TOTAL METRICS WWW NEWSLETTER DECEMBER 1998

Welcome to this month's newsletter which reports on the outcome from the International Software Benchmarking Standards Group (ISBSG) meeting held in the Netherlands last month. The aim of the meeting was to focus on ways in which the group can increase the value that it provides its members and to design an extended product range. The members of ISBSG represent software metrics groups world wide who contribute to the ISBSG's repository of software project metrics. Many large organisations now rely on the standardised data within the ISBSG's repository to cost effectively benchmark their project developments, or use as projected productivity rates for input into their project estimates.

For nearly 20 years, organisations worldwide have been using Functional Size Measurement methods to estimate the size of their planned software projects. However the successful use of functional size measurement has lain almost exclusively with those organisations that develop commercial type applications. Organisations who develop real-time control or embedded software have only been able to use the traditional FSM methods with limited success. We present a discussion paper that looks at the alternatives sizing methods and makes recommendations on suggested strategies.

On behalf of us all at Total Metrics I would like to extend our best wishes during this festive season and thank you all for our association over the last year. I hope that you will continue to find our newsletter beneficial in the coming year.

Pam Morris
Editor

CONFERENCES

Federation of European Software Measurement Association Conference Hamburg Germany April 26 – 29, 1999.

The FESMA conference, held annually, is billed as the 'number one' European software measurement conference. FESMA is an organisation that coordinates and supports the activities of various software measurement organisations from 7 european countries including Belgium, Denmark, Finland, France, Germany, Great Britain and the Netherlands. Following on from the success of the FESMA98 conference in Antwerp earlier this year, FESMA will hold the next series of annual conferences in Hamburg in 1999. The German Software Metrics group DASMA, will host the conference.

The conference will focus on achievements of information technology over the last 25 years, especially in the areas of software metrics in project control, estimating and risk management to determine how these achievements can be used for a new start in improving the software process in the new millenium.

The conference will also run an IFPUG certification exam. The deadline for registration to participate in the exam is February 15, 1999.

Proposed workshop topics for Monday 25th of April include; project management, function point counting fundamentals, software sizing, estimating, benchmarking and setting up a metrics program.

FESMA conference administration office can be contacted via email at the following address: fesma@conferences.ti.kviv.be

ESCOM-SCOPE'99 is currently calling for papers for their 1999 conference to be held on 27/29-Apr-99 at Hermonceux, Sussex, UK.
The deadline for submissions of abstracts is December 10th 1998. Send abstracts to R.J.Kusters@tm.tue.nl.

IFPUG Functional Size Measurement Certification Exam Schedule

The International Function Point Users Group (IFPUG) certify function point practitioners to be proficient in the interpretation and application of the IFPUG 4.0 Counting Practices Guidelines as described within their IFPUG Counting Practices Manual. The purpose of this certification is to assist organisations in ensuring their applications are being accurately measured. The certified counter is qualified as a CFPS – certified function point specialist.

IFPUG and its affiliated metrics groups hold the certification exam at regular intervals around the world. Certification once attained is valid for 3 years.

Certification Exams are scheduled at the following venues for the first quarter of 1999:

- Melbourne Australia – March 1st (contact asmavic@ozonline.com.au)
- Hamburg Germany – April 25th (contact fesma@conferences.ti.kviv.be)
- New Orleans USA – April 26th (contact ifpug@ifpug.org)

Total Metrics is offering a one-day exam preparation workshop on Friday February 12th in Melbourne to prepare participants for the forthcoming certification exam. The workshop includes a mock exam and gives advice on how to study and prepare to ensure success. If you would like more information about the Total Metrics Exam Preparation workshop email: *training@totalmetrics.com*.

NEWS AROUND THE WORLD

News on COSMIC – The New Generation of Software Measures

The COSMIC (Common Software Measurement International Consortium) project has begun! Metrics experts from around the world have begun work on the functional size measurement method which will take us into the new millenium. Members from the COSMIC consortium have submitted abstracts to present papers on the group's objectives and planned deliverables at both the FESMA and the ESCOM-SCOPE'99 conferences.
The title of the paper is : "One Size Fits All" – sub-titled "COSMIC - Aims, Design Principles and Progress".

The FESMA paper will be presented by Alain Abran, Professor at the Universite du Quebec a Montreal (Canada) and joint COSMIC Project Leader. The ESCOM-SCOPE'99 paper will be presented by Grant Rule from Software Measurement Services Limited UK.

Both presentations will cover the activities and planned deliverables of COSMIC. COSMIC has participation from leading software measurement experts from Australia, Europe and North America and aims to develop a new generation of measures of functional size for use in performance measurement and estimating in software activities. The proposed measures will draw upon the best features of existing IFPUG, NESMA, MkII and Full Function Point methods, the emerging ISO standards for functional size measurement (ISO 14143), along with new ideas. They are designed to achieve levels of accuracy and wide applicability beyond that available with current techniques, across both business "information processing" applications and "highly-constrained" software. They are intended as evolutionary improvements of existing functional sizing methods. The presentations will briefly review the origins, needs for the COSMIC approach, and the potential benefits. They will discuss the design principles and report on the project's current organization and status.

If you are interested in finding about more about COSMIC please contact one of the following:

➢ Americas	alain.abran@cosmicon.com
➢ Australia, South East Asia and Japan	pam.morris@cosmicon.com
➢ British Isles , Middle East, India	charles.symons@cosmicon.com
➢ Scandinavia	risto.nevalainen@cosmicon.com
➢ Western Europe	jolijn.onvlee@cosmicon.com
➢ Other Regions	peter.fagg@cosmicon.com

QuEST – Formation of a Consortium of Telecommunications Organisations for Common Software Measurement and Process Improvement Standards.

The QuEST Forum (**Qu**ality **E**xcellence for **S**uppliers of **T**elecommunications Leadership) recently announced their interest in contributing to the development of software measurement standards suitable for use by Telecommunications companies. QuEST is an international consortium of telecommunications companies initiated by key North-American telecom service providers to develop, with their suppliers, a harmonization of quality requirements within the telecommunications supply chain. The membership of QuEST includes in excess of 100 individuals from 40 international and regional telecom suppliers and providers working towards the common goal of creating and maintaining a consistent set of quality system requirements for the telecommunications industry - worldwide. Because software is such a key component of telecom products, QuEST has already started to take into consideration the work of ISO/IEC JTC1/SC7 in areas such as Life-Cycle Processes. If you would like to find out more about QuEST contact: Jean-Normand Drouin via email: jndrouin@qc.bell.ca

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International Software Benchmarking Standards Group Meeting Netherlands 8 –11 November 1998

Nine members from six countries attended a structured workshop to establish strategies on how ISBSG can:

- increase the value that it provides to its member organisations
- provide greater benefits to software engineers through an improved and extended product range
- strengthen its financial position so that it can continue to service its members in a professional way
- attract an increasing number of project submissions.

The outcome from the meeting was a decision to provide a range of products to the ISBSG member metrics associations, beyond the current Repository report and data. These new products are planned to include a selection of papers covering the following topics - research papers on practical use of the the repository data, how to use the repository for estimating, information on how team size impacts productivity rates, other factors which influence project productivity, descriptions of data within the repository, and the relationship between size, productivity and project duration.

The availability of these products combined with competitive product pricing and marketing will provide improved value to the ISBSG member organisations. It was agreed to improve the

mechanism for submission of projects into the repository by enhancing the manual and electronic data collection methods and making these available to members.

The ISBSG WWW site has been recently updated and it is recommended that people interested in finding out more on the repository and its report take a look at the site at http://www.isbsg.org.au.

Discussion Paper

EVALUATION OF FUNCTIONAL SIZE MEASUREMENT For REAL-TIME, EMBEDDED and CONTROL SYSTEMS

Executive Summary

1. BACKGROUND

For many telecommunications and electronics industry organisations their software applications portfolio is representative of a wide variety of functional domains. Most of the applications are 'data rich' and are described as being MIS (Management Information Systems) type software. The remaining 10-20% of the applications can be classified as belonging to the 'function' rich or 'control' rich domains that are commonly described as embedded, control or real-time software.

As part of the contract performance monitoring, the supplier needs to implement productivity measures, which monitor the amount of software, delivered per unit effort or cost. The amount of delivered software is measured by determining the functional size of the software product using IFPUG Function Point Analysis version 4.0.

2. ISSUES

Most applications within an organisations can be satisfactorily sized using IFPUG FPA. For these 'data' rich applications, the people who develop and support the software are usually satisfied that:

- The IFPUG FPA method measures functional size, which represents the functionality, required, developed and supported within the software.

- The measured size correlates with the effort to develop, enhance and support the software.
- The software can be measured repeatably over time, using different counters to arrive at an equivalent functional size.

However in many cases when IFPUG FPA has been applied to the 'control rich' and 'function rich' software the people who develop and support the software do not observe this same behaviour. That is:

- Many of the functional requirements delivered by the software have not captured using the FPA technique.
- The functional components measured by the FPA technique do not have an equivalent within these types of software, requiring the rules to be 'bent' in order for the software to be measured.
- The measured FPA functional size does not correlate with the comparative effort to build, enhance or support these applications.
- The software could not be measured in a repeatable way since different counters 'bent' the rules in different ways.

The developers of these 'non MIS' software applications generally reject the FPA technique as a capable method for measuring the functionality delivered by their applications and feel that it is an invalid measure for use in productivity comparisons or as an input into estimating.

3. MEASURING FUNCTIONAL SIZE IN OTHER FUNCTIONAL DOMAINS

3.1 IFPUG FPA Technique

The IFPUG FPA technique was developed and has been refined for use in MIS type applications where it has been used very effectively for over 20 years as input into productivity comparisons and estimating models. However its limitations in non-MIS applications has been widely reported and published by many researchers. (Conte, 1986; Galea, 1995; Grady, 1992; Hetzel, 1993; Ince, 1991; Jones, 1988; Jones, 1991; Kan, 1993; Whitmire, 1992).

The inability for industry to measure these types of non-MIS applications is reflected in their lack of representation within the ISBSG repository. (In Release 5 of the ISBSG repository less then 10 projects of the 450 submitted were non-MIS).

3.2 Existing FSM Methods

Since the mid-1980s developers in non-MIS environments have explored alternative methods for measuring functional size. These methods, their degree of use and benefits and limitations are summarised in the table below.

Method Name	Functional Domain	Degree of Penetration in FSM users	Benefits	Limitations	Current Status	Data in ISBSG Database	Comments
Feature Points (1987)	Scientific, Algorithmic	Few users in USA, mostly SPR clients	Measures Algorithms	Could not arrive at a consistent definition of Algorithm	Not supported by SPR, no longer used	NO	Had potential but not for real-time or control systems. Problem with measuring algorithms
Mark II (1989)	MIS Potentially real-time	>50% of UK market. Few users outside the UK	Measures inputs and outputs from processes. Lower emphasis on data	Calibrated for MIS environment. Limited tools and trained people outside UK.	In use and being refined. Data in ISBGS database	YES	Similar to FFP. Has possibilities in the real-time environment but needs re-calibration
Boeing 3D (1994)	Real-time	Very very small	Measures state transitions and data transformatio ns	Not useful when specifications are not the same as that used in Boeing	rarely used outside Boeing	NO	Had potential but limited if specifications were not written in a specific way
Full Function Points (FFP) (1997)	Real-time embedded, control systems	Users in Canada, Australia, Japan, UK, USA	Designed specifically for real-time and embedded software	New, limited tools and trained staff available	Only supported method available for Real-time embedded, control systems	YES (Next Release)	Most viable method available until COSMIC is released. Will provide major input to COSMIC method.
COSMIC (2000)	MIS, Real-time embedded, control systems	Still in development based on FSM concepts embedded in FFP, MarkII and FPA.	Measures processes with a lower emphasis on data. Being developed by International Consortium of experts and researchers	Planned delivery date November 2000	Not available for public use for 2 years but will be ISO compliant and ISO verified.	Planned	Will be internationally developed under ISO framework to maximise internationally recognition.

3.3 Planned International FSM Standards : COSMIC

Cosmic (Common Software Measurement International Consortium)[1] is a group established by 5[2] countries interested in an international standard set of software measurements which are ISO compliant. The first deliverable is a functional size measurement method which addresses both the MIS and Real-time domains and is based on FFP, Mark II and FPA.

The COSMIC core team is a group of international metrics experts[3] which include; Charles Symons (developer of MarkII and Alain Abran and Jean Marc Desharnais (developers of FFP) and Pam Morris[4] (Convenor of ISO FSM Standard) and Peter Fagg (IFPUG Counting Practices Committee). It is anticipated that the COSMIC method will be a refinement of FFP , Mark II, IFPUG and NESMA methods.

3.5 Conclusion

COSMIC is an optimal solution for an FSM Method that is planned to have the following characteristics:

- ISO 14143 compliant
- Applicable in non-MIS domains
- Internationally developed, tested and accepted
- Validated using the ISO 14143 framework.

However the COSMIC FSM Method will not be ready for another 2 years, assuming adequate funding is available.

In the meantime, FFP is the only existing method to measure for Real-time, embedded or control software that has the following characteristics:

- Is currently available
- published in the public domain
- supported by a counting practices committee drawn from International Experts
- is available in several languages
- has formal training courses available
- has software to support counts
- has been field tested to demonstrate its usefulness in the real-time domain
- is used in a number of countries
- is accepted as a functional size measurement technique by ISBGS repository
- is used by other telecommunications companies
- developed specifically for real-time software

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[1] Refer Total Metrics November Newsletter for the summary of the aims and deliverables from COSMIC

[2] Current members include UK, Canada, Finland, Netherlands, and Australia – Japan and USA have expressed interest in participating.

[3] Pam Morris from Total Metrics is a member of the COSMIC core team representing Australia.

[4] Pam Morris from Total Metrics is also a member of the IFPUG Counting Practices Committee and the FFP Counting Practices Committee.

FFP was field tested in three countries with two communications companies (Bell Canada and Nortel). It shows more promise than any other method in this domain and is already in use in Japan, Canada, UK, USA, and Australia. It has been translated from English into French and Japanese. There are currently in the order of 20 projects ready for submission to the next release of the ISBSG database. The FFP user group is made up of experts from USA, Japan, Canada, UK and Australia. Its members have extensive experience in the development of counting practices guidelines. Ie. FFP CPC members (Denis St. Pierre and Pam Morris) are also current members of the IFPUG CPC and Grant Rule is a member of the Mark II UK User Group.

FFP has only been released into the public domain, just over 12 months. A software tool to support the FFP technique is currently being developed and will be ready for Beta testing at the end of 1998. Training courses are being run in Europe, Canada and Australia in the last quarter of 1998.

4. IFPUG FUNCTION POINT ANALYSIS

4.1 IFPUG's Position on Counting Non-MIS Software

IFPUG do not explicitly state the applicability of their FPA method for different functional domains, however they implicitly do not exclude its applicability in any domain. The recognition of the difficulties in applying the technique to non-MIS software has been raised within IFPUG membership. In order to address the issues raised, the IFPUG New Environments committee developed a case study (Case Study 4 TRAC Traffic Light Control System) which they counted the real-time specification using traditional IFPUG FPA methods. Case Study 4 is due for release before the end of 1998 and contains some realtime components.

4.2 IFPUG's Position on FFP

The FFP technique was developed and calibrated to fit with the IFPUG FPA technique. Early in 1998, requests from the IFPUG members to evaluate this new technique initiated the setting up of an FFP review committee. The committee is currently evaluating FFP; their preliminary report to the IFPUG board in September 1998 was that the review was worth pursuing and that they required more material and time for reviewers. They anticipate that the final review will be completed by February 1999.

4.3 IFPUG's FFP Review Report

The objectives of the review of the FFP technique is not to check its 'usefulness' or validity as an FSM technique but to check whether it is a valid extension to FPA and to ensure the research design was competent. IFPUG were initially planning to check FFP for compliance to the Functional Size Measurement Standard ISO 14143 – Part 1 and verify it using Part 3 but it is understood that this no longer within scope.

The relevance of the outcome from this FFP review to the potential users of FFP is unclear since the review plan does NOT include assessing the technique in the field with actual applications and actual effort figures.

4.4 FSM - ISO Compliance and Verification Testing

The ISO Functional Size Measurement suite of standards (14143 – Parts 1,2,3,4,5) have been developed by 17 countries over the last 6 years, specifically to assist users of a new FSM Method to assess its claim that it measured functional size within a particular functional domain and its measures could be used for specific purposes. Part 2, the compliance standard, has been approved as a Committee Draft standard and the current draft can be used to check compliance to the concepts of a Functional Size Measurement Method. The FFP Counting Practices committee is currently undergoing the compliance testing of FFP. Part 3 of 14143 - Verification of an FSM, is being developed as a Technical Report Type 2 and is not yet ready for use but has been approved as a Preliminary Draft Technical Report. Part 3 gives guidance to users on how to test the accuracy and validity of a functional size measurement method.

4.5 Conclusion

The value of the IFPUG assessment to organisations needing to use a functional size measurement technique for real-time control or embedded applications is uncertain since the IFPUG criteria for approval is *NOT* to check the most important criterion for most organisations' needs i.e.:

- the validity or accuracy of FFP as an FSM method in a real-time domain,
- whether FFP gives better results than FPA when used in productivity comparisons or estimating models.

The only *internationally developed* process to check an FSM Method is via the methodology outlined in the ISO 14143 FSM suite of standards. However this framework of standards is still in draft form and will not be ready for at least 18 months.

The other alternative approach to assess a method is to review the published literature on [5]field tests or for an organisation to field test a method on a number of pilot projects and correlate it against the relevant effort figures.

Overall Conclusion

If your organisation needs to start measuring non-MIS applications now, then it is recommended that they use FFP in its current form until the COSMIC standard stabilises and then migrate counts to the new method in 2001.

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[5] Oligny, Serge, Abran, Alain, Desharnais, Jean-Marc, Morris, PM, *Functional Size of Real Time Software: Overview of Field Tests* 13th International Forum on COCOMO and Software Cost Modeling – Los Angeles, October 1998.

About the Author – Pam Morris

Ms Pam Morris (B.Sc., Dip. Ed., Grad. Dip. Computing, CFPS), is the Director of Consulting and Training for TOTAL METRICS Pty. Ltd. She has extensive experience in the software development field, specialising in software process improvement and software metrics since 1989. She has combined her consulting and tertiary teaching experiences to develop and present numerous Software Measurement and FPA training courses to over 200 organisations and 900 attendees in Australia, the United States of America, UK and New Zealand since 1991.

Ms Morris is a founding member of the Australian Software Metrics Association (ASMA), holding a position on the Executive Board and the Function Point Counting and ISBSG Benchmarking Database Special Interest Groups.

Ms Morris is the international project editor of the ISO Standard 14143 for Functional Size Measurement and is convenor of WG12 (the ISO/IEC standards group responsible for the development of functional size measurement standards). She plays an active role internationally in the development of the FPA technique and represents ASMA on the International Function Point User Group (IFPUG) Counting Practices Committee and the Full Function Point Counting Practices Group. She is the Australian representative on the newly formed Common Software Measurement International Consortium and is on the IT15 Standards Australia committee for Software Engineering standards.

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