Memo

To: IFPUG Members

From: IFPUG Counting Practices Committee (CPC)

Date: December 15, 2005

Re: Practical Guidelines for Identifying Unique Elementary Processes (Committee Draft)

The CPC is pleased to announce that it has completed its research and has published an initial draft of "Practical Guidelines for Identifying Unique Elementary Processes" (embedded below) for feedback and comment from IFPUG members. Within this document, the CPC has proposed a solution to the long-standing issue of the treatment of multiple-media. The CPC realizes that the Counting Practices Manual (CPM) does not explicitly cover multiple-media. As a result, individual function point analysts have treated multiple-media in different ways. This has resulted in inconsistency and reduced repeatability and therefore needed to be addressed to ensure the continued viability and growth of the method. Whenever inconsistency is eliminated, changes will result for some function point analysts. The CPC does not claim that function point analysts have counted incorrectly in the past, just that the method has not been clear on this issue.

In an effort to improve the consistency and repeatability of the function point method, the CPC has thoroughly researched this issue and proposes the guidelines set forth in the Practical Guidelines for Identifying Unique Elementary Processes. This document is to be considered a "Committee Draft" and has been published in accordance with the CPM Change Process Step 4, "The CPC presents a proposed solution to the IFPUG membership". An impact study (Step 5) may be performed to identify any significant impact on existing counts. Until such time as these guidelines become part of the Counting Practices Manual, they are not considered part of the official rules and consequently will not be included in the CFPS Exam.

Members are encouraged to study/use these guidelines and to report their experiences to the Counting Practices Committee (CPC) by sending an email to cpc@ifpug.org. The CPC accepts feedback on its documents at any time; however, we would appreciate your feedback on this paper within 30 days (by January 16, 2006) to allow us sufficient time to consider and incorporate your feedback before officially releasing the paper. Please refer to the feedback request form (embedded below), which summarizes key areas where feedback is sought.

The following provides additional insight into the CPC's research and the rationale behind the paper. Your feedback is critical, so that we can ensure the guidelines are clear, concise and unambiguous. The CPC is looking forward to receiving your feedback so that, together, we can improve the IFPUG Function Point Method.

Background Information

The International Standard ISO/IEC 14143-1:1998, defines FSM (Functional Size Measurement) as a measure of "functional" requirements that excludes "technical" and "quality" requirements. Its focus is to describe functional size measures, rather than technical size measures. Unfortunately, the standard does not provide practical definitions of "functional requirements" and provides only limited examples of non-functional requirements. It does not state whether aspects of requirements such as multiple media are either functional or non-functional. IFPUG has published the Counting Practices Manual as an ISO standard for Functional Size Measurement, which is conformant with 14143-1:1998, and is intended to remain so. It is therefore important to understand and remain aware of the differences between "functional" requirements and "technical" or "quality" requirements. *A Framework for Functional Sizing* provides the basis for differentiating between functional and non-functional user requirements. In order to illustrate the processes that the CPC followed in identifying the type of requirement embodied in multiple media, a highlighted excerpt from *A Framework for Functional Sizing* is embedded below.

Requirements related to multiple media are usually specified by the users, but this does not mean that they are functional. As users have become more and more technically informed, their specifications have increasingly included technical requirements (e.g., client-server, web-enabled, etc.). While these technical requirements do contribute to requirements size, they are still technical rather than functional. Their inclusion in a project will impact the overall product size as well as the amount of effort to deliver the requested product, but does not impact the functional size.

Given the active participation of one of its members in the development of the ISO FSM standards, the CPC is comfortable that its position is aligned with that of ISO. Many other IFPUG members are also involved in the development of the ISO FSM standards, and in the two years since the publication of *A Framework for Functional Sizing*, the CPC has not received any comments critical of the paper. This position is also supported by the fact that none of the other approved FSM Standards support sizing of multiple media.

As stated in *A Framework for Functional Sizing*, technical requirements can and should be measured to give a more complete understanding of requirements size, overall product size and the associated development and/or support effort. The CPC is not stating that technical requirements cannot or should not be measured, only that they must be clearly recognized as separate measures.

For a more complete understanding of the differences between functional and technical requirements, the CPC recommends a thorough review of *A Framework for Functional Sizing*. The CPC also encourages review of the embedded excerpts from that paper, which illustrate the logic behind the identification of multiple media requirements as technical.

A Framework for Functional Sizing draws on a wide variety of sources to determine the attributes that can be used to identify the nature of a requirement. It then provides guidance on assessing those attributes to determine whether a particular requirement is functional or technical. The CPC believes that *A Framework for Functional Sizing* provides an objective process for correctly identifying whether a requirement is functional or technical in nature. To our knowledge, this is the only method that allows us to do this.

The Practical Guidelines for Identifying Unique Elementary Processes used *A Framework for Functional Sizing* to identify whether multiple media was functional or technical in nature. The CPC believes that it has made an objective assessment of the nature of multiple media requirements. However, the CPC is willing to analyze any such arguments and to make whatever changes are necessary as long as they are compliant with ISO/IEC 14143-1:1998 and are supported by a majority of the function point analysts.

CPC Feedback Request

Topic - Practical Guidelines for Identifying Unique Elementary Processes (Committee Draft)

Function point analysts are encouraged to study/use these guidelines and to report their experiences to the International Function Point Users Group Counting Practices Committee (IFPUG CPC) by emailing this feedback request to the CPC at CPC@IFPUG.ORG by January 16, 2006. Both positive and negative feedback is required so that the CPC can provide the best possible solution to the issues being addressed and accurately assess the impact. In particular, feedback is sought in the following areas:

Question 1:	Do the arguments presented in this paper provide sufficient basis for the conclusions reached?
	Answer:
Question 2:	Does the paper contain a sufficient range of examples to enable consistent application of the proposed guidelines?
	Answer:
Question 3:	To what extent do the proposed guidelines reflect the existing measurement techniques employed within your organization or by your clients?
	Answer:
Question 4:	If the proposed guidelines represent a change to existing practices, what impact will they have?
	Answer:
Other Comments:	

CPC Rationale for Decision on Multiple Media

The International Standard ISO/IEC 14143-1:1998, defines FSM (Functional Size Measurement) as a measure of "functional" requirements that excludes "technical" and "quality" requirements. IFPUG has published the Counting Practices Manual as an ISO standard for Functional Size Measurement, which is conformant with 14143-1:1998, and is intended to remain so. It is therefore important to understand and remain aware of the differences between "functional" requirements and "technical" or "quality" requirements. *A Framework for Functional Sizing* provides the basis for differentiating between functional and non-functional user requirements.

In *A Framework for Functional Sizing*, we have used industry recognized sources (including IEEE, ISO and PSM) to define types of requirements. This document summarizes how we have used the contents of this paper to resolve the multiple media issue.

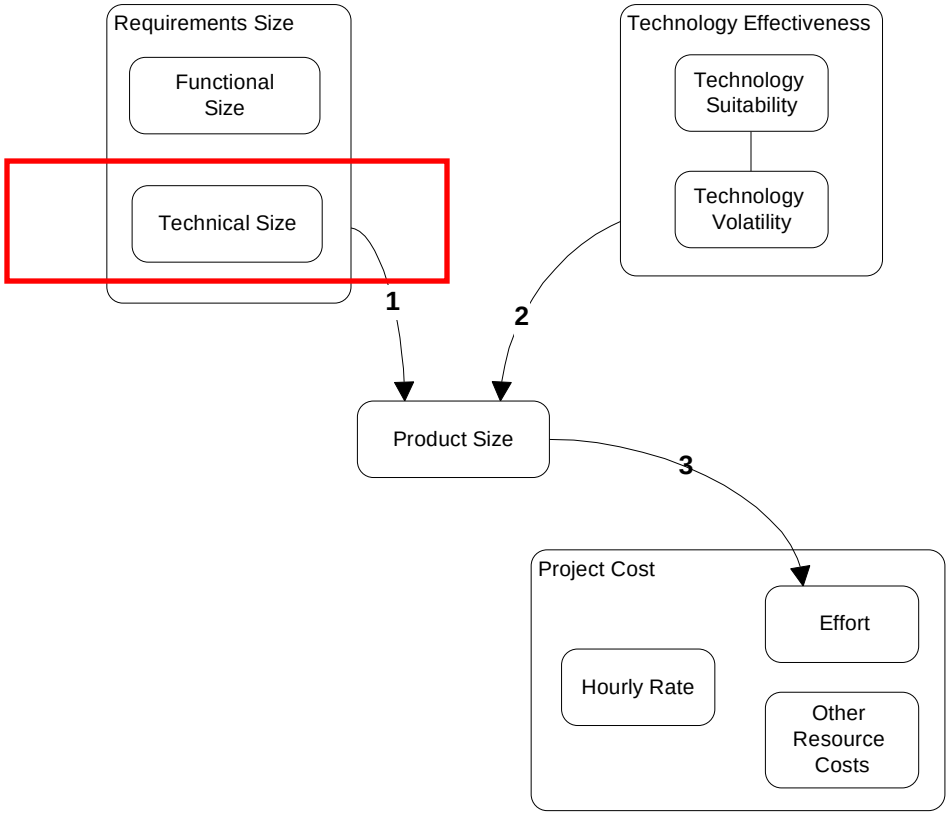
Requirements Definition Mapping

Referencing the IEEE and ISO definitions (see below), multiple media requirements are INTERFACE requirements, which are a subset of TECHNICAL requirements. (Note: Interface here does not equate to External Interface Files but rather an interface to a data delivery mechanism; e.g., fax, printer, e-mail, etc.)

IEEE Definition of Requirement	Requirement Type	
	IEEE	**ISO**
Specifies or constrains the design of a system or system component	design	technical
Specifies a function that a system or system component must be able to perform	functional	functional
Specifies or constrains the coding or construction of a system or system component	implementation	technical
Specifies an external item with which a system or system component must interact	interface	functional
Sets forth constraints on formats, timing or other factors caused by such interaction	interface	technical
Imposes conditions on a functional requirement, e.g., specifies the speed, accuracy, or memory usage with which a given function must be performed	performance	technical
Specifies a physical characteristic that a system or system component must possess; e.g., material, shape, size or weight	physical	technical

Conceptual Sizing Model

Referencing the Conceptual Sizing Model (see below), multiple media requirements contribute to the TECHNICAL SIZE.



The following relationships correspond to the numbered flows in the figure:

1. *Requirements size* measures the functional and technical requirements that the system must meet. *Requirements size* is a primary determinant of *product size* (the quantity of product that must be developed or maintained). The technical size represents those attributes of the design that are specified by the business; e.g., client server, web enabled.

2. By default, those attributes of the design that have not been specified by the business are within the domain of the developers and are included in the Technology Effectiveness. These attributes can also affect the *product size*.

3. The *product size* directly affects the need for resources as expressed by the development effort.

Requirements Gathering Technique

In *A Framework for Functional Sizing*, we also used the "5 W's and an H" technique to identify the nature of a component of the user requirements. Based on this technique, we have identified that multiple media requirements answer the question "HOW?", which are therefore TECHNICAL requirements.

Question	Manifestation in User Requirements	Functional	Technical
Who?	The organizational unit, job type or client type to which the requirement relates	X	
What?	The task that needs to be performed; a functional requirement	X	
Where?	The machine or machine type (client, server, etc.) on which the processing is required to occur		X
When?	There are several possibilities; e.g.,		
	• Performance – the task must be completed within one hour of initiation		X
	• Order – the task must be initiated after completion of the weekly reconciliation and must be completed before initiating the weekly reports	X	
	• Period – the processing logic depends on the period of time to which the transaction applies	X	
Why?	The rationale behind the requirement; asking "why" a requirement exists, results in answers to the "who", "what", "where", "when" and "how"	Not directly applicable	Not directly applicable
How?	The manner in which the task is initiated, performed or in which it delivers its results; asking "how", determines the methods used to deliver the functionality; the "how" can affect the data entry, processing and data delivery mechanisms, but does not affect the value of the result (i.e., the "what")		X

Summary

IFPUG FPA was originally developed as a measure of software size, but has evolved as we've learned more about software & measurement. We now understand that software size has two components: Functional & Technical. In order to remain conformant to ISO/IEC 14143-1:1998, IFPUG FPA can measure only functional requirements. This document has explained the rationale for the CPC's identification of multiple media as a technical requirement.

Practical Guidelines for Identifying Unique Elementary Processes

Committee Draft

Version 1.0

December 2005

First Release, December 2005

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International Function Point Users Group (IFPUG)

Practical Guidelines for Identifying Unique Elementary Processes

Version 1.0

Counting Practices Committee

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1 Introduction

1.1 Purpose

This paper proposes additional guidelines to be used in the identification of unique elementary processes to achieve more consistent results across the function point analysis community. It addresses two areas that have resulted in the greatest inconsistencies – groups of processes that differ in the enabling/delivering media or in the DETs that cross the boundary. Additional issues will be addressed by future releases of this paper.

This paper elaborates on the IFPUG Counting Practices Manual Release 4.2 Series (CPM)[1] and the '5Ws and an H' technique that was introduced in Framework for Functional Sizing[2] as an aid to distinguishing between functional and technical requirements.

1.2 Feedback Sought

Function point analysts are encouraged to study/use these guidelines and to report their experiences to the International Function Point Users Group Counting Practices Committee (IFPUG CPC) by sending an email to cpc@ifpug.org. In particular, feedback is sought in the following areas:

- Do the arguments presented in this paper provide sufficient basis for the conclusions reached?
- Does the paper contain a sufficient range of examples to enable consistent application of the proposed guidelines?
- To what extent do the proposed guidelines reflect the existing measurement techniques employed within your organization or by your clients?
- If the proposed guidelines represent a change to existing practices, what impact will they have?

Both positive and negative feedback is required so that the CPC can provide the best possible solution to the issues being addressed and accurately assess the impact.

1.3 The Issue

The CPM provides guidance for the identification of unique elementary processes. The CPM states that:

to be considered as a unique elementary process, one of the following must apply:

- processing logic is unique from the processing logic performed by other elementary processes for the application
- the set of data elements identified is different from the sets identified for other elementary processes for the application
- the ILFs or EIFs referenced are different from the files referenced for other elementary processes for the application

1 International Function Point User Group, Counting Practices Manual Release 4.2, January 2004

2 Framework for Functional Sizing, IFPUG CPC, Release 1.0, September 2003

The CPM also identifies a list of 13 forms of processing logic. With the exception of resorting or rearranging a set of data, these actions can assist in determining unique processing logic and hence in identifying unique elementary processes.

The issue is the ability to correctly identify the elementary process. The CPM states that an elementary process:

- is the smallest unit of activity that is meaningful to the user(s) and
- must be self-contained and leave the business of the application being counted in a consistent state

To correctly identify unique elementary processes, the function point analyst must identify the **complete** elementary process together with any variations that may exist within it. To identify the complete elementary process, it is also necessary to correctly distinguish between those components of the requirement that are functional and those that are technical.

This paper applies the '5Ws and an H' technique to assist in identifying elementary processes and hence uniqueness.

1.4 Functional and Technical Requirements

Framework for Functional Sizing draws on a number of publications to demonstrate that requirements are either functional or technical in nature. It explains that the ISO standard for functional size measurement (*ISO/IEC 14143-1:1998*[3]) requires that conforming measurement methods restrict themselves to measuring only the functional requirements. It is important to note that this does not mean that the size of the technical requirements must be ignored, only that they cannot be included in the measurement of functional size.

3 ISO/IEC 14143-1:1998 Information technology – Software measurement – Functional size measurement – Definition of concepts

1.5 The 5Ws and an H

The following table is repeated from *Framework for Functional Sizing* for reference:

Question	Manifestation in User Requirements	Functional	Technical
Who?	The organizational unit, job type, or client type to which the requirement relates	X	
What?	The task that needs to be performed; a functional requirement	X	
Where?	The machine or machine type (client, server, etc.) on which the processing is required to occur		X
When?	There are several possibilities; e.g.,		
	• Performance – the task must be completed within one hour of initiation		X
	• Order – the task must be initiated after completion of the weekly reconciliation and must be completed before initiating the weekly reports	X	
	• Period – the processing logic depends on the period of time to which the transaction applies	X	
Why?	The rationale behind the requirement; asking "why" a requirement exists results in answers to the "who", "what", "where", "when", and "how"	Not directly applicable	Not directly applicable
How?	The manner in which the task is initiated, performed, or in which it delivers its results; asking “how”, determines the methods used to deliver the functionality; the "how" can affect the data entry, processing, and data delivery mechanisms but does not affect the value of the result; i.e., the “what”		X

2 Multiple Media

Multiple media refers to processes that perform the same function (processing logic, user-recognizable data crossing the boundary, and files referenced/maintained), but which are enabled or delivered via different media. This means that the "what" is the same, and it is only the "how" that varies.

2.1 The Issue

When delivering data to the user, there are three different scenarios where multiple media might be considered an issue in the identification of unique elementary processes:

1. The users require the business application to provide the ability to select the final delivery media for a report – either on initiating the report or after previewing the results. This may be the result of a specific requirement for the report or a generic requirement that applies across the application. When the scope of the count includes the size of the complete application, multiple media must be considered in the identification of unique elementary processes. See Figure 1 below.

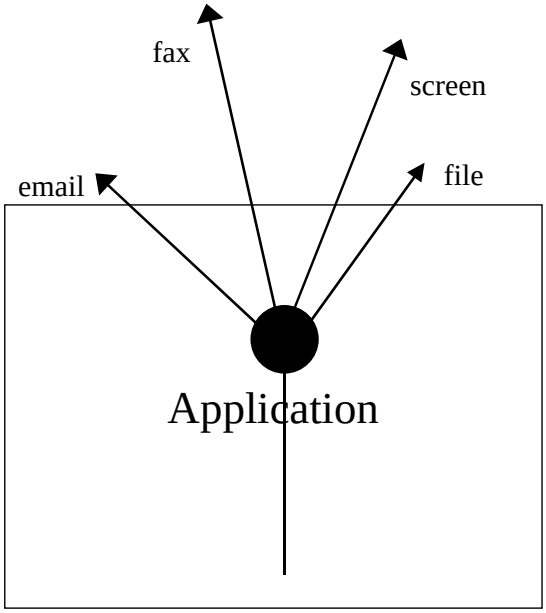

Figure 1 – An application provides the ability to deliver a report across multiple media

2. A variant on paragraph 1 above is the requirement for a presentation layer that accepts reports from the business application and satisfies the user's choice of delivery media. The presentation layer might be an obvious front end to a single business application (such as a spreadsheet), or it might be a corporate tool that appears to be a part of the application. In either situation, the presentation layer is inside the application boundary.

   When the purpose of the count is to size the application to determine development cost, only the application and data layers are included within the measurement scope. The multiple media capability exists within the presentation layer and is outside the scope of the count. The scope of the count excludes the functionality provided by the presentation layer since it is not being developed or supported. The business application delivers the reports to the presentation layer, and multiple media is not an issue. See Figure 2 below.

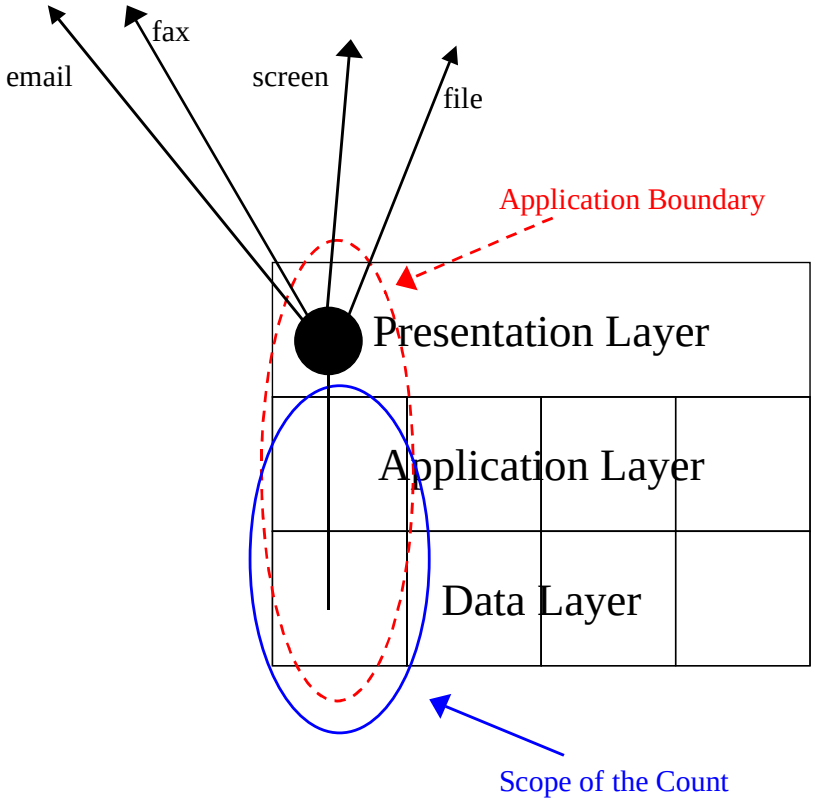

Figure 2 – An application delivers a report to a presentation layer within the boundary, which is then responsible for distribution

3. The third variant involves sending information from one application to another application with multiple media capabilities. Figure 3 illustrates this variant where Application A sends information to Application B, which provides multiple media capabilities.

   When the purpose of the count is to size Application A, the scope of the count excludes the functionality provided by Application B since it is not being developed or supported. Application A delivers the reports to Application B, and multiple media is not an issue.

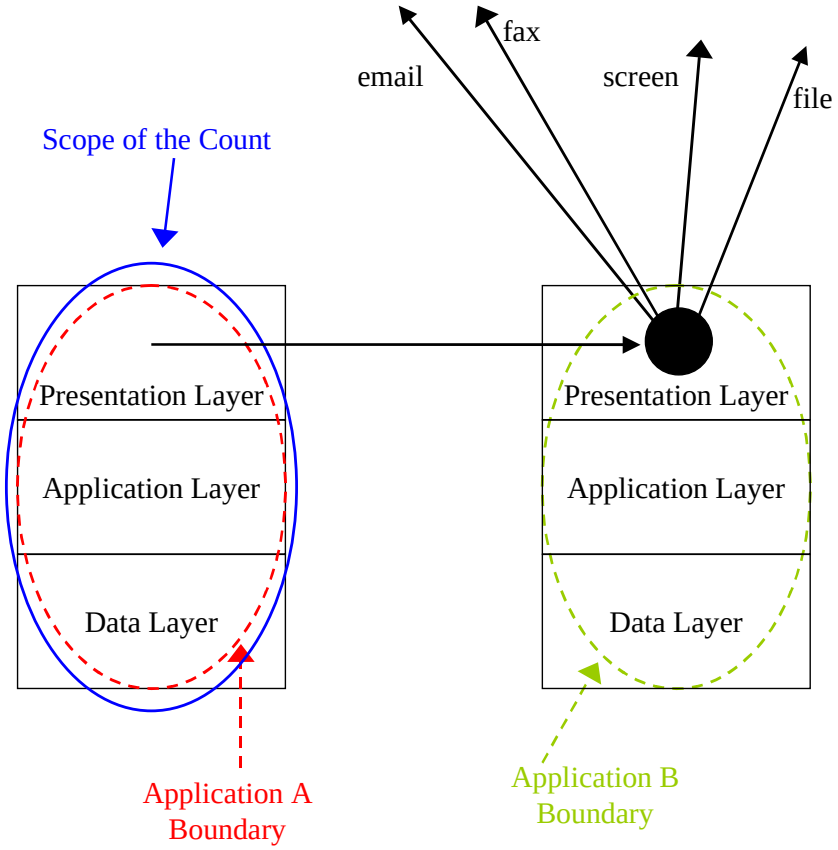

Figure 3 – Application A delivers a report to Application B, which is then responsible for distribution

Having explained the three scenarios above, the primary focus of Section 2 is to explore the multiple media issue when it is within the scope of the count.

2.2 Examples – Identifying a Single Unique Elementary Process

Each of the following scenarios describes a set of processes that perform the same function (processing logic, user-recognizable data crossing the boundary, and files referenced/maintained) but which are enabled or delivered via different media.

- The following four reports are required:
  - an on-screen list of customers
  - a printed list of customers
  - a microfiche list of customers
  - an emailed list of customers

- The following three inputs are required:
  - a funds transfer using character-based screen
  - a funds transfer using an automatic teller machine
  - a batch funds transfer from transactions received on magnetic tape

- The following three inputs are required:
  - a sales order from a barcode reader
  - a sales order from a mobile phone
  - a sales order from the Internet

- The following two outputs are required:
  - a statistical report in comma separated values (CSV) format
  - a statistical report in a proprietary spreadsheet format

- The following two inputs are required:
  - the ability to add a customer order on-line
  - the ability to add bulk customer orders in a batch process

In each set of the examples above, only one unique elementary process is counted because the choice of media is a determinant in "how" the functionality is delivered, and therefore is not part of the functional size.

2.3 Examples – Identifying Multiple Unique Elementary Processes

In some situations where functionality is enabled/delivered via different media, there are also differences in processing logic, user-recognizable data crossing the boundary, and/or files referenced/maintained.

Examples include:
- a funds transfer using an automatic teller machine may involve different user-recognizable data than one using a character-based screen; e.g., bank id
- a batch transaction may maintain an additional file (suspense file) that is not required for an online transaction[4]

In such cases there are clear differences in one or more of the processing logic, user-recognizable data crossing the boundary, or files referenced/maintained. The functional

4 Batch functions often process header and trailer records as an integrity check. As shown in the CPM example, these records do not contain user recognizable data and therefore cannot contribute to the identification of unique elementary processes.

component, or the “what”, determines the difference between the transactions, and therefore multiple unique elementary processes exist. The fact that the processes are delivered/enabled via multiple media is incidental and is not a consideration in determining uniqueness. See Section 3 of this paper for further discussion on similar transactions.

2.4 The Solution

The solution is to identify the functional and technical components of the requirement. The functional component is the “what”, and the media satisfies the “how”, a technical component of the requirement.

The same logical function (i.e., no differences in processing logic, user-recognizable data, or FTRs) is delivered via more than one media. From a functional perspective, the elementary process is identified as ‘perform the function via various media’, rather than ‘perform the function in media x’. The choice of media is a determinant in “how” the functionality is delivered, and therefore not considered as part of the functional size. The smallest unit of activity is to deliver the functionality to the user – it is not completed until delivery has occurred via one or more media.

For some media, a report must be accompanied by specific media distribution information to ensure that it can be delivered correctly. The media distribution information is optional data, and the associated processing is optional processing. For the identified report, all the user-recognizable addressing information for all required media options is included in the total number of DETs for the report. E.g., consider a report of Customer Names and Addresses that must be delivered via email or facsimile. To ensure correct delivery, the application must include either an email address or a phone number with the report. Therefore, the report has 4 DETs – Customer Name, Address, Email Address, and Phone Number.[5]

Figure 4 below shows the functional view of multiple media, which is counted as a single transactional function. Delivering the functionality over multiple media is incidental and is not a consideration in determining uniqueness.

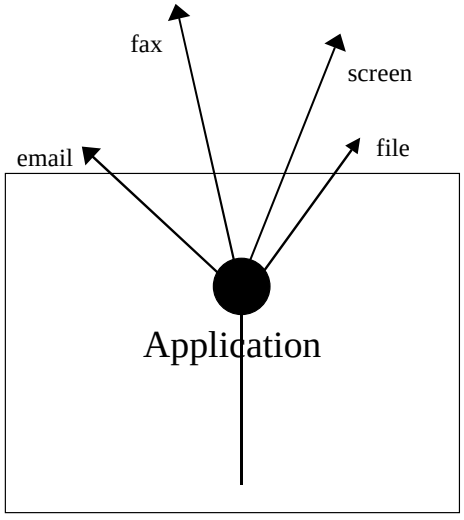

Figure 4 – The functional view of multiple media – a single transactional function

5 Note that technical data (such as hash totals in trailer records, tape density, etc.) are not user recognizable and should not be counted.

Figure 5 below shows the technical view of multiple media – multiple functions. This contributes to the technical size, and not the functional size.

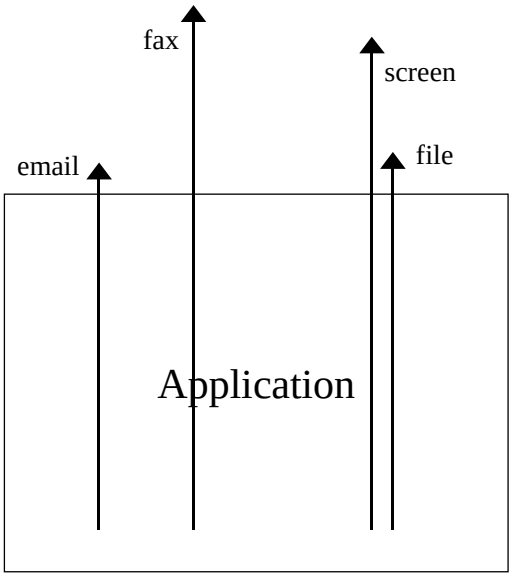

Figure 5 – The technical view of multiple media – multiple transactional functions

2.5 Summary

The requirement to enable or deliver functionality via multiple media, when processing logic, user-recognizable data crossing the boundary, and files referenced/maintained are all the same, is a technical component of the requirement. Multiple media, and associated media specific distribution information and processing logic, are not sufficient to identify multiple unique elementary processes. Media specific processing logic is optional processing as part of the elementary process. The media specific DETs are optional DETs included in the complexity of the elementary process as part of the total number of DETs.

3 Similar Transactions – Different DETs

Similar transactions – different DETs refers to processes that reference/maintain the same set of logical files, but differ in some minor aspect – such as one or two additional data elements crossing the boundary.

3.1 The Issue

When sizing transactions, there are scenarios where additional DETs might result in the identification of unique elementary processes. This does not refer to datasets delivered to data analysis tools as is often seen in a data warehouse. Such scenarios often involve delivery of large numbers of DETs to the data analysis tool, which then functions as a report writer in allowing the user to select the particular DETs they wish to view. E.g., an application may be required to produce a dataset containing 40 DETs. This dataset is delivered to a data analysis tool that provides the user with the ability to selectively report on any subset of DETs and generate their own totals and subtotals. This data analysis tool is part of the presentation layer. As with multiple media, the purpose is generally to size the business application in order to determine development and enhancement costs. In such cases, only the application and data layers are included within the measurement scope. Figure 6 below shows how the scope excludes the presentation layer.

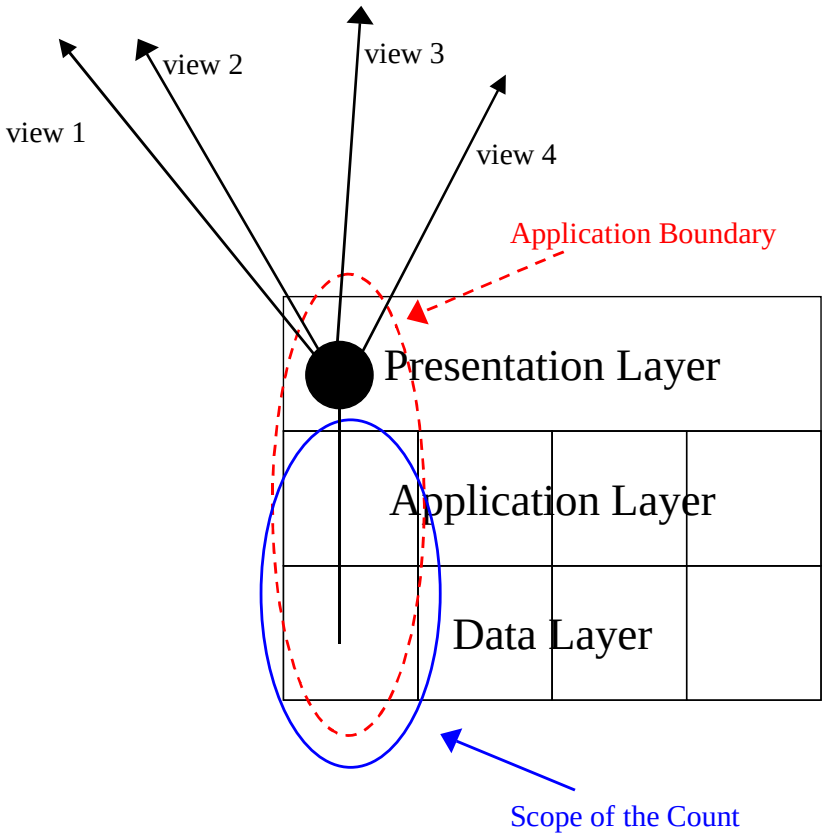

Figure 6 – An application delivers a dataset to a presentation layer, which provides the user with the ability to create custom reports

3.2 Examples – Identifying Multiple Unique Elementary Processes

Each of the following scenarios describes a set of processes that perform a similar function but which involve slightly different DETs crossing the boundary.

- The following two reports are required:
  - a list containing Customer Name, Customer Id, and Address
  - a list containing Customer Name, Customer Id, Address, and Phone Number

Since the two reports involve different DETs crossing the boundary, two unique elementary processes are counted.

- The following two reports are required:
  - a list containing Customer Name, Customer Id, Address, and Date of Birth and
  - a list containing Customer Name, Customer Id, Address, and Phone Number

Since the two reports involve different DETs crossing the boundary, two unique elementary processes are counted.

- The following two reports are required:
  - a bar chart of the volume of sales by region
  - a pie chart of the volume of sales by region

Both charts can be expected to display the volume of sales for each region; however, the pie chart involves additional processing to calculate and display the percentage of sales for each region. Therefore, in addition to different DETs crossing the boundary, the two reports also involve different processing logic. Again, two unique elementary processes are counted.

3.3 Examples – Identifying a Single Unique Elementary Process

Each of the following scenarios describes a set of processes that perform a similar function.

- The following two lists are required:
  - customers for a specified country containing Customer Name
  - customers for all countries containing the Customer Name and Country

Although the first list does not specify the country for each customer, the country appears in the title of the report. Therefore in both cases two DETs cross the boundary, and only one elementary process is counted. Although the format of the report is different, the two formats do not result in an additional elementary process. Additionally, the selection criteria permit the selection of one or more countries.

- The following two lists are required:
  - a list containing Customer Name and Customer Address
  - a list containing only Customer Name

After discussions with the developer, the user agrees that only one list is required – containing Customer Name and Customer Address. Based upon the revised requirements (what must be delivered), there is only one list, and only one elementary process is counted.

- The following two inputs are required:
  - Add an employee without dependents
  - Add an employee with dependents

The CPM illustrates that it is inappropriate to count one transactional function to add employees with dependents and a second transactional function to add employees without dependents. From a functional perspective, the elementary process is identified as ‘add employee’, rather than as two separate elementary processes of ‘add employee with dependents’ and ‘add employee without dependents’.

3.4 The Solution

When transactions with different DETs (other than optional) cross the application boundary, they result in separate elementary processes, a difference in the “what”. When optional DETs cross the boundary as part of a transaction, they are considered to be a part of a single elementary process. Contrast this with the situation in Section 2, where the difference between a number of processes is the result of a technical component of the requirement, and therefore not considered as part of the functional size.

4 Conclusion

This paper addresses areas that have generated the greatest inconsistencies in relation to identifying unique elementary processes. The solution lies in identifying whether the difference between the processes is due to a functional or a technical component of the requirement.

If the difference is due to a functional component of the requirement, it contributes to the identification of unique elementary processes. Optional DETs do not imply unique elementary processes.

However, if the difference is due to a technical component of the requirement, it cannot be used to identify unique elementary processes and does not contribute to the functional size.

As discussed in *Framework for Functional Sizing*, identifying a component of a requirement as technical does not mean that it cannot or should not be sized, only that it must be separately measured. Technical requirements do not contribute to the functional size; however, they do contribute to both the technical size and the requirements size.