TOTAL METRICS WWW NEWLETTER NOVEMBER 1998

Welcome to this months newsletter which provides an insight into the recent advancements in the progression of software measures with the establishment of the COSMIC initiative. COSMIC (Common Software Metrics International Consortium) is a group of international metrics experts and sponsors who have set up a project which aims at developing a set of software measures to address the measurement needs of the Information Technology industry beyond the millenium. The project aims to target a wide range software functional domains and provide the IT industry with better measures for productivity comparisons and for estimating software effort, cost, schedule and resources. We review the aims and deliverables of the group and discuss the benefits of such an initiative to the IT industry, worldwide. We have continued with our reviews of major Software Metrics conferences and this month review the UKSMA 10th Anniversary conference (United Kingdom Software Metrics User Group) held in London late October. We summarize presentations given by two of the keynote speakers; the most renowned of which was Tom Gilb. Gilb is recognized as a metrics 'guru' and originally coined the term 'software metrics' in his book of the same name in 1976. His presentation reviewed the 1995 Ratheon Report, which he held up as an excellent example of process improvement driven by the *measurement* of that improvement. Other key note speakers included, Carol Dekkers the current IFPUG president who spoke about the IFPUG Vision of the future and Professor Alain Abran from the University of Quebec in Montreal who introduced the new Full Function Point Method for sizing software, to the UK audience. Pam Morris from Total Metrics Australia extended the topic of FFP by discussing its effectiveness in measuring utility, infrastructure and systems software, with a focus on the needs of outsourcing contract performance requirements.

Next month we will report on the outcome from the International Software Benchmarking Standards Group (ISBSG) meeting which is being held in the second week of November in the Netherlands.

CONFERENCES

IFPUG Spring Workshop – *Hyatt Regency New Orleans LA USA April 25th to 27th 1999*

IFPUG announced at their recent Orlando conference that in future they would only hold one conference a year. The next one will be held in the last quarter of 1999. However in the first half of each year they will be holding *Workshop Meetings*. IFPUG has scheduled their first *Workshop Meetings* for April 25 –27 1999 in New Orleans. These meetings will offer a wide range of training courses in software measurement related topics as well as the IFPUG certification exam. The various IFPUG committees will be also taking the opportunity to hold their meetings at this time. The Counting Practices Committee (CPC) will be giving half-day training courses which highlight the differences between the Counting Practices rules defined in the new version 4.1 of the Counting Practices Manual and the previous version 4.0. (The new 4.1 Version is planned for release January 1999). Pam Morris from Total Metrics, who is also on the CPC, will be presenting a workshop on Validating Function Point Counts. This Validation workshop has been an enormous success in the past and is usually booked out months in advance so book now if you are interested. If you would like more information on the format and content of the one-day course contact Pam

Morris email: Training@Totalmetrics.com. Visit the IFPUG web-site (http:/www.ifpug.org) for more information and a complete listing of all the workshops being offered.

The next IFPUG Conference is scheduled for October 18th to 22nd 1999, and will also be held in New Orleans. The format will combine the workshop meetings with presentations on software metrics from industry representatives. It will include a conference dinner and the usual conference proceedings.

NEWS AROUND THE WORLD

Functional Size Measurement article in *Scientific American* and *Fortune*

The December 1998 issue of *Scientific American* will feature an article on Function Points, by software Measurement guru Capers Jones. Jones is also publishing an article on the same topic in *Fortune* in the coming months.

COSMIC – The New Generation of Software Measures

A group of international software measurement experts from five countries met last week in London to establish the COSMIC (Common Software Metrics International Consortium) project. The group were drawn together by a common goal to refine current software measures to enable them to be used effectively across a variety of functional domains and software development platforms beyond the year 2000. COSMIC aims to develop improved ways of measuring the size of software for use in software development estimating and in measuring the performance achieved in software activities. Charles Symons (UK) and Professor Alain Abran (Canada) are the project managers of this initiative. They are currently seeking industry support in the way of financial sponsors, research associates and technical expertise.

Background of the COSMIC initiative

Accurate estimating and measuring the size of software is a subject of huge economic importance for the software industry.

Software suppliers face the task of translating customer requirements into the size of software to be produced as a key step in their project cost estimating. Customers want to know the size delivered as an important component of measuring supplier performance.

Given the explosive growth and diversity of software contracting and outsourcing, suppliers and customers need more accurate ways of estimating and of measuring performance, which must work equally reliably across all types of software. Current methods for measuring the size of software are not always of sufficient strength to meet market needs, or work only for restricted types of software. Industry urgently needs software size measures which are demonstrably more accurate and more widely usable.

As software contracting and outsourcing is a global activity, it is also essential that the new methods are tested and accepted internationally.

The COSMIC initiative aims to meet these needs.

Conditions are now ripe for success

The consensus of a large number of industry experts in estimating and performance measurement is that there is now sufficient experience with existing software sizing methods (specifically the 'IFPUG', 'MkII', 'FFP' methods and ideas embodied in the developing ISO standards) together with emerging ideas, that the new methods can be developed in the very short term.

A group of internationally recognized experts in the software measurement field have pooled their resources to start work on defining the new methods. Their target is to have a first release ready for testing within a very few months. Experts participating in the project are initially drawn from Australia, Canada, Finland, Netherlands, UK and the USA.

The group has formally defined a set of Aims (see below) and established itself as the Common Software Measurement International Consortium, or 'COSMIC'.

The need for field testing and hence industrial sponsorship

Experience shows that development and thorough field testing of new software sizing methods to the point where they are demonstrated to be robust can take several years. But industry urgently needs the new methods today.

The COSMIC founders are therefore currently seeking sponsorship from major software producers and users to support the detailed design effort and to participate in field testing which is planned to begin in the next few months. If enough sponsoring partners can be found, the time to market can be reduced from several years to one to two years.

If you are interested 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

AIMS OF COSMIC

To develop test and bring to market a new generation of software size measure(s), which have the following characteristics.

Accommodate Business Needs

- are suitable as a basis for normalizing and comparing performance measures of productivity (size/effort), speed of delivery (size/elapsed time) and quality (e.g. defects/size) for activities throughout the life cycle of the software
- are suitable for use as a component of estimating methods for development and maintenance effort and time
- can assist in the estimation of the operational life cycle costs

Optimize the Scope of applicability

- in principle applicable to as wide as possible a range of software 'domains'; in practice priority will be given to business software and its supporting software as in operating systems, and to real-time software as in telephony, process-control, or embedded software; a second priority will be to investigate algorithmic-rich software

Include the following Desirable Characteristics

- should be derivable from user requirements; the size measures should separately cover functional user requirements and other user requirements (e.g. technical and quality requirements). The priority will be to initially measure functional user requirements. These methods should also work for sizing information processing requirements before they are specifically allocated to software

- are based on some verifiable theory, i.e. the method has an academically sound basis and we should be able to explain very clearly what it is we are measuring. The sizing methods should be independent of specific software development methods and notations, but compatible with modern ways of stating software requirements such as structured methods, relational data analysis, the object orientated paradigm, etc.; conformant with ISO Standard 14143/1 on Functional Size Measurement and conformant with measurement theory.

- draw on the best ideas from the current ISO 14143, NESMA, IFPUG 4.1, MkII 1.3.1, and FFP methods and other relevant concepts if needed, but unconstrained by adherence to any particular method

- can be calibrated to demonstrable levels of accuracy and precision for defined purposes, that is producing software sizes with known confidence levels. This implies the weightings (or 'units' allocated to the various types of requirements) have some rationale behind them, for example they can be justified in relation to measurable or observable phenomena in real software.

- should be reasonably simple to explain to potential users of the methods and require a manageable effort to apply.

- should be precisely defined and designed to be repeatable, so to aim to eliminate subjectivity. The result will be that the methods will be more easily automated

- should be sufficiently widely accepted to be regarded as an Industry Standard; target maximum time to market should be 2 years.

If you would like to find out more about the COSMIC project hen contact Charles Symons at charles.symons@cosmicon.com.

IFPUG Certification Exam held in Australia and the United Kingdom

The IFPUG Specialist Function Point Counter exam is held twice yearly at IFPUG conferences and workshop meetings, however a number of user groups throughout the world are also licensed to hold this exam. In the last two weeks the exam has been held both in the United Kingdom and Melbourne Australia. Attendees who pass the exam are recognized internationally as 'certified function point specialists' or *CFPS*. The exam has very high pass criteria and only half the participants who sit the exam actually pass. In order to qualify, as *CFPS* the participant has to pass by over 90% in all three sections of the exam. The certification process ensures that organisations selecting external consultants, only select those which have been proven to understand the principles and concepts embodied by the IFPUG 4.0 counting practices manual.

The Australian Software Metrics Association (ASMA) hosted the recent certification exam held in Melbourne and they are planning to run another in the first half of 1999. If you would like to register for the next Australian exam, contact ASMA on asmavic@ozonline.com.au. Total Metrics offers a one-day exam preparation workshop to prepare participants for the 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.*

Functional Size Measurement Standards pass their first round of International Balloting

The International Standards Organisation (ISO) has under its scope of work, a project 7.31, to develop a suite of standards for functional size measurement. ISO/IEC/ JTC 1/ SC 7/ Working Group 12 (WG12) administers the 7.31 project which is up of five component parts:

1. Definition of Concepts
2. Compliance Assessment of Software sizing methods to ISO/IEC 14143-1:1998
3. Verification of a Functional Size Measurement Method
4. Functional Size Measurement Reference Model
5. Determination of Functional Domains for use with Functional Size Measurement.

Part 1 the Definition of Concepts was approved as a full international standard mid 1997. The other four parts were balloted in July of this year for the status of a Committee Draft standard (Part 2) and as Preliminary Draft Technical Reports (Parts 3,4,5). At the recent WG12 November meeting in London, it was announced that all four parts had been approved i.e. 75% of the 15 countries voted 'yes' to progress the documents to the next stage in the ISO process. This means that work can progress within WG12 towards establishing part 2 as a full international standard and the other parts as Technical Reports. Pam Morris, the director of consulting at Total Metrics, is the international convenor of WG12. Contact her at *Pam.Morris@totalmetrics.com* if you would like more information on the content and aims of the standards.

REVIEW ARTICLE

Software Measurement in Practice

United Kingdom Software Metrics 10th Anniversary Conference October 29th to 30th 1998

The recent UKSMA conference in London UK October 29th to 30th 1998 focussed on the practical application of software measurement. Approximately 60 delegates participated in the conference representing over 10 countries. The keynote speakers included Tom Gilb (respected author, expert on defect prevention and software engineering guru) spoke on the powerful and pitiful measures of software engineering. Carol Dekkers (IFPUG President) presented IFPUG's vision of the future. Alain Abran (metrics researcher and developer of FFP) and Pam Morris (Convenor and project editor of the ISO standards for functional size measurement) presented research results from the new Full Function Point (FFP) method.

Key Note Address 1

Tom Gilb (Gilb@acm.org) *Powerful and Pitiful Measures of Software Engineering*

Gilb began his presentation emphasizing that much of the supporting material for his talk could be found on his WWW site. www.gilb@acm.org. The site provides visitors with a plethora of free papers and books. The cost of non-conformance and defect prevention was the focus of Gilb's

presentation. He used the 1995 **Ratheon Report** by *Dion et al* to support his main points. He described the report as an excellent example of process improvement driven by measurement of that improvement. The Ratheon Report is available from: *WWW.sei.cmu.edu/products/publications/95.reports/95.tr.017.html*. The report discusses the cost of quality over time at Ratheon. They measured the cost of non-conformance (cost of injecting defects) over six years (1998 – 1994). Over that time the cost of rework was reduced from 43% of the total development costs to less than 5%. Gilb's experience has shown that the cost of rework in an organisation is usually 40%-60% if not controlled. However organisations have found that in only a few years of applying process improvement strategies they can gain an order of magnitude of improvement. E.g. Ratheon achieved an improvement from 43% to 30% in the first year. This resulted from the realization that although the organisation had standards for software development no one was actually using them. Inspection techniques measure deviations from standards and procedures. Gilb emphasized the power of such a simple metric (cost of non-conformance) and how it can be easily translated to real 'bottom line' costs to management. His experience has found that it is a great measure to get management commitment to a measurement program. However despite the effectiveness of the measure and the impact of rework on profit, many organisations do not have any processes in place, which focus on driving down rework effort. He has found that whilst the IT department wants technical measures to control its processes these are often not understood by the financial controllers who actually approve funding and support. He recommended that if you are going to have an effective measurement program you need measures are understandable by management to engender their support. However he emphasized that it not what you measure but what you *do* with the measure which is the most important aspect. He recommended the use of 'feedback' measures. I.e. Measures that give you feed back on your processes to enable you to target areas for improvement. Some measures, which he recommended, included measuring product quality by 'bug density' i.e. Defects delivered per unit product. But he felt that a more powerful variation of this metric is to measure the mean time between impact on users. I.e. Measure the bugs, which annoy users, and how frequently they appear. Defect density just measures 'defects' not the frequency of impact. It is a technical measure; not a customer orientated measure. If your organisation is customer focussed then a good feed back measure would be one which measures those defects which impact customers.

Powerful metrics are those which support strategic or fundamental objectives. Fundamental objectives are those which focus on the organization's profit and survival. They include optimizing Software Productivity rates, minimizing lead-time, and maximizing predictability of product and predictability of time to market, and optimizing product quality, customer satisfaction and profitability. The measures to support these fundamental objectives were the 'means' by which the fundamental objectives could be achieved. These 'means' objectives would be to measure the number and severity of customer complaints, rework costs, service costs, training costs, specification defectiveness etc. Gilb warned not to shift your focus away from the fundamental objectives to the 'means' objectives or they can become primary. Focus on what is important to the strategic direction and profitability of the company.

He also recommended that if you are responsible for process improvement within your organisation that you develop your own motivational skills since you need to motivate an organisation via leadership to get the organisation to change. Gilb was a charismatic and dynamic speaker and his presentation was well received by all.

Key Note Address 2

Carol Dekkers *Functional Size Measurement and Software Metrics – A vision of the Future*

Ms Dekkers is the current president of the International Function Point Users Group she is the CEO of Quality Plus a US based organisation, which specializes in quality and software metrics. She is the project editor of the ISO Functional Size Measurement Technical Report 14143-5.

Ms Dekkers started her presentation with a brief background on IFPUG, the International Function Point Users Group, which was established in 1986 by 12 organisations, which had adopted Albrecht's rules. They joined together with that aim to formalize Albrecht's rules. Initially there were only two IFPUG committees but these have grown to the current 10 committees

- Counting practices committee (CPM , subcommittees)
- ISO 141143 (14143 – 1-5, Category C Liaison, reviews)
- Certification committee (training and CFPS)
- New Environments Committee
- Applied programs - Benchmarking Committee, Management Reporting Committee
- Conference Committee
- Education services Committee
- Communications and marketing
- Academic affairs committee

IFPUG Membership is growing. Ms Dekkers stressed that IFPUG will always be a 'not for profit' volunteer run user group committed to the exchange of knowledge of ideas for improved software measurement technique.

New Vision at the tactical level.
IFPUG have introduced a 'New methods review process' to look at any new Functional Size measures and what they offer to IFPUG members. They are currently reviewing the final drafts of the CPM 4.1 for release January 1998. They are planning over the next year to continue to develop new case studies certification procedures and white papers etc. The vision for the near future includes their continued ISBGS membership and participation as well as ongoing training on benchmarking techniques and methods.

Their Academic affairs committee liaises with universities and encourages them to increase the use of software metrics in university metrics curriculums.

One of IFPUG's main challenges for the future is the urgent need to awaken the mainstream information technology industry to the benefits of Functional Size based measurement. They also face the dilemma of the growing number of Functional Size Measurement variants and need to decide whether they are to be embraced or rebuked. They have identified that they need to focus their metric improvement efforts. Some potential areas identified include:

- Industry needs on metrics usage (estimation, user value)
- Statistical validity and research results
- Perceived need for conversion factors, leveraged metrics etc

- Ease of use of metrics (automation potential, speed of measurement)
- Development of new metrics (builds on or strip down?)

Ms Dekkers closed her presentation with a reiteration that IFPUG was member focussed and their main objectives were to meet their members needs as identified in the ’97 survey.