COSMIC FUNCTIONAL SIZE MEASUREMENT METHOD

"Determining the size of system functionality and measuring the performance of project teams is the basis of successful projects."

Function Point Analysis (FPA) is one of the most widely used methods to determine the size of software projects. FPA originated at a time when only a mainframe environment was available. Sizing of specifications was typically based on functional decomposition and modelled data.
Nowadays, development methods like Object Oriented, Component Based and RAD are applied more often. There is also more attention on architecture and the use of client server and multi tier environments. Another development is the growth in complexity caused by more integrated applications, real-time applications and embedded systems and combinations. FPA was not designed to cope with these various newer development approaches.

Estimating projects

But in these contemporary environments it is still important for a successful project to estimate accurately and reliably. Given its origin in the MIS software domain, applying FPA has become more difficult and the correlation between size in Function Points and effort and other size-related performance parameters is less self-evident. In addition, the increased complexity of modern functionality is often not reflected in the size because the concepts counted in FPA have arbitrary upper size limits.

COSMIC

The limitations of traditional FPA were the reason to start the COSMIC initiative in 1998.

The Common Software Measurement International Consortium (COSMIC), aimed to develop, test, bring to market and to seek acceptance of a new software sizing method to support estimating and performance measurement (productivity, time-to-market and quality).

The measurement method must be applicable for estimating the effort for developing and maintaining software in various software domains. Not only business software (MIS) but also real-time software (avionics, telecom, process control) and embedded software (mobile phones, consumer electronics) can be measured.
The basis for measurement must be found, just as in FPA, in the user requirements the software must fulfil. The result of the measurement must be independent of the development environment and the method used to specify these requirements. Sizes depend only on the user requirements for the ultimately delivered software product.

ISO/IEC 14143

ISO/IEC standard 14143-1 defines principles that a method for Functional Size Measurement should meet. In December 2002 version 2.2 of the Measurement Manual of COSMIC Full Function Points (COSMIC-FFP) was published (ISO/IEC 19761), conformant with ISO/IEC 14143-1.
Version 3.0 was published in December 2007, when the name was simplified to the 'COSMIC method'. This version has no change to the sizing method; it still complies with ISO/IEC 14143-1. The aim was clarifying areas that might be seen as ambiguous and improving the support of the various knowledge levels.

COSMIC Concepts

The Functional User Requirements (FUR) are, according to the definition of a functional size measurement method, the basis for measurement. They specify user's needs and procedures that the software should fulfil.
The FUR are analysed to identify the functional processes. A Functional Process is an elementary component of a set of FUR. It is triggered by one or more events in the world of the user of the software being measured. The process is complete when it has executed all that is required to be done in response to the triggering event.
Each functional process consists of a set of sub-processes that are either movements or manipulations of data. Since no-one knows how to measure data manipulation, and since the aim is to measure 'data-movement-rich' software, the simplifying assumption is made that each functional process consists of a set of data movements.

A Data Movement moves one Data Group. A Data Group is a unique cohesive set of data (attributes) specifying an 'object of interest' (i.e. some thing that is

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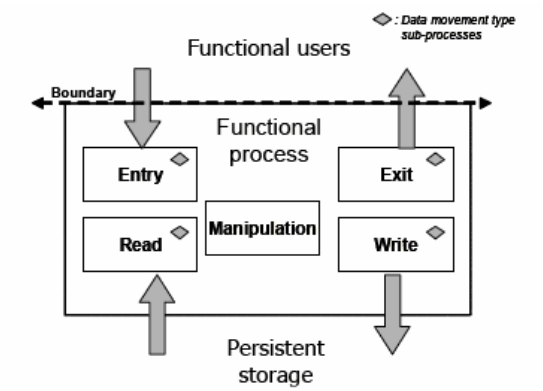
'of interest' to the user. Each Data Movement is counted as one CFP (COSMIC function point).

COSMIC recognises 4 (types of) Data Movements:

- Entry
  moves data from outside into the process
- Exit
  moves data from the process to the outside world
- Read
  moves data from persistent storage to the process;
- Write
  moves data from the process to persistent storage.



MIS Example

Invoices should be made as part of the financial settlement of week 40. These invoices relate to customer product deliveries in week 40. For the invoice all deliveries of week 40 will be collected. The invoice is kept in data storage to write off customer's payments. The customer receives a hard copy of the invoice.

Identified data movements:

E week number
R read deliveries
R read customer data
W store invoice
E print customer data
E print customer related deliveries
E print invoice totals
E message handling

The Functional Process consists of a set of 8 data movements; the size is 8 CFP.

Real-time Example

A domestic oven allows the user to set a target temperature and then press 'start' for the oven to heat up and maintain the temperature. The first functional process has the following data movements:

E Start this functional process from menu
E Set target temperature
X Display target temperature
W Store target temperature

Total size: 4 CFP

The second functional process has

E Start clock which repeats every 10 secs
E Obtain current oven temperature
R Retrieve target temperature
X Set heater on/off, depending on temp
X Display current temperature
X Sound audible signal when target temperature is first reached

Total size: 6 CFP

The benefits

The COSMIC method:

- Is based on fundamental software engineering principles, so 'future-proof';
- supports realistic scheduling and budgeting;
- is objective, simple to learn and easy to use;
- supports communication between principal, user and supplier;
- increasing complexity is rated;
- is applicable in most software domains;
- is applicable for complete applications and for components, in any layer;
- complies with ISO 14143.

Galorath and COSMIC

Over the past period Galorath has gained experience with COSMIC. Galorath and associated partners have in addition to experience in executing COSMIC analysis, the knowledge and the facilities to implement this method and to train employees.

Both Galorath and its partners are involved in the International Advisory Committee and the Measurement Practices Committee, responsible for definition and improvements of the COSMIC guidelines and bring in suggestions based on practical experience, see, for example, the Guideline for Sizing Business Applications.

Like to know more?

We would like to tell you more about COSMIC. You can contact one of our consultants for a talk without any obligations. Just send an email to pi@galorath.com.

On www.galorath.com you will find a more extensive overview of the possibilities and services Galorath offers.

Public domain versions of the COSMIC documentation, including translations can be found at www.gelog.etsmtl.ca/cosmic-ffp.