirements Engineering (TDRE) is the agile answer. Like its smaller brother Test-Driven Development (TDD), it connects requirements and testing.

TDRE is a method that extends agile software development "upwards" to testing. Where unit testing was mainly used as a specification of code, TDRE abstracts to integration tests and system tests in interaction with requirements of the same abstraction levels. Our industry experience from various industries from IT to safety-critical embedded software shows that both cycle time as well as development cost can be cut by up to 30% with strong focus on testability already during requirements elicitation. The described lessons learned from practice help to transfer the methodology into your own environment.

5 References

[1] Bjarnason, E. and M. Borg: Aligning Requirements and Testing: Working Together toward the Same Goal. IEEE Software, vol. 34, no. 1, pp. 20-23, Jan.-Feb. 2017,

[2] Charette, R. N.: Puncturing Pernicious Project Pufferies. IEEE Computer, Vol. 51, No. 5, pp. 78-83, 2018.

[3] Davis, A. M.: Just Enough Requirements Management. Dorset House, New York, USA, 2005.

[4] Hussain, A., E.Mkpojiogu, F.M.Kamal: The Role of Requirements in the Success or Failure of Software Projects. International Review of Management and Marketing, No. S7, Vol. 6, pp. 306-311, 2016.

[5] Test-Driven Requirements Engineering. Here are several YouTube videos to illustrate TDRE: https://www.youtube.com/c/VectorConsultingServices/, Last accessed 3. Oct. 2020.

6 Author

Christof Ebert is the managing director of Vector Consulting Services. Many Fortune 100 companies have already used his competence to improve their performance and competitiveness. His books on requirements engineering and distributed teams serve as industry references. As a business angel and professor at the University of Stuttgart and the Sorbonne in Paris, he is building bridges for innovative business. Dr. Ebert serves on the boards of IEEE Software, Journal of Systems and Software, Software Quality Journal, and several conferences.
Follow him at https://twitter.com/christofebert

A Historical Overview of Software Measurement
(represented by selected book covers)

Reiner R. Dumke

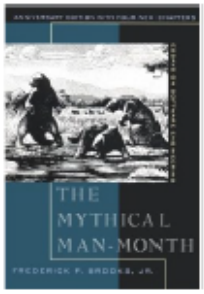
University of Magdeburg, Reiner.Dumke@ovgu.de

The following selected summary of book covers is intended to give an insight into the historical roots of software measurement and to illustrate the breadth of application fields of this core discipline of software engineering.

This summary is intended to stimulate, inform, inspire and motivate the reader in his or her activities in the core topic of the future: the application of computer science in all areas of our lives and societies.

1. Pioneers in the 70's and 80's

Brooks



McCabe

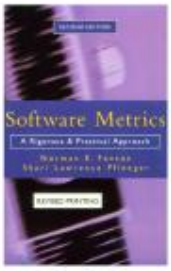
Shneiderman

Halstead

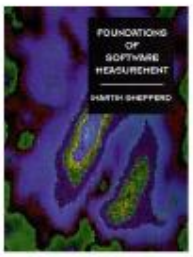
Software/ Programming and empirical Science

2. First Theoretical Foundations

Fenton



Shepperd



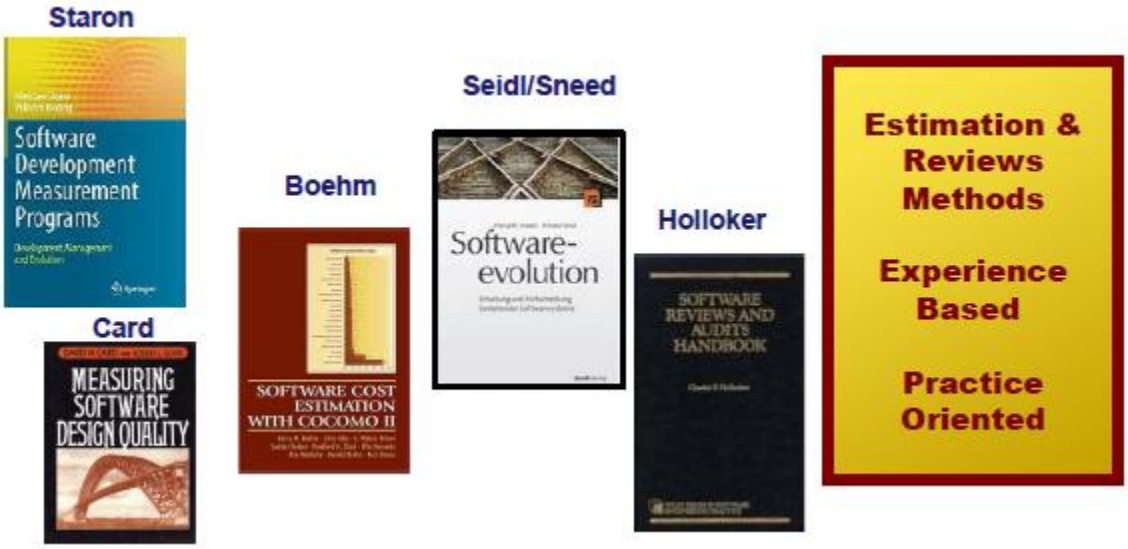
Zuse

Measurement Theory

Metrics and Measures

3. Classical General Overviews

4. Special Methodologies



5. Measurement Books in Native Languages

Buglione

Robillard

Thaller

Isozimov

Motivation

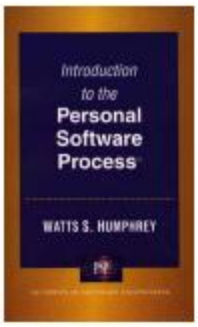
Information

Distribution

Community extension

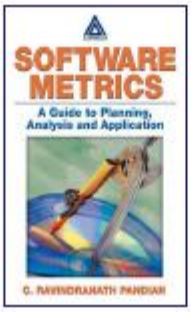
6. Process Measurement

Humphrey

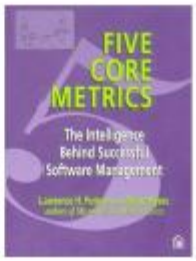


Florac

Pandian



Putnam

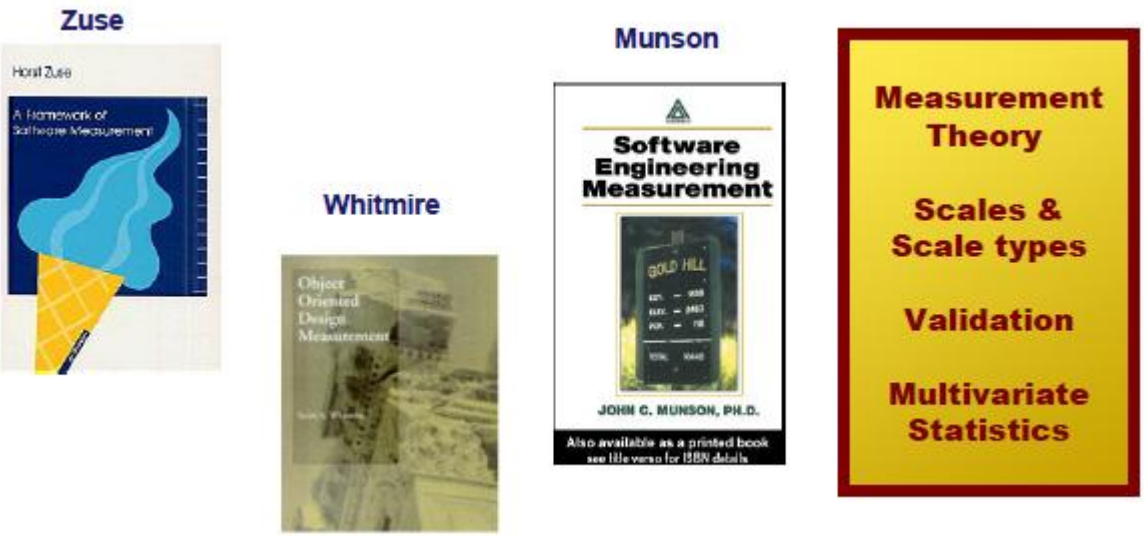


Statistical Process Control (SPC)

Business Orientation & Experience

7. Empirical Background

8. Measurements Theoretical Background



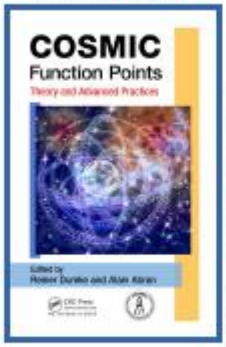
9. Practice-Oriented Measurements

10. Measurement Tool Books

11. Software Size Measurement

Symons

Dumke/Abran



Jones

Dumke et al

Lines of Code, Counting

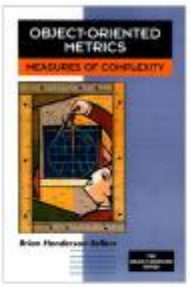
Point Metrics

Standards & Methods

Experiences

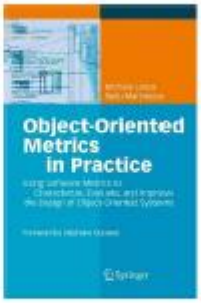
12. OO Software Measurement

Henderson-Sellers



Lorenz

Lanza



OO Structures

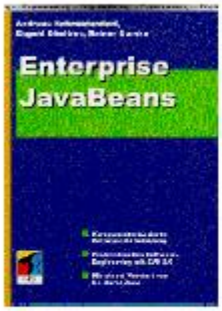
OO Library Evaluation

OO Tools Evaluation

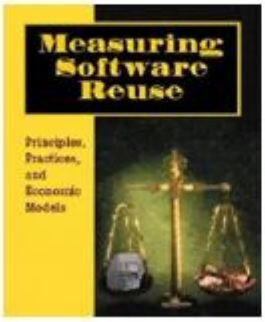
Experiences

13. Component-Based System Measurement

Schmietendorf



Poulin



Ezran

Component Libraries

Component Quality

Component Reuse

14. Service-Oriented Software Measurement

Kunz

Rud

Schmietendorf et al

Service Process Evaluation

SOA Frameworks

Industrial Experiences

15. Agent-Based System Measurement

16. Performance Measurement

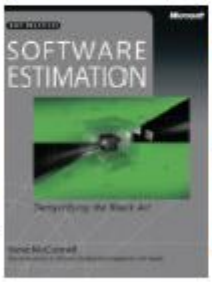
17. Agile Development Measurements

18. Web Measurements

19. Software Measurement and Estimation

Jones

McConnel



Abran

Trendowicz et al

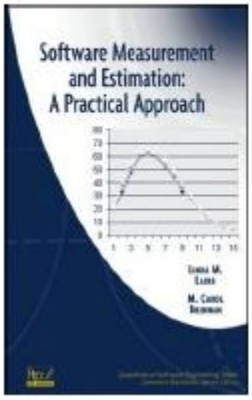
Size-Based Estimation

Estimation Methods

Benchmarking & Assessment

20. Software Measurement Education

Laird



Zuse

MDIS

Holistic View

Tool-based (more than Thausend of Metrics)

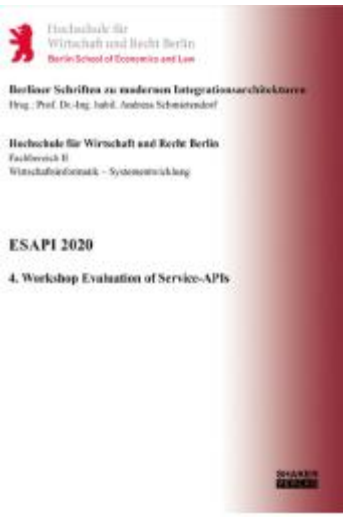
Excersizes

21. Measurement Methodologies Books

References

1. Dumke, R.R.: *Challenges in Editing Books on Software Measurement.* Proc. of the Mensura 2007, Nov. 4-6, 2007, Mallorca, Spain

2. *Software Measurement Bibliography*, https://fg-data-science.gi.de/publikationen/bibliographie

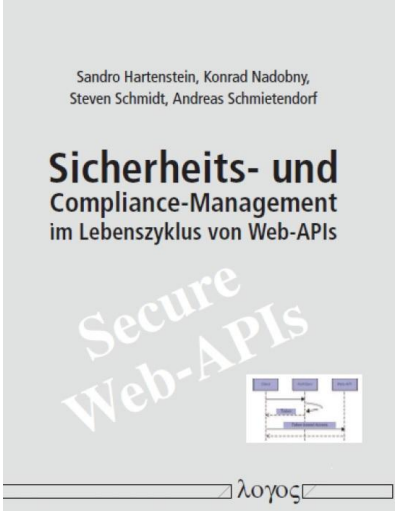


Andreas Schmietendorf

ESAPI 2020 – 4. Workshop Evaluation of Service-APIs

Shaker-Verlag, Aachen, November 2020, ISBN 978-3-8440-7515-1

Das vorliegende Buch fasst die insgesamt 11 Beiträge und Diskussionen des 4. Workshop zur Bewertung von service-basierten APIs zusammen und ist in der Buchreihe der Schriften zu modernen Integrations-architekturen erschienen.



Hartenstein/Nadobny/Schmidt/ Schmietendorf:

Sicherheits- und Compliance Management

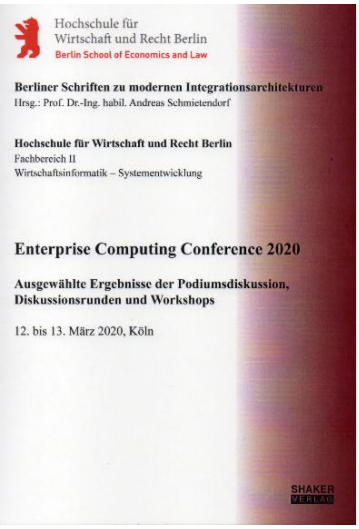
Logos-Verlag, Berlin, 2020
ISBN 978-3-8525-5086-8

This book describes approaches and techniques for implementing Web APIs keeping security-related requirements. The API management involves analytical and constructive approaches for quality assurance during the development. The DevOps approach was considered in the context of business processes.

Software Metrics: A Complete Guide - 2021 Edition

Gerardus Blokdyk and Publishers, 2021
ISBN 978-1-8674-9201-6

This book summarizes essential software project and management metrics and their application to practical and industrial areas and examples.



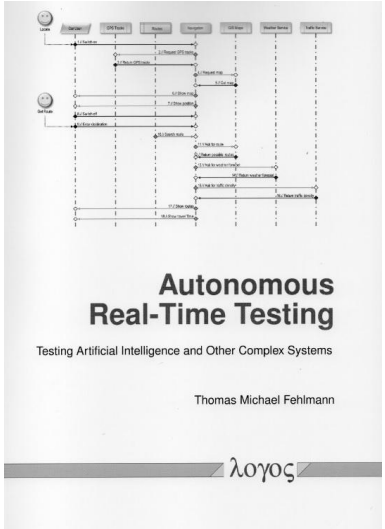
Schmietendorf, A.:

Enterprise Computing Conference 2020

Köln, März 2020

Shaker Verlag, Aachen, 2020,
ISBN 978-3-8440-7320-1

Dieses Buch beinhaltet die Beiträge zur ECC-Konferenz 2020 zur Thematik „Enterprise Transformation“ vor allem in relevanten Anwendungsbereichen.



Thomas M. Fehlmann:

Autonomous Real-Time Testing

Testing Artificial Intelligence and Other Complex Systems
Logos-Verlag, Berlin, 2020
ISBN 978-3-8525-5086-8

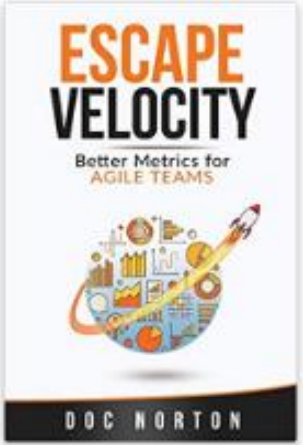
The book explains the theory and the implementation approach for a framework for Autonomous Real-Time Testing (ART) of a software-intense system while in operation. Principles and approaches like Combinatory logic,Analytic Hierarchy Process (AHP) and Quality Function Deployment (QFD) are used for a complex testing approach of real-time systems like automotive solutions, IoT control software and embedded system releases.

Andreas Schmietendorf

Empirische Untersuchungen zum Cloud-Einsatz im KMU-Bereich - eine zusammenfassende Betrachtung

Shaker-Verlag, Aachen, April 2020, ISBN 978-3-8440-7356-0

Das vorliegende Buch reflektiert die Ergebnisse von forschungs- aber auch industrieorientierten Projekten rund um die Themenstellung des Cloud Computings, die durch den Autor initiiert und in den vergangenen 10 Jahren verantwortet bzw. im Rahmen seiner Arbeitsgruppe bearbeitet wurden.



Doc Norton

Escape Velocity: Better Mertrics for Agile Teams

Februar 2020

This book identifies the velocity as the most commonly used metric in agile software delivery. The efficiency of Scrum teams is the main focus. Metrics are considered in general and further measure like lead time, team joy, team performance etc. are proposed especially. The book includes many interesting stories of agile team management.

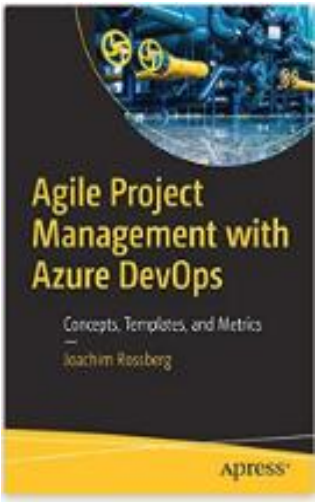
Elyjoy Muthoni Micheni

Metrtics and Models for Evaluating the Quality and Effectiveness of ERP Software

Juli 2019

This book presents a set of theoretical measurement models and metrics for measuring software size and complexity of large scale enterprise resource planning software based on practical experiences. It focuses on the measurement of usability, service quality, security, interoperability, maintenance and enterprise resource planning.

Joachim Rosberg



Agile Project Management with Azure DevOps: Concepts, Templates, and Metrics

April 2019

This book considers Agile project management to use and customize Microsoft Azure DevOps. The basic process involves the Application Life Cycle Management approach and achieve an overall higher quality output.“

Schmietendorf, A.:

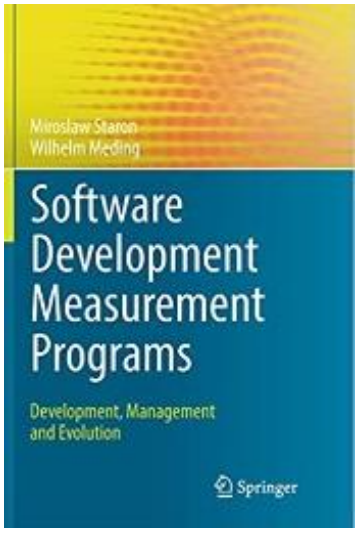
Workshop ESAPI 2019

Dresden, November 2019

Shaker Verlag, Aachen, 2019,
ISBN 978-3-8440-6837-5

Dieses Buch beinhaltet die Beiträge zur ESAPI-Konferenz 2019 zu Sicherheits- und Compliance-aspekten von Web-APIs vor allem in relevanten Anwendungsbereichen.

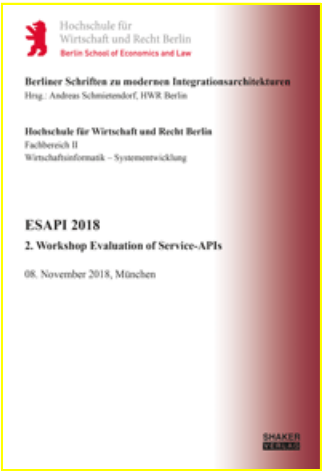
Miroslaw Staron:



Software Development Measurement Programs

Springer Publ., 2019
ISBN 978-3030063085

This book describes approaches and techniques for implementing software measurement processes from a practical point of view involving toll support, project integration and measurement programs evolution.



Schmietendorf, A.,:

ESAPI 2018

2. Workshop: Evaluation of Service-APIs
8. November 2018, München

Shaker Verlag, Aachen, April 2018, ISBN 978-3-8440-6254-0

The book includes the proceedings of the Evaluation of Service-APIs 2018 Workshop held in Munich in November 2018, which constitute a collection of theoretical studies in the field of measurement and evaluation of service oriented and API technologies.

Gerardus Blokdyk:

Software Measurement the Ultimate Step-By-Step Guide

5starcooks Publ. 2018

This book summarizes some helpful practical experiences about measurement integration in software management processes and their successful implementation.

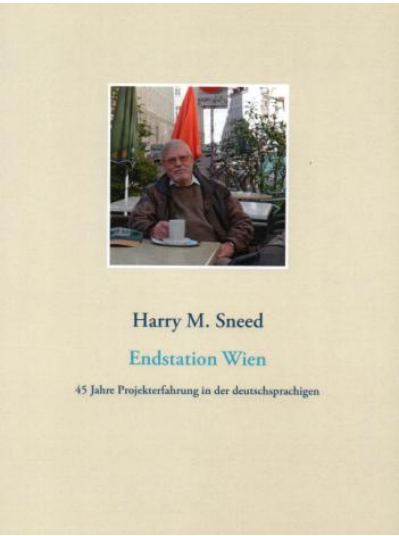
Schmietendorf, A., Nitze, A.:

ESAPI 2018

2. Workshop: API-First/API-Management
19. April, Hamburg

Shaker Verlag, Aachen, April 2018, ISBN 978-3-8440-5927-4

The book includes the proceedings of the API-First/API-Management 2018 Workshop held in Hamburg in April 2018, which constitute a collection of theoretical studies in the field of measurement and evaluation of service oriented and API technologies.



Harry Sneed:

Endstation Wien

45 Jahre Projekterfahrungen in der deutschsprachigen IT-Welt
BoD Norderstedt, 2017, 328 S.
ISBN 978-3-7448-8364-1

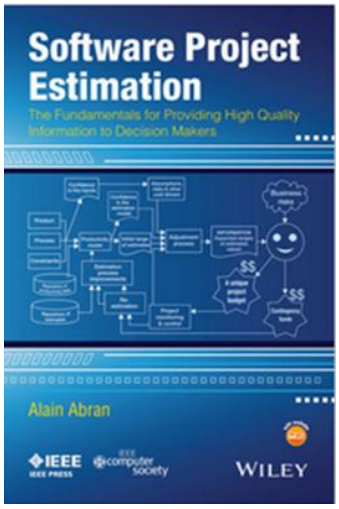
Dieses Buch beschreibt nahezu die gesamte Tätigkeit von Harry Sneed in der IT-Welt, von den Anfängen der Großrechner mit den COBOL und PL/1-Programmen bis hin zu den aktuellen und modernen Ansätzen Service-orientierter Technologien und Systemen. Dieses Buch fasst vor allem die umfangreichen Erfahrungen zu Wartungs-, Migrations- und Testprojekten zusammen, die auch für die Beherrschung aktueller und moderner Software-Anwendungen, von unschätzbarem Wert sind.

Staron, M, Melding, W.:

Proceedings of the IWSM/Mensura 2017

Joined Conference of the 27th International Workshop on Software Measurement (IWSM) and the 12th International Conference on Software Process and Product Measurement (Mensura), ACM 2017, *ISBN 978-1-4503-4853-9*

This proceedings are available at the Computer Science Bibliography of Trier.



Abran, A.:

Software Project Estimation: The Fundamentals for Providing

High Quality Information to Decision Makers

Wiley IEEE Computer Society Press, 2015 (288 pages), ISBN 978-1-118-95408-9

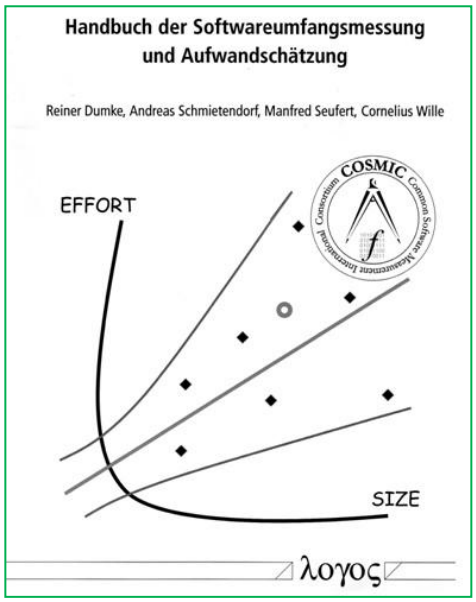
This book introduces theoretical concepts to explain the fundamentals of the design and evaluation of software estimation models. It provides software professionals with vital information on the best software management software out there. End-of-chapter exercises, Over 100 figures illustrating the concepts presented throughout the book, Examples incorporated with industry data.

Please remember:

Dumke, R., Schmietendorf, A., Seufert, M., Wille, C.:

Handbuch der Softwareumfangsmessung und Aufwandschätzung

Logos Verlag, Berlin, 2014 (570 Seiten), ISBN 978-3-8325-3784-5



This book shows an overview about the current software size measurement and estimation approaches and methods. The essential part in this book gives a complete description of the ***COSMIC measurement method****, their application for different systems like embedded and business software and their use for cost and effort estimation based on this modern ISO size measurement standard.*

Software Measurement & Data Analysis Addressed Conferences

September 2021

Euromicro DSD/ SEAA 2021:	**Software Engineering & Advanced Application Conference** September 1 – 3, 2021, Palermo, Italy see: https://dsd-seaa2020.unipv.it
EuroAsiaSPI^2 2021:	**European Systems & Software Process Improvement and Innovation Conference** September 1 - 3, 2021, Krems, Austria see: https://2021.eurospi.net/index.php/about/eurospi-2016
SCC 2021:	**International Conferences on Services Computing** September 5 - 10, 2021, **as Virtual meeting**, see: https://conferences.computer.org/scc/2021/
CLOUD 2021:	**IEEE International Conference on Cloud Computing** September 5 -10, 2021, **as Virtual meeting**, see: https://conferences.computer.org/cloud/2021/
SERVICES 2021:	**IEEE World Congress on Services** September 5 -10, 2021, **as Virtual meeting**, Chicago, USA see: https://conferences.computer.org/services/2021/
IFPUG 2021:	Sept 17, 2021 – **Knowledge Café** on "Measuring the Maturity and Capability of Measurement Practices in Your Organization" (L.Buglione)
RE 2021:	**IEEE International Requirement Engineering Conference** September 20 - 24, 2021, South Bend, USA see: http://conf.researchr.org/home/re-2021
ISBSG 2021:	Sept 22, 2021 - **Benchmarking** Software Development Based on Function Point Analysis In Japan - https://www.isbsg.org/isbsg-webinars/ -
GUFPI-ISMA 2021:	Sept 24, 2021 – 2nd **EventoMetrico 2021** (virtual) -https://gufpiisma.wildapricot.org/event-4416269
SEFM 2021:	**International Conference on Software Engineering and Formal Methods** September 2021, **organization in process** see: https://event.cwi.nl/sefm2020/

October 2021

IFPUG 2021:	Oct 7, 2021 – **Knowledge Café** on "IFPUG SNAP - past, present, future: 10 years of experiences" (C.Tichenor, S. Saxena)
ESEM 2021:	**Conference on Empirical Software Engineering and Measurement** October 11 - 15, 2021, Bari, Italy see: https://conf.researchr.org/home/esem-2021
ISBSG 2021:	**10th IT Confidence conference** (Oct 8 and Oct 14) - https://www.isbsg.org/it-conference-2021/ (free registration)
data2day 2021:	**Konferenz für Big Data, Data Science und Machine Learning** October , 2021, Heidelberg, Germany see: https://www.xpobuzz.com/.data2day
ICSEA 2021:	**nternational Conference on Software Engineering Advances** October 3 - 7, 2021, Barcelona, Spain see: https://www.iaria.org/conferences2021/ICSEA21.html
ASQT 2021:	**Arbeitskonferenz Softwarequalität, Test und Innovation** October , 2021, Bozen, Austria **see:** http://www.asqt.org/
IWSM/Mensura 2021:	**Common International Conference on Software Measurement** October , **organization in process** see: https://www.iwsm-mensura.org/

November 2021

ESAPI 2021:	**API Conference 2021** November 4, 2021, Cologne, Germany **see: https://blog.hwr-berlin.de/schmietendorf/**
ICPCC 2021:	**Performance Computing and Communications Conference** November 15 – 16,2021, Jeddah, Saudi Arabia see: https://waset.org/perfromance-computing-and-communications-conference-in-november-2021-in-jeddah
PROFES 2021:	**International Conference on Product Focused Software Process Improvement** November 25 - 26, 2021, Turin, Italy see https://softeng.polito.it/profes2021/
ASE 2021:	**Automated Software Engineering** November 15 - 19, 2021, Melbourne, Australia see: https://conf.researchr.org/home/ase-2021

GUFPI-ISMA 2021:	Nov 26, 2021 – **3rd EventoMetrico** 2021 (virtual) - https://gufpiisma.wildapricot.org/event-4494362
SERA 2021:	**IEEE/ACIS Conference on Software Engineering Research, Management and Applications** November 30, 2021, Kanazawa, Japan see: https://acisinternational.org/conferencences/sera-2021

December 2021

IEEE ICDM 2021:	**IEEE International Conference on Data Mining** December 7 - 10 , 2021, Auckland, New Zealand see: https://icdm2021.auckland.ac.nz/
Big Data 2021:	**IEEE International Conference on Big Data** December 15 - 18, 2021, Orlando, USA see: http://bigdataieee.org/BigData2021/
BCD 2021:	**International Conference on Big Data, Cloud Computing, and Data Science** December 14 - 16, 2021, Macao see: https://2020.aconf.cn/conf-177327.html

see also:

- http://www.acisinternational.org/newconferences.html
- https://www.acm.org/conferences
- https://www.ieee.org/conferences_events/index.html

COMMUNITIES

Common Software Measurement International Consortium (COSMIC)

http://cosmic-sizing.org

Central Europe Computer Measurement Group (ceCMG)

http://www.cecmg.de

Metrics Association's International Network (MAIN)

http://*www.mai-net.org*

Netherlands Software Metrics users Association (NESMA)

http://www.nesma.org/

GI-Fachgruppe Software-Messung und Bewertung

https://fg-metriken.gi.de/

(Measurement News Online)

Deutschsprachige Anwender-gemeinschaft für Software-Metrik und Aufwandschätzung

http://www.dasma.org

International Software Bench-marking Standard Group (ISBSG)

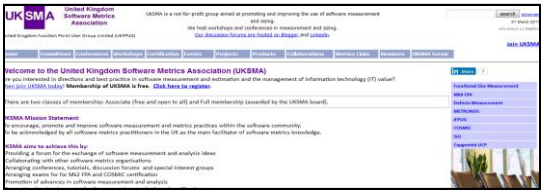
https://www.isbsg.org

Finnish Software Measurement Association (FISMA)

http://www.fisma.fi/in-english/

Asociacion Espanola de Metricas de Software

http://www.aemes.org/



United Kongdom Software Metrics Association (UKSMA)

http://www.uksma.co.uk

Gruppo Utenti Function Point Italia - Italian Software Metrics Association (GUFPI - ISMA)

http://www.gufpi-isma.org

Anwenderkonferenz Software-qualität und Test (ASQT)

http://www.asqt.org

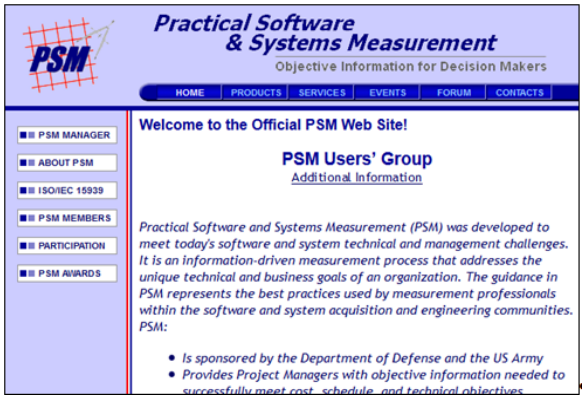
MEASUREMENT SERVICES

Software Measurement Laboratory (SML@b)

http://www.smlab.de

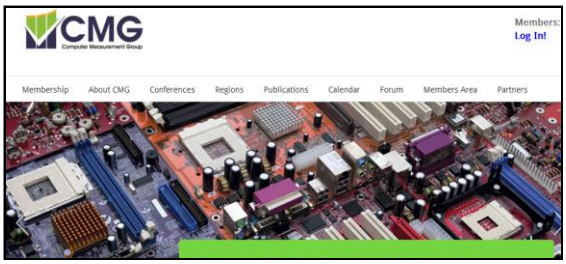
International Function Point Users Group (IFPUG)

http:www.ifpug.org



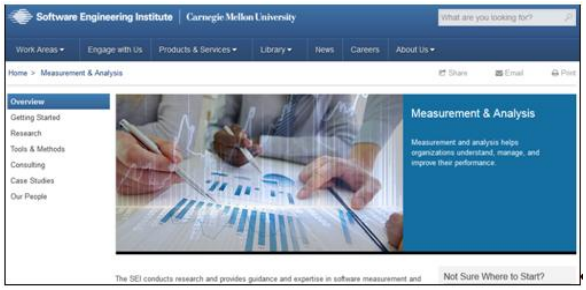
Practical Software & Systems Measurement

www.psmsc.com/:



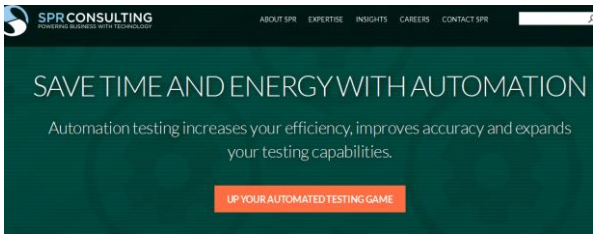
Computer Measurement Group (CMG)

http://www.cmg.org



Software Engineering Institute (SEI)

www.sei.cmu.edu/measurement/

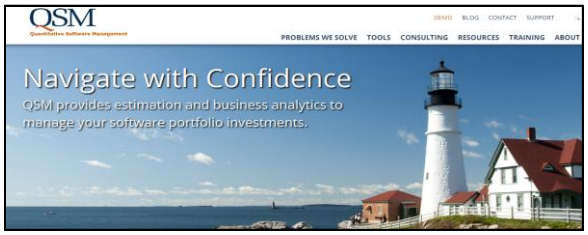
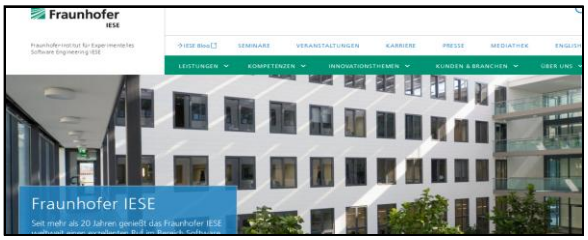


Software Productivity Research (SPR)

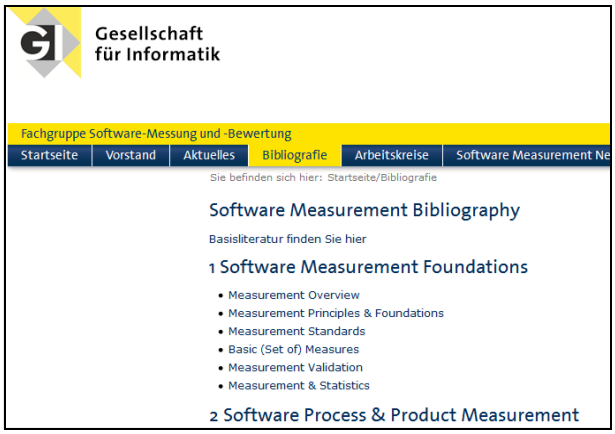
http://www.spr.com/

McCabe & Associates

http://www.mccabe.com

	**SQS Gesellschaft für Software-Qualitätssicherung** ***http://www.sqs.de***
	**Quantitative Software Management (QSM)** ***http://www.qsm.com/***
	**Fraunhofer Institute for Experimental Software Engineering (IESE)** **https://www.iese.fraunhofer.de/**
	**National Institute of Standards and Technology (NIST)** ***https://www.nist.gov/el***

SOFTWARE MEASUREMENT INFORMATION



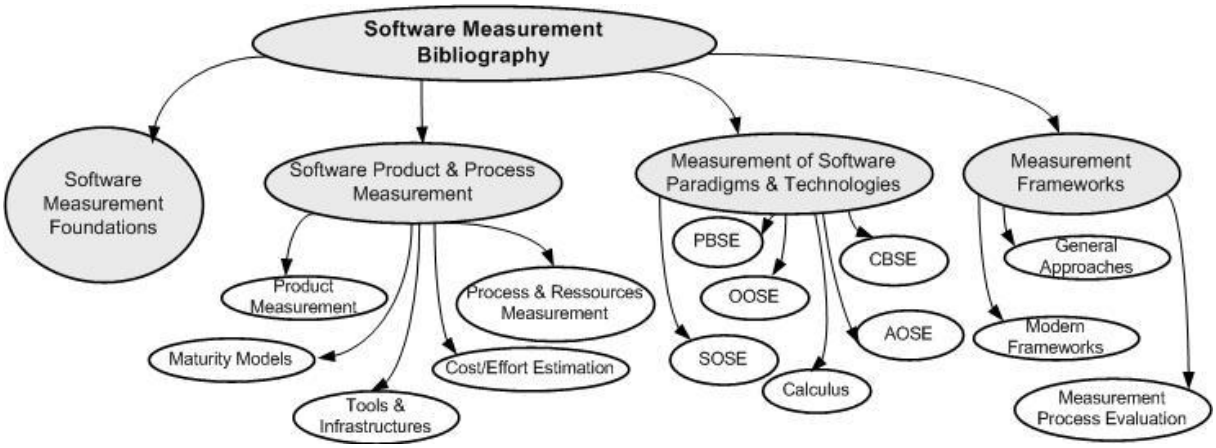
Software Measurement Bibliography

See our overview about software metrics and measurement in the Bibliography at

https://fg-metriken.gi.de/bibliographie/

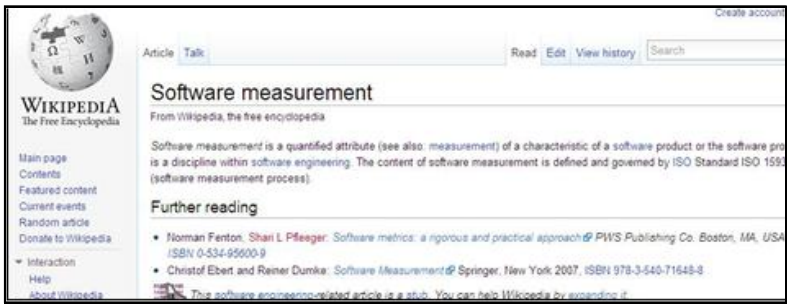
including any hundreds of books and papers

Bibliography Structure:



Software Measurement & Wikipedia

Help to qualify the software measurement knowledge and intentions in the world wide web:



Software Engineering Body of Knowledge (SWEBOK)

http://*www.swebok.org*

Project Management Body of Knowledge (PMBOK)

http://www.pmbook.org

SOFTWARE MEASUREMENT NEWS

VOLUME 26 2021 NUMBER 2

CONTENTS

Announcements 2

Frank Vogelezang: No IWSM conference this year 2
Andreas Schmietendorf: Ankündigung des ESAPI-Workshops 4

Conference Reports 7

Jens Heidrich:
Praxis-Workshop für Mittelständler: Industrielle Daten erfolgreich nutzbar machen 7
Andreas Schmietendorf:
Bericht zu den Ergebnissen des Online-Worlshops (e) trust 10

Community Reports 15

Frank Vogelezang: Software Cost Estimation Summit 15

News Papers 22

Christof Ebert:
Test-Driven Requirements Engineering (TDRE) 17
Reiner Dumke, Anja Fiegler, Cornelius Wille:
A Historical Overview of Software Measurement 24

New Books on Software Measurement 35

Conferences Addressing Measurement Issues 42

Metrics in the World-Wide Web 45

ISSN 1867-9196