Come back Function Point Analysis (Modernised) - all is Forgiven!

Charles Symons
Software Measurement Services

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Purpose of this talk

• To trace the evolution of Function Point Analysis
  – how did it start?
  – what are its strengths and weaknesses?
  – why has its use declined?

• To discuss the potential for an accurate reliable Functional Sizing method for software

• To introduce the COSMIC FFP method
Agenda

- The ‘ups and downs’ of Function Point Analysis
  - The market potential for an accurate Functional Sizing Method
  - FPA modernised - COSMIC FFP
- Conclusions
‘FPA’ was developed to enable productivity comparisons across different technologies

Albrecht’s aims:
• A consistent measure of Software Size (= work output)
• Independent of the technology used for the system
• Simple to apply and meaningful to the end-user

Later, the value for estimating effort from a requirements specification was realised
Albrecht’s Function Pont Model - a 1970’s ‘Dow Jones index’ of size

Application Boundary

To/From
Users

Inputs
Outputs
Inquiries

Other Applications

Logical
Internal
Files

External
Interface
Files

14 x ‘General Application Characteristics’

= 

\[ \text{Information Processing Size} \]

\[ \text{Adjustment for Technical & Quality Reqs.} \]
Function Point Analysis (‘FPA’) inevitably followed the ‘Hype Curve’
The Hype initially succeeded

- IBM’s ‘programmer productivity’ push
- Function Point User Groups established standards
- Benchmarking clubs published results
- Adopted by many major companies and Government Departments

... then the inevitable trough of disillusionment
General Software Metrics problems caused most of the ‘trough’ rather than FPA

Setting up and managing a Software Metrics Programme proved harder than most imagined

• Too low in the organisation
• Effort of data collection interferes with projects
• Poor data analysis and presentation
• Continuous re-structuring, cost-cutting and outsourcing
And the FPA model did not keep pace with changing IT fashions

Increasingly complex rules or FPA becomes irrelevant

The Value Adjustment Factor becomes meaningless

Albrecht’s Business Application model of the 1970’s

Packages, RAD, Relational DB’s, Object-Oriented, Infrastructure, Client-Server, Real-time, WWW, etc

Conservatism of Users Consultants Tool Suppliers with large measurement DB’s

Criticisms of Academics Alternative FSM models
But in spite of the problems, FPA survives

- A niche-industry of estimating methods and tools, benchmarking services, consultancy, etc
- Some use in outsourcing contracts
- ...but far below its potential!

Performance measurement and estimating is enormously important - the software industry needs Functional Sizing!
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Supposing we had a reliable, accurate FSM Method

A ‘Mind Map’ for Functional Size Measurement
So the market potential for a reliable and accurate FSM Method is huge

Potential beneficiaries:
- Requirements Analysts
- Estimators
- Project Managers
- Investors
- Software Process Improvement engineers
- Procurement and Contract Managers
Functional Size Measurement will only really succeed if it satisfies certain conditions

• (Clear added value in the market ✓)
• Simple to apply; complements modern ways of specifying requirements and developing software
• Any new FSM Method must either enable conversion from existing measurements or there must be a compelling reason to re-invest
• A truly international supply of training, consultancy, tools, standards, marketing, etc
• ... and software metrics must be taken more seriously!
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The COSMIC * FFP Method draws on a long history of experience

* Common Software Measurement International Consortium
The COSMIC FFP Project Aims

To develop, test, bring to market and gain acceptance as an industry standard, a new generation of software functional sizing methods which are applicable:

– in as wide a range of software ‘domains’ as possible;

– priority to be given to business and real-time software (e.g. process control, operating systems, telephony, embedded, etc.)

for performance measurement

as a component of estimating methods from early in a software item’s life
Evolution of COSMIC FFP

FFP V1 Experience
V2 Aims - COSMIC
V2 Principles
V2 Field Trials
Research
Tools, etc
Prepare market acceptance
Promotion

1998 1999 2000 2001

Today

On-going
On-going
On-going
On-going
Alain Abran  
Charles Symons  
Moritsugu Araki  
J.-M. Desharnais, Serge Oligny, Denis St Pierre  
Reiner Dumke, Gunter Buehren  
Peter Fagg, Grant Rule  
Vinh Ho  
Roberto Meli  
Pam Morris  
Jolijn Onvlee  
Marie O’Neill  
Risto Nevalainen  

Canada  
UK  
Japan  
Canada  
Germany  
UK  
Vietnam  
Italy  
Australia  
Netherlands  
Ireland  
Finland  

Experience:  
Academia  
Industry  
IFPUG, MkII, Laturi, NESMA, etc  
ISO SC7/WG12
COSMIC FFP is based on a very simple model of software functionality

Any person, engineered device or software interacting with the software being measured

Data manipulation is ignored
(We assume a constant average amount of data manipulation associated with each data movement)
Definition of a ‘Functional Process’

“A functional process is a unique set of data movements (entry, exit, read, write).”

“It is triggered directly, or indirectly via an actor, by a unique event-type which is indivisible from the requirements viewpoint. The functional process is complete when it has executed all that it is required to do in response to the triggering event.”

Equivalent to a MkII “Logical transaction” and similar in intent (?) to an IFPUG “Elementary process”.

SNS
The COSMIC FFP Sizing Rules

The size of a Functional Process
- the arithmetic sum of the number of Data Movements (Entries, Exits, Writes and Reads)
- minimum size: 2
- maximum size: no upper limit

The size of an item of software is the sum of the sizes of all the Functional Processes
So why is the COSMIC FFP sizing model superior?

- Simple and unambiguous
- Applicable to Business/MIS and to real-time software (e.g. process control, telecoms, avionics, infrastructure)
- Applicable to any component of multi-tier, multi-layered architectures
- Eliminates the need for a ‘Value Adjustment Factor’ for technical and quality requirements
Much work has been done to keep the model simple and well-defined

The COSMIC FFP model is based on fundamental concepts from Structured Information Analysis established in the 1980’s

Example: IBM Global Services found multiple interpretations of the term ‘Use Case’

IBM GS has adopted the MkII FP Logical Transaction (= the COSMIC FFP Functional Process) as a key component of its LEAD * method for estimating OO projects

G Jensen, ‘Life-cycle Effort and Duration’, ACOSM 2000
Why no ‘VAF’? Example: requirement for an on-line enquiry with no technical or quality constraints

“On entry of a Customer name or ID, the software shall display a list of his/her investments and their current market valuation”

(A complex enquiry, probably requiring retrieval of multiple types of investment products and values from remote databases
- can be sized by any existing FP method)
Example as before: but the response time must not exceed one second

Possible solutions:

- Very fast hardware
- Low-level programming language

Extra functional processes to maintain investment values continuously up-to-date

Take into account in project estimating and costing

Increased Functional Size
Example as before: and the User must be able to fax the statement to the customer from his PC

COSMIC FFP can size the software in any layer
Example as before: and the application architecture is four-tier client-server

COSMIC FFP can size the human view and also the size of the components of multi-tier, multi-layer software which the developer must build.
Conclusion, we do not need a ‘Value Adjustment Factor’

All requirements can be allocated to:

• Functional User Requirements of software that has to be built or changed in any layer or tier - which can be sized

• Project processes, e.g. inspections, testing

• Selection of hardware and software to be acquired

Take into account in estimating, not in Functional Size
Conversion from older FP methods may be possible in some cases

- If the ‘old’ FP method attempts to measure the same functionality as does the COSMIC FFP method, then conversion should be possible
- If the ‘old’ FP method misses functionality, then no conversion is possible

Initial interest in COSMIC FFP has come mainly from organisations that have never used an FP method, or have tried and abandoned its use.
Summary: the COSMIC FFP Meta-model

Degree of Relationship:
- One-to-many
- One-to-one

COSMIC-FFP BFC-Type

Functional Process (Transaction-Type)

Data Movement-Type (Functional Sub-Process)

Event (-Type)

User (-Type)

Software Item

Layer

Software Environment

Input

Output

Entry (-Type)

Write (-Type)

Read (-Type)

Exit (-Type)

Data Attribute (Type)

Data Group (Type)

Object (Entity-Type)

Degree of Relationship:

Triggers

(is one of)

(Moves)
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The COSMIC FFP method is much more valuable than just for sizing

We need requirements which are

- Understandable
- Traceable
- Testable
- Measurable

The COSMIC FFP method is a basic requirements analysis and management method – size measurement is almost a spin-off
COSMIC FFP method has achieved a number of ‘firsts’

The first Functional Sizing method to:

- be designed by an international group of experts on a sound theoretical basis
- draw on the practical experience of all the main existing FP methods
- be designed to conform to ISO 14143 Part 1
- be designed to work across MIS and real-time domains, for software in any layer or peer item
- be widely tested in field trials before being finalised
There are many drivers for renewed interest in FPA and Software Metrics

• Improved functional sizing, extending into new software domains
• Demands for measurement from ISO 9000 (2000)
• The new CMM - I requires measurement at Level 2
• Maturing of software contracting and outsourcing requiring performance measurement, better estimating and control of requirements, benchmarking, etc.
Available resources

- **Complete documentation** on the Web
  - Concepts and definitions,
  - Measurement Manual,
  - Publications,
  - http://www.lrgl.uqam.ca/ffp.html
  - http://www.cosmicon.com

- **Training and consultancy** support available in Europe, N America and Asia/Pacific
Thank you for your attention

Charles Symons
Software Measurement Services Ltd
143 High Street
Edenbridge
Kent  TN8 5AX
England
Tel: +44 1732 863 760
Fax: +44 1732 864 996
E-mail: charles_symons@compuserve.com