

A

Absolute Error

Difference between the relative value and estimated value.

Adaptive Maintenance

The modification of a software product, performed after delivery, to keep a software product usable in a changed or changing environment. Adaptive maintenance provides enhancements necessary to accommodate changes in the environment in which a software product must operate. These changes are those that must be made to keep pace with the changing environment. For example, the operating system might be upgraded and some changes may be made to accommodate the new operating system. (ISO/IEC 14764:2006)

ADD

This is a function point calculation of the added functions in the project. The formula is:

Development: $AFPA = ADD$

or

It is the user created functions in the development project (excluding the conversion functionality) or the functionality that always exists when the application is measured.

It's the function point calculation of the added functionalities in an enhancement project. The formula is:

Enhancement Project: $EPP = ADD + CHGA + CFP + DEL$

Application, after the enhancement: $AFPA = (AFPB + ADD + CHGA) - (CHGB + DEL)$

AFPA

$AFPA = (AFPB + ADD + CHGA) - (CHGB + DEL)$

where

AFPA is the application function point count after the enhancement project;

AFPB is the application function point count before the enhancement project;

ADD is the size of the functions being added by the enhancement project;

CHGA is the size of the functions being changed by the enhancement project – as they are / will be after implementation;

CHGB is the size of the functions being changed by the enhancement project – as they are / were before the project commenced;

DEL is the size of the functions being deleted by the enhancement project.

Alter System Behavior

To alter system behavior means to change a business parameter (through a transaction). The effect caused by this change in the parameter is reflected in the behavior of other operations. Example: the buying system empowers its buyers and can buy goods worth up to \$10,000 throughout the month without any authorization. This value is a system parameter and when its modified, the buying operations will be affected, in other words, it will change the system behavior.

Analysis Type

Can be an enhancement Project, Development Project and Application.

Application

An application is a cohesive collection of automated procedures and data supporting a business objective; it consists of one or more components, modules, or subsystems.

Application Functional Size

An application's functional size is a measure of the functionality that an application provides to the user, determined by the application function point count by the activity of applying the IFPUG Functional Size Measurement (FSM) Method.

An application functional size from a measurement after the development project or at any time during the application's life cycle shall be calculated using:

$$AFP = ADD$$

where

AFP is the application function point count;

ADD is the size of the functions to be delivered to the user by the development project (excluding the size of any conversion functionality) or the functionality that exists whenever the application is counted.

An application functional size after an enhancement project shall be calculated using:

$$AFPA = (AFPB + ADD + CHGA) - (CHGB + DEL)$$

where

AFPA is the application function point count after the enhancement project;

AFPB is the application function point count before the enhancement project;

ADD is the size of the functions being added by the enhancement project;

CHGA is the size of the functions being changed by the enhancement project – as they are / will be after implementation;

CHGB is the size of the functions being changed by the enhancement project – as they are / were before the project commenced;

DEL is the size of the functions being deleted by the enhancement project.

Artefact

An element created as part of the definition, maintenance or use of a development or enhancement process of an Information System. It includes process descriptions, plans, procedures, specifications, architecture design, detailed design, source code, and user documentation. The artifacts may or may not be delivered to the client or the end user.

Asset

- (1) A capital asset of the enterprise.
- (2) An advantage or resource.

Associative Entity Type

An entity type that contains attributes which further describe a many-to-many relationship between two other entity types.

Attributive Entity Type

An entity type that further describes one or more characteristics of another entity type.

B

Backlog

It is the inventory of identified functions that have not yet been attended to. With productivity information it is possible to estimate what the effort and cost necessary to eliminate this inventory will be; Management would be able to decide if more professionals are necessary to reach their goals. Finally, the ability to make some decisions that involve organizational projects.

Balance Score Card

A measurement and management methodology for effort, developed at Harvard Business School professors, Robert Kaplan and David Norton, in 1992. The methods used in the business management, services and infrastructure, generally are based in traditional methods that can be used in IT and ERP software such as support solutions related to the management of services and business result guarantee. The steps in these methodologies include: business strategy definition, company management, service and quality management; these steps are executed by performance indicators.

Base Functional Component (BFC)

Elementary unit of Functional User Requirements defined by and used by an FSM Method for measurement purposes. (ISO/IEC 14143-1:2007)

ILFs, EIFs, EIs, EOs, EQs are types of BFCs.

Batch File

This is also known as a transaction file or an interface file (not to be confused with an EIF). It's a file on the context of an operating system, but not in the context of FPA.

This file is the result of the processing of an application whose objective is to send data to another application so that they can be processed. –Generally, the information is discarded after it has been processed.

A difference between the EIF and the batch file is that in the EIF the system that uses the data can (and usually does) see the same data again. In the batch file, when the data is processed, the system will never see the same batch data again.

Benchmarking

The search for industry best practices that, if implemented, would yield superior performance.

BFPUG

Brazilian Function Point Users Group (www.bfpug.com.br) is the group of FPA users in Brazil.

Boundary

The boundary is a conceptual interface between the software under study and its users.

Business Data

May also be referred to as Core User Data or Business Objects. This type of data reflects the information needed to be stored and retrieved by the functional area addressed by the application. Business Data usually represents a significant percentage of the entities identified.

C

Calculation Guide

A document intended for internal use that guides the performed function point measurements in software projects. Its characteristic is that it has a specific focus on situations where the organization has experience with function point calculations. Its purpose is to translate general concepts from the CPM to specific organizational cases.

Cascade Life Cycle

It was the first model that was known in software engineering and serves as a base for many life cycles used nowadays. This basically consists in linear model in which each step needs to be completed before the next one can start. For example, the requirements analysis needs to be completed before the system design can start.

CCMI

The Capability Maturity Model Integration (CMMI) is a model for the evaluation and improvement of maturity of the processes within an organization and also for the identification of key practices that are required to increase the maturity of these processes. It was created by the Software Engineering Institute – SEI from Carnegie Mellon University and sponsored by the Department of Defense of North America.

CFPS

Certified Function Point Specialist:

The CFPS certification program – Certified Function Point Specialist – has as an objective to formally recognize professionals capable of measuring function points in a precise manner and also knows the IFPUG practice.

In order to get the certification, the professional should pass an exam that is provided by the IFPUG whose grade should be at least 90% to pass. This exam consists of approximately 150 multiple choice questions based on the CPM (Counting Practices Manual).

The duration of the test is 3 hours. This is a hard exam to pass due to time given and the high grade necessary to pass. Unfortunately, IFPUG does not reveal statistics in relation to the pass rate.

The certification validity period is three years long. Thereafter, the professional needs to retake the exam or participate in a certification extension program. This program allows for the validity to be extended for 2 or 3 years by the accumulation of credits in various activities, such as: realize the function point calculation, teach courses, write articles or books, and participate as a volunteer in one of the committees in the IFPUG. However, this renovation can be performed two consecutive times, in which thereafter the professional will have to take the exam in order to renew their certification.

By the start of 2008, the certification exam was only conducted by pen and paper with a manual correction. Thereafter, the exam was automated and can be distributed by any accredited Prometric Center in the world. There is an option of taking the exam in English or in Portuguese.

This certification does not require that the person be a professional, that person should have some experience with function points or have taken a course in order to prepare. The only requirement to take the CFPS exam is to be affiliated with the IFPUG.

However, without proper preparation, the possibility of passing is minimal. Even for the professional that that is taking the exam for recertification, it is recommended that adequate preparation is taken. Our Preparation for the CFPS exam course is designed specifically to help the candidate with the preparation necessary to obtain/renew certification.

CHGA

CHGA – Changed Functions After

Functional Size calculation for the modified functions in the enhancement project, after the change is performed.

In the enhancement project.

$$EFP = ADD + CHGA + CFP + DEL$$

In the application formula after the enhancement project.

$$FPA = (AFPB + ADD + CHGA) - (CHGB + DEL)$$

CHGB

CHGB – Changed Functions Before

Functional Size calculation for the modified functions in the enhancement project, before the change is performed.

In the application formula after the enhancement project.

$$FPA = (AFPB + ADD + CHGA) - (CHGB + DEL)$$

Class Diagram

A representation of the structure and relationships between the classes that are object models. It's a model that is very useful for the system, it defines the classes that the system needs to have and serves as a base for the construction for the communication, sequence and state diagrams.

COCOMO II

CONstructive COst Model is a parameter based estimation that includes the use of mathematical equations to calculate the team's effort, size and time in the software project. Its equations are based on research and historical data using as input the number of source lines of code (or function points) and the evaluation of other relevant measurement aspects called cost drivers.

Code Data

The user does not always directly specify Code Data, sometimes referred to as List Data or Translation Data. In other cases it is identified by the developer in response to one or more technical requirements of the user.

Code Data provides a list of valid values that a descriptive attribute may have. Typically the attributes of the Code Data are Code, Description and/or other 'standard' attributes describing the code; e.g., standard abbreviation, effective date, termination date, audit trail data, etc.

Component

In the context of FPA, the term component implies that it is a “part of the set” and not in terms of “reusable piece of software”, that is a more technical term that is related to the context development software.

Cone of Uncertainty

Theory that explains the phenomenon that occurs in the software industry that acknowledges that the end date of a project is unknown.

As time passes in the project, the estimations for duration become more precise.

Consistent State

The point at which processing has been fully executed; the functional user requirement has been satisfied and there is nothing more to be done.

Context Diagram

Represents the system in its totality as one process and is composed of the data flow actors, these represent the interfaces between the system and the external entities. The diagram is a form to represent the study object, the project and its relationship to its surroundings. A context diagram allows for the identification of the limits of the processes, the areas involved in the process and the relationships with other processes and the elements outside of the company (i.e. clients, suppliers).

Contribution

The function type's (ILF, EIF, EI, EO, EQ) contribution to the functional size.

Control Information

Control Information is data that influences an elementary process by specifying what, when or how data is to be processed.

Copy

(1) To read data from a source, leaving the source data unchanged, and to write the same data elsewhere in a physical form that may differ from that of the source. For example, to copy data from a magnetic disk onto a magnetic tape. (2) The result of a copy process as in above. For example, a copy of a data file. (IEEE)

Corrective Maintenance

The reactive modification of a software product performed after delivery to correct discovered problems. The modification repairs the software product to satisfy requirements. (ISO/IEC 14764:2006)

Counting Scope

The counting scope defines the set of Functional User Requirements to be included in the function point count.

CPM

Counting Practices Manual owned by the IFPUG. It contains all of the definitions and the rules necessary for the function point calculation process. Most recent version: 4.3

Goals:

- Provide a clear and detailed description on how to count function points;
- Promote coherence in the performed calculations by the IFPUG members;
- Provide orientation about how to go about the function point calculations based on technique artifacts and the most popular software development methodologies;
- Provide a common understanding for development of tools that provide automated support for function point calculation.

D

Data Communication

One of the 14 general system characteristics that describe the level in which the application communicates directly with the processor. The data or control information used by the application are sent and received through communication resources.

The data and control information used in the application are sent or received over communication facilities. Devices connected locally to the control unit are considered to use communication facilities. Protocol is a set of conventions that permit the transfer or exchange of information between two systems or devices. All data communication links require some type of protocol.

- 0 Application is pure batch processing or a stand-alone application
- 1 Application is batch but has remote data entry or remote printing
- 2 Application is batch but has remote data entry and remote printing
- 3 Application includes on-line data collection or TP (teleprocessing) front end to a batch process or query system
- 4 Application is more than a front-end, but supports only one type of TP communications
- 5 Application is more than a front-end, and supports more than one type of TP communications protocol

Data Conversion

These are the data or transaction functions that are expected to convert data and/or to offer conversion requirements specified by the user, such as the conversion verification reports. A main characteristic of these functions is that they are discarded after they are used, they do not make part of the application after its installation. When the system goes live, these functions are no longer necessary.

In the development project formula:

$$DFP = (UFP + CFP)$$

In the enhancement project formula:

$$EFP = ADD + CHGA + CFP + DEL$$

Where CFP are the Conversion Function Points.

Example: A new payroll system will be implemented. As part of the development project, this system requires that a program read the accounts payable of another system, and that in a series of established rules, update the data base of the accounts payable in the new system.

A manual entry of data is also necessary to complete some data that are not available in these systems. All of these characteristics are discarded at the end of the system implementation.

Data Element Type (DET)

A data element type is a unique, user recognizable, non-repeated attribute.

Data Function

A data function represents functionality provided to the user to meet internal and external data storage requirements. A data function is either an internal logical file or an external interface file.

Data Model

An implementation model data subset that describes the logical and physical representation of data in the system.

Defect

A problem which, if not corrected, could cause an application to either fail or to produce incorrect results. The absence of functionality that was specified or required is also considered a defect.

DEL

The variable that represents the function points in relation to the deleted functions in the enhancement project.

The enhancement project formula:

$$EFP = ADD + CHGA + CFP + DEL$$

The application formula after the enhancement project.

$$AFP = (AFPB + ADD + CHGA) - (CHGB + DEL)$$

Delivery Rate

The productivity measure for creating or enhancing an application. It is expressed by the Project Function Points divided by the Work Effort for the development or enhancement project.

Derived Data

Data created as a result of processing that involves steps, other than or in addition to, direct retrieval and validation of information from data functions.

Developer

Generic term for all the professionals that are involved in software development. It covers all of the following positions: programmer, systems analysts, business analysts, tester, documenter, project analyst, etc.

DFP

$$DFP = ADD + CFP$$

where

DFP is the development project function point count;
ADD is the size of the functions to be delivered to the user by the development project;
CFP is the size of the conversion functionality.

Dispersion Measure

Is used to evaluate data when the data itself is similar, describes how 'far' the data is from the central value. In this manner, the dispersion measure can also be used to evaluate the level of representation in the measurement. The more common variability measurements for quantitative data are the variance, its square root, and standard deviation. The total amplitude, interquartile distance and the total deviance are examples of dispersion measures.

Distributed Processing

One of the 14 general system characteristics describing the degree to which the application transfers data among physical components of the application.

Distributed data or processing functions are a characteristic of the application within the application boundary.

- 0 Data is not transferred or processed on another component of the system.
- 1 Data is prepared for transfer, and then is transferred and processed on another component of the system, for user processing.
- 2 Data is prepared for transfer, and then is transferred and processed on another component of the system, not for user processing.
- 3 Distributed processing and data transfer are on-line and in one direction only.
- 4 Distributed processing and data transfer are on-line and in both directions
- 5 Distributed processing and data transfer are on-line and are dynamically performed on the most appropriate component of the system.

E

Efficiency

Producing a result with a minimum of extraneous or redundant effort.

Elementary Process (EP)

An elementary process is the smallest unit of activity that is meaningful to the user.

End-User Efficiency

One of the 14 general system characteristics that describes

End-User Efficiency describes the degree of consideration for human factors and ease of use for the user of the application measured.

The on-line functions provided emphasize a design for user efficiency (human factor/user friendliness). The design includes:

- Navigational aids (e.g., function keys, jumps, dynamically generated menus, hyperlinks)
- Menus
- On-line help and documents
- Automated cursor movement
- Scrolling

- Remote printing (via on-line transmissions)
 - Pre-assigned function keys (e.g., clear screen, request help, clone screen)
 - Batch jobs submitted from on-line transactions
 - Drop down List box
 - Heavy use of reverse video, highlighting, colors, underlining, and other indicators
 - Hard-copy documentation of on-line transactions (e.g., screen print)
 - Mouse interface
 - Pop-up windows
 - Templates and/or defaults
 - Bilingual support (supports two languages: count as four items)
 - Multi-lingual support (supports more than two languages: count as six items)
- 0 None of the above.
- 1 One to three of the above.
- 2 Four to five of the above.
- 3 Six or more of the above, but there are no specific user requirements related to efficiency.
- 4 Six or more of the above, and stated requirements for user efficiency are strong enough to require design tasks for human factors to be included
- 5 Six or more of the above, and stated requirements for user efficiency are strong enough to require use of special tools and processes in order to demonstrate that the objectives have been achieved.

Enhancement Project Function Point Count

The activity of applying the IFPUG Functional Size Measurement (FSM) Method to measure of the functional size of an enhancement project.

Enhancement Project Functional Size

The enhancement project functional size is a measure of the functionality added, changed or deleted at the completion of an enhancement project, as measured by the enhancement project function point count by the activity of applying the IFPUG Functional Size Measurement (FSM) Method.

An enhancement project functional size shall be calculated using:

$$EFP = ADD + CHGA + CFP + DEL \quad (3)$$

where

EFP is the enhancement project function point count;

ADD is the size of the functions being added by the enhancement project;

CHGA is the size of the functions being changed by the enhancement project – as they are / will be after implementation;

CFP is the size of the conversion functionality;

DEL is the size of the functions being deleted by the enhancement project.

Entity Dependent

An entity that is not meaningful or is not significant to the business, in and of itself without the presence of other entities such that

- an occurrence of entity X must be linked to an occurrence of entity Y
- the deletion of an occurrence of entity Y results in the deletion of all related occurrences of entity X.

Entity Independent

An entity that is meaningful or significant to the business, in and of itself without the presence of other entities.

Entity subtype

A subdivision of entity type. A subtype inherits all the attributes and relationships of its parent entity type, and may have additional, unique attributes and relationships.

Estimated Calculation

Proposed technique by NESMA to estimate the size of a system in function points based only on the identification of its functions, without the necessity of identifying their complexities. In this case we can attribute a low complexity for logical files and a medium complexity for the transactions.

External input (EI)

An external input (EI) is an elementary process that processes data or control information sent from outside the boundary. The primary intent of an EI is to maintain one or more ILFs and/or to alter the behavior of the system.

External Inquiry (EQ)

An external inquiry (EQ) is an elementary process that sends data or control information outside the boundary. The primary intent of an external inquiry is to present information to a user through the retrieval of data or control information. The processing logic contains no mathematical formula or calculation, and creates no derived data. No ILF is maintained during the processing, nor is the behavior of the system altered.

External Interface File (EIF)

An external interface file (EIF) is a user recognizable group of logically related data or control information, which is referenced by the application being measured, but which is maintained within the boundary of another application. The primary intent of an EIF is to hold data referenced through one or more elementary processes within the boundary of the application measured. This means an EIF counted for an application must be in an ILF in another application.

External Output (EO)

An external output (EO) is an elementary process that sends data or control information outside the application's boundary and includes additional processing beyond that of an external inquiry. The primary intent of an external output is to present information to a user

through processing logic other than or in addition to the retrieval of data or control information. The processing logic must contain at least one mathematical formula or calculation, create derived data, maintain one or more ILFs, and/or alter the behavior of the system.

F

Facilitate Change

One of the 14 general system characteristics that describes the degree to which the application has been developed for easy modification of processing logic or data structure.

The following characteristics can apply for the application:

A. Flexible Query

1. Flexible query and report facility is provided that can handle simple requests. (count as 1 item)
2. Flexible query and report facility is provided that can handle requests of average complexity. (count as 2 items)
3. Flexible query and report facility is provided that can handle complex requests. (count as 3 items)

B. Business Control Data

1. Business control data is kept in tables that are maintained by the user with on-line interactive processes, but changes take effect only on the next business cycle. (count as 1 item)
2. Business control data is kept in tables that are maintained by the user with on-line interactive processes, and the changes take effect immediately. (count as 2 items)

- 0 None of the above.
- 1 A total of one item from above.
- 2 A total of two items from above.
- 3 A total of three items from above.
- 4 A total of four items from above.
- 5 A total of five items from above.

File

For data functions, a logically related group of data, not the physical implementation of those groups of data.

File Type Referenced (FTR)

A file type referenced is a data function read and/or maintained by a transactional function.

Final Function User Requirements

The requirements that come about the joint sessions between the users and developers. They are considered the final version of the requirements and have the following characteristics: a common language for developers, they are complete, coherent, viable and approved by the user.

Fixed Price

This type of contracts favors the project focus, with a defined start and end. Requires a larger level of organization by both the client and the supplier. As the requirements get better, there is a less chance of error.

A factor that complicates the use of this focus is to assume that the requirements do not change after the start of the project.

Foreign Key

Data in an ILF or EIF that exists because the user requires a relationship with another ILF or EIF.

FPA Calculation Scope

The calculation scope defines the set of functional user requirements to be added to the function point calculation. This:

Defines the subset of the software that will be measured;

Is determined by the function point calculation purpose;

Identifies which functions will be added in the function point calculation in order to supply relevant answers for the calculation purpose;

Can include more than one calculation scope:

The calculation scope of:

An enhancement project calculation includes all of the functionalities such as modifying and eliminating. The affected application limits remain the same. The application functionality reflects the function impacts of adding, inserting and eliminating.

A development project calculation included all of the affected functions (built or modified) by the project activities.

An application function point calculation can be, depending on its final objective, only the functions that are used by the user or the total functionality delivered. - For example, supplying a package as in a software solution.

Function point analysis

The method for measuring functional size as defined within the IFPUG Functional Size Measurement (FSM) Method.

Function Type

The five base functional components identified in the IFPUG Functional Size Measurement (FSM) Method. NOTE: The five function types are: External Input, External Output, External Inquiry, Internal Logical File and External Interface File. Also known as Base functional component.

Functional Requirement

A sub-set of the user requirements specifying what the software shall do in terms of tasks and services. (ISO 14143-1:2007)

Functional Size

Size of the software derived by quantifying the functional user requirements. (ISO 14143-1:2007)

Functional Size Measurement

Size of the software derived by quantifying the functional user requirements. (ISO 14143-1:2007)

Functionality

The features or capabilities of an application as seen by the user.

G

General System Characteristics (GSCs)

The general system characteristics are a set of 14 questions that evaluate the overall complexity of the application.

1. Data Communications
2. Distributed Data Processing
3. Performance
4. Heavily Used Configuration
5. Transaction Rate
6. On-line Data Entry
7. End-User Efficiency
8. On-line Update
9. Complex Processing
10. Reusability
11. Installation Ease
12. Operational Ease
13. Multiple Sites
14. Facilitate Change

Gold Plating

The process of adding functionality in a system that hasn't been solicited by the users due to the developer thinking that these functionalities can improve the system.

H

Heavily Used Configuration

One of the 14 general system characteristics that describes the degree to which computer resource restrictions influence the development of the application.

A heavily used operational configuration may require special considerations when designing the application. For example, the user wants to run the application on existing or committed equipment that will be heavily used.

- 0 No explicit or implicit operational restrictions are included.
- 1 Operational restrictions do exist, but are less restrictive than a typical application. No special effort is needed to meet the restrictions.
- 2 Operational restrictions do exist, but are typical for an application. Special effort through controllers or control programs is needed to meet the restrictions.
- 3 Stated operational restrictions require special constraints on one piece of the application in the central processor or a dedicated processor.
- 4 Stated operational restrictions require special constraints on the entire application in the central processor or a dedicated processor.
- 5 In addition, there are special constraints on the application in the distributed components of the system.

I

IEC

International Electrotechnical Commission (www.iec.ch) is an worldwide organization that prepares and published international norms in regards to electrical technologies, electronics and the related.

IEEE

Non-Profit organization made up of professionals interested in the advancement of technology. Originally the name comes from the Institute of Electrical and Electronics Engineers (www.ieee.org), however its interest and activity scope has expanded over the years to cover a wider topic set.

IFPUG

The International Function Point Users Group is a membership governed, non-profit organization committed to promoting and supporting function point analysis and other software measurement techniques.

Image

An exact replication of another object, file, or table that is usually created through a utility.

Impact Factor

Level of Change unit of measurement that can vary depending on the nature of the scope of the modification. It is used by the NESMA method in order to measure enhancement projects.

Implicit Inquiry

It is a transaction that supplies data to the user (generally precedes another transaction that will take place), but it is no clearly explicit in the requirements or in the system itself (no even in the menu options, toolbars, etc.).

This is very common for screens where the user is about to edit or delete records from a file. Generally before deletion or modification, all of the records are presented to the user and thereafter has the option to eliminate or delete the record. This implicit inquiry can be

classified as an EO or EQ. When this is identical to an explicit inquiry (although not common however), only one of these functions should be counted.

Incremental

The notion of an incremental process corresponds to the idea of “increasing little by little” the system scope.

Indicative Calculation

Proposed technique by NESMA to estimate the size of a system in function points based only on the identification of its logical files.

The size is determined counting 35 FP for each ILF identified and 14 FPs for each EIF identified.

$$FPA = (\#ILF \times 35) + (\#EIF \times 15)$$

Initial Technical Requirements

Represents the developer’s vision of the requirements created after the viability study. One of the developer’s responsibilities, among many, is to organize the requirements within the existing applications. The initial technical requirements can include necessary elements for the implementation, but are not used in the Function Point Calculation. They can have the following characteristics: technology dependence, unknown language to the user and they don’t always adhere to the user’s needs.

Initial User Requirements

Represents the user requirements before the joint sessions between the users and the developers. These can have the following characteristics: Incomplete, unviable, vague, and expressed in a language only familiar to the business user.

Installation Ease

One of the 14 general system characteristics describing the degree to which conversion from previous environments influenced the development of the application.

Conversion and installation ease are characteristics of the application. A conversion and installation plan and/or conversion tools were provided and tested during the system test phase.

- 0 No special considerations were stated by the user and no special setup is required for installation.
- 1 No special considerations were stated by the user, but special setup is required for installation.
- 2 Conversion and installation requirements were stated by the user, and conversion and installation guides were provided and tested. The impact of conversion on the project is not considered to be important.
- 3 Conversion and installation requirements were stated by the user, and conversion and installation guides were provided and tested. The impact of conversion on the project is considered to be important.
- 4 In addition to 2 above, automated conversion and installation tools were provided and tested.

5 In addition to 3 above, automated conversion and installation tools were provided and tested.

Internal logical file (ILF)

An internal logical file (ILF) is a user recognizable group of logically related data or control information maintained within the boundary of the application being measured. The primary intent of an ILF is to hold data maintained through one or more elementary processes of the application being measured.

ISBSG

International Software Benchmarking Standards Group (www.isbsg.org) is a non-profit organization responsible for creating and maintaining a repository of historical data for IT projects with the end goal of helping IT management around the world.

ISMA

ISMA (International Software Measurement and Analysis Conference) – International conference in regards to measurement and software analysis which is annually promoted by IFPUG.

ISO

International Organization for Standardization (www.iso.org) is an international federation of national bodies in charge of normalization, made up of more than 160 countries, one entity per country. The ISO is a non-governmental organization, with the goal of promoting the development of norms and related activities throughout the world, with the intent of facilitating the exchange of experiences as well as intellectual, scientific, technological and economic knowledge. The ISO's work results in international norms.

ISO/IEC 15939

International norm for software measurement process. Defines an information model as well as associated terminology. The ISO/IEC 15939 cover activities in relation to measurement, necessary information and the measurement result analysis.

ISO/IEC 20926

Software Functional Size Measurement Standard in accordance with the IFPUG and it also adheres to ISO/IEC 14143.

Iterations

The notion of Iterative Process corresponds to the idea of "improving (or refining) little by little" the system (iterations).

L

Liability

Term used to describe the debts and investments of an organization. The debts are represented by more tangible quantities, such as cost and effort.

Life Cycle

Describes the stages that the software goes through from its conception until maintenance.

Load

To copy computer instructions or data from external storage to internal storage. (IEEE)

Logical File

A logical file/data function represents functionality provided to the user to meet internal and external data storage requirements. It can be either an internal logical file or an external interface file.

M

Maintain

The term "maintain" refers to the ability add, modify or delete data through an elementary process. Examples include, but are not limited to, the addition, modification, suppression, initial load, revision, update, assignment and creation.

Maintenance

The effort to keep an application performing according to its specifications, generally without changing its functionality (or functional size). Maintenance includes repair, minor enhancement, conversion, user support and preventive maintenance activities. Activities include defect removal (see repair), hardware or software upgrades (see conversion), optimization or quality improvement (see preventive maintenance), and user support.

Mandatory subgroup

One of the two types of subgroups for record element types (RETs). Mandatory subgroups mean the user must use one of the subgroups during an elementary process that creates an instance of the data.

Maximum

Largest value of a data sample.

Mean

The value that indicates the segment in which most of the data is concentrated in a distribution.

Measurement

Assigning relative value. Usually, in the improvement process, measures gained from this activity are combined to form metrics.

Medium

The median is the numerical value separating the higher half of a data sample, a population, or a probability distribution, from the lower half. The median of a finite list of numbers can be

found by arranging all the observations from lowest value to highest value and picking the middle one

Metadata

Metadata, or Meta Information, is data about other data. An element of metadata can explain what the other data is, generally comprehensible information by a computer. The metadata facilitates the comprehension between the relationships and data utility information. In Function Point Analysis, Metadata is considered code data.

Metrics Analyst

Professional responsible for the measurements. This person can be CFPS certified or not.

MH

Man-Hour is a unit, agreed upon and subjective, it's the measurement of amount of work realized by one person during one hour.

Minimum

The lowest value of a data sample

MM

Man-Month is a unit, agreed upon and subjective, it's the measurement of amount of work realized by one person during one month.

Multiple Sites

One of the 14 general system characteristics describing the degree to which the application has been developed for different hardware and software environments.

- 0 The needs of only one installation site were considered in the design.
- 1 The needs of more than one installation site were considered in the design, and the application is designed to operate only under identical hardware and software environments.
- 2 The needs of more than one installation site were considered in the design, and the application is designed to operate only under similar hardware and/or software environments.
- 3 The needs of more than one installation site were considered in the design, and the application is designed to operate under different hardware and/or software environments
- 4 Documentation and support plan are provided and tested to support the application at multiple installation sites and the application is as described by 2.
- 5 Documentation and support plan are provided and tested to support the application at multiple installation sites and the application is as described by 3.

NESMA

The Netherlands Software Metrics Association (www.nesma.org). A membership governed non-profit organization in the Netherlands, committed to promoting and supporting function point analysis and other software measurement methods.

Non-Functional Requirements

Non-Function Requirements describe the environmental conditions that the software should work under. It describes how the system characteristics will be delivered to the user. Generally speaking, they are organized into categories (ISO/IEC 9126, FURPS and FURPS+). By which, through its characteristics, provide support for the procurement of Non-Functional Requirements.

The ISO/IEC 14143 does not provide a definition for Non-Functional Requirements, but they present some examples.

Examples of Non-Functional Requirements include but are not limited to:

Quality Restrictions (for example: Ease of use, efficiency, portability)

Organization Restrictions (for example: operation location, objective hardware and norm completion)

Environmental Restrictions (for example: interoperability, security, privacy)

Implementation Restrictions (for example: development language, delivery schedule)

Normalization

The process by which any data structure can be transformed by a database designer into a set of normalized relations that have no repeating groups.

Normalization Constant

The software size in terms of function points that are used as normalization constants that allow for parameter establishment such as productivity (function points produced by man-month), the delivery rate (man-hours to produce one function point), defect density (defects found by function point) among others.

O

Object-Oriented

Object Oriented (OO) is a systems analysis and programming paradigm based on the composition and the interaction between different units of software called objects. The focus of OO has an objective to better identify the set of objects that describe a system. The functionality of this system is through the relationship and exchange of messages between these objects. Each object has a set of attributes and methods that define their functionality.

Online Data Entry

One of the 14 general system characteristics describing the degree to which data is entered or retrieved through interactive transactions.

On-line User Interface for data entry, control functions, reports, and queries are provided in the application.

- 0 All transactions are processed in batch mode.
- 1 1% to 7% of transactions are interactive.
- 2 8% to 15% of transactions are interactive.
- 3 16% to 23% of transactions are interactive.
- 4 24% to 30% of transactions are interactive.
- 5 More than 30% of transactions are interactive.

Online Update GSC

One of the 14 general system characteristics describing the degree to which internal logical files are updated online.

- 0 No present, no influence
- 1 Incidental influence
- 2 Moderate influence
- 3 Average influence
- 4 Significant influence
- 5 Strong influence throughout

Operational Ease

One of the 14 general system characteristics describing the degree to which the application attends to operational aspects, such as start-up, back-up, and recovery processes.

Operational ease is a characteristic of the application. The application minimizes the need for manual activities, such as tape mounts, paper handling, and direct on-location manual intervention.

- 0 No special operational considerations other than the normal back-up procedures were stated by the user.
- 1 - 4 One, some, or all of the following items apply to the application. Select all that apply. Each item has a point value of one, except as noted otherwise.
 - Start-up, back-up, and recovery processes were provided, but human intervention is required.
 - Start-up, back-up, and recovery processes were provided, but no human intervention is required (count as two items)
 - The application minimizes the need for tape mounts and/or remote data access requiring human intervention.
 - The application minimizes the need for paper handling.
- 5 The application is designed for unattended operation. Unattended operation means no human intervention is required to operate the system other than to start up or shut down the application. Automatic error recovery is a feature of the application.

Optional Subgroup

Optional subgroups are those that the user has the option of using one or none of the subgroups during an elementary process that adds or creates an instance or the data.

Parametric Estimation

Parametric Estimation is a technique that utilizes this statistical relationship between the historical data and other variables (for example, meters squared in construction, source lines of code in software development, labor hours necessary) in order to calculate resource cost estimation in comparison to a preplanned schedule. This technique can produce higher levels of precision depending on the sophistication and the quantity of resources and underlying costs incorporated in the model.

PDU

Professional Development Unit is the measurement unit used to quantify the approved activities of professional service and apprenticeship related to Project Management compatible with the knowledge areas and the processes described in "A Guide to the Project Management Body of Knowledge (PMBOK® Guide) and involve the appropriate expert resources. Typically, a PDU is obtained by each hour invested in an activity or a structured and planned learning experiment.

Perfective Maintenance

Modification of a software product after delivery to detect and correct latent faults in the software product before they are manifested as failures. Perfective maintenance provides enhancements for users, improvement of program documentation, and recoding to improve software performance, maintainability, or other software attributes. Contrast with: adaptive maintenance; corrective maintenance. (ISO/IEC 14764:2006)

Performance

One of the 14 general system characteristics describing the degree to which response time and throughput performance considerations influenced the application.

PERT/CPM

Program Evaluation and Review Technique PERT is used in planning.

The techniques known as PERT/CPM were developed in an independent manner for Project Planning and Control since 1950. The terms PERT and CPM are abbreviations for Program Evaluation and Review Technique (PERT) y Critical Path Method (CPM).

Examples of Projects that use PERT/CPM:

1. Facility Control
2. Research and Development of products
3. Movie Production
4. Naval Construction
5. Information System Installation
6. Campaign publicity, amongst others

PERT and CPM mainly use graphs to plan and visualize the coordination between the project activities.

Meanwhile that PERT is the average calculation from 3 different possible durations of an activity (optimistic, pessimistic and most probable), the CPM is a critical path calculation

method given to a sequence of activities, in other words, the activities of a sequence cannot be altered without also altering the total project duration.

PMBOK

The "Project Management Body of Knowledge" (PMBOK® Guide) is a term to describe the body of knowledge in regards to Project Management.

It describes the knowledge subset in regards to Project Management that are recognized as good practices in many projects; most of the time, there is a professional consensus about its values and applicability. However, the general acceptance is that it cannot be applied on all projects blindly, each project/industry has to decide what is appropriate.

Preventive Maintenance

Changes to hardware or software performed to prevent future defects or failures. For example, restructuring programs or data to improve maintainability or to prevent defects.

Primary Intention

Intent that is first in importance.

Primary Key

A set of one or more fields whose values are never repeated within a file. It's what identifies in a unique manner the file record.

It can be simple (when it's only composed by one field) or composite (when it's composed of more than one). If the field is a composite primary key, the values of each individual field can be repeated, but the combination cannot.

Processing Logic

Any specific requirement requested by the user in order to complete an elementary process, such as validations, algorithms, calculations, read or file maintenance.

Summary of the Processing Logic used by the transactions:

1. Validation
2. Calculations and mathematical equations
3. Conversion to equivalent values
4. Filter and selection of data based on specific criteria to compare multiple data sets
5. Analysis of the conditions in order to determine which apply
6. Update at least one ILF
7. Reference at least one ILF or EIF
8. Data retrieval or control information
9. Creation of derived data
10. Changing the system behavior
11. Preparation and presentation of information outside the boundary
12. Ability to accept data or control information that crosses the boundary
13. Change the order or organization of a data set. – If the only difference in the logic is the logical order, it is not enough to guarantee the uniqueness of the elementary process.

Should – The transaction should mandatorily execute this type of processing logic

Should* - The transaction should execute at least one of its processing logic classified as should*

Can – The transaction can execute this type of processing logic, but is not mandatory

Productivity

The ratio of work product to work effort.

Project Management

Process in knowledge, capacity, instruments and techniques are applied to projects in order to satisfy expectations and necessities of various stakeholders (PMI definition).

It's the application of knowledge, abilities and techniques for the preparation of related activities in order to reach a set of predefined objectives within a certain time period, with an associated - cost and quality value, by mobilizing technical and human resources.

Project Management Institute

The Project Management Institute (PMI) is a US not-for-profit professional organization for project management. The PMI provides services including the development of standards, research, education, publication, networking-opportunities in local chapters, hosting conferences and training seminars, and providing accreditation in project management.

Project Management Professional

Project Management Professional (PMP) is a credential offered by the Project Management Institute (PMI).

Prototype

Product is a product that has not yet been commercialized but is in the test planning phase. For software engineering, it is a system prototype/model without the intelligent functions (database access, inherited systems. Business rules, etc.), only available with visual capabilities and some basic functions. Normally it's used for approval purposes.

PSM

PSM (Practical Software and Systems Measurement) is standard methodology for the implementation of procedures for software measurement, compatible with the ISO/IEC 15939 and with the CMMI "Measurement and Analysis" Process Area. It is sponsored by the USA's Department of Defense.

Provides details in regards to the steps and tasks for the implementation of a software measurement program such as lessons learned, case studies and an implementation guide. It also includes a set of measurements that are successfully used by industries that are previously defined:

Progress and Duration

Resources and Costs

Product Stability and Size

Process Performance

Technology Effectiveness

Client Satisfaction
Function Point (FP)

It is the FPA unit of measurement that represents the functional size of the software.

Purpose of the count
The reason for performing the function point count.

R

Record element type (RET)

A record element type (RET) is a user recognizable sub-group of data element types within a data function.

Reference data

This type of data is stored to support the business rules for the maintenance of the Business Data; e.g., in a payroll application it would be the data stored on the government tax rates for each wage scale and the date the tax rate became effective. Reference Data usually represents a small percentage of entities identified.

Refresh

The process of recreating a set of data to make it current with its source.

Repair

The correction of defects that have resulted from errors in external design, internal design, or code. Examples are missing functions that do not result in application failure (external design error) or errors resulting in a stop-run situation (code error).

Requirement

Necessary condition/ability so that a stakeholder can solve a problem or scope objective.
Necessary condition/ability that needs to be fulfilled or possessed in a solution or solution component to fulfill a contract, specification or other formal imposed documents.
Definition based on the IEEE 610.12-1990: IEE Standard Glossary of Software Engineering Terminology

Requirements Gathering

Activity of producing, investigating, discovering and/or identifying the requirements that the users have for a system or project.

Return on Investment

In finance, the return on investment (ROI), also known as rate of return, is the relationship between the money acquired and lost through an investment, and the quantity of money invested.

Reusability

Reusability describes the degree to which the application and the code in the application have been specifically designed, developed, and supported to be usable in other applications.

- 0 No reusable code.
- 1 Reusable code is used within the application.
- 2 Less than 10% of the application code developed is intended for use in more than one application.
- 3 Ten percent (10%) or more of the application code developed is intended for use in more than one application.
- 4 The application was specifically packaged and/or documented to ease reuse, and the application is customized at the source code level.
- 5 The application was specifically packaged and/or documented to ease reuse, and the application is customized for use by means of user parameter maintenance.

RUP

Rational Unified Process is a process model for iterative software development. This can be adapted by any organization, process elements can be retrieved to better suit the organization's needs.

S

Scope creep/gallop

Additional functionality that was not specified in the original requirements, but is identified as the scope is being clarified and the functions defined.

Service Level Agreement

A Service Level Agreement (SLA) is part of the service contract between two or more entities in which the level of provision is formally defined. In practice, the term is used contextually at the point of delivery of a specific service or specific duty.

Significant

Recognizable by the user and satisfies a user functional requirement.

Source Lines of Code

It's a measurement in software used to measure the size of a software program which is equivalent to the number of lines of code in the text file.

Standard Deviation

Most common measurement for statistical dispersion. Some characteristics:

1. It is a non-negative number;
2. It unites itself with the same measurement units as the data.

Stakeholder

Term used in management that refers to any person or entity that affects or is affected by the company activities.

T

Test Function Point

Unit of measurement for the functions that are testing related. This concept is used by NESMA in their enhancement project measurements.

Transaction Rate

Transaction Rate describes the degree to which the rate of business transactions influenced the development of the application.

The transaction rate is high, and it influences the design, development, installation, and support of the application. Users may require what they regard as normal response time even during times of peak volume.

- 0 No peak transaction period is anticipated.
- 1 Low transaction rates have minimal effect on the design, development, and installation phases
- 2 Average transaction rates have some effect on the design, development, and installation phases.
- 3 High transaction rates affect the design, development, and/or installation phases.
- 4 High transaction rate(s) stated by the user in the application requirements or service level agreements are high enough to require performance analysis tasks in the design, development, and/or installation phases.
- 5 High transaction rate(s) stated by the user in the application requirements or service level agreements are high enough to require performance analysis tasks and, in addition, require the use of performance analysis tools in the design, development, and/or installation phases.

Transactional function

A transactional function is an elementary process that provides functionality to the user to process data. A transactional function is an external input, external output, or external inquiry.

U

UML

The Unified Modeling Language (UML) is a general-purpose modeling language in the field of software engineering, which is designed to provide a standard way to visualize the design of a system.

UML is not a development technique; it does not say what to do first and second, and so on. It merely helps visualize its design and the communication between objects.

Unified Process

Unified Process is the set of activities necessary to transform the user requirements into software. The UP for software development combines the iterative and incremental cycles for software construction.

Unit Price

In this model, the supplier remuneration is determined with the project elements. This element may in the form of: screens, reports, table, use case, source lines of code or function point.

In theory, this is a model that looks to balance the deficiencies of man-hour contracting.

Update

The reconstruction process of a data set to update it alongside its origin.

Use Case

A use case is the document that represents a discrete unit of interaction between the user and the system, in other words, it's a sequence of actions (with possible variations) that produces a concrete result.

Describes the functionalities that the system has, detailing the interaction with the user (or actor) and the system. They should not contain technical terms from the development area; it should only be in the language of the user. It should also not describe how the system should be built.

Typically a system would have a lot of use cases, each one representing a specific functionality that will be offered to the user.

User

A user is any person or thing that communicates or interacts with the software at any time.

User Recognizable

The term user recognizable refers to requirements for processes and/or data that are agreed upon, and understood by, both the user(s) and software developer(s).

User's Vision

Represents a formal description of the business user's needs in their language. The developers translate the user information into technical terms in order to provide a solution. This

- Is a description of the business functions
- Is approved by the user.
- Can be used to count function points.
- Can vary in its physical form (prototypes, meeting notes, vision document, use cases, etc.)

Note 1: The term developer in this case does not only refer to the programmer, but also all of the professionals involved in the systems development process (analyst, documenter, tester, project manager, etc.)

Note 2: A technical document generated by the developer can be used to count function points, if possible to extract the same functional requirements, however, they do not represent the user's vision because they do not use the business user's language.

V

VAFA

The application adjustment factor after the enhancement project has taken place (Value Adjustment Factor of the application After).

The enhancement project formula:

$$aEFP = [(ADD + CHGA + CFP) * VAFA] + (DEL * VAFB)$$

Application Formula after the enhancement project

$$aAFP = [(AFPB + ADD + CHGA) - (CHGB + DEL)] * VAFA$$

VAFB

The application adjustment factor before the enhancement project has taken place (Value Adjustment Factor of the application Before).

The enhancement project formula:

$$aEFP = [(ADD + CHGA + CFP) * VAFA] + (DEL * VAFB)$$

Value adjustment factor (VAF)

The factor that indicates the general functionality provided to the user of the application. The VAF is calculated based on an assessment of the 14 general system characteristics (GSCs) for an application.

Viability Analysis

Study that is performed before the start of a project to see if it's worth committing to (usually done in terms of Cost/Benefit).

Vision Document

Contains the vision that all actors have of the system that is about to be developed, in terms of the needs and most important characteristics. It has a description of the basic desired requirements; it provides the base for all of the detailed requirements.

It can also contain a formal requirements specification. The vision document captures design limitations and high level requirements so that the user can understand the system that needs to be developed.