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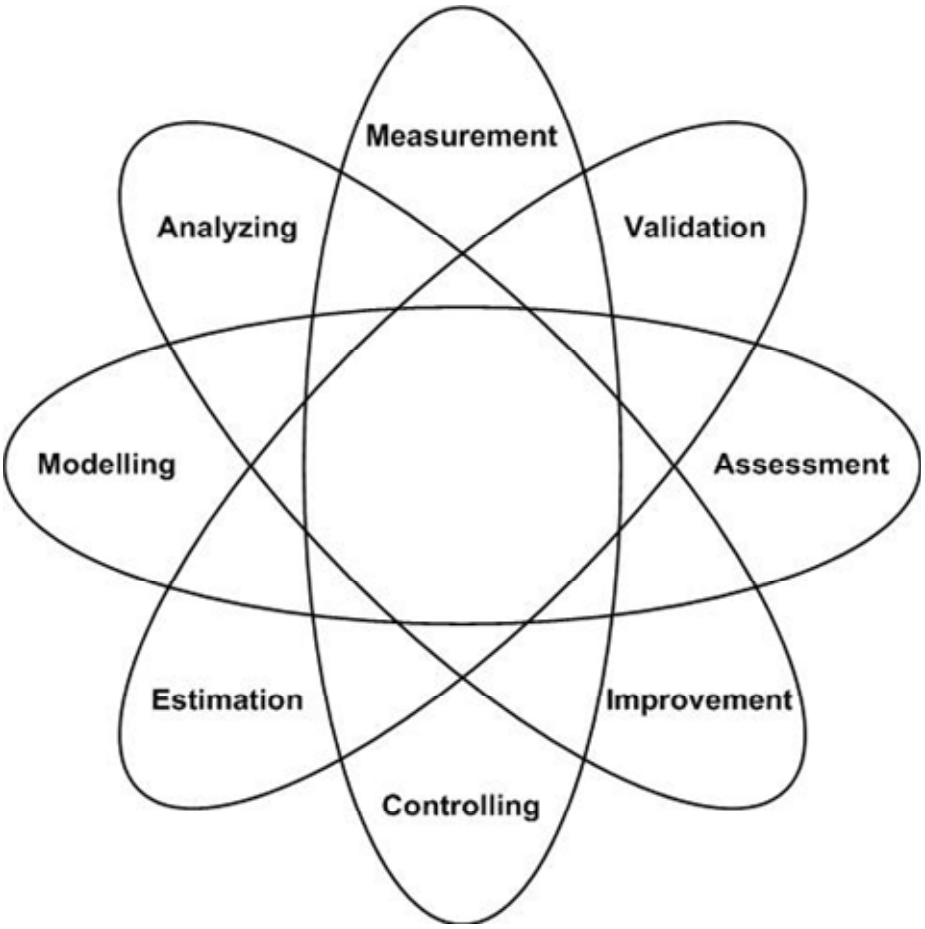

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Call for Papers

IWSM-MENSURA 2013

The Joint Conference of the 23nd International Workshop on Software Measurement (IWSM) and the 8th International Conference on Software Process and Product Measurement (MENSURA)

October 23-25, 2013, Ankara, Turkey

THEME & SCOPE

Software measurement techniques, methods, processes and tools are keys for successfully managing and controlling software development projects. Measurement is essential for any engineering activity and for increasing scientific and technical knowledge regarding both the practice of software development and empirical research in software technology. The conference focuses on all aspects of software measurement and facilitates the exchange of software measurement experiences between theory and practice.

TOPIC OF INTEREST

We encourage submissions in any field of software measurement, including, but not limited to:

- Software measurement foundations
- Practical measurement applications
- Measurement processes and resources
- Empirical case studies
- Measurement acceptance
- Functional size measurement
- Software estimation
- Software process measurement and improvement
- Quantitative and qualitative methods for software measurement
- Measurement for specific areas, e.g. web services
- Measurement for system engineering
- Measurement for integration, and testing
- Metrics validation
- Measurement services
- Measurement tools
- Measurement experience and guidance
- Theory of measurement
- Measurement paradigms
- Enterprise embedded solutions of measurement
- Software benchmarking
- Software process improvement frameworks and measurement
- Statistical process control for software processes

PAPER PROPOSALS

Authors should submit paper proposals through the Easychair system at: **https://www.easychair.org/conferences/?conf=iwsmmensura2013** (***Full papers*** *(5 to 10 pages) or* ***Short papers*** *(3 to 6 pages).* Papers should not have already been published elsewhere, nor should they have been submitted to a journal or to another conference. At least one among the authors of each paper accepted must register for the conference and commit to paper presentation. All papers submitted must follow the **CPS format**. Accepted and presented full papers and short papers will be included in the conference proceedings, which will be submitted to the **IEEE Computer Society Digital Library (CSDL)**, and **IEEE Xplore**. A selection of the accepted papers will be invited to revise and re-submit extended versions of their conference papers for consideration for publication in a Journal (under negotiation).

WORKSHOP PROPOSALS

The main idea of the workshops is to bring both practitioners and researchers to one platform and exchange ideas on particular topics of importance. Workshop proposals should be described in one or two A4 pages and submitted directly to the Workshops Chair via <ozgurtanriover@yahoo.com>. Conference language is English.

IMPORTANT DATES

	Full papers	Short papers	Workshop proposals
Submission	April 5, 2013	June 7, 2013	March 1, 2013
Notification of acceptance	May 17, 2013	June 21, 2013	March 29, 2013
Final version	June 14, 2013	July 5, 2013	N/A

Further information see: **http://iwsm2013.wordpress.com/**

Sponsoren

Willkommen!

DASMA Metrik Kongress
13.-15. November 2013,
Fraunhofer IESE, Kaiserslautern

Software-Messverfahren und Metriken sind Schlüsseltechnologien für Controlling und Management des Softwareentwicklungs-Prozesses. Messen ist eine wichtige Grundlage für jede Ingenieurtätigkeit und die Gewinnung neuer Erkenntnisse in Wissenschaft und Technik. Es ist damit sowohl für die Praxis der Software- Entwicklung als auch für die empirische Forschung zur Software-Technik unverzichtbar.

Dem notwendigen **Erfahrungsaustausch zwischen Theorie und Praxis** bietet diese Tagung eine ideale Plattform.

Informationen zum Call for Paper werden in Kürze verfügbar sein.

Weitere Hinweise: **http://www.metrikon.de**

In diesem Jahr findet erstmalig im Rahmen der MetriKon ein **Doktorandensymposium** statt. Es soll ein Forum für alle Doktoranden der Informatik und verwandter Disziplinen bieten, die im Rahmen ihrer Arbeit mit der Vermessung und Qualifizierung von Softwareprodukten oder -prozessen in Berührung kommen. Es richtet sich explizit nicht nur an Doktoranden die sich im Kern ihrer Arbeit mit dem Thema beschäftigen, sondern auch an all diejenigen, die im Rahmen der Evaluierung ihrer Forschungsergebnisse auf die Erhebung valider und aussagekräftiger Daten angewiesen sind. Das Symposiums verfolgt dabei zwei Stoßrichtungen: Einerseits soll durch einleitende Expertenvorträge in das Thema Messen im Rahmen von Dissertationen eingeführt werden, anderseits soll den teilnehmenden Doktoranden im Anschluss die Möglichkeit geboten werden, ihre Arbeit im Kontext quantitativer Verfahren vorzustellen und sich mit anderen Doktoranten und erfahren Forschern auszutauschen. Dabei soll in einer angenehmen und konstruktiven Atmosphäre offen über noch ungelöste Probleme und Ideen diskutiert werden

Bewertungsaspekte serviceorientierter Architekturen (BSOA2012) - detaillierter Workshopbericht

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1. Hintergründe zur Initiative

Serviceorientierte Architekturen und Lösungsansätze spielen bei der Gestaltung unternehmensweit verwendeter IT-Architekturen bzw. bei der Entwicklung neuer Softwareanwendungen nach wie vor eine entscheidende Rolle. Eine SOA sollte dabei weder als Produkt oder Lösung noch als Technologie verstanden werden. Im Kern geht es bei dem serviceorientierten Paradigma um die gezielte Restrukturierung bzw. geschäftsorientierte Ausrichtung gewachsener Anwendungslandschaften unter Verwendung interoperabel und lose gekoppelter Fachservices. In diesem Zusammenhang gilt es, die dafür benötigten Ressourcen, Prozesse, Methoden und Technologien einer Bewertung zu unterziehen, um zu evaluieren, welcher Stand erreicht ist und Verbesserungsvorschläge zu identifizieren und zu steuern. Hierbei gilt es insbesondere, die vielfältigen Interessen bzw. Zielstellungen einer SOA zu berücksichtigen. Ungeachtet der häufig zitierten SOA-Ernüchterung interessiert sich die BSOA-Initiative seit mehreren Jahren für mögliche (aus Sicht der Wissenschaft) bzw. benötigte (aus Sicht der Industrie) Bewertungs- und Messansätze.

Der am 15. November 2012 in Dresden durchgeführte 7. BSOA-Workshop widmete sich sowohl konstruktiven als auch analytischen Bewertungsansätzen im Kontext serviceorientierter Architekturen. In zunehmendem Maße galten die im Rahmen des Workshops besprochenen Themen der Bewertung neuer Trends, wie z.B.:

- Anbindung mobiler Anwendungen an eine Unternehmens-IT,
- Implikationen zum Cloud-Paradigma,
- Integrationsaspekte im Kontext von Big-Data-Applikationen,
- Referenzarchitekturen (Daten, Prozesse, Anwendungen, Integration),
- Einsatz regelbasierter Systeme zur Servicesteuerung.

Die in diesem Zusammenhang benötigten Integrationslösungen profitieren zunehmend von den im Internet bzw. Intranet verfügbaren Serviceangeboten (z.B. Cloud-Services). Sollen diese mit bereits vorhandenen Services kombiniert bzw. orchestriert werden, bedarf es einer syntaktisch und semantisch gesicherten Interoperabilität der involvierten Datenobjekte. Darüber hinaus müssen konzeptionell hergeleitete, aber auch implementierte Services im Kontext der unterstützten Geschäftsprozesse möglichst reibungslos verwendet werden können.

2. Beiträge des Workshops

Im Folgenden findet sich eine kurze inhaltliche Zusammenfassung der auf dem Workshop gehaltenen Vorträge. Die korrespondierenden Artikel können innerhalb des Tagungsbandes [Schmietendorf/Patzer 2012] eingesehen werden.

Olaf Resch: Möglichkeiten einer Business-Rule-basierten Servicesteuerung

> Ein Geflecht angebotener und konsumierter Services geht mit einem komplexen Service-Ökosystem einher. Im Mittelpunkt des Beitrages stand die Bewertung organisatorischer, ökonomischer und technologischer Implikationen, die sich durch eine Business-Rule-basierte Steuerung ergeben.

Marco Mevius, Rolf Stephan, Peter Wiedmann: BPM(N)^{Easy} – Agiles cloud- und servicebasiertes Geschäftsprozessmanagement

> Im Mittelpunkt des Beitrages steht die systematische bzw. methodische Verknüpfung von Cloud Computing und Geschäftsprozessmanagement. Die in diesem Zusammenhang entwickelte Methode BPM(N)^{Easy} soll die Anpassungsfähigkeit von Geschäftsprozessen verbessern und die Einstiegshürde reduzieren.

Klaus Lutterjohann, Daniel Simon: Risikobetrachtung bei Software-Architekturen

> Ergebnisse einer strukturierten und systematischen Risikoanalyse von Architekturen können dabei helfen, Managemententscheidungen zu objektivieren, Problembereiche zu identifizieren aber auch die vielfältigen Stakeholder im Projekt einzubinden. Hierbei helfen nicht nur Architekturverifikationen sondern insbesondere Architekturevaluierungen.

Frederik Kramer: Serviceorientierte Architekturen und Shared Services - ein konzeptueller Vergleich

> Beide Ansätze werden aus ökonomischer und technischer Perspektive miteinander verglichen. Mit Hilfe einer Konzeptsynthese motiviert der Autor ein integriertes Vorgehensmodell, wobei die notwendige Geschäftsausrichtung und das Change Management hervorgehoben werden.

Michael Gebhart: Effiziente Qualitätsanalyse der Gestaltung serviceorientierter Architekturen auf Basis von SoaML

> Die von der OMG zur Verfügung gestellte “Service oriented architecture Modeling Language“ (kurz SoaML) bietet einen technologie-neutralen Formalisierungsansatz. Auf dieser Grundlage schlägt der Autor einen methodischen Ansatz zur Qualitätsbestimmung einer SOA vor.

Anja Fiegler, Niko Zenker, Jan Draheim, Reiner Dumke: Referenzarchitektur von System-Management-Services in Large-Scale Cloud-Systemen

> Im Mittelpunkt steht hier die zumeist ungenügende Reife von Messungen, Messverfahren und Metriken, die im Rahmen eines System-Managements benötigt werden . Unter anderem werden die Ergebnisse einer industriellen Fallstudie zu Cloud-Kennzahlen vorgestellt.

Harry Ultsch: Praktische Aspekte der Qualitätssicherung von Cloud-Services

> Die Verfügbarkeit und Performance von Cloud Services und deren Qualitätssicherung mit Hilfe aktiver und passiver Verfahren steht im Mittelpunkt dieses Beitrags. In diesem Zusammenhang wurden einsetzbare Werkzeuge praxisnah vorgestellt.

Neben den dargestellten Vollbeiträgen gab es die folgenden Posterpräsentationen, die insbesondere jungen Absolventen und Doktoranden vorbehalten waren:

> *Felix Müller:* Konzept zur Anbindung mobiler Anwendungen an Enterprise Systeme;
>
> *Ayman Massoud, Reiner Dumke:* Efficient SOA-based Integration of Legacy Applications;
>
> *André Nitze:* Chancen zum Einsatz von Agilität in Serviceorientierten Architekturen;
>
> *Marcus Zieger:* Einsatzszenarien ereignisgesteuerter Architekturen im E-Commerce;
>
> *Ahmed A. Hussein, Reiner Dumke:* A Dynamic Modular Framework for Enhancing the Security of Enterprise Business Processes.

3. Ergebnisse der Diskussionsrunde

3.1 Diskussionsthemen

Einen festen Platz innerhalb des BSOA-Workshops hat die moderierte Diskussionsrunde zu aktuellen Herausforderungen in der IT-Landschaft. Im Mittelpunkt des Interesses standen die ggf. vorhandenen Beziehungen zwischen Service-Orientierung und XaaS (zumeist als „Anything-as-a-Service“ bezeichnet). Zur Initiierung der Diskussion wurden die folgenden Themenbereiche vorgegeben, wobei die letztgenannte Fragestellung am stärksten durch die Teilnehmer reflektiert wurde:

- Service oriented Multi-Channel Architectures – the XThing,
- Serviceorientierung im Bereich der analytischen Qualitätssicherung,
- Serviceorientierung vom XaaS bis zum TaaS (Test as a Service).

Wie bereits im vergangenen Jahr konnte für die Moderation der BoF-Session Herr Dr. Frank Simon (SQS AG) gewonnen werden. Die im folgenden Abschnitt vorgestellten Ergebnisse wurden durch die Autoren protokolliert, interpretiert und zum Zweck der Verständlichkeit teilweise mit korrespondierenden Aspekten angereichert, ohne jedoch den ursprünglichen Sinn zu verändern.

3.2 Ausgewählte Ergebnisse

Noch immer besteht die Schwierigkeit, SOA als Idee und vor allem hinsichtlich der implizierten Mehrwerte dem Unternehmensmanagement verständlich darzustellen. Eigentlich sind im Rahmen arbeitsteiliger Fertigungsprozesse Unternehmen innerhalb und über ihre Grenzen hinaus seit Jahrzehnten serviceorientiert organisiert. Aus dieser Betrachtung heraus handelt es sich bei einer SOA auch um ein Organisationsprinzip, was sich unter

anderem in einer benötigten SOA-Governance niederschlagen sollte. Ggf. können die folgenden im Rahmen der Diskussion identifizierten Kernmerkmale des vordergründig pragmatisch orientierten XaaS-Ansatzes auch zur Verbesserung der Verständlichkeit einer SOA beitragen:

- Berücksichtigung einer betriebswirtschaftlichen Servicesicht,
- Externe Vermarktbarkeit von Serviceangeboten,
- Ad hoc einsetzbare Serviceangebote (Vorraussetzungen??),
- Anforderungsgetriebene bzw. pragmatische Servicebereitstellung,
- Internetbasierte Veröffentlichung (Provisioning) eines Service,
- Semantische und syntaktische Interoperabilität von Services.

Dementsprechend stellt sich die Frage, wie XaaS und SOA zueinander in Beziehung stehen. Durch die Teilnehmer wurden folgende Interpretationen innerhalb der Diskussion herausgearbeitet:

- Überlappende Zielstellungen beider Ansätzen,
- SOA häufig getrieben durch die IT, also eher ungewöhnlicher Treiber,
- Probleme mit IT-zentrierten SOA-Ansätzen,
- Diversifizierte Reifegrade eingesetzter Servicelandschaften,
- SOA ist hilfreich für das Konsumieren eines XaaS,
- XaaS kann allerdings auch ohne eine SOA existieren.

Die folgende Abbildung wurde innerhalb der Diskussion entwickelt und stellt verschiedene Aspekte beider Ansätze gegenüber:

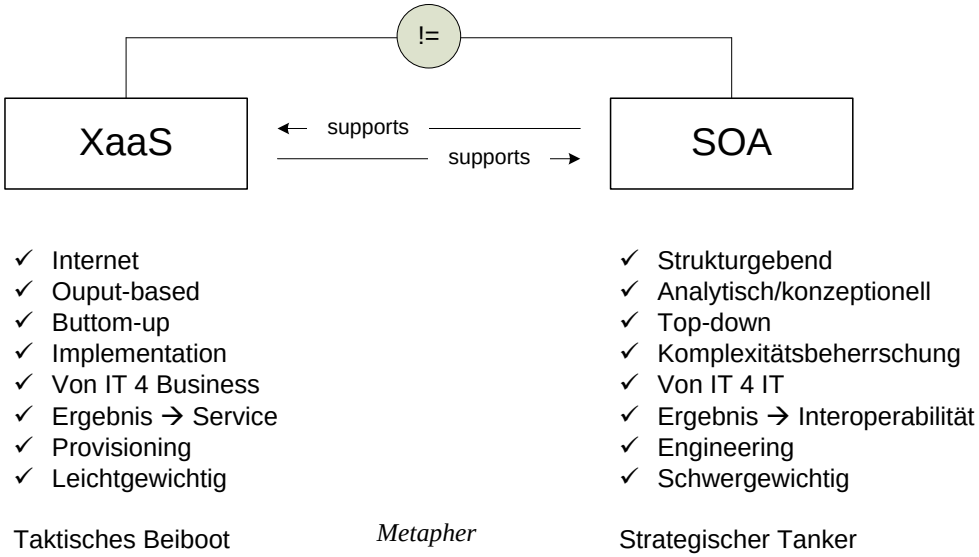

Abbildung 1: Gegenüberstellung XaaS und SOA

XaaS impliziert bei zunehmender Reife der genutzten Integrationsarchitektur ähnliche Herausforderungen, wie diese bei einer SOA existieren. Daher kann eine SOA auch als Enabler für eine nachhaltige Marktpositionierung von XaaS betrachtet werden. Es bleibt abzuwarten, inwieweit der XaaS-Gedanke auch die Idee einer zunehmenden IT-Industrialisierung treiben kann, wie dies für SOA der Fall ist. In diesem Zusammenhang wurde dem SOA-Ansatz deutlich mehr Potential zugewiesen als den eher „ad hoc" getriebenen XaaS Serviceangeboten. Für die vielfältigen Implikationen des „ad hoc" Cloudings sei auf [Simon/Schmietendorf 2012] verwiesen.

Die folgenden Aussagen sollen lediglich im Sinne einer Ergebnissicherung zusammenfassend dargestellt, aber nicht weiter interpretiert werden:

- Im Kontext des XaaS gilt es, die Denkweise vom „Wie" zum „Was" zu verlagern, d.h. die hinter einer Serviceschnittstelle liegende Implementierung sollte einem Servicenutzer weitgehend „egal" sein.

- XaaS und SOA dienen beide der Beherrschung von mit modernen Software- und Hardwarelösungen bzw. unternehmensweiten Architekturen einhergehenden Komplexitäten.

    - SOA als analytischer und konzeptioneller Ansatz (Mittel zur Architekturgestaltung – Reduktion von Serviceabhängigkeiten);

    - XaaS als implementierungsnaher Ansatz zur agilen Umsetzung benötigter Teillösungen.

- XaaS und SOA ergänzen sich. Für eine Industrialisierung der IT kann eine SOA eher einen großen Beitrag, XaaS hingegen nur einen kleinen Beitrag leisten (gekoppelte Services).

- XaaS Serviceangebote können zwar alleine existieren, bei einem benötigten Zusammenspiel (Interoperabilität) wird allerdings eine Architektur zur Festlegung struktureller und regulativer Aspekte benötigt.

- Die Innovationsfähigkeit eines Unternehmens kann als funktionaler Zusammenhang zwischen dem Reifegrad einer Servicelandschaft und der Fähigkeit, im zeitlichen Verlauf auf notwendige Veränderungen reagieren zu können, verstanden werden (HQ SOA – High Quality SOA).

Im Rahmen der sehr lebhaft geführten Diskussion wurde auch der folgende metaphorische Ansatz zur Verdeutlichung der wechselseitigen Beziehungen zwischen XaaS und SOA entwickelt. Dieser wurde innerhalb der vorhergehenden Abbildung verarbeitet.

- Kleine „Beiboote" alias XaaS sind zwar schnell und wendig, über den Atlantik schaffen es diese aufgrund ihrer geringen Reichweite aber nur im Verbund mit einem großen Tanker.

- Im Falle eines Krieges kommt der Tanker alias SOA allerdings ebenfalls nicht ungeschützt über den Atlantik. Hier benötigt er den taktischen Schutz wendiger Beiboote alias XaaS.

SOA und XaaS können sich dementsprechend gegenseitig befruchten.

4. Weitere Informationen

Alle Artikel des Workshops wurden innerhalb des 10. Bands der Schriftenreihe „Berliner Schriften zu modernen Integrationsarchitekturen“ beim Shaker-Verlag publiziert. (ISBN 978-3-8440-1411-2)

Abbildung 2: Tagungsband zum BSOA-Workshop des Jahres 2012

Im Jahr 2013 soll der BSOA-Workshop erstmals in der Schweiz stattfinden. Als Gastgeber konnte die adhoc AG aus Basel gewonnen werden. Weitere Informationen zur BSOA-Initiative, wie z.B. der Call for Paper für den kommenden BSOA-Workshop, finden sich unter folgender URL im Internet:

http://ivs.cs.uni-magdeburg.de/~gi-bsoa

5. Quellenverzeichnis

[Schmietendorf/Patzer 2012] Schmietendorf, A.; Patzer, K. (Hrsg.): BSOA 2012 - 7. Workshop Bewertungsaspekte serviceorientierter Architekturen (Dresden - 15. November 2012), in Berliner Schriften zu modernen Integrationsarchitekuren, Shaker-Verlag, Aachen, November 2012,

[Simon/Schmietendorf 2012] Simon, F.; Schmietendorf, A.: Ad-hoc-Clouding: Es gibt keinen Weg mehr zurück, Gastbeitrag im Online-Magazin ZDNet.de (Special Cloud Computing), NetMediaInteractive GmbH, München, 07. Mai 2012.

Prioritization of Software Projects Using Fuzzy Logic

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Abstract. *The specific need expressed and tackled in this paper is to design for a financial institution in Mexico a formal mechanism for the prioritization of project initiatives with incomplete information, which usage would not depend on its few experts for the evaluation of candidate initiatives. This organization was therefore looking for a prioritization model that would, on the one hand be based on the best knowledge, models and practices developed informally by its own experts and, on the other hand, which would be usable across the organization by employees with less expertise that the experts. To tackle this issue, this paper proposed a fuzzy logicbased approach to prioritize project initiatives.*

Keywords*: EPCU, Prioritization Projects Initiatives, Uncertainty Contexts, Fuzzy Sets, Expert Judgment Estimation, Strategic Planning.*

1. Introduction

1.1 Context

Within organizations there is a vast amount of knowledge and most of this knowledge belongs to the individuals and is acquired through people's experience which is translated into information as required for the operation and value creation of the business.

A business culture is developed under the influence of national culture and executive leadership, and it is defined with perceptions shared about organizational work practices in the distinct organizational units [12, 15].

While all the people in an organization are contributors, however there are some "key" people (experts) at different levels in the organization who use their expertise to organize, delegate, coordinate and make decisions.

However, while these people use their own expertise to make decisions to support the successful operation of an organization, there are still organizational drawbacks such as:

- Experience belongs to the experts, not to the organization.
- An expert, under different circumstances, may take different decisions about the same problem.
- Experience cannot be replicated consistently and often the experience cannot be even described or understood clearly or accurately.
- Experience often makes use of linguistic variables and subjective elements which allow the understanding of the real-world: the experience manages the uncertainty associated to the lack of quantitative measures.

These experience-related drawbacks are highly relevant to organizations which want to thrive: it is necessary to ensure that such experienced-based knowledge be usable and disseminated throughout the organization in some ways for it to be used by other people who do not have as much knowledge or experience and without continuously requiring the assistance of the experts.

This is illustrated in this paper by a case study of a financial institution which had its own experts in the evaluation and prioritization of project initiatives: such individual expertise had been developed by each expert individually taking into account the business and cultural context of the organization, through a set of informal analysis and decision making models developed over a number of years. Such individual experience-based models take as input very few variables at an early stage, which variables are typically descriptive or qualitative at best.

The strategic planning process of this organization begins at the end of each year. In this process the candidate projects to be developed by the organization over the next year are defined from a list of project initiatives. These projects initiatives at this stage are only at a conceptual level: this means that they do not have yet a detailed business plan for each initiative. However, the people who assess the feasibility of the projects initiatives can provide a perception of the impact of variables specific to each project, in comparison with the other projects being assessed.

The set of people who determine the priority of the projects initiatives are the CEO, CFO, CIO and the operations director. All of these people (for research purposes, the people who determine the priorities of the projects initiatives are referred to as ‘practitioners’) have various levels of knowledge, skills and information. These practitioners could have also different vested interests: some of the projects may impact directly their own business area.

The same set of facts or information will be provided to the practitioners of each project initiative. Based on their experience and considering

A) the expected profits the project would contribute to the organization,

B) how complex is the implementation of the project, and

C) the expected project development costs.

These practitiones would assign a priority index to the projects initiatives.

Obviously, depending on the experience and the focus of each of the practitioners and the conditions under which they determine the priority index, these indexes would give different ratings. To determine a unique consolidated index, the final value will depend on the negotiation between the practitioners: who is more convincing or who holds a higher position?

Assuming the availability of an experience-based model to determine a priority index, and that it is used to prioritize the projects initiatives for the year n, what could happen the next year?

In the strategic planning of the next year (*n +1*), different people will probably participate in the project initiatives assessment. In this sense, it is very likely that the considerations made in year *n* to determine the priority index will be different from those considered in year (*n +1*), and the following (*n +2…m*).

An ad hoc approach for projects initiatives assessment and prioritization as described above is not like performing a systematic assessment approach: in the ad hoc approach: a specific project for a certain year could be considered with less priority while in another year it might be considered as very important under the same set of assumptions since the experience of the practitioners who determine the priority for each initiative could lead to differences in the prioritization results.

Assuming that projects are the elements that implement the strategies and that organizations do not have a consistent mechanism to define which projects are aligned with the strategy, it is then likely to take longer to achieve the organizational objectives.

The specific need expressed and tackled in this paper was to design for this financial institution a formal mechanism for the evaluation and prioritization of project initiatives with incomplete information, which mechanism should not depend on its few experts for the evaluation of specific initiatives. In summary, this organization was looking for a prioritization model that would:

- be based on the best knowledge and practices developed informally by its own experts, and
- be usable across the organization by employees with less expertise that the experts.

Said differently, the organization was looking for a mechanism that would allow employees across the organizations to be supported, when assigned the task to analyze and prioritize projects in a context of limited information, by a decision making model embedding the knowledge of its own experts.

This paper reports on the research work carried on to tackle this specific issue. The approach selected is based on previous work carried on to tackle the estimation of software projects in a context of early estimation when only a few qualitative variables are available. The estimation model developed has been based on fuzzy logic, the EPCU model [1,5]. This paper adapts this approach to tackle the issue at hand that is, to develop a prioritization model embedding the knowledge of experts and usable by non experts.

This paper is organized as follows. Section 2 presents the description of the fuzzy logic-based EPCU model. Section 3 presents an overview of how the prioritization of initiatives was made in an ad hoc approach (experience-based). Section 4 presents a case study case of the use of the EPCU model to prioritize initiatives in a financial institution. Finally, section 5 presents the conclusions and suggestions for further work.

2. The fuzzy logic approach and the EPCU model

2.1 Handling experience by the experts

The fuzzy logic is a framework that takes into account characteristics such as:

- the way practitioners take decisions;
- the (qualitative) variables that practitioners use; and
- the uncertainty associated with the event analyzed (i.e. the use of the information available, often vague or ambiguous).

In 2007 Valdés *et al*. [1] proposed a fuzzy logic based model referred to as the Estimation of Projects in Contexts of Uncertainty (EPCU) model. This model takes into account:

- the linguistic variables used by experts to describe the input variables in their experience-based estimation process (when these inputs are based on the vague or ambiguous information available when they have to come up with a project estimate); and
- the way experts combine these linguistic values to arrive at a project estimate.

This approach used in the EPCU model combines the organization experts' informal expertise at estimating together with a fuzzy logic rule base process in the area of software projects estimation.

This approach consists in developing a rule base model using fuzzy logic to quantify the relationships across software project attributes which, in practice, are often classified in terms of linguistic values (such as low, very low, average, high and very high) based on the expertise of the employees of an organization.

The use of fuzzy logic offers a well-structured quantitative framework for capturing the vagueness of human knowledge expressed in natural language [2]: in fuzzy logic, the expression of knowledge is (or is allowed to be) a matter of degree [2], which is how human thinking is organized [3].

"Basically, fuzzy logic is a precise logic of imprecision and approximate reasoning. More specifically, fuzzy logic may be viewed as an attempt at formalization/mechanization of two remarkable human capabilities:

1. The capability to converse, reason and make rational decisions in an environment of imprecision, uncertainty, incompleteness of information, conflicting information, partiality of truth and partiality of possibility – in short, in an environment of imperfect information.

2. The capability to perform a wide variety of physical and mental tasks without any measurements and any computations" [4].

The fuzzy logic-based models are typically designed on the basis of the expertise of recognized experts who identify and intuitively quantify the inputs (i.e. the independent variables) with linguistic values and infer the value of the dependent variables (for instance: estimates of project effort, project duration, prioritization index).

The EPCU fuzzy logic model is designed to be used at the very early stages of software development, when exists an incomplete information environment. However their use can be useful for other contexts or similar environments with high uncertainty and when there is a need to generate a quantitative result in a consistent way and with similar or better results than using the expert-based approach [5].

The EPCU model is defined in a generic way and it can be used in various contexts - see Figure 3.

This paper describes a specific use of the EPCU model for prioritization of project initiatives in a strategic planning exercise for a Mexican financial organization.

2.2 The EPCU Model

2.2.1 Overview of the model

The EPCU model [1,5] has six steps: identification of the input variables, specification of the output variable, generation of the inference rules, fuzzification, inference rule evaluation, and defuzzification (Figure 1).

The first three steps are related to the configuration of the decision making model by the experts: this configuration process generates a decision making model or EPCU "context" [5]. The last three steps are related to the use of the model generated by the practitioners.

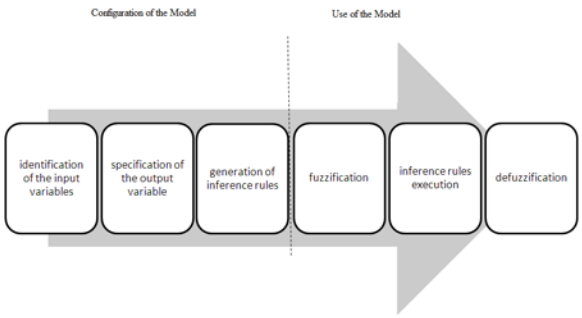

Figure 1. EPCU model steps

2.2.2 Identification of the input variables

The goal of this step is to elicit the most significant variables for a project (or a kind of projects) from the expert practitioners within an organization, along with an assessment of these variables: software size, software complexity, team skills, and so on.

It is natural for experts to have different opinions about some variables. To deal with this, fuzzy logic is used in a step known as fuzzification and which is described in section 2.2.4.

Expert practitioners must define the fuzzy sets for each variable, which means that they must classify the variables in terms of linguistic values. For example, for the complexity parameter, the fuzzy set could be classified as low, average, or high.

Also required is to define the membership function domain to represent the opinions of the experienced practitioners about these input parameters. By the end of this step, the most significant parameters have been generated, together with their fuzzy sets and the ranges available for each of them.

2.2.3 Generation of Inference Rules

All the fuzzy sets belonging to each input variable must be combined into an 'if…, then…' form:

If x and y, then z

If x or y, then z

where x is a fuzzy set for one input variable, y is a fuzzy set for another input variable, and z is the fuzzy set for the output variable.

All the fuzzy sets for each input variable must be combined to generate the rulebase.

2.2.4 Fuzzification

The goal of this step is to obtain fuzzified values as a consequence of opinions put forward by an expert practitioner. This means that a membership function must be defined for the input variables.

If three fuzzy sets are used for the input variable, the membership function can look something like the example in Figure 2.

Once the membership function is defined for all the input variables, an expert opinion needs to be requested for each variable. This process will create fuzzy values to be used in the next step to execute the rulebase.

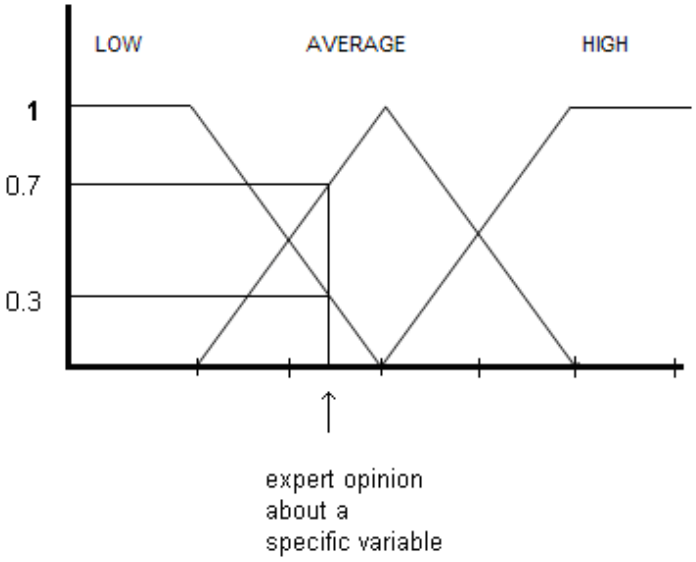

Figure 2. Example of a fuzzy membership function and defuzzification

2.2.5 Inference Rule execution

The fifth step consists in executing the rulebase by substituting the fuzzy values obtained for each input variable fuzzy set. The Inference Rule execution must follow the rules of fuzzy logic, such as:

Value (P or Q) = max {value (P), value(Q)}
Value (P and Q) = min {value (P), value(Q) }

2.2.6 Defuzzification

The sixth step is defuzzification, with the objective of obtaining a crisp value for the final estimate. Examples of defuzzification methods are: Max-Min, Max-Dot, Max-Product, Centroid Average, and Root Sum Square (RSS). The EPCU estimation generated in the case studies presented next was developed using RSS and then computing the 'fuzzy centroid' of the area.

This method was selected because it combines the effects of all applicable rules, scales the functions at their respective magnitudes, and computes the fuzzy centroid of the composite area. Even though it is more complex mathematically than the other methods, it was selected because it gives the best weighted influence to all the Inference Rules involved ("fired" in the specialized vocabulary).

The steps for obtaining the crisp value are:

1. Obtain the strength for each fuzzy set belonging to the output membership function (RSS). Considering the values obtained in the Inference Rule execution step, the strength for each fuzzy set defined for the output variable is obtained with the following formula.

$$FS_k = (\Sigma\, R_i^{\,2})^{0.5}$$

   where

   FS_k is the fuzzy set defined by a same linguistic value.
   R_i is the rule that fired a specific fuzzy set.

2. Obtain the fuzzy centroid of the area. The weighted strengths of each output member function are multiplied by their respective output membership function center points and summed. The area obtained is divided by the sum of the weighted member function strengths, and the result is taken as the crisp output.

$$\text{Crisp Value } (FS_k) = \text{Centroid} = \Sigma\ (\text{“}FS_k\text{” center} * \text{“}FS_k\text{”}\_\text{strength}\ ) \,/\, \Sigma\ (\text{“}FS_k\text{”}\_\text{strength})$$

where FS_k is the fuzzy set defined by the same linguistic value.

2.2.7 EPCU Results

In [5] an experiment was designed to test the EPCU model. A set of 5 finished projects was estimated by people who had not been involved in these projects (independent estimators): this means that the people who estimated a specific project knew only the preliminary requirements of a project to be specified and developed later on (i.e. using only the information available at the beginning of these projects).

Two sets of estimates were produced for each project: one set of estimates is made by the estimators themselves using their own experience and another set of estimates is generated automatically by the EPCU model.

For all estimates, the practitioners considered the description of the software requirements as they were described in the early phases for the real projects (a context similar to the strategic planning context, that is: an incomplete information context).

		FULL SAMPLE	MORE THAN 5 YEARS of EXPERIENCE IN SOFTWARE DEVELOPMENT	LESS THAN OR EQUAL TO YEARS of EXPERIENCE IN SOFTWARE DEVELOPMENT	MORE Than OR EQUAL to 10 YEARS off PROFESSIONAL EXPERIENCE	LESS THAN 10 YEARS of PROFESSIONAL EXPERIENCE	NON IT PROFESSIONALS	IT PROFESSIONALS
Number of practitioners		84	31	44	45	39	25	59
P1	MMRE	55%	54%	55%	59%	55%	52%	56%
	MdMRE	65%	54%	63%	67%	65%	51%	67%
	SD MRE	31%	30%	33%	30%	31%	31%	30%
	Pred(25%)	21%	23%	23%	16%	46%	20%	22%
Number of practitioners		84	31	44	45	39	25	59
P2	MMRE	16%	17%	14%	16%	16%	18%	15%
	MdMRE	14%	14%	14%	14%	15%	17%	14%
	SD MRE	11%	11%	11%	12%	10%	11%	11%
	Pred(25%)	85%	84%	89%	82%	87%	84%	85%
Number of practitioners		84	31	44	45	39	25	59
P3	MMRE	41%	44%	40%	40%	43%	46%	39%
	MdMRE	37%	52%	32%	35%	38%	51%	30%
	SD MRE	30%	31%	31%	29%	32%	28%	31%
	Pred(25%)	42%	39%	45%	42%	41%	32%	46%
Number of practitioners		83	31	43	45	38	25	58
P4	MMRE	34%	31%	37%	32%	36%	27%	37%
	MdMRE	17%	17%	17%	17%	17%	17%	17%
	SD MRE	31%	30%	32%	31%	31%	27%	32%
	Pred(25%)	58%	61%	56%	60%	55%	64%	57%
Number of practitioners		83	31	43	45	38	25	58
P5	MMRE	21%	24%	19%	23%	19%	22%	21%
	MdMRE	24%	24%	21%	24%	23%	24%	24%
	SD MRE	13%	16%	11%	15%	11%	12%	14%
	Pred(25%)	80%	71%	91%	76%	87%	76%	81%

Table 1. Performance of the EPCU model, by project, and by practitioners' sub-samples

As is shown in [5] the performance produced by the EPCU model for most of the projects is significantly better than that of the Expert Judgment Estimation approach, based on the quality criteria used (MMRE, SDMRE, PRED(25)). When the performance is better using the Expert Judgment Estimation approach, the difference is not significant, so the performance can be considered equivalent.

In order to investigate whether or not the performance of the EPCU model is influenced by the expertise of the practitioners who evaluated the input variables of the projects to be estimated, the following practitioners' sub-samples were identified:

1. Practitioners with more than or equal to 10 years of professional experience (or with less than or equal to10 years of professional experience).

2. Practitioners with more than 5 years in software development experience (or with less than or equal to 5 years in software development experience).

3. IT related professionals (or non-IT related professionals)

The performance of the use of the EPCU model for each of the sub-samples of data related to the practitioners classification that was identified in Table 1 was evaluated using the same 4 criteria: MMRE, MdMRE, SDMRE and Pred(25%).

By comparison, it can be observed that the EPCU model enables a systematic replication: no matter the level of skills of the people who assign the values for the input variables, the EPCU model generates estimates with less dispersion (see MMRE variations and SDMRE variation in Table 1) and similar to the full sample and all of the SDMRE values are less than 50% and most of the MMRE are lower than 50% - only project 1 has its MMRE over 50%.

In summary, the experience systematic replication feature using the EPCU model is relevant for an organization, particularly when there is a need for taking decisions within an environment of incomplete information.

3. Ad hoc Initiatives Prioritizing

This section presents now the new case study to illustrate how the structure of the EPCU model has been be used to embed the experts' knowledge in project prioritization into a formal mechanism allowing people with other skills set to prioritize project initiatives according to the organizational rules embedded in the experts' knowledge.

When a fuzzy system is to be used, the scheme to follow is shown in Figure 3: the fuzzy system is defined by the input variables (subjective), and for these variables linguistic values are determined (i.e. LOW, AVERAGE, HIGH): these values are also used to define the relationships of the input variables with the output variable as inference rules (i.e. IF-THEN).

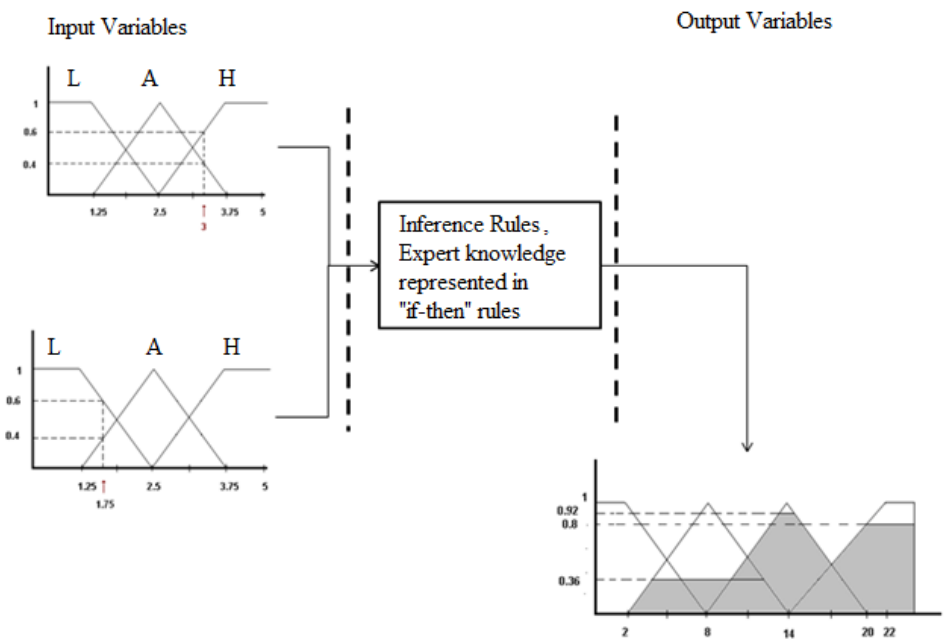

Figure 3. General scheme of a fuzzy system

A fuzzy system enables a replicable framework of knowledge by which consistent results could be obtained under the same facts; this is feasible because the way to make inferences is defined before starting the prioritization, without knowing the projects initiatives that will be evaluated and prioritized in the strategic planning process.

Project initiatives could be assessed in the same way but not by the same people (practitioners): this is because the prioritization model was defined previously, and it is considering how the experts make inferences and using a set of variables previously defined (experience systematic replication).

This is certainly a major advantage: the definition by the experts of the inference rules preserves such knowledge for the organization, thereby allowing other people to benefit from such knowledge embedded in the fuzzy logic model.

4. Using the EPCU model to prioritize initiatives

The need described by the financial institution in the context of its planning process was:

- To develop a formal mechanism for evaluation of project initiatives with incomplete information,
- which mechanism did not depend on the experts for the evaluation of initiatives.

The steps to configure the EPCU model were made in conjunction with the organization experts.

4.1 EPCU model configuration

4.1.1 Identification of the input variables

Taking into consideration the above assumptions, a context based on the EPCU model to evaluate and prioritize the initiatives was created for this financial institution.

An EPCU “context” is defined as:
“a set of variables (inputs and output) and the relations that affect a specific project or a set of similar projects” [5].

This definition is important because in the use of the EPCU model, the practitioners will provide as input their opinion about the context of the project, rather than evaluate/prioritize directly the output variable (in this case the priority index) using an intuitive approach.

The input variables defined by the financial organization experts were:

- profit expected to the business for the execution of a specific project,
- the complexity considered while developing the project, and
- the effort estimated.

The input variables were defined through interviews with the experts, using the same procedure as defined in [5].

All of these variables are linguistic: this means they were assessed based on experience as well as on opinions provided by the experts in a specific numerical reference [0, 5].

The values assigned to these variables were obtained based on interviews with managers (experts) of the organization (i.e. the managers who conducted the assessment of project initiatives in the annual strategic planning).

At the time a strategic planning is done, these variables are subjective, i.e. are not quantified, and there is not necessarily yet a business plan for each project. For this reason the reference values used for the evaluation of each of these input variables are: LOW, AVERAGE, HIGH, and were used to generate inference rules in the EPCU model [5] based on the evaluation and prioritization expertise of their own experts.

The selected numerical range for each of these variables is [0,5], where 0 is the minimum value (lowest) and 5 is the maximum value (highest) see Figure 2.

4.1.2 Identification/Specification of the output variables

The output variable, which is a priority index, can be defined as a percentage [0,100] in order to identify the projects with higher prioritization.

For the output variable (priority index) the membership function defined (Figure 4) has four linguistic values (LOW, AVERAGE, HIGH, VERY HIGH), the defined range is [0,100], the unit is a percentage, and for the highest priority for a project initiative, the priority index will be close to 100.

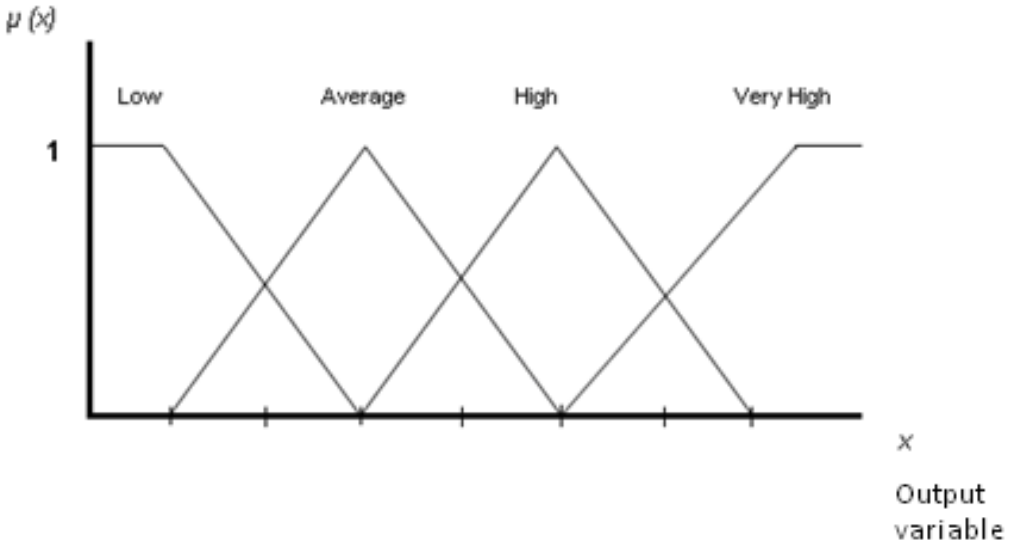

Figure 4. Output variable membership function

4.1.3 Generation of Inference Rules

Once the input variables and the output variable defined, the next step is to define the inference rules in order to relate them.

These inference rules were defined by the experts of the organization, supported by the researcher as described in [5].

4.2 Prioritizing the project initiatives with the EPCU model

The financial institution provided a set of 11 proposed project initiatives to prioritize using the EPCU context defined. These initiatives were assessed in the strategic planning exercise for 2009. The list of project initiatives is shown in Table 2.

No.	Project initiative
1	AMS SEARCH SPACE MEXICO FASE2
2	SISPAGOS
3	SCOTIANÓMINA
4	CALIFICACIÓN CARTERA COMERCIAL
5	PISCO
6	MEJORAS AL PROCESO DE CALIFICACIÓN
7	CÁLCULO DE CAPITAL PARA OPICS Y SIBUR
8	INFORMACIÓN DE COSECHAS PARA CRÉDITOS A
9	BURSATILIZACIÓN DE LA CARTERA HIPOTECARI
10	TASA DE ACUERDO AL RIESGO
11	FORMULARIO OPERACIONES EN DÓLARES

Table 2. Project initiatives list

With this list of project initiatives, the prioritization was made in a session with the people who usually determined the priority of the projects in ad hoc manner.

Using the Delphi method [14], the value assignments for the input variables were obtained for each project. With the values assigned for the input variables for each project initiative, the EPCU model was executed and the priority indexes were obtained.

Table 3 shows the results obtained and Figure 5 shows the results plotted.

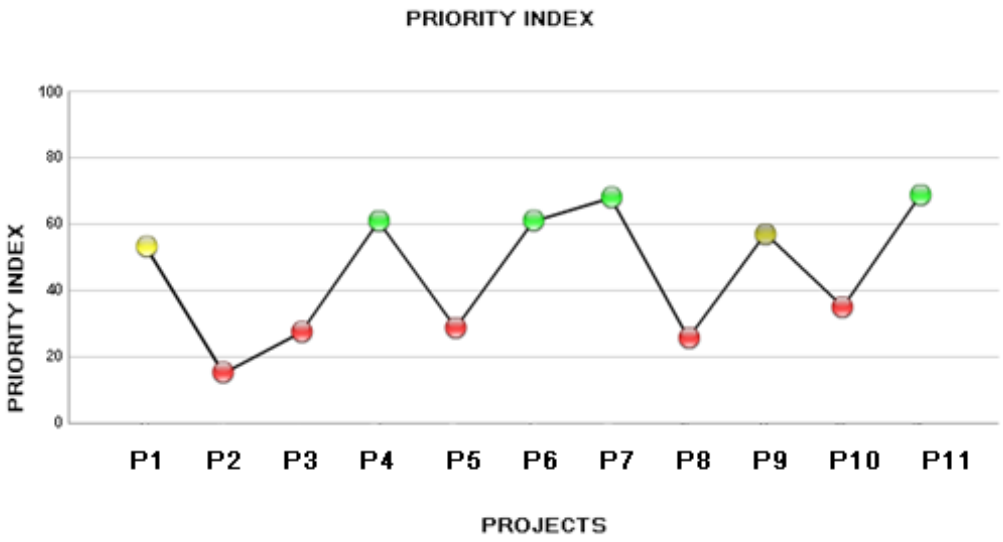

Figure 5. Plotted results of the prioritization of projects

	Project initiative	Profit expected to the business	Effort estimated	Complexity considered	Priority index
1	AMS SEARCH SPACE MEXICO FASE2	3.5	2	3	53.29%
2	SISPAGOS	2	3.5	4	15.32%
3	SCOTIANÓMINA	1.5	3	2	27.64%
4	CALIFICACIÓN CARTERA COMERCIAL	4	2	2	60.97%
5	PISCO	2.5	3	3	28.92%
6	MEJORAS AL PROCESO DE CALIFICACIÓN	5	2	2	60.97%
7	CÁLCULO DE CAPITAL PARA OPICS Y SIBUR	3.5	1.5	2	68%
8	INFORMACIÓN DE COSECHAS PARA CRÉDITOS A	2	3	3	25.84%
9	BURSATILIZACIÓ N DE LA CARTERA HIPOTECARI	5	2	3	57.34%
10	TASA DE ACUERDO AL RIESGO	3	2.5	3.5	35.31%
11	FORMULARIO OPERACIONES EN DÓLARES	3.5	2	1	69%

Table 3. Results of prioritization of projects using model EPCU

5. Observations

5.1 Summary

Currently the experience for the operations, value creation and decision making from a specific organization reside more often in people while it is the organizations which are assuming the risks.

On the one hand, the organization is dependent on its experts in order to use their experience and, on the other hand, this experience cannot be used consistently in recurrent processes, such as in strategic planning.

A fuzzy system allows handling the uncertainty associated with the real world, as well as qualitative variables: this is at a lower cost than of acquiring detailed information.

The fuzzy system also allows defining the inferences rules representing the experts' experience that is used to modeling the complex relationships between the variables involved in a decision making process: this kind of system keeps the knowledge for the organization.

The use of the EPCU model, as shown in this paper, helps:

- the organization to keep the experience that is used for the prioritization of project initiatives by the experts; these experiences are translated into inference rules (rulebase) that are stored and managed by the organization and not only by the experts themselves.

- the same experience (rulebase) could be used without the experts' presence: the inference rules stored create an inference engine that can be used in other similar events: this inference engine can be run under certain rules defined in the EPCU model [1, 5].

When the EPCU model is used to determine the priority of project initiatives, it always uses the same experience which is stored in the inference engine, so the presence of experts it is not required, and the priority assessment is isolated from the social context.

It is important to always have the same evaluation mechanism for similar events (consistency), which provides the reliability of experience-based approach [5].

When an organization defines the same model (EPCU context) to define the priority of project initiatives, each time you run the strategic planning process under similar assumptions the results are similar.

This will allow the project initiatives alignment across different periods to achieve the objectives of the organization.

In summary, the use of EPCU model for prioritization of projects initiatives addresses the needs expressed by the financial institution that were:

- Have a formal mechanism for the evaluation of project initiatives with incomplete information,

- Do not depend on the experts for the evaluation of initiatives,

5.2 Further work

This paper has shown how to use the EPCU model to prioritize project initiatives.

For the set of project initiatives provided by the financial institution used in the case study, some other experiments are needed and will be explored in further research:

- The comparisons between the results gathered from prioritization using EPCU model and the experience-based approach.

- The comparisons between the results gathered from prioritization using EPCU from the experts who were involved in the project initiative assessment (results from this paper) against other people with distinct skills but with the same information provided.

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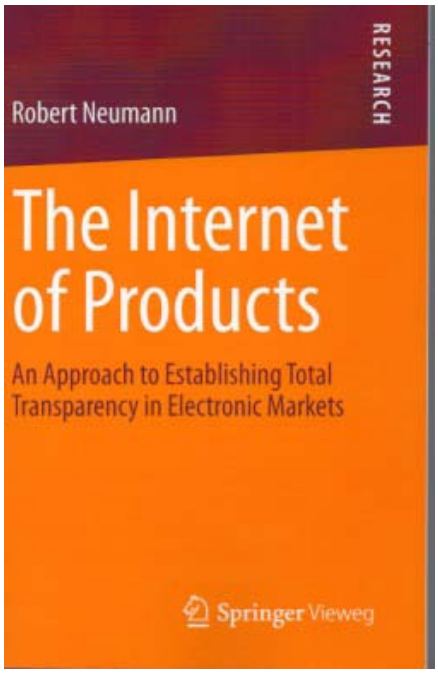
Neumann, R.:

The Internet of Products
An Approach to Establishing Total Transparency in Electronic Markets

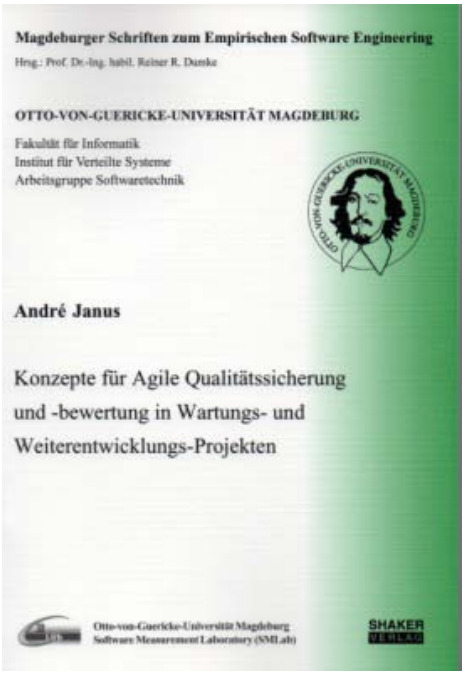
Springer Vieweg, 2013 (263 Seiten), ISBN: 978-3-658-00904-5



Janus, A.:

Konzepte für Agile Qualitätssicherung und -bewertung in Wartungs- und Weiterentwicklungs-Projekten

Shaker Verlag, 2013 (177 Seiten), ISBN: 978-3-8440-1578-2



Schmietendorf, A.; Patzer, K.:

BSOA 2012
7. Workshop Bewertungsaspekte serviceorientierter Architekturen
15. November 2012, Dresden

Shaker Verlag, Aachen, 2012 (136 Seiten), ISBN 978-3-8440-1411-2

Seit nunmehr 7 Jahren beschäftigt sich die BSOA-Initiative mit der Bewertung von serviceorientierten Architekturansätzen. Zunächst beschäftigten sich die Teilnehmer im Rahmen der ersten Workshops mit der messtechnischen Erfassung der mit einer SOA einhergehenden Ausprägungen und Merkmale bzw. den involvierten Stakeholdern. Sehr schnell wurde deutlich, dass sich eine SOA weniger auf technologische Sachverhalte bezieht als vielmehr auf die veränderte Sichtweise zur Gestaltung unternehmensweit genutzter IT-Systeme. Erwartete Vorteile einer SOA bezogen sich insbesondere auf die Zielstellungen des Informationsmanagements. In diesem Zusammenhang wurden Mehrwertpotentiale durch eine verbesserte Geschäftsprozessorientierung der IT, reduzierte Daten- und Funktionsredundanzen, verringerte Komplexitäten bei Anwendungen und Schnittstellen, verringerte Kundenbindungen oder auch die Flexibilität mit der eine benötigte IT-Lösung bereitgestellt werden kann, ausgemacht.

Aus der Vielzahl an eingereichten Beiträgen konnte durch das Programmkomitee eine anspruchsvolle Agenda zusammengestellt werden.

Büren, G.; Dumke, R.R.; Ebert, C, Münch, J.:

MetriKon 2012 - Praxis der Softwaremessung
Tagungsband des DASMA Software Metrik Kongresses
8.-9. November 2012, Stuttgart

Shaker Verlag, Aachen, 2012 (250 Seiten), ISBN 978-3-8440-1432-7

The book includes the proceedings of the MetriKon 2012 held in Stuttgart in November 2012, which constitute a collection of theoretical studies in the field of software measurement and case reports on the application of software metrics in companies and universities.

Abran et al.:

IWSM-MENSURA 2012
2012 Conference of the 22nd International Workshop on Software Measurement and the 2012 Seventh International Conference on Software Process and Product Measurement (IWSM-MENSURA 2012)
17-19 October 2012, GUFPI-ISMA, Assisi, Italy

CPS Publishing Service (online), 2012

This proceedings includes the full papers and the short papers of the 2012 Conference of the 22nd International Workshop on Software Measurement (IWSM) and the 2012 Seventh International Conference on Software Process and Product Measurement (MENSURA).

Witt, T.C.:

IT Best Practices: Management, Teams, Quality, Performance, and Projects

CRC Press, 2012 (355 Seiten), ISBN: 978-1-4398-6854-6

Ideal for project, IT, and systems development managers, IT Best Practices: Management, Teams, Quality, Performance, and Projects covers the skills, knowledge, and attributes needed to succeed in bringing about large-scale change. It explains how to incorporate quality methods into the change management process and outlines a holistic approach for transformation management.

Detailing time-tested project management techniques, the book examines management skills with a focus on systems thinking to offer a pragmatic look at effecting change. Its comprehensive coverage spans team building, quality, project methodology, resource allocation, process engineering, and management best practices. The material covered is validated with references to concepts and processes from such business greats as W. Edwards Deming, Jack Welch, and Henry Ford. Readers will learn the history behind the concepts discussed along with the contributions made by these great business minds.

The text supplies an awareness of the factors that impact performance in today's projects to supply you with the real-world insight needed to bring about large-scale change in your organization. Although it is geared around change, most of the concepts discussed can be directly applied to improve efficiencies in your day-to-day activities.

Software Measurement Involved Conferences

January 2013:

SWQD 2013:

Software Quality Days
January 15-17, 2013, Vienna, Austria
see: **http://www.software-quality-days.com/en/**

February 2013:

IASTED SE 2013:

IASTED International Conference on Software Engineering 2013
February 11 - 13, 2013, Innsbruck, Austria
see: **http://www.iasted.org/conferences/home-796.html**

ISEC 2013:

6th India Software Engineering Conference
February 21 - 23, 2013, New Delhi, India
see: **http://isoft.acm.org/isec2013/docs/ISEC-2013%20CFP.pdf**

March 2013:

CSMR 2013:

17th European Conference on Software Maintenance and Reengineering
March 5-8, 2013, Genova, Italy
see: **http://csmr2013.disi.unige.it/**

FASE 2013:

16th International Conference on Funcamental Approaches to Software Enginering
March 16 - 24, 2013, Rome, Italy
see: **http://www.etaps.org/2013/fase13**

ICST 2013:

International Conference on Software Testing, Verification & Validation
March 18 - 22, 2013, Luxembourg
see: **http://www.icst.lu/**

SEPG 2013:

25th Software Engineering Process Group Conference
March 4-7, 2013,Orlando, Florida, USA
see: **http://www.sei.cmu.edu/sepg/**

April 2013:

EASE 2013:

International Conference on Empirical Assessment in Software Engineering
April 14-16, 2013, Porto de Galinhas, Brazil
see: **http://www.cin.ufpe.br/~ease2013/**

REFSQ 2013:

19th International Working Conference on Requirements Engineering: Foundation for Software Quality
April 8-11, 2013, Essen, Germany
see**: http://www.refsq.org/2013/**

iqnite 2013:

Software Quality Conference
April 23-25, 2013, Düsseldorf, Germany
see: **http://www.iqnite-conferences.com/de/index.aspx**

CIbSE 2013:

16th Iberoamerican Conference on Software Engineering
April 8 - 10, 2013, Montevideo, Uruguay
see: **http://cibse2013.ort.edu.uy/es/Presentacion.php**

ICPE 2013:

4th ACM/SPEC International Conference on Peformance Engineering
April 21 - 24, 2013, Prague, Czech Republic
see: **http://icpe2013.ipd.kit.edu/**

STAREAST 2013:

Software Testing Analysis & Review Conference
April 28 - May 3, 2013, Orlando, FL, USA
see: **http://stareast.techwell.com/content/stareast-2013**

May 2013:

ICSE 2013:

International Conference on Software Engineering
May 18 - 26, 2013, San Francisco, USA
see: **http://2013.icse-conferences.org/**

MSR 2013:

10th Working Conference on Mining Software Repositories
May 18 - 19, 2013, San Francisco
see: **http://2013.msrconf.org/**

ICPC 2013:

21th International Conference on Program Comprehension
May 20 - 21, 2013, San Francisco, USA
see: **http://www.ing.unisannio.it/icpc2013/**

CSEE&T 2013:

26th Conference on Software Engineering Education and Training
May 19 - 21, 2013, San Francisco
see: **http://conferences.computer.org/cseet/2013/**

June 2013:

XP 2013:	**14th International Conference on Agile Software Development** June 3 - 7, 2013, Vienna, Austria see: **http://xp2013/**
EJC 2013:	**23th European Japanese Conference on Information Modeling and Knowledge Bases** June 3 - 7, 2013, Nara, Japan see: **http://www.tt.cs.titech.ac.jp/EJC2013/**
SPICE 2013:	**SPICE Conference** June 4 - 6, 2013, Bremen, Germany see: **http://www.spiceconference.com/**
ASWEC 2013:	**22nd Australian Software Engineering Conferences** June 4 - 7, 2013, Melbourne, Australia see: **http://aswec2013.ict.swin.edu.au/**
PROFES 2013:	**14th International Conference on Product Focused Software Process Improvement** June 12-14, 2013, Paphos, Greece see: **http://profes2013.cs.ucy.ac.cy/**
VDA Automotive SYS Conference 2013:	**Quality Management for Automotive Software-based Systems and Functionality** June 12 - 14, 2013, Berlin, Germany see: **http://www.vda-qmc.de/software-prozesse/vda-automotive-sys/**
QoSA 2013:	**9th International ACM Sigsoft Conference on the Quality of Software Architectures** June 17 - 21, 2013, Vancouver, Canada see: **http://qosa.ipd.kit.edu/qosa_2013/**
OSS 2013:	**9th International Conference on Open Soure Systems** June 25 - 28, 2013, Koper-Capodistria, Slovenia see: **http://oss2013.case.unibz.it/**
EuroSPI 2013:	**20th European Systems & Software Process Improvement and Innovation Conference,** June 27 - 29, 2013, Dundalk, Ireland see: **http://2013.eurospi.net/**

July 2013:

ICWE 2013:
International Conference on Web Engineering
July 8-12, 2013, in Aalborg, Denmark
see: **http://icwe2013.webengineering.org/**

RE 2013:
21th IEEE International Requirement Engineering Conference
July 15-19, 2013, Rio de Janeiro, Brazil
see: **http://www.re13.org/**

ENASE 2013:
8th International Conference on Evaluation of Novel Approaches to Software Engineering
July 3-7, 2013, Anger Loire Valle, France
see: **http://www.enase.org/**

UKPEW 2013:
24th Annual United Kingdom Workshop on Performance Engineering
July 4 - 5, 2013, Edinburgh, UK
see: **http://ukpew.lboro.ac.uk/**

ICSOFT 2013:
8th International Conference on Software and Data Tehnologies
July 29 - 31, 2013, Reykjavik, Iceland
see: **http://www.icsoft.org/**

August 2013:

SERA 2013:
11th ACIS Conference on Software Engineering
August 16-18, 2012, Prague, Czech Republic
see: **http://acis.cps.cmich.edu/SERA2013/index.html**

AGILE 2013:
International Conference on Agile
August 5 - 9, 2013, Nashville, USA
see: **http://agile2013.agilealliance.org/**

ICGSE 2013:
8th International Conference on Global Software Engineering
August 26-29, 2013, Bari, Italy
see: **http://collab.di.uniba.it/icgse2013/**

QEST 2013:
International Conference on Quality Engineered Software and Testing
August 27 - 30, 2013, Buenos Aires, Argentina
see: **http://www.qest.org/qest2013/**

September 2013:

ASQT 2013:
Arbeitskonferenz Softwarequalität und Test
September 6.-7., 2012, Klagenfurt, Austria
see: **http://www.asqt.org/**

Euromicro SEAA 2013:
39th Software Engineering & Advanced Application Conference
September 4 - 6, 2013, Santander, Spain
see: **http://www.teisa.unican.es/dsd-seaa-2013/**

CONQUEST 2013:
13. International Conference on Software Quality
September , 2013, Nuremberg, Germany
see: **https://www.isqi.org/de/conquest.html**

IFPUG ISMA 2013:
IFPUG ISMA 8 + ISBSG IT Confidence Conference 2013
September 29 - Ocotober 6, 2013, Rio de Janeiro, Brazil
see: **http://www.ifpug.org/**

October 2013:

ESEM 2013:
International Symposium on Empirical Software Engineering & Measurement
October 10 - 11, 2013, Baltimore, USA
see: **http://umbc.edu/eseiw2013/esem/cfp.shtml**

UKSMA 2013:
Annual UKSMA Conference - Managing your Software (through Measurement)
October , 2013, London, UK
see: **http://www.uksma.co.uk/**

IWSM-MENSURA 2013:
Common International Conference on Software Measurement
October 23-25, 2013, Ankara, Turkey
see: **http://iwsm2013.wordpress.com/**

November 2013:

BSOA 2013:
8. Workshop Bewertungsaspekte service-orientierte Architekturen
November , 2013,
see: **http://www-ivs.cs.uni-magdeburg.de/~gi-bsoa/**

MetriKon 2013:
International Conference on Software Measurement
November 13 - 15, 2013, Kaiserslautern, Germany
see: **http://www.metrikon.de/**

see also: Conferences Link of **Luigi Buglione (**http://www.semq.eu/leng/eveprospi.htm**)**

See the upgrade of our virtual software measurement laboratory SML@b

Measurement Approaches & Tools

Software Process and Ressources Measurement

- ISO: ISO 9000 Self Assessment
- SLIM: Demonstration of the Software Equation
- SDC: Software Development Complexity
- SAFE: Security Assessment for E-Commerce
- SFMEA: Failure Mode and Effect Analysis Tool (Human Factors Prediction)
- UnitMetrics: Metrics Application in Agile Software Development
- Y2K: Year 2000 Problems, Approaches and Solutions

Process Maturity Models and Measurement

- AMMI: Agile Maturity Model Integration
- CMM: Capability Maturity Model
- CMMI: Capability Maturity Model Integration
- PEMM: Performance Engineering Maturity Model
- Light TPEF: Light Test Process Evaluation Framework
- S^3M : Maintenance Maturity Model

Software Cost Estimation

- COCOMO: COnstructive COst MOdel
- COCOTS: COnstructive COts effort estimation
- FP: Function Point Execution Example
- UCP: Use Case Point Based Cost Estimation

Software Product Measurement

- GRAPH: Program Graph Evaluation
- PDM: Problem Defintion Measurement
- PALM: Measurement and Estimation for Handhelds
- PMT: Prolog Measurement Tool

Software Size Measurement and Infrastructures

- FFPCounter: Full Function Point Counting Support Tool
- COSMIC-FFP: COSMIC Function Point Tutorial and Measurement
- FSeMP: Functional Size e-Measurement Portal

Measurement of Software Paradigms and Technologies

Procedural-Based Software Engineering (PBSE), the paradigm of the 70's and 80's:

- MACROPLUS: Metrics Based General Macro Programming Approach
- SVS: Software eValuation System based on the McCall Quality Model
- DORIS: Dialog-Orientiertes Quelltext-Redigierungs- und Makro-Implementierungs-System
- MALIS: Makro-basiertes Applikations-Generierungssystem für Leitungs- und Informationssysteme (LIS)
- MCOMP: Metrics-Based Compiler

Object-Oriented Software Engineering (OOSE), the paradigm of the 90's:

- OOMJ: OO Measurement of Java Technologies
- OOM: OO Modelling Measurement Tool
- MPP: Measurement of C++ Programs
- OOP: Measurement of Object-Oriented Programs
- STME: Smalltalk Measurement Extension
- QEV: Quality EValuation as Web-Based GUI for C++ Projects
- ETAS: Efficient Testing of Aspect-Oriented Programs

Component-Based Software Engineering (CBSE), the paradigm of the late 90's and 2000's:

- CoMeT: Corba Measurement Tool
- EJB-Eval: Evaluation of Appropriateness of EJB Application
- HOS: Higher Order Software Based Code Generation & Quality Assurance

Service-Oriented Software Engineering (SOSE), the paradigm of the 2000's:

- BPELmeter: Performance Measurement of Service Orchestration based on BPEL descriptions
- WSMP: Web Service Measurement Portal
- CPF: Cache Performance Factor Measurements of Windows Azure based Cloud Computing

Agent-Oriented Software Engineering (AOSE), the current and future paradigm:

- ARTEMIS: Agent-Based Measurement considering the ISO 15939
- Agent Academy: Evaluation of intelligent Software Agent Development Tools
- SAMF: Software Agent Measurement Framework
- PERF-Aglets: Performance Measurement of Mobile Agents using Aglets

Measurement Frameworks and Processes

Systematic Measurement:

- GQM: Goal Question Metric Approach

Ubiquitous Measurement:

- WEBTOMIX: Web Content Mesasurement based on Web Tomography
- SET Tool: Self Evaluation Test of Web Sites using the WCAG 2.0
- WMS: Web Measurement Suite

Adaptive Measurement:

- Wesement: Web Service Measurement Service
- EPOLL: Web-Based Online e-Poll Framework
- Hackystat: Software Process Measurement in Open Office Infrastructures
- PISA: Projekt-Information-Statistik-Analyse Approach of Industrial e-Learning Applications

Proactive Measurement:

- PEC: Proactive E-Learning Courses for Mobile Environments
- ABEL-GUI: Agent-Based E-Learning GUI

Ontology-Based Measurement:

- QuaD^2: QuaD^2 Approach Based Measurement
- GEO PORTAL: Ontology-Based Geo Portals with Semantic Web

Categorical-Theory Based Measurement:

- OPC: Efficiency of Organic Product Cataloges
- ArbiterOne: Performance-Based E-Commerce

Measurement Process Evaluation:

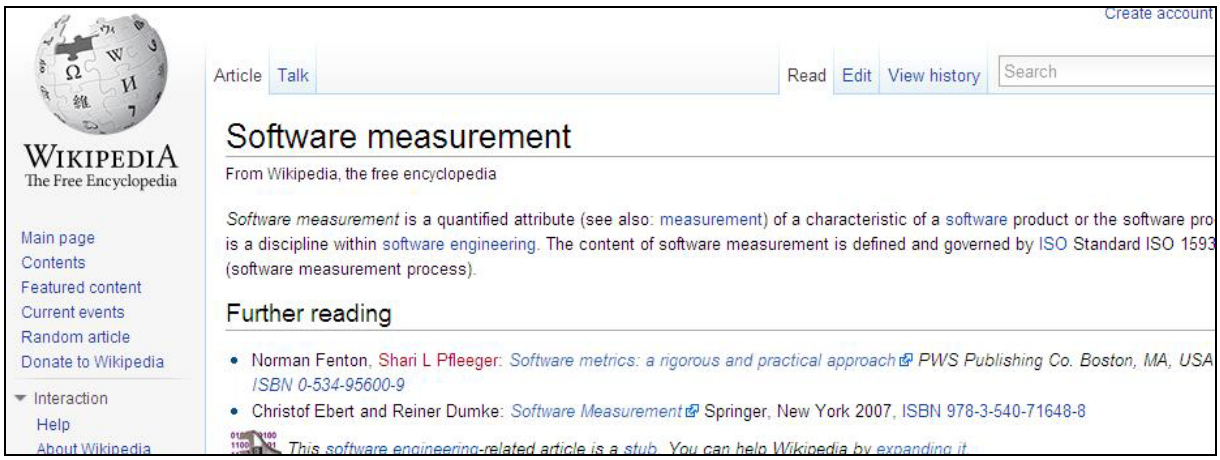
- CAME-PE: CAME-based measurement process evaluation

Measurement Repositories und Supports

- COCKPIT: Multidimensional Software Measurement and Evaluation
- MDB: Software Metrics Data Base
- SOFTMETRICS: Web-Based GUI of a Multi Tool Oriented Metrics Data Base
- ISBSG Portal: International Software Benchmarking Standards Group Data Exploration
- VisuGraph: Visualization of Web Based Infrastructures
- AMCI: Agent-Based Measurement Cockpit Infrastructure
- EXP: Experience Factory Portal

Hinweis: unsere neue GI-Webseite ist direkt zu erreichen unter **http://fg-metriken.gi.de/**

Außerdem ist unsere Thematik im Wikipedia noch zu wenig präsentiert. Während wir eine erste Charakterisierung zum Software Measurement haben (s. u.) fehlt zur Software-Messung und -Bewertung noch jegliche Beschreibung im Wikipedia.



Hier sollte unsere Community noch stärker wirksam werden.

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