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Information technology — Software measurement — Functional size measurement

Part 1: Definition of concepts

Technologies de l'information — Mesurage du logiciel — Mesurage de la taille fonctionnelle

Partie 1: Définition des concepts

Reference number
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Foreword

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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ISO/IEC 14143-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and system engineering*.

This second edition cancels and replaces the first edition (ISO/IEC 14143-1:1998), of which it constitutes a minor revision.

ISO/IEC 14143 consists of the following parts, under the general title *Information technology — Software measurement — Functional size measurement*:

— *Part 1: Definition of concepts*

— *Part 2: Conformity evaluation of software size measurement methods to ISO/IEC 14143-1:1998*

— *Part 3: Verification of functional size measurement methods* [Technical Report]

— *Part 4: Reference model* [Technical Report]

— *Part 5: Determination of functional domains for use with functional size measurement* [Technical Report]

— *Part 6: Guide for use of ISO/IEC 14143 series and related International Standards*

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Introduction

Organizations engaged in software engineering have struggled for years in search of acceptable quantitative methods for measuring process efficiency and effectiveness, and for managing software costs, for the systems they acquire, develop, enhance or maintain. One critical, and particularly elusive, aspect of this measurement requirement has been the need to determine software size. Numerous software sizing methods have been proposed in the past. These included numbers of source lines of program code and various measures derived from the technical characteristics of the software.

These methods can have limitations in that they:

— cannot always be applied early in the software development process;

— cannot always be applied uniformly throughout the software's lifetime; or

— cannot always be meaningfully understood by users of the software.

The concepts of Functional Size Measurement (FSM) are designed to overcome these limitations by shifting the focus away from measuring how the software is implemented to measuring size in terms of the functions required by the user. In 1979, Allan J. Albrecht of IBM was the first to publicly release a method based on such concepts, known as Function Point Analysis.

Since the public release of Function Point Analysis, many sizing methods have been developed based on Albrecht's and other concepts. As these various sizing methods were developed without common agreement of the fundamental concepts of FSM, it was natural that inconsistencies amongst the methods would develop. These inconsistencies lessen the ability and attractiveness of any of these methods to be used as a standard method for the functional sizing of software.

This part of ISO/IEC 14143 defines the fundamental concepts of FSM, thereby promoting the consistent interpretation of FSM principles.

The text in this part of ISO/IEC 14143 has been formatted in order to facilitate the checking of a candidate software sizing method for conformance to this part of ISO/IEC 14143.

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Information technology — Software measurement — Functional size measurement

Part 1: Definition of concepts

1 Scope

This part of ISO/IEC 14143 defines the fundamental concepts of Functional Size Measurement (FSM). This part of ISO/IEC 14143 does NOT provide detailed rules on how to:

— measure Functional Size of software using a particular method;

— use the results obtained from a particular method;

— select a particular method.

This part of ISO/IEC 14143 is applicable when determining if a method for sizing software is an FSM Method. It does not prevent the development of various methods, but rather provides a basis for assessing whether a particular method conforms to FSM.

This part of ISO/IEC 14143 is intended for use by those persons associated with the acquisition, development, use, support, maintenance and audit of software.

2 Normative Reference

There are no normative references.

3 Definitions

For the purposes of this document, the following definitions apply.

3.1
Base Functional Component
BFC
elementary unit of Functional User Requirements defined by and used by an FSM Method for measurement purposes

EXAMPLES A Functional User Requirement could be “Maintain Customers” which may consist of the following BFCs: “Add a new customer”, “Report Customer Purchases”, and “Change Customer Details”. Another example might include a collection of logically related business data maintained by the software under study such as “Customer Details”. There are many other examples.

3.2
BFC Type
defined category of BFCs

EXAMPLES These include “External Inputs”, “External Outputs” and “Logical Transactions”, and data stores such as “Internal Logical Files”.

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3.3
boundary
conceptual interface between the software under study and its users

3.4
FSM Method
specific implementation of FSM defined by a set of rules, which conforms to the mandatory features of this part of ISO/IEC 14143

3.5
Functional Domain
class of software based on the characteristics of Functional User Requirements which are pertinent to FSM

3.6
Functional Size
size of the software derived by quantifying the Functional User Requirements

3.7
Functional Size Measurement
FSM
process of measuring Functional Size

3.8
Functional User Requirements
sub-set of the User Requirements describing what the software does, in terms of tasks and services

NOTE Functional User Requirements include but are not limited to:

- data transfer (for example Input customer data, Send control signal);
- data transformation (for example Calculate bank interest, Derive average temperature);
- data storage (for example Store customer order, Record ambient temperature over time);
- data retrieval (for example List current employees, Retrieve aircraft position).

User Requirements that are not Functional User Requirements include but are not limited to:

- quality constraints (for example usability, reliability, efficiency and portability);
- organizational constraints (for example locations for operation, target hardware and compliance to standards);
- environmental constraints (for example interoperability, security, privacy and safety);
- implementation constraints (for example development language, delivery schedule).

3.9
local customization
FSM Method that has been modified for local use, such that it might produce different Functional Sizes from those obtained prior to modification

3.10
Scope of the FSM
set of Functional User Requirements to be included in a specific FSM instance

NOTE The Scope of the FSM is determined by the purpose for measuring the software. For example, if an organization needs to know the size of its software portfolio, then the Scope of the FSM will include all the Functional User Requirements currently utilized. However, if a project manager is seeking to determine the size of a particular release of software, then the scope will include only those Functional User Requirements impacted by the project.

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3.11
user
any person or thing that communicates or interacts with the software at any time

EXAMPLES Examples of "thing" include, but are not limited to, software applications, animals, sensors, or other hardware.

3.12
User Requirements
description of the set of user needs for the software

NOTE User Requirements comprise two subsets: Functional User Requirements and non-functional user requirements.

4 Abbreviations

FSM Functional Size Measurement

BFC Base Functional Component

FUR Functional User Requirements

5 Characteristics and requirements

5.1 Characteristics

5.1.1 FSM Method characteristics

5.1.1.1 An FSM Method shall have the following characteristics:

a) it is based on a representation of the Functional User Requirements from the perspective of the users;

b) it can be applied as soon as any Functional User Requirements have been defined and while they are available;

c) it derives a Functional Size through the assessment (refer to 5.2.2) of Base Functional Components.

5.1.1.2 An FSM Method should be as independent as possible of particular software development methods or technologies.

NOTE This will facilitate a broader use of the FSM Method.

5.1.2 Base Functional Component characteristics

A BFC shall have the following characteristics:

a) it expresses only Functional User Requirements;

b) it is classified as one, and only one BFC Type.

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5.1.3 Functional Size characteristics

Functional Size shall have the following characteristics:

a) it is not derived from the effort required to develop the software being measured;

b) it is not derived from the effort required to support the software being measured;

c) it is independent of the methods used to develop the software being measured;

d) it is independent of the methods used to support the software being measured;

e) it is independent of the physical components of the software being measured;

f) it is independent of the technological components of the software being measured.

5.2 Requirements

5.2.1 FSM Method requirements

5.2.1.1 An FSM Method shall

a) define the attributes of the BFCs,

b) define the rules used to assess the BFCs,

c) define the units in which Functional Size is expressed, and

NOTE For example “Function Points”.

d) describe the Functional Domain(s) to which the FSM Method can be applied.

NOTE Guidance to assist users to describe the Functional Domain(s) is provided in TR2 14143-5:2004.

5.2.1.2 An FSM Method should

a) describe the kind of information necessary to enable the FSM Method to be applied,

b) provide guidelines on how to document a specific FSM instance,

c) describe the purposes for which the FSM Method can best be used such that the users of the FSM Method can judge its suitability for their purpose, and

d) state its degree of convertibility to other sizing methods.

NOTE Examples of “degree of convertibility” include, but are not limited to, the following:

— full convertibility — The Functional Size can be transformed to another software size measure using an algorithm or a mathematical model, under all conditions;

— restricted convertibility — The Functional Size can be transformed to another software size measure using an algorithm or mathematical model under some conditions. For example, for a limited range of sizes or within a specified degree of accuracy;

— no convertibility — The Functional Size cannot be transformed to another software size measure.

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5.2.2 Base Functional Component assessment requirements

NOTE 1 The order of presentation of the following BFC assessment requirements is at the discretion of the FSM Method.

An FSM Method shall

a) define the BFC Types,

b) describe how to identify which Functional User Requirements will be included within the Scope of the FSM,

c) describe how to identify BFCs within the Functional User Requirements,

d) define how to classify BFCs into BFC Types, if there is more than one BFC Type,

e) define how to assign a numeric value to a BFC according to its BFC Type,

NOTE 2 An example of such a definition is: “an Output is a BFC Type which is assigned the value 5 if the BFC accesses less than two files and the value of 8 if two or more than two files are accessed”.

f) define the relationship, if any, between the BFC Type and the boundary, and

NOTE 3 An example of a relationship of a BFC Type with the boundary is: “an Internal Logical File must reside on the software side of the boundary”.

g) define the relationships, if any, between the BFC Types.

NOTE 4 An example of a relationship between BFC Types is: “an Internal Logical File must be maintained by one or more External Inputs”.

NOTE 5 An example of a relationship between BFC Types is “each Logical Transaction comprises an Input, Process and Output component”.

5.2.3 Designation of Functional Size

The FSM Method shall state the conventions to be adopted when reporting Functional Size such that it is qualified with

a) the units of the FSM Method,

b) the name of the FSM Method, and

NOTE 1 Example: Functional Size = 300 Function Points (XYZ v2.0).

c) an indicator that a local customisation of a particular FSM Method has been used, where applicable.

NOTE 2 Example: Local customisation of version 2.0 of XYZ Method = XYZ v2.0c.

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6 Process for applying an FSM Method

An FSM Method shall include the following activities in order to derive Functional Size:

a) determine the Scope of the FSM;

b) identify the Functional User Requirements within the Scope of the FSM;

c) identify the BFCs within the Functional User Requirements;

d) classify BFCs into BFC Types, if applicable;

e) assign the appropriate numeric value to each BFC;

f) calculate Functional Size.

7 FSM Method labelling conventions

An FSM Method shall

a) use a name which will distinguish it from all other existing FSM Methods, and

NOTE 1 Example: Method name = XYZ.

b) where applicable, include a version number appended to the Method name, which will distinguish it from all other versions of the Method.

NOTE 2 Example: Version 2.0 of XYZ Method = XYZ v2.0.

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