

Notes from the sixth meeting of the UK COSMIC SIG Friday 21st October 2016

University College London

Present:

Alain Abran, ETS Montreal, Sananathan Rajagopal (MoD, Bristol), Mark Churm, Scott Williams, (HMRC Telford); Federica Sarro, University College London, Aveek Dasgupta, Jagadeesh (SITA), Andrew Langridge (Price Systems), Peter Fagg (Pentad Ltd), Bernard Londeix (Telmaco), Charles Symons, (COSMIC)

Apologies: Carol Buttle, Mike Downing, Mike Eagles (Capgemini), Allan Edwards (HMRC), Mark Harman (UCL), Chris Woodward (COSMIC)

1. COSMIC Contributions to Effort Estimation Improvements and Functional Size Measurement Automation (Alain Abran)

The paper describes the successful use of COSMIC sizing for effort estimating in various domains (real-time embedded development and enhancements, web and agile developments), and on the various efforts to automatically measure size from source code, designs in e.g. UML, and from text. This paper had won the **Best Paper Award** at the recent International Cost Estimating and Analysis Association 'International Training Symposium' in Bristol.

The paper is freely available at:

<http://www.iceaaonline.com/ready/wp-content/uploads/2016/10/SW02-paper-Abran-Contributions-of-Cosmic.pdf>

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2. 'Myths and perception of software estimating' (Sananathan Rajagopal)

Sanath is SME on software cost estimating in the MoD's Defence Equipment and Support Agency, concerned with whole-of-life equipment cost estimating. The slides for his talk are available at: http://www.scaf.org.uk/library/prespaper/2014_10/Software%20Estimation%20Is%20the%20Problem%20Solved%20-%20Sanathanan%20Rajagopal,%20CAAS.pdf

His thesis is that the problems of estimating are not that we don't have good estimating methods, but that requirements are constantly changing. It's therefore important to choose the right development life-cycle (waterfall, iterative, prototyping, agile) to correspond to the frequency of requirements change. Too rapid changes in agile projects can lead to chaos. In the domain of defence systems, the integration of software with hardware is the other big cause of project difficulties.

3. Multi-objective software effort estimation' (Federica Sarro)

Federica's paper (issued with this note) describes CoGEE (Confidence Guided Effort Estimation), a method to simultaneously maximise estimation accuracy and minimise uncertainty.

The CoGee approach uses Search-based Software Engineering (SBSE). Whereas conventional SE aims, in the case of effort estimation, to find the 'perfect' single estimate for a given project, SBSE aims to determine a 'fitness function' that will guide automated search to find which is the better of any two estimates. Both approaches use data from past projects (as does e.g. estimating by analogy). In the CoGEE case, the two objectives in this first study were to estimate effort and to understand the uncertainty bound.

The research applied SBSE to five datasets containing actual effort and other effort-driver data (e.g. FP size of components) on over 700 projects. Effort estimates according to the CoGEE approach were compared against other approaches to analysing the same data including linear-regression, case-based reasoning and other machine-learning methods. CoGEE outperformed other methods after an exhaustive range of tests for sensitivity and validity. Federica would welcome the opportunity to apply the method to other datasets. Contact f.sarro@ucl.ac.uk

4. Automated Data Collection (Andrew Langridge)

Andy described the use of open-source web-crawling software (RapidMiner) to obtain accurate prices of commodity hardware, e.g. PC's, needed for cost estimating. The tool will next be used to obtain prices for software. (See slides issued with this note.)

5. Workshop on 'Estimating for mixed new/re-use projects over the life-cycle' (Aveek Dasgupta)

Aveek introduced this topic by describing the estimating processes used in SITA's complex projects that are carried out by globally-distributed teams (see slides issued with these notes). He noted that nowadays every project touches some existing system. The difficulties with estimating are not 'what are the rules' but 'how to apply them'?

In SITA, determination of initial business requirements is followed by impact analysis, architecture, initial cost estimates and choice of the SDLC to be used, all before starting development. FSM methods (various) are used to cost most activities, for new, changed, re-developed and re-used software, where unit costs vary with the point in the SDLC concerned.

We then discussed what publication, if any, could COSMIC usefully produce to support estimators through this complex world. A document aimed at CFO/CIO could be useful but how to do this in at most three pages will be very difficult. To be given more thought.

6. Revision of ISO 19761: overview of ISO Systems/Software Engineering standards activities (Peter Fagg)

The main COSMIC method standard, the 'Measurement Manual', is sub-titled 'The Implementation Guide to ISO/IEC 19761'. Work is therefore underway to update the ISO standard 19761 so that it is in line with version 4.0.1 of the method.

Peter described work going on in SC7, the part of ISO/IEC concerned with systems and software engineering. Standards needed for software engineering are now considered to be complete so the emphasis is on standards at the system level. Work is underway on systems architecture, systems for smart cities (IoT), systems integration, big data and trustworthy software, i.e. if you buy some software how do you know that you can trust the code or the supplier. If interested in specific topics, please contact Peter directly via md@pentad.co.uk.

7. Report on COSMIC-related papers and discussions at the IWSM conference in Berlin (Charles Symons)

(See slides issued with these note, which include references) Charles noted that most cost estimates are needed before requirements are known in detail, so approximate sizing methods are particularly important. At the IWSM there were two papers on approximate COSMIC sizing, one on the novel use of 'patterns' for estimating. Patterns should also help novices to learn and apply the method.

Work continues on various approaches to automation of COSMIC sizing, notably work in France ('Estimancy') using AI techniques applied to agile user stories in text form. Finally, a very interesting survey on agile practices showed as much under-estimation of effort as has been observed with waterfall projects, and the same causes, e.g. uncertain and changing requirements. Also noted that in addition to effort under-estimation, such surveys never capture the under-delivery of the initially-promised scope.

All presentation slide-sets at the IWSM are available via:

<https://www.dropbox.com/sh/eh80zo8vsimln6r/AAASsgXvxQ3gEfAgyWyhRQGEa?dl=0>

Charles reported on a new guide obtainable from Nesma for estimating implementation of packaged software, via www.nesma.org.

At the COSMIC Annual Meeting, we discussed the future orientation of COSMIC. The goal set in 2000 of bringing to market a new FSM method based on fundamental SE principles has been achieved. However, general software industry acceptance of software metrics and data-driven estimating methods is still low. In light of this and other discussions, IFPUG and Nesma have agreed to join with COSMIC to work together on the promotion of these methods to support software procurement in the widest sense. At some stage, other organizations will be invited to join this enterprise. Watch this space!

8. Next meeting

To be held in March/April 2017. Please send suggestions for the agenda to CS.

Charles Symons

31st October 2016