COSMIC Method 4.0 – latest news

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An updated version 4.0 of the COSMIC Measurement Manual (MM) is being prepared for issue by early 2014. The designation '4.0' indicates this will be a major revision of the MM, in two ways:

• Proposed changes to the method between releases of the MM are published in 'Method Update Bulletins' (MUB's). Four MUB's have been published since the current v3.0.1, all available on www.cosmicon.com, and a fifth (MUB 11 – see below) will be published shortly. The MM 4.0 will incorporate the changes for all five MUB's.

• We are trying really hard to make the MM easier to understand, so there will be many editorial improvements.

On the other hand, v4.0 will not change any of the fundamental principles and rules of the method. All existing measurements should remain valid unless mistakes have been made due to a lack of clarity in our definitions and rules.

Since the method was first published in 2000, we have needed to issue only eleven MUB's. Yet over the years, the method has been used to measure an ever-widening range of types of software (SOA components, smartphone apps, components of distributed web systems) with only the need to clarify some existing rules and definitions. This is a very satisfying indicator of the method's stability and of our commitment to ensure its continuity.

Upgrading to v4.0 does not stop with publication of v4.0 of the MM. The 'Method Overview' document has been completely re-written to make it easier to understand; it is currently being reviewed by the MPC. Next, some other existing Guidelines will need editorial changes to align them with v4.0. The existing 'Advanced & Related Topics' document will be replaced by two new Guidelines, on 'Approximate Measurement'; the other on 'Convertibility'. Finally, all the current eleven translations of the MM will need to be updated. There is a great deal more to do but we hope you agree that the goals of improving the method definition and of making it easier to understand make the effort worthwhile.

Method Update Bulletin 11: functional process definition refined

Work on MUB 11 delayed v4.0 by one year

MUB 11, to be issued shortly, concerns the definition of a 'functional process' and several related topics. The reason for the change was the realization that the current definition could be mis-interpreted, leading to a measurement error. The functional process is the corner-stone of the method, so we should not change its definition without very careful thought. Hence the Measurement Practices Committee reviewed eleven iterations of MUB 11 over the past year to get it right.

We strongly urge users to study MUB 11.

Interest in the COSMIC method accelerates!

Download rate doubles in one year

In the last COSMIC News (September 2012) we reported that the number of downloads of the English-language version of the Measurement Manual from www.cosmicon.com had reached 2700, having increased four times over the preceding nine months. The total for all languages had reached 6250.

Now, one year later, the totals for the English version have reached 6,000 and for all languages 13,500.

The average rate of weekly downloads over the last year is now **double** what it was for the first nine months of 2012 when we first started tracking download statistics.

N.B. These figures do not include downloads from other sites around the world.

Will v4.0 mean that I must re-take the certification examination?

The Certification Chair (Jean-Marc Desharnais) has carried out an impact analysis of the changes that will come with v4.0 on the questions and answers of the Foundation-level certification examination. This shows that the answer to only 1 of our stock of 274 questions needs to be changed to make the exam compatible with v4.0.

We will therefore recognize that anyone who has passed the exam at the current level of v3.0 will be considered by COSMIC as still certified for v4.0. However, the wording of some questions can now be improved, some questions will be deleted and some new ones added, so the, exam will be revised soon after v4.0 is published, affecting about 20% of the current set of questions. We will therefore recommend existing certificate-holders to re-take the exam when it is upgraded to re-assure the market of the continuing validity of their qualification.

COSMIC news from around the world

Brazil: A first COSMIC training course in Brasilia given by Fatto Consulting attracted representatives of Brazilian Federal institutions including the Central Bank, from Petrobras (one of the world's largest oil companies), a bank and two outsourcing companies. Use of COSMIC was seen as solving problems that 1st Generation FSM methods could not solve properly such as sizing software for web-enabling and for multi front-end applications, middleware needed to adapt existing software to a new DBMS, maintenance changes, support software, etc.

Italy: INPS (Istituto Nazionale della Previdenza Sociale), the Italian Government department for social security is trialling the COSMIC method for situations where 1st generation methods (previously recommended for use in Government IT) have proven inadequate.

Japan: JFPUG, the Japanese Function Point Users Group, has translated the COSMIC Standard (ISO/IEC 19761) into Japanese. It is expected to be published as a Japanese Industrial Standard (JIS X 0143:2014) early next year.

Mexico: In November, Francesco Valdes will publish a paper on *Using the ISO 19761 COSMIC Measurement Standard to Reduce "Information Asymmetry" in Software Development Contracts and Enable Greater Competitiveness*", in the journal 'Technology & Investment.'

Poland: At a PoSMA workshop organised by ZUS (the very large Polish Government agency for social & medical insurance) for senior management and IT directors from government administration. ZUS proposed on the basis of their experience that the COSMIC method should be adopted as standard for the whole Government administration in Poland.

COSMIC Foundation Level Certification exams have been held in several countries this year including the first exams in Brazil and China. As well as English, the exam is now available in Italian and Portuguese and soon will be available in Polish and Spanish.

Re-thinking test metrics with COSMIC

We have long recognized that a list of COSMIC functional processes provides an excellent basis for test planning. Now, Thomas Fehlmann has extended the idea to use data from COSMIC measurements to size test cases and to re-think some traditional test metrics.

The Problem:
Organizations that are rapidly building up business-critical portfolios of apps for smartphones face new test challenges. Traditionally, software testing experts define *defect density* in relation to code size, e.g. as 'defects per KLOC'. Defects are anomalies detected in tests or after release. But code sizes are meaningless for much of today's software and service portfolios. For instance, apps are extracts of software services mapped to (contd.)

Test metrics

need re-thinking

for smartphone

apps.

COSMIC

measurements

can help

(contd.) smartphones, with as little native code as possible. And this native code only deals with identification, authentication and graphical rendering, not with the functionality that the user expects.

Furthermore, testing such software usually only reveals that 'function X does not work'. Testing staff may not be able to say much more about the actual defect, or defects, that caused a test failure.

So, how should you monitor test progress, record defects and calculate measures such as defect density and test coverage when you do not have access to software code?

The approach to testing apps: Typically, the approach to testing apps relies on 'test stories' (or 'test scenarios') that map customers' needs (what they should expect from the software or services they use) to functionality. Test stories are executed by a number of test cases, each of which defines test data together with the expected response; they usually apply to one but sometimes more than one functional process. Test cases use different test data to investigate whether exceptions and invalid data are handled properly, as well as correct and consistent input data.

Test measurements: Lacking any knowledge of KLOC, we need a measure that can be used to size tests, to which defects can be easily related, and that

is linear i.e. the size of a 'whole' is equal to the sum of the sizes of its parts. The COSMIC method meets these preconditions and is the only FSM method to do so.

Fehlmann first proposes to define a *test case size* as the count of the number of data movements to be executed by the case. Example: suppose a functional process of size 9 CFP, including an error message. A test case that had no input errors and that should execute all data movements of this process would have a size of 8 CFP. Another test case with one input data error would have size 2 CFP (the Entry that must process the faulty input data, plus the resulting error message). The size of a test story is simply the sum of the sizes of all its test cases, say 75 CFP, for our example.

Fehlmann defines *test intensity* as the ratio of the size of the story to the size of the functionality tested by the story. So in our case, if this test story covers only the one functional process, the 'test intensity' would be 75 / 9 = 8.3.

Test Coverage of a test story indicates, as usual, the percentage of all data movements (i.e. of the functional size covered by the story) executed by its test cases at least once.

A test case failure can usually be assigned to a specific data movement. Hence a data movement can be found by testing to be correct or 'defective', i.e. it has one or more

defects (as usually defined). Fehlmann, proposes to count *defective data movements* (DDM's) rather than defects and to introduce a rule that a specific defective data movement may be counted only once in a test story – since several test cases in the story may find the same data movement to be defective. With this approach he can now derive *DDM density*, which should be a repeatable metric. In our example if executing a particular test story reveals 2 defective data movements in the functional process of 9 CFP, the DDM density of this functional process would be 22%.

Conclusions

Fehlmann has defined a method for measuring test sizes, calculating test intensity and test coverage, and a defective data movement density, which ideally complements the current ISO/IEC/IEEE draft standard 29119 on Software Testing and allows for test benchmarking. Moreover, test intensity, coverage and DDM density allow predicting DDM density after release. The approach probably has much wider application than just to smartphone apps.

For more, contact Dr Thomas Fehlmann, Euro Project Office, Zurich (E: thomas.fehlmann@e-p-o.com; W: www.e-p-o.com

Thomas and Eberhard Kranich, of T-Systems International, Bonn, Germany, present more on these ideas in "Measuring Software Tests with COSMIC" at MetriKon 2013, Kaiserslautern, Germany eberhard.kranich@t-online.de

What can you do to help COSMIC?

The development of the COSMIC method has required an enormous investment of time and brain-power by many software measurement experts from around the world over the last 15 years.

"Ask not what COSMIC can do for you – ask what you can do for COSMIC" (with apologies to President John F. Kennedy)

Organizations and individuals using the method benefit from this investment – all of it entirely free. Although the method is mature, there is still an enormous amount to do if we are to fulfill the method's market potential, which is to help improve the professionalism of the software industry.

It's therefore worth thinking what can you individually or your organization, as users of the method, do to help grow its acceptance and thus contribute something back to the COSMIC community? Here are some suggestions:

1. We need to improve the range and depth of the COSMIC benchmark data derived from projects in the ISBSG (International Software Benchmarking Standards Group) database. You can help by submitting your organization's COSMIC-measured project data to the database. The data submission process is very simple – see the www.cosmicon.com and the www.isbsg.org sites – and you will get feedback comparing your data against the existing benchmarks.

2. More publicity could help enormously. Why not write up your experience of using the method for your local market or for wider publication, or present your experience at a local or international conference?

3. It would be great if more organizations would publicly acknowledge that they are using the method. Our published list of names of existing users gives confidence to other organizations who may be considering using the method. Please find out if your organization is willing to allow its name to be added to the list. If agreed, please send details to the COSMIC News Editor (see below)

4. Translating version 4.0 documents into local languages will be a major task. See the current translations for details of the translators; contact them to see if you can help with translating the v4.0 documents

5. Join the Linkedin 'COSMIC Users Group'. Share your measurement questions on this forum and receive announcements of new publications.

Further Information

COSMIC, the Common Software Measurement International Consortium, is a not-for-profit organization, run entirely by volunteers, dedicated to the improvement of software measurement and its uses in project estimating, process improvement, benchmarking, etc. All our standards, guidelines, support tools, research publications, etc are available for free download from the portal at www.cosmicon.com. At this site you will find much useful information about software functional size measurement and its uses, the COSMIC organization and methods, available resources, method certification, benchmark data, etc.

Current COSMIC Officers can be contacted via the 'cosmicon' site. They are:
- Chair: Alain Abran, Ēcole de Technologie Supérieure, Montréal, Canada
- President: Luca Santillo, Agile Metrics, Italy

If you have any questions or require further information on the COSMIC method, please contact your national representative on the COSMIC International Advisory Council, via http://www.cosmicon.com/iacV3.asp, or contact the 'COSMIC Users Group' on Linkedin at http://www.linkedin.com/groups/COSMIC-Users-Group-4428621/about

If you would like to publish an article in this newsletter relating your experience with COSMIC, please forward a draft to the Editor via cr.symons@btinternet.com