SCOPE 4.1   - Help User Manual

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1 Getting Started

1.1 Start SCOPE

1. Select the **SCOPE icon** on your Desktop or under Windows START - Programs - **SCOPE** and double click on **SCOPE.exe**
2. Enter your Contact Name, and your Company or Organization Name, and the **SCOPE** Serial Number into the dialogue boxes provided. (Note: each of these fields has been supplied with your software or by your supplier)
3. You must enter these above three fields EXACTLY the same as provided to you in order for **SCOPE** to validate your License. It is therefore recommended that you copy and paste the details directly from the email sent.
4. If you are not using an Evaluation copy of **SCOPE** then your license details need to be 'Activated' on the Total Metrics Web site. You need to be connected to the Internet to Activate **SCOPE**. Once you have entered the license details press the Activate button. **SCOPE** will return a message to let you know that you have successfully activated **SCOPE**.
5. Use the example **SCOPE** databases under the **SCOPE** Directory/Databases to explore the functionality provided by **SCOPE**.

SCOPE records the project data entered by you within a single database consistent with a Microsoft ACCESS^{TM} format. **SCOPE** database files are stored as *.fpa* files.

If Total Metrics provides you with an updated serial number for a new version of **SCOPE** software then you can update it by selecting **Change Registration Details** under Help on the main menu.

1.2 SCOPE License Registration

When you purchase **SCOPE** you will nominate the number of concurrent **SCOPE** Users who will be installing and using **SCOPE**. Total Metrics will issue you with a License for that number of Users.

Contact Name	= John Smith
Organisation Name	= Acme Metrics and Co
Serial Number	= 3cc2 4kk9 vkc1 jy3j
Registered Email	= john.smith@acme.com

Your License Key is made up of Four parts. When you Start **SCOPE** you will be prompted to insert your License Key details into the fields within each of the four parts.

1. **Contact Name** - name as provided by Total Metrics
2. **Organisation Name** - of your company as provided by Total Metrics.
3. **Serial Number** - encrypted number specifically generated by Total Metrics for your purchase. eg. "*1q8u 2d9u 3r9g 9j9j* " Enter each 4 character-set into each of the 4 data entry boxes - 16 characters in total. i.e. the character-set *1q8u* would be entered into first data entry box, *2d9u* into the next
4. **Email** - your email address for support.

Once you have input your License Key details you will be asked to Activate **SCOPE**. When a new Release of **SCOPE** is issued you will be sent an updated Serial Number. You may also be issued with a new Serial Number if your type of **SCOPE** license changes. For example: from an Evaluation Version to a full production version or from **SCOPE** Professional to **SCOPE** Corporate. To update the Registration Details of an installed version of **SCOPE**, select Help / Change License Details from under the main menu.

1.3 License Activation

1.3.1 Activate SCOPE

In order for you License to be validated, you need to activate it on the Total Metrics WWW site. In order to do this you need to be connected to the Internet the first time you open SCOPE. On the bottom left hand side there is an Activate/Deactivate Button. If it is displaying 'Activate' then press it to Activate your license. SCOPE needs to connect to the Total Metrics WWW site in order to activate so please ensure you have an internet connection. SCOPE will verify how many seats have already been activated for this License key and confirm that the activation was successful.

You only need to Activate SCOPE once, the very first time you use it. After that you do not need to be connected to the Internet to use SCOPE. Once your License Key is activated on your computer it does not need to be activated again. HOWEVER if you want to upgrade your computer or move SCOPE to another computer you first need to Deactivate your License key for your original installation of SCOPE.

1.3.2 Deactivate SCOPE

Ensure your computer is connected to the Internet. Open the dialogue box below (Help / Change Registration Detail) and select the button on the bottom left hand side to Deactivate SCOPE. SCOPE needs to connect to the Total Metrics WWW site in order to Deactivate so please ensure you have an internet connection. SCOPE will deactivate SCOPE and confirm how many seats are now available for this License key. Ensure you get confirmation that your version of SCOPE has been deactivated before decommissioning or un-installing SCOPE on your computer or trying to activate this license key on another computer.

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If you experience and problems with Activation please see Trouble shooting
Activation

1.4 Step by Step - your First Function Point Count

Setting up your First Function Point Count in SCOPE

To download and print these instructions click here.

1. You can put your first count in the Example Database (Select <Example Database> under <File>) or create a new empty database (Select to <New> under <File> and enter the File Name of your new SCOPE database, e.g. *MySCOPEdatabase.fpa*)

2. From the Application List displayed select ✚ to add a new Application and type in the Application name of your count   (e.g. *Customer Information System*). Once created, highlight the Application name, expand [+] and highlight the **Work in Progress Release** branch.

3. Counts are recorded under Releases for an Application. Select ✚ to add a new Release of the software application and name it. e.g. "*Release 1.0 of Customer Information System*".

4. A new ☐ count session called "Change Request" is inserted automatically. This is where your count information will be stored. Each release can have many count sessions.

5. Highlight the Release and select ✚ to set up a new function point count session ☐ for this Release. To change details press F2 or select 🖉 . Change the status of the count to "In Progress". You can rename the new Count Session e.g. "*Initial Count for Project Scoping*". Record background details about the count

6. If the Change Request for which you are doing the count belongs to a Project. Then select the Project List tab at the top of the screen. ✚Add the new project, highlight it and select ✚ to link the Count Session to the Project. When you select OK you see your new Count Session listed (🖉) ready for

you to highlight and Open. NOTE: If you do only want to record the Count Size Result for Benchmark Metrics then just record the size manually on the Count Details or Project Details screens.

7. Double click to open the Count Session. The Function Point Counting Screens will display and your cursor will be positioned on the ⬚ Function Tree. Create a functional breakdown of your software by first adding Functional Groups (Function Folders) using [Alt+Ins] or selecting from the Node button on the top tool menu.

8. At the lowest level Function Folder insert the Elementary Processes/Transactions you want to add by pressing [Ins] or right clicking to display insert menu. NOTE: The Function Groups, allow you to logically hierarchically group your processes, just like MS Explorer uses a directory structure to enable you to group your files.

9. After you create a functional group, use F2 or double-click to rename it from the default name of "Function Folder" (e.g. call it *Maintain Customer Details*).

10. New elementary processes are created with a 'green', right facing arrow. Double click the Process and the Details screen displays in the right hand side screen. The direction of the arrow indicates the process has defaulted to being an INPUT. If you change the Process Type to OUTPUT you will see the arrow reverse. Green indicates that it is a new process to the application. You will see the radio button in the status bar at the bottom of the screen indicate it as an Added function for Enhancement Type. If you want to record it as 'changed' for an enhancement project then you can select the 'Changed' radio button and the arrow will change to orange.

11. Use the right hand details screen to assess the Type and Complexity of each Elementary Process.

12. To count your logical data groups (Internal and External Files) select the Data tab at the top of the LHS screen. Highlight the Data Release root node and you can begin by entering a Data Folder. Data Folders allow you to 'Group' your Logical Data.

13. Insert the Logical Data Groups [Alt+Ins]. Highlight the Data Group, and in the Details screen in the opposite window, determine the Data Group Type (ILF or

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EIF) using [User Select] - Data Group Type, then select the complexity. Complexity defaults to Low, to select the range of RETs and DETs select Range then the appropriate position on the matrix or you can enter the number of RETs and DETS.

14. If you want to list the actual RETs and DETS right click on the Data Group and select to insert.

15. If you want to link your processes to the Data Groups they access. Select the [Function] Tree Tab on the top LHS of the screen and the Data Tab on the top RHS of the screen. Highlight the Process you want to link, then 'click' in the box next to the Data Group name. You can also create 📋 [Notes] for your Processes and Data Groups by selecting the [Notes] tab, creating a Note under a 💬 Note SET and linking. 🔧 Attributes (similar to Key words) can also be assigned using the 📌 [Attribute] Tab.

16. The function point count will automatically calculate from any position in the Function tree and displays in the status bar at the bottom of the screen. The value displayed will change depending on the position of the cursor on the function tree.

17. To see the detailed report, select 📊 Report Icon on the main menu. Expand [+] the branch that says Function Point Count Results and select the report named *Count Session Impacted Functional Size - Detail*. Select to Preview the report and it will display online.

18. The above instructions provide the basic guidelines for creating a basic Project Development Count or Enhancement count. Record your Adds, Changes and Deletes for your Change Requests using the Impact options in the status bar in a Count Session. Baseline counts can be created from Project counts by selecting the Update to Baseline button in the Applications List. SCOPE has many more features that allow you to profile your count and track functional creep across project life cycles. Please view the Online Tutorials and HELP within SCOPE to understand all the features in SCOPE.

1.5 Tutorial Using Example SCOPE Database

Set Up New Release Building Hierarchy Trees for Counts

This Chapter assists you to open our Sample Database provided in your **SCOPE** installation software and explore the functionality of **SCOPE**.

When you open **SCOPE** you will see Open Example Database as a menu option under File on the main menu. Click to open the Example Database. Alternatively once you have started **SCOPE**, select **File – Open.** Browse to the directory where the **SCOPE** example database is stored (e.g. **SCOPE** EXAMPLE DATABASE VER 4.1 BUILD 221.0.FPA*)* (Note: the example database is under the directory where **SCOPE** was installed typically C:\Program Files\Total Metrics**SCOPE**). To open, either 'double-click' or select **Open**.

The **Application List** is displayed. Select the [+] icon to display the releases stored for the Application with the name "*AMS - View Example Counts*".

The **Production Releases** are the Functional Size models for the Baseline Application Releases. The Gold Open Padlock Icon indicates that this is the latest release and that there are no current project counts to update this release.

The **Work in Progress Releases** stores the functional model for the original Development Project Count "AMS ND Rel 1.0 March 2009" and other later Enhancement projects e.g. "*AMS Enh Rel 1.1 June 2009*".

Expand the directories under the Release *AMS ND Rel 1.0 March 2009* by pressing the [+] next to the name, and display the three Count Sessions for the three Change Requests that were recorded during the project. Select "AMS #001- Daily

Rate" and double-click to open the count or select the Open Icon from the menu at the top.

The **Function** Tree which holds all the elementary processes displays.   To explode the tree either click [+], or use the Icons on the Tools Bar at the top of the screen or select from the top menu Trees – Expand Level 4 tool button.

Move the mouse down and highlight the first Process "Create Assignment". Either double click the process or select the **Detail** Tab along the top of the Right Hand Screen. The functional size details of the "Create Assignment" process displays on the right hand **Details** Screen.

The **Details** screen also displays a history of the impacts to the Process in the Session Impact dialogue box. We see that the *Create Assignment* Process was added new in the first Count Session for the Development Project and subsequently this Count Session "*AMS #001- Daily Rate"* Impact Count changed the process in response to the users change request. This is also shown to us in the Function screen where the icon for this process is coloured orange.

The Count Session that is currently selected is displayed just above the status bar under the bottom LH screen and should be displaying "session "*AMS #001- Daily Rate*". With the "*Create Assignment*" Process highlighted select the Enhancement Type= **'Delete'** radio button at the bottom of the screen. You will see the colour of the arrow icon next to the Process change from Orange to Red , to show it is deleted. You would select this option when recording a Change Request to remove existing functionality from an application. It is marked as 'logically removed' and will be physically deleted when the release updates the baseline when the Release is completed.

To display the Data Groups accessed by the Process *Create Assignment* select the **Data** Tab along the top of the Right Hand Screen. Expand the Data Tree. The red

 in the check box indicates that these Data Groups are accessed by *Create*

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Assignment. The Pen Icon next to Assignment indicates that this is an Internal Logical File updated by the Processes in AMS. In comparison, the Notebook Icon next to CLIENT DETAILS indicates that this is an External Interface file and only 'read' by the AMS Processes.

Highlight the Data Group *CLIENT DETAILS* and Right click the mouse to change the **Access Type** for the Data Group from **Read Only** to **Update**. Notice the change of the Icon. The orange colour of the *ASSIGNMENT* Pen Icon is showing that this Data Group was recorded to be 'changed' within this Count Session.

Highlight the ASSIGNMENT Data Group and double click or select the **Detail** Tab along the top of the Left Hand Screen to show the Details screen for the *ASSIGNMENT* Data group.

Select the **Function** Tab along the top of the Left Hand Screen to show the Function tree again. Select the **Notes** Tab along the top of the Right Hand Screen to show the Notes linked to the Create Assignment Process. Place your cursor on the top node and use the Trees- Expand Level 4 tool button to expand the Notes trees. The red in the check box indicates that this **Note** is accessed by Create Assignment.

Expand the Specification Cross Reference Node and select the first linked Note *Section 1.2 - Create Assignment* and double click to display the **Detail** tab for this note on the LH side to show the text describing the functional requirements for this Process.

Select the **Function** Tab along the top of the Left Hand Screen to highlight the next note linked to Create Assignment. This is under the List of Errors identified in Acceptance Testing. The error identified for this Process is. "*Data entry box for Assignment name is too small - please increase to allow 100 characters*".

'Flip' the views by using the Flip Icon (*HINT: Looks like a double headed arrow or anchor*) on the top menu. The **Note** is now on the LH side of the screen. Select the **Attribute** Tab on Right Hand Screen to show the **Attribute Tree**. Explode the **Category** "Defect Severity Levels" to display the severity which has been attributed to the highlighted error.

The Attributes can also be linked to any other Tree. Select the **Function** Tab along the top of the Left Hand Screen then explode the Priority for Release 1 Category. You can see the function Create Assignment has been assigned a 'mandatory' priority.

To see what other functions have been determined as being Mandatory to Release 1, select the Filter Icon on the top menu. Highlight the priority "mandatory" then click the option (OR) along the top menu. Immediately all the Processes identified as being mandatory are highlighted with red Flags. If you want to know which ones are mandatory and required then click on the option again while required is highlighted. You will see more Processes are now Flagged . To report the Functional Size of just the 'Flagged' items, select the top node of the Function tree Function **AMS ND Rel 1.0 March 2009** and then Report icon and expand [+] "Function point count result" and select report " Baseline Release Functional Size". Tick the check box for 'Select Flagged Nodes" and then select to Preview the report. This filters the report to display only the 'Flagged nodes' for the Mandatory and Required Processes.

To toggle the Flags on and off use the '' option to clear the Filter selection and then option to reset. To clear the Flags select the clear Flags Icon on the top menu.

All of the four types of Trees (Function, Data, Attributes and Notes) can be displayed on this screen. Each tree type is identified by the Tab at the top of the screen and

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can link to any other Tree type displayed in the opposite side. To display a particular combination of trees just select the appropriate Tabs.

Continue experimenting with the different ways you can Filter the data, combining Filters across trees and within branches. Each will give you a different profiled view of your Processes and Data.

If you want to create a new Release to try out your new skills, then return to the **Software Applications List** (See under File on the main menu). Follow the instructions for creating a new Release, (see **Create a new Release**).

1.6 Set Up User Options

SCOPE provides various operating defaults to be set under Main Menu/ [Options] . Before starting your first measurement we would strongly recommend that you review these options and set them up to suit your way of working.

There are 4 different types of Set Up Options.

1. **User Options** - these options enable the user to change the way SCOPE operates (see below)

2. **Function Point Count Default Values** - these options allow you to set the input of new process and file nodes to those most common to assist in faster data entry.

3. **Template Setup Options** - allows you to set up Template Function Blocks that you most commonly enter to facilitate faster automated counting

4. **Numerical Attributes Template** Options - allows you to set up your own Numerical Attribute Templates for re-use within the database.

1. User Options

In all the following Options SCOPE allows you to manually override the SCOPE default value by pressing the [✖ Manual] button adjacent to the option. If you change the path or the option in the box and later want to revert back to the SCOPE default value just press the ✔ [Manual] again and SCOPE will automatically reload the default value.

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o **Access Runtime Location: -** this is the directory path where the *MS Access® 'Runtime'* version has been installed. By default **SCOPE** installs MS Access Runtime under the C:/Program Files directory. If you have selected to install it at another location, you can change the default path by clicking the Manual] button.

o **Snapshot Runtime Location: -** *Snapshot Viewer®* is triggered by **SCOPE** and used in previewing online reports. This is the directory path where the *Snapshot Viewer®* program version has been installed. By default **SCOPE** installs Snapshot Viewer under the C:/Program Files directory. If you have selected to install it at another location, you can change the default path by clicking the [Manual] button.

o **SCOPE Connect URL -** this is the URL to connect to the **SCOPE** Connect Web Portal for viewing Benchmark Reports.

o **Microsoft Excel Report Template -** this is the directory path where **SCOPE** has installed the *MS Excel ® Chart Report Templates* used for the default design of the Excel Benchmark Metrics Chart reports. By default **SCOPE** installs all three Excel Report Templates under the Total Metrics Directory under the "My Documents" directory of the User Logon ID eg . *C:\Users\John.Smith\Documents\Total Metrics* directory. If you modify the design of your Benchmark Metrics reports and you would like your own customised design to be used in all future Excel Benchmark Chart reports, then follow instructions in Saving a New Excel Chart Template

- o **Winmerge Path** - Winmerge® is a utility that enables the comparisons between two similar files eg. two WORD documents, two Excel Spreadsheets etc. SCOPE uses this utility in its compare reports function.

- o **Status Bar**

  - **Dynamic FP Calculation** - SCOPE dynamically calculates the functional size of the currently selected Function branch as you move around the Function Hierarchy Tree. It is recommended to turn this off ❌ when viewing very large Release/ Application baselines, as these calculations may require significant memory utilisation and slow the display performance of SCOPE. If you want SCOPE to calculate or refresh size for display just press **F5** and SCOPE will display the functional size of the current position. It is recommended that you turn this option on for small function trees and off for large function trees.

  - **Only Flagged Data Nodes Used for FP Calculation -** this instructs SCOPE on how to include data in the calculation of size when located on a function branch. By default SCOPE will include all Data Groups linked to the processes within the branch, but in certain cases you may only want the size to include Data Groups that have satisfied certain criteria and are displayed as 'flagged'. For more information on how this option works see Reporting the Functional Size in Function Points. It is recommended that you turn this option on ✅.

- o **Node Name Insert Defaults -** you should change these defaults based on the characteristics of what you are currently keying. You may change them many times during the setting up of your hierarchy trees.

  - **Use Last Inserted Node Name** - When this option is ✅ selected SCOPE will automatically load the newly inserted Tree node with the

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same name as the last inserted node. This speeds up text insertion when creating nodes which have predominately similar names as the user just needs to modify a small part of the name. eg. Create New Online Account User, Modify Online Account User, Delete Online Account User etc.

- **Auto Edit Inserted Node Name -** When this is ✅selected **SCOPE** will automatically move its edit 'focus' to the newly inserted node to allow immediate editing. When this option is turned off, it allows the user to keep inserting new nodes and retain the focus at the parent node.

- **Double Click Displays Node's Detail Screen -** When this is ✅selected **SCOPE** will automatically open the Detail screen on the opposite screen, when you double click the node so you can edit the nodes details. Some users find this a distraction and prefer to turn it off and manually select the Details Tab on the other screen when they want to edit the nodes details.

- **On / Off Tooltips -** When this is ✅selected **SCOPE** will display a tool tip box over the node when it has the cursor located on it. It is recommended to turn this off ❌ as it may become distracting if not specifically required.

o **Autosave** - **SCOPE** automatically saves your changes to your data at specified intervals, 5 to 30 minutes apart. If you select to disable this option then you will have to manually select to save the data. If you have failed to save your data you may be able to recover it - see Backup and Recovery and what to do if **SCOPE** is not responding.

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- o **Language** - SCOPE displays using English as its default language. To change the display and all reports to another language select from the list. You can change the display language without restarting SCOPE.

- o **User Name** - SCOPE defaults to display the user name of the current Windows Logon User ID, you can change the name here. This is the 'author' name stored by SCOPE when a tree node is created or modified.

1.7 Flash Tutorials

Most of the major functions and features within SCOPE are fully explained via a Flash Tutorial on the topic. Please go to

http://www.totalmetrics.com/function-point-software/SCOPE-project-sizing-software/flash-tutorials

For Tutorials on how to do the following functions:

- Set Up a New Application
- Set Up a New Release
- Set Up a New Baseline Count
- Set Up an Enhancement Count
- Set Up Multiple Counts on the Same Release
- Import Export Release Counts
- Building Hierarchical Trees
- Counting An Elementary Process
- Counting a Logical File
- Import Count Sessions from other Databases into a Release
- Import a Count from EXCEL
- Import and Export Trees or Parts of Trees
- Documenting Your Count - Notes
- Enhancement Count - Existing Baseline
- Excel Benchmarking Metrics Charts
- Enhancement Count - No Baseline Data Groups
- Enhancement Count - No Baseline Transactions
- Exporting data to ISBSG
- Export Project Data to SEER SEM Estimation Software
- Import Benchmark Data - Applications, Releases, Projects and Change Requests
- Linking Counts to Projects
- Linking Data to Transactions
- Metrics Reporting - Tabular Data

- NESMA Enhancement Counts

- Quick Early Counting - Template Groups

- Recording Application M and S Metrics

- Recording Project Development and Enhancement Metrics

- Recording Project Metrics

- Reporting Counts

- Comparing Two **SCOPE** Reports

- Save Excel Benchmark Report Templates

- Set Up New Count - Development Count

- Set Up Project

- Set Up Excel Benchmark Data Report Templates

- Setting up Numerical Attributes

- Setting Up Numerical Attribute Templates for Reuse

- Setting up User Defaults for Function Point Counting

- Snapshot Applications Releases and Counts

- Update to Baseline

- User Options - Set Defaults for **SCOPE**

- Using the Count for Earned Value Reporting

- Using the Count for Project Estimation

- What is a Benchmark Period

- Assigning Project Metrics to Benchmark Periods

- Import Export Releases

- How to User **SCOPE** Viewer

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1.9 SCOPE Support

Support for **SCOPE Project Sizing Software ™ (SCOPE)** is available free:
- o   for the first year after purchase
- o   for any **SCOPE** users with a current maintenance agreement

However experience has shown us that our users require very little support since **SCOPE** is very easy to learn and use. Please read all the hints in the HELP text and do the **SCOPE** tutorials to fully understand the full flexibility of the product.

We welcome feedback from **SCOPE** users and many of the new features and functions we have implemented in **SCOPE** are the direct result of Users having a need and letting us know. If you think of a feature that would help you in recording, managing, validating, reporting your counts, please let us know and we will review the potential for other users also needing it and prioritise it accordingly.

To register any suggestions or give us feedback about **SCOPE** contact us via our WWW site using our online Feedback form:
http://www.totalmetrics.com/function-points-forms/feedback-form

We will respond to your support request within 1 Australian business day.

2 Overview SCOPE Features

2.1 About SCOPE

2.1.1 Editions Available

SCOPE is available in a variety of different Editions which are designed specifically to satisfy different needs by organisations. These database used by each of these editions is identical which means you can share data with other users, upgrade to a different edition at any time and have a mix if editions within use in your organisation. SCOPE Editions include:

2.1.1.1 SCOPE Classic™

SCOPE Classic™ designed for people who really *need* Function point counts and IT Metrics reporting. SCOPE Classic™ is a full metrics repository with Portfolio management and Benchmarking Metrics capability. It is available in two editions

1. SCOPE Professional™(single user database)

2. SCOPE Corporate™ (multi-user concurrent access database).

SCOPE Classic™is ideal for individuals or organizations who have a need to manage all the function point, productivity and quality metrics for a large number of software applications, each of which have multiple releases and multiple Change Requests against those Releases. A project may have many Change Requests each of which impacts multiple applications. Not only do you need to function point count one or many of these options, but you also need to manage their productivity and quality metrics, provide management trend reporting and benchmark against industry.

You have multiple concurrent counters who may be all counting Enhancement projects that impact the same applications and you need to ensure that they do not overwrite each others work. You need to have everything documented, traceable and auditable and in a single repository!

SCOPE Corporate™ and **SCOPE Professional™** will do all of the above and more! Major Corporations worldwide have implemented **SCOPE Classic™** to manage multiple metrics teams, across multiple sites with applications portfolio sizes in excess of 1 million function points.

2.1.1.2 SCOPE Metrics™

SCOPE Metrics™designed specifically for those organizations that currently have historical performance metrics data or plan to collect them and need a central metrics storage and reporting repository. **SCOPE Metrics™** enables users who use other tools (eg. Spreadsheets) for function point counting to perform analytical reporting and ISBSG benchmarking of their project data and maintenance and support data. **SCOPE Metrics™** can be upgraded to full function point capability at any time.

2.1.1.3 SCOPE Lite™

 SCOPE Lite™designed specifically individuals and organizations that need to count function points ***cost effectively*** but do not want to make a large financial investment into function point counting tools. **SCOPE Lite™** has distilled the essence of **SCOPE Classic™** to just give you the excellence of the function point counting capability of **SCOPE**. Import your old Excel counts today and start counting!

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Note : SCOPE Lite™ has all the function point capability of SCOPE Classic without the Portfolio Management capability ie. does not have the features of import and export of SCOPE Releases , Applications, Projects and Count Session.

2.1.1.4 SCOPE Viewer™

How to use SCOPE Viewer Tutorial

SCOPE Viewer™ enables the Function point counters to share all details of the Count Results as a softcopy with personnel who may not have a SCOPE license. It allows the user to view all aspects of a Count that has been recorded in a SCOPE database.   Function point counters can select to 'snapshot' just one count for Users to review or they can select all counts for a Release or provide the users with access to all counts in the SCOPE database. The Users can then make comments on the count results and return the data to the counter to incorporate into the master version of the count. SCOPE Viewer™ is free and can be downloaded from the Total Metrics web site. Features are read only access and reporting capability only.

2.1.1.5 Summary of Differences between Editions

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SCOPE Edition - Features Included	SCOPE Classic™		METRICS	LITE
	SCOPE Professional™	SCOPE Corporate™	SCOPE Metrics™	SCOPE Lite™
Multi-user Access	No	Yes	Yes	No
Annual Lease	Yes	Yes	Yes	Yes
Perpetual License	Yes	Yes	Yes	No
Function Point Counting - Full Capability	Yes	Yes	No	Yes
Metrics Repository and Reporting	Yes	Yes	Yes	Limited
Portfolio Configuration Management	Yes	Yes	Yes	No
+SCOPE Connect™	Yes	Yes	Yes	Yes
ISBSG™ Online Benchmarking	Yes	Yes	Yes	Yes
Price INCLUDES 1 Year Maintenance and Support	Yes	Yes	Yes	No

2.1.2 Versions Published

SCOPE Project Sizing Software ™ (SCOPE) Version 1.6 first Published January 2004. We have continued to **enhance SCOPE every year** since then to ensure that it remains aligned with your technical environment and to ensure that it responds to the markets changing needs to functionally size software and benchmark the IT environment.

SCOPE Upgrades Published:

- o Version 1.7 June 2005
- o Version 1.8 December 2005
- o Version 1.9 May 2006
- o Version 2.0 August 2007
- o Version 2.1 August 2008
- o Version 2.2 June 2009
- o Version 3.0 April 2010 - SCOPE Corporate™ (Multi-User database) and SCOPE Professional™ (Single User database)
- o Version 4.0 July 2011 - SCOPE Corporate™ , SCOPE Professional™, SCOPE Metrics™, SCOPE Lite™
- o Version 4.1 October 2012 - SCOPE Corporate™ , SCOPE Professional™, SCOPE Metrics™, SCOPE Lite™

2.1.3 Users and Distributors

SCOPE was first published in 2004 and since then had 9 major releases and has grown by 300% in functionality. It is recognised world wide as being the most comprehensive function point counting software tool on the market. It has been selected as the software of choice by over 70 major large multi-national clients (inlcuding IBM, Vodafone, NEC, CSC). It is used by thousands of function point counters located worldwide across fourteen countries.

Please contact Total Metrics for reference sites.

SCOPE has local distributors who provide support and training in most countries. Please contact us to find your local distributor.

2.1.4 Intended Audience

This User's Guide is intended to be read by software project managers, business analysts, software developers or anyone who intends to use **SCOPE** to:

- Quantitatively size their software using *ISO/IEC 20926 IFPUG 4.3 unadjusted or IFPUG CPM 4.3 functional sizing Methodology.*
- Collect Applications Development and Maintenance and Support Metrics for productivity and quality reporting.
- Quantitatively size their software project for input into project effort, cost and schedule estimates.
- Manage their software application portfolio by recording a quantitative audit trail of functional changes for each release, mapping changes to a specific change request, release or project.
- Graphically model the functionality of their software projects or applications for documentation and **SCOPE** negotiation purposes.

Familiarity with Microsoft Windows® and some familiarity with functional decomposition techniques is assumed. For quantitative sizing some knowledge of the IFPUG Functional Size Methodology is required. See www.ifpug.org

For more information about ISBSG (International Software Benchmarking Standards Group) see: www.isbsg.org

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2.1.5 SCOPE Training

- 1 hour free online interactive training in SCOPE features - book your session now with Total Metrics
- In-house half day training sessions in all the features and functions of SCOPE with practical exercises to complete.
- 1 day full SCOPE training integrated into the FPA Process - so you know how to use which features of SCOPE for each FPA counting step
- 3 day intensive IFPUG certified training course in applied IFPUG function point analysis and using SCOPE.

For details on Locations and times for training sessions contact admin@totalmetrics.com or your local SCOPE distributor.

For full details of Training content visit: http://www.totalmetrics.com/training-software-metrics

2.1.6 Copyright Notice

This User Manual and **SCOPE Project Sizing Software™ including :**
- **SCOPE Corporate™**
- **SCOPE Professional™**
- **SCOPE Metrics™**
- **SCOPE Lite™**
- **SCOPE Viewer™**

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2.2 Technical Features

2.2.1 Installation

2.2.1.1 To Install SCOPE

Download **SCOPE** from the Total Metrics WWW site using the User ID and Password provided by Total Metrics.

Before you can install **SCOPE** you must save the downloaded ZIP files to your hard drive and check you have sufficient space.
Select to extract the ZIP file and SAVE the extracted files to your hard drive. You cannot run the Install without extracting and saving first.

2.2.1.2 Instructions for Installation from Hard Drive

1. Go to the drive where you saved **SCOPE** and select "Double click me to Install **SCOPE** 4_1.exe"
2. Follow the prompts.

2.2.1.3 Changes to your Computer

As part of the install process **SCOPE** needs to install the following third party components on your computer:

1. **MSXML®**

2. **.Net Framework 4.0®**

3. **Microsoft ACCESS XP® 2002 runtime environment**

4. **Snapshot Viewer®**

5. **WinMerge®**

6. **Full Convert Enterprise 5.0®**(is not installed – The SCOPE installation only copies files and saves)

SCOPE installs a run-time version of Microsoft ACCESS XP®.   If you decide to move the location of the ACCESS XP® runtime program then you need to enter the new pathname in SCOPE under View, Screen Display Options in the Main Menu.   The standard set up path is : C:\Program Files (x86)\Microsoft Access Runtime\Office10

SCOPE utilises the MS product Snapshot Viewer® to display its reports online. In some instances when MS Office is re-installed on a computer, the Microsoft install process overwrites the link between SCOPE and Snapshot Viewer®, so the reports will no longer display. Just uninstall and re-install SCOPE and the problem is fixed.

2.2.1.4 Administrator Rights of Installer

SCOPE will install template files and schemas in a number Directories associated with the Windows User Name of the Person logged in during the SCOPE Installation. Since these files are stored in the Directories associated with the User Name of the person installing. This means that if a Technical Administrator completes your SCOPE installation they will need to login under the SCOPE Users Windows User name not their own and they will need to ascribe administrator rights to the SCOPE Users Windows User Name for the period of the Installation. These Administrator rights can be revoked when the SCOPE Install has completed.

2.2.1.5 Template Files Set Up for SCOPE on your Computer

During the install SCOPE saves a number of Template files and Schemas under the Windows User Name of the Installer associated with the following directories:

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- My Documents\Total Metrics (Libraries \Documents \ Total Metrics)

- C:\Program Files (x86)\Total Metrics\SCOPE

See also SCOPE License Registration and Activate SCOPE

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2.2.2 Machine Requirements

Intel-based personal computer

• Windows XP® Service Pack 3

•[1] Windows Vista ®

• Windows 7 ® Service Pack 1

100 Mb of hard disk space

16 Mb of RAM

SCOPE installs its own files on your computer plus a number of third party Components to supports its functionality.

The **SCOPE** database is a multi-user Microsoft Access database and can be accessed concurrently by up to 250 users (**SCOPE** Corporate Edition). The database can be stored centrally and accessed via the network by **SCOPE** users.

SCOPE is designed to be installed on the Users Desktop /notebook Computer. Ie. The executable files are installed locally and all the relevant configuration files to be stored under the Windows User Name \ My Documents directory of the person installing **SCOPE**. Each User activates their own license for **SCOPE**.

2.2.3 Auto Save Backup and Recovery

SCOPE will automatically save your database at prescribed time intervals. The default interval is 15 minutes but it can be modified or disabled completely by the User (View/User Options/ Auto Save). It is highly recommended that you do not

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[1] In some instances users have experienced difficulties with early versions of Vista. We would recommend that you update your Windows to Windows 7 if you experience issues.

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disable Auto Save, however if you are planning major changes to your data then we suggest that you copy the database as a backup prior to making the changes, just in case you make a mistake. If your **SCOPE** database is very large then it may be more efficient to just 'snap shot' the Release you are working on to a new database as your backup. Then if you want to 'roll back' back your changes to the start then you can just import from the backup snap shot version.

Be aware that if you are using the multi-user **SCOPE** Corporate version of **SCOPE** that if another user selects to save the database then all your changes will automatically be saved by their command.

If for some reason **SCOPE** is terminated unexpectedly while you have an open **SCOPE** database, the next time you open **SCOPE** it will ask if you want to recover your unsaved file. If you confirm then your previous set of changes will be saved and your database re-instated.

2.2.4 Compact Database

This option 🛠 which is found under FILE on the Menu is used to compress an existing **SCOPE** database. Run this option on a regular basis to reduce the overall size of your **SCOPE** database and to speed up saving and response times.

2.2.5 Single Database File for Ease of Administration

SCOPE Database – single Microsoft Access® Compatible File
SCOPE databases are easily identified and saved as a single *.FPA file that is Microsoft Access® compatible.
All editions of **SCOPE** are able to view and/or edit the same **SCOPE** database.

2.2.6 Basic SCOPE Commands

2.2.6.1 Exit

This menu option will close any open files and exit **SCOPE**, returning you to MS Windows. **SCOPE** prompts you to save data before exiting but does NOT save automatically. **SCOPE** does NOT save as you edit, to save during editing use the **Save/Save As** option.

2.2.6.2 New

Use this option to start a new **SCOPE** database. You will be asked for a new **File Name**, and a location (on your hard drive or network) to save the file.

2.2.6.3 Open

This option is used to open an existing **SCOPE** database. The result is a standard Windows dialog box, asking for the location of the database to be opened. **SCOPE** databases have the extension **.fpa**.

2.2.6.4 Import from FPW

This option allows you to import all the data from Function Point Workbench™ into a **SCOPE** database without losing any information. The import takes less than a minute for an average sized FPW data repository. As soon as the import complete you can start counting in **SCOPE**.

2.2.6.5 Close / Close Current

CLOSE will close your current .fpa database and all the counts. CLOSE CURRENT only closes the currently displayed count.

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2.2.6.6 Save/SaveAs

Use this to either **Save** the file you have been working on, or to save it in a different location and/or with a different **File Name**. SCOPE saves automatically at user controllable time intervals, you can adjust the time interval or disable the Auto Save. However if you are in a multi-user environment using SCOPE Corporate then other concurrent users may elect to save the database (including your data).

2.2.6.7 Compact Database

Use this housekeeping function to manage the efficiency of SCOPE. We recommend you compact the database routinely to ensure that the indexes to all SCOPE records are working efficiently.

2.2.6.8 SCOPE Online HELP

Press **F1** in any screen to access Help on any topic. In order to view HELP your computer needs to connect to the Total Metrics WWW site. SCOPE Help additionally provides search capability on **Table of Contents**, **Index**, and **Glossary**.   For more advanced help also view the SCOPE online Tutorials (see http://www.totalmetrics.com/products/SCOPE/SCOPE_Help) and the Function Point Counting Expert System FP Decision Maker™

2.2.6.9 Starting Up SCOPE

When you first run SCOPE, the options of which SCOPE database is to be opened can be found under the **File** Menu.
In addition, the **File** menu also contains a list of the most recently opened databases. These are listed in reverse order, above the **Exit** option. Other options in the **File** menu are listed below.

2.3 Operational Features

2.3.1 What is SCOPE

SCOPE is a Project Management, Software Metrics Repository and Functional Size Measurement software tool that supports the IFPUG 4.3 Function Point Analysis (FPA) methodology and ISBSG Metrics recording and Benchmarking. It is a powerful combination of easy to use features and comprehensive functionality. SCOPE makes it easy to measure the Functional Size of software applications and software projects.

SCOPE enables logical groups of Functions and Processes to be visually mapped out as nodes on a hierarchical tree, providing a detailed view of a project's functionality and the relative size of each functional area. This capability to expand or collapse functional branches allows you to see as little or as much detail on one screen as you wish.

2.3.1.1 Functional Size Measurement and Project Management Features

- You can find out the size of any functional area within an application by clicking on a branch node and checking the Function Point count in the status bar.
- You can quickly and easily gain an overview of an application's functionality by expanding or collapsing the relevant part of the tree.

If you need to measure the Functional Size of an existing software application or project, then SCOPE allows you to simply record the type and complexity of Processes and Data Groups and calculate the functional size. Simple FPA counts like these may be all that is required, but SCOPE is designed to do much more towards providing an audit trail to monitor and control your project's progress and the growth of an application over multiple releases during its lifetime.

By using **SCOPE** in the initial stages of project development, you can model your planned software's functionality in higher level Functions, and easily evaluate the impact of a particular decision to include or exclude functions. As a project evolves, **SCOPE** supports you as you add detail and decompose the Functions down into Processes. Additionally, **SCOPE** supports complex development cycles with multiple change requests within the same release it acts as a software asset register and by keeping a history of multiple software versions in production. **SCOPE** enables you to keep a 'functional' history of each application by providing a documented audit trail of changes to the software throughout its life. Traceability and being able to quantify changes is particularly important for contract negotiations of pricing variations in outsourced development.

During a software development project, uninformed decisions can lead to inconsistent and incorrect resource allocation that can ultimately jeopardize the project's outcome. For example, a project's success in terms of remaining within budget and time constraints can sometimes mean sacrificing functionality. These trade-off decisions are made more difficult without some way to measure and compare functionality across different parts of the application being developed. **SCOPE** allows you to easily do this "what-if" analysis, and thus make informed management decisions on the impact of **SCOPE** changes; plus you will have a record that enables those decisions to be justified, if required later.

2.3.1.2 <u>Benchmarking Capability</u>

SCOPE enables the collection of performance and quality metrics for benchmarking and performance monitoring. Its sophisticated reporting capability enables comparison to Industry data and trends analysis. See : Setting Up Applications and Projects for Benchmarking

2.3.2 Why Hierarchies?

SCOPE uses Tree Hierarchies as a means of modelling the functional requirements of the software. Hierarchies are a powerful organisational technique to break large problems down into manageable tasks. The human race itself is a hierarchy; we have parents, grandparents, great-grandparents, and so on, in an extended hierarchy that graphically describes our inter-relationships and forms our family trees.

Whenever we face the need to introduce a system of classification to describe relationships, it is the hierarchy that we naturally choose. Phylum, class, order, etc. for plants and animals, Dewey decimal notation for library books, domain names on the Internet, directory classifications in Microsoft® Windows Explorer; these are all examples of hierarchical arrangements.

Hierarchies are powerful precisely because they are natural to us. They enable us to get around our built-in limitations and sort complex information in a structured and comprehensible manner.

SCOPE supports this natural way of thinking by visually arranging information in a way that makes sense. It reduces hundreds of pages of functional specifications to a graphical model that can be used to quickly communicate and negotiate software content and project **SCOPE** with the business user.

See also Types of Hierarchy Trees in **SCOPE**

2.3.3 Types of Hierarchy Trees

SCOPE has four types of **Hierarchy Trees**: two of which model the functionality to be delivered by the software and must be created in order to measure functional size: these two are:

Function Hierarchy Tree -   - models what the software does. It has two levels of nodes.

1. **Functions**: record the functional areas into which the software's functionality can be decomposed.
2. **Processes**: record the lowest elementary work task that the software is required to complete. This is the node level that is assessed for its function point weighting.

Data Hierarchy Tree -   – models the data that the software is required to store and access. It has four levels of nodes.

1. **Data Group Folders**: -   - allows the cataloguing of Data Groups into folders for documentation purposes. This level of grouping corresponds to the Function Groups on the Function Tree; it is just used for modelling purposes and not considered for the function point count.
2. **Data Groups**: -   - record the logical groupings of data at the level of an 'entity' or 'object'. This is the node level which is assessed for its function point weighting.
3. **Record Element Types** (RETs) -   - record the sub-groupings of the fields to be stored within the Data Group.
4. **Data Element Types** (DETs): -   - record the fields to be stored within the data group. If there are no sub-groupings of fields (i.e. no RETs) then they may be recorded directly under Data Groups, if they belong to a sub-grouping then they are recorded under their related RET.

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The other two Hierarchy Trees do not contribute to functional size, instead they enable the functionality within the Function Hierarchy and Data Hierarchy to be annotated and dynamically grouped for analysis. These other two trees are:

Notes Hierarchy Tree - 🗒️ - models related textual information that needs to be cross-referenced to the software's functional and data nodes or attribute nodes. Notes act in a similar way to a 'footnote' or 'comment' and provide annotation to other tree nodes. The Notes Hierarchy has two levels of nodes.

1. **Note Sets**: - 💬 - record the names of the groupings of textual information such as 'Specifications Documents'.

2. **Notes**: - 📝 - record the textual information to be cross-referenced, e.g. under the Note Set 'Specification Documents' each Note would map functions and data groups to specific sections within the functional specification document.

Attribute Hierarchy Tree - 🔧 – enables categories to be set up that can be used to selectively identify, characterise and group either software Functions, Data Groups or Notes. It has two levels of nodes.

1. **Categories**: - 🔧 - record the names of the groups of characteristics, e.g. "Implementation Priority Ratings", "Specification Quality".

2. **Attributes:** - 🔧 - record the different types of characteristics you may want to assign to your software Functions, Data Groups or Notes. Attributes can be of two types: Standard attributes and Numerical attributes. Numerical Attributes enable you to quantify your functional model eg. selectivlty apply productivity rates so you can estimate hours to develop, apply NESMA impact factors, do earned value reporting etc.

E.g. if at the group level the Category was "Implementation Priority Ratings" then the Attributes could be:

- "Mandatory – High Priority"
- "Required – Medium Priority" and
- "Optional – Low Priority".

E.g. The 'Specification Quality' Category could have Attributes such as:

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- "Complete"
- "Incomplete" or
- "Not Specified"

Each software Process could be selectively characterised for priority and Specification Quality and then the relative size of each attribute grouping or the combined attribute grouping determined using the Filter Mode function. E.g. "Mandatory – High Priority" functionality can be selected and analysed separately and found to be 100 function points of a total of 150 function points. If the Attribute "Complete" is also included in the Filter then the selection is reduced to be only 75 function points. That is, of the Mandatory – High Priority functions only 75 functions points of the total 100 functions points have a "Complete" specification.

SCOPE enables more than one attribute within any Category to be Linked to any single node on another tree. E.g. a Process may exhibit the characteristics of more than one Attribute in the same Category and Linked to them all. For example if you had a category called *Country* Installed and it had attributes called *USA, Europe, Australia, Japan*. If a process was planned to be implemented in all countries then it could be linked to all attributes. A process can be linked to attributes on one or many categories. For example this allows you to report the Functional Size of the '*Mandatory- High Priority* 'functions and data that had been '*Completely'* specified and installed in Australia and Japan.

How are Attributes different to Notes?

All nodes in any of the four **SCOPE Hierarchy Trees** can be **Linked** to another node in any of the other three trees, thus providing a multi-dimensional documented model of your software.

2.3.4 Building Trees

Building Hierarchy Trees

To build a tree of any type, you generate nodes and rename them. The type of nodes that you can enter at any point depends on the tree, and the level within the tree. The root node is Level 0, the **Hierarchy Tree** can be decomposed to 'n' levels.

- High level nodes (Levels 1 or 2 etc) can contain child nodes of the same level or lower.
- Level 'n' nodes cannot contain any other child nodes. They represent the lowest level.
- Level 'n' nodes can be inserted directly within the root node. However we recommend that you insert a level 1 or 2 node first.
- For certain trees, nodes of different types (i.e. RETs and DETs) cannot mix on the same Level of a branch of a tree.

To insert or edit tree nodes, use either:
- **Node** menu at the top of the screen select
- **Alt Insert** (parent nodes) and Insert keys (child nodes)
- Mouse **right click** pop-up menu.

For very fast insertion of multiple standard sets of process nodes use the Insert Template Function Group feature.

2.3.5 Mapping SCOPE terms to IFPUG and IT Terminology

The terminology differences between how **SCOPE** works and how clients describe their Application and Maintenance environment sometimes results in the same word being used to mean different concepts.

To assist the reader and avoid confusion we have provided some guidance to the terminology below. E.g. Clients typically use the following terms: 'Count' to mean a 'Project Count' (Project Size in **SCOPE**). Whereas, in the real world, a business initiative resulting in a software development Project can impact one or many applications and each application may have one or more counts of the impact of that Project on the application.

SCOPE implements these concepts but it terminology is slightly different. **SCOPE** has been developed to be compliant with the IFPUG ISO standard 20976 and the new IFPUG CPM version 4.3.

SCOPE Terminology:

- **SCOPE** refers to a 'Project Size' for the equivalent concept of the typical client term 'Project Count'. Where the Project Size is the aggregate functional size of all the impact counts for each the application boundary impacted by the Project. Within **SCOPE** 'Count' is reserved for the Work Package impact by the Project on a particular Application Boundary (**SCOPE** calls this a 'Count Session').

- **SCOPE** assumes that a project may impact transactions and Files in one or more Application Boundaries

- **SCOPE** assumes that an Application Boundary may incorporate one or more Physical Systems, each of which will need to record and report its impact

- **SCOPE** allows for each Physical System to have its own Work Package for the Project. This Work Package is measured in a Count Session

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- **SCOPE** therefore allows the user to record one or more 'Count Sessions' for each Physical System impacted by the Project in the Boundary. Or if the User wanted they could combine all impacts for the Project into one count session

- Each 'count session' records the impact within a single Application Boundary and is linked to a single project. However a Project, may have assigned to it many count sessions impacting many application Boundaries. A project can also have more than one count session for a single Application Boundary. E.g. One for each work package or one or more for each Physical system impacted

- **SCOPE** recognises that Logical Applications from a User View has an Application Boundary. Therefore the Count Session for an Application will only include functions (transactions and data groups) that are accessed by transactions within that Application boundary. Physical Systems can be recorded within the Logical Application Model as belonging to the Application Boundary

- **SCOPE** recognises and incorporates the concept that Logical Applications from a User View may incorporate one or more 'physical systems' and that one or more Projects may impact these systems concurrently

see: **SCOPE** Architecture

2.3.6 SCOPE Relationships

The following model maps the SCOPE concepts of Applications, Projects, Releases, and Count Sessions to the terms commonly used in Software Development.

2 SCOPE Model

Logical Application Boundaries may be made up of one or more Physical Systems. Each System resides within a Logical Application Boundary

Project

Project Impacts one or more → **Applications**   *Application Boundary*

Physical System

Project is linked to one or many Work Packages (Count Sessions). Each Count Session is associated with a Release of an Application. The sum of the Count Session Impacts (Count Size in FPs) is the size of the Project. Therefore a Project Size is the aggregate of all the functionality impacted across different applications that is impacted by the Project.

have one or more

Applications have versions called Releases.
A single Release of an Application Boundary may be impacted by one or many different Projects each Project will be associated with a Work Package/ Change Request. The size of the impact of a Change Request is measured in a Count Session. Many different Projects can impact a Release of an Application. Ie. Count Sessions may be for many different

Project = ∑(Count Sessions Size all Applications impacted)

Release

A Release represents a Version of a Software Application. A Production Release is recorded as a Baseline Count a 'Work in Progress' Release is a version of the Application that is being worked on by Projects and has one or many project counts.

Count Session = Work Package
to measure Project Impact on current version of the Applications Software. A Count session can record impacts on one or more Physical Systems within the Application Boundary

Scope Architecture - Releases Projects and Counts
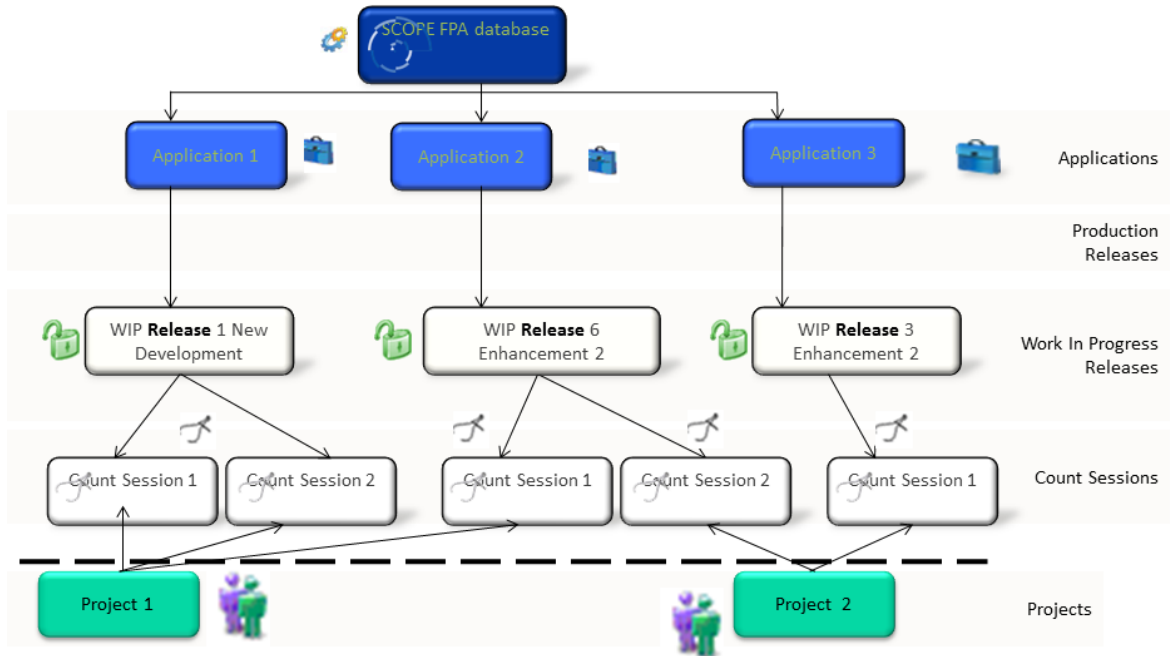
See Also SCOPE Architecture

2.3.7 Using SCOPE to Support FPA

Using **SCOPE** to support the FPA methodology makes it easy to make changes as a project's requirements inevitably evolve, and to analyse an application in many different ways. **SCOPE** enables you to track an application's functions from its initial development release, into production and through all subsequent releases.

Once the application is delivered, **SCOPE** records it as a **Production Release**. If an enhancement to the functionality is requested, then **SCOPE** enables you to take a copy of the **Production Release** as a size model base on which to record the impact of the changes required for the next Release (e.g. Release 2.0).

SCOPE allows you to record planned work or current work on software as "**Work in Progress Releases**". These changes to the same release of software may be the result of multiple change requests from a variety of users, each with their different priorities. The impact of _each_ change request can be separately recorded and functionally sized by associating each enhancement with a **Count Session**. The net cumulative impact on the release can be quantitatively assessed, as can the rework. Functions can be prioritised and different scenarios can be sized to assist with making decisions on which changes are included or excluded.

The activity of performing a Function Point count proceeds through a series of prescribed procedural steps. When this methodology is applied consistently, the Function Point size result is repeatable and the software size can be universally compared with the size of other software projects or applications.

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2.3.8 Multi-Lingual - Screens Messages and Reports

SCOPE allows you to dynamically select your own language for its screen displays, messages; menus and reports (see - Main Menu [Options] [User Options] Languages include:

- English
- Portuguese
- Dutch
- German
- Italian
- Spanish
- Japanese
- Chinese
- Korean
- French

Please let us know if you identify any terms where you would recommend a better translation
See Changing Language Screen Display and Reports

2.3.9 Multi-User - **SCOPE** Corporate

SCOPE Corporate License Type is designed for large organisations that require concurrent access by multiple users to a **SCOPE** database.   It enables storage of all your function point counts in a central repository that can be updated and /or viewed simultaneously by any number of **SCOPE** Corporate and **SCOPE** Viewer users.

To avoid the issues of two users working on the same hierarchy at the same time and moving and changing components, **SCOPE** will lock a Release once it has been opened. I.e. As soon as a User opens a Count for a Release, that Release is locked by the User and no other Users will have access to it until the first User selects to exit the count or opens another Release in the same database. **SCOPE** displays the

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name of the User currently working on a count. Other Users can open and access any other Release in the Database that is not specifically Locked.

SCOPE Professional – has all the features of **SCOPE** Corporate but operates in the same mode as previous versions of **SCOPE** and is ideal for organisations that prefer to store their **SCOPE** counts locally and only need single user access at any one time to the database.

Users can upgrade current licenses from **SCOPE Professional** to **SCOPE Corporate** to take advantage of having global accessibility to your counts.

2.3.10   **SCOPE** Viewer

SCOPE Viewer™ enables Function point counters to share all details of the Count Results as a softcopy with personnel who may not have a **SCOPE** license. **SCOPE Viewer™** works the same way as **SCOPE** but only has limited functionality.

 It allows the user to view all aspects of a Count that has been recorded in a **SCOPE** database. Function point counters can select to 'snapshot' just one count for Users to review or they can select all counts for a Release or provide the users with access to all counts in the **SCOPE** database.

The Users can then make comments on the count results and return the data to the counter to incorporate into the master version of the count. **SCOPE** Viewer™ is free and can be downloaded from the Total Metrics website. http://www.totalmetrics.com/function-points-forms/**SCOPE**-Viewer-Request-Form

Whilst **SCOPE Viewer™** will not allow the users to modify the count by adding, or deleting Nodes, it will allow user to:

- link nodes and to change node names and descriptions

- run all count reports

- Assign notes or attributes you have previously set up. We would recommend that you set up an Attribute Category with Attributes that allow the Users to assign relevant attributes to the nodes they have made changes to or aspects of the count they want to highlight. E.g. Attributes could be Agree, Disagree made changes, Incorrect see notes, etc.

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2.4 FP Counting Usability Features

2.4.1 Function Point Counting Screen Layout

SCOPE displays the Main Screen after the **User** selects to **Open** a **Release Count Session** when in the **Applications List**. The Main Screen is divided into several parts, each of which has a separate role.

The central area of the main screen is divided into two parts, which will be referred to as the left-hand (LHS) and right-hand (RHS) sides from this point onwards.

The two sides are identical and can be resized by dragging the centre dividing bar to the left or right. They are interchangeable by clicking the 'flip' icon (looks like a bent paper clip) located at the top of the screen. You can flip to focus the hierarchy on the left hand side for **Linking** to other trees and re-size it to find the layout that suits you best.

Each side can contain one of five views, which you can choose using the row of tabs at the bottom of the screen, above the status line. The only restriction is that you cannot display the same view in both sides at the same time.

The views are grouped into two types: **Hierarchy Trees** and **Details**.

Hierarchy Tree views display one of the four trees:

1. **Function**
2. **Data**
3. **Attribute**
4. **Notes**

The views are selected using the Tabs above the main windows. When you display a tree on one side and select the **Detail** tab on the other, a data entry form appears showing the details that correspond to the selected tree node. The Tab for the currently displayed Tree is 'raised' and the other tree tabs appear as 'depressed'.

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NOTE: Some of the features within **SCOPE** can only be invoked when a hierarchy is located on the LHS of the screen.

The two sides of the screen can show either two trees at the same time or one tree and its associated details.

HINT: For very large counts, speed up the tree display turn off the dynamic calculation of function points (select F5 or Main Menu, View, Options).

HINT: To speed up saving your database, use the Compact Database option under Files in the Main Menu, then select Save.

In any of the tree views, you can:

- Insert and Delete tree nodes
- Edit node names
- Copy nodes
- Move nodes
- Flag nodes
- Record node impact type (Function and Data Group Trees only)
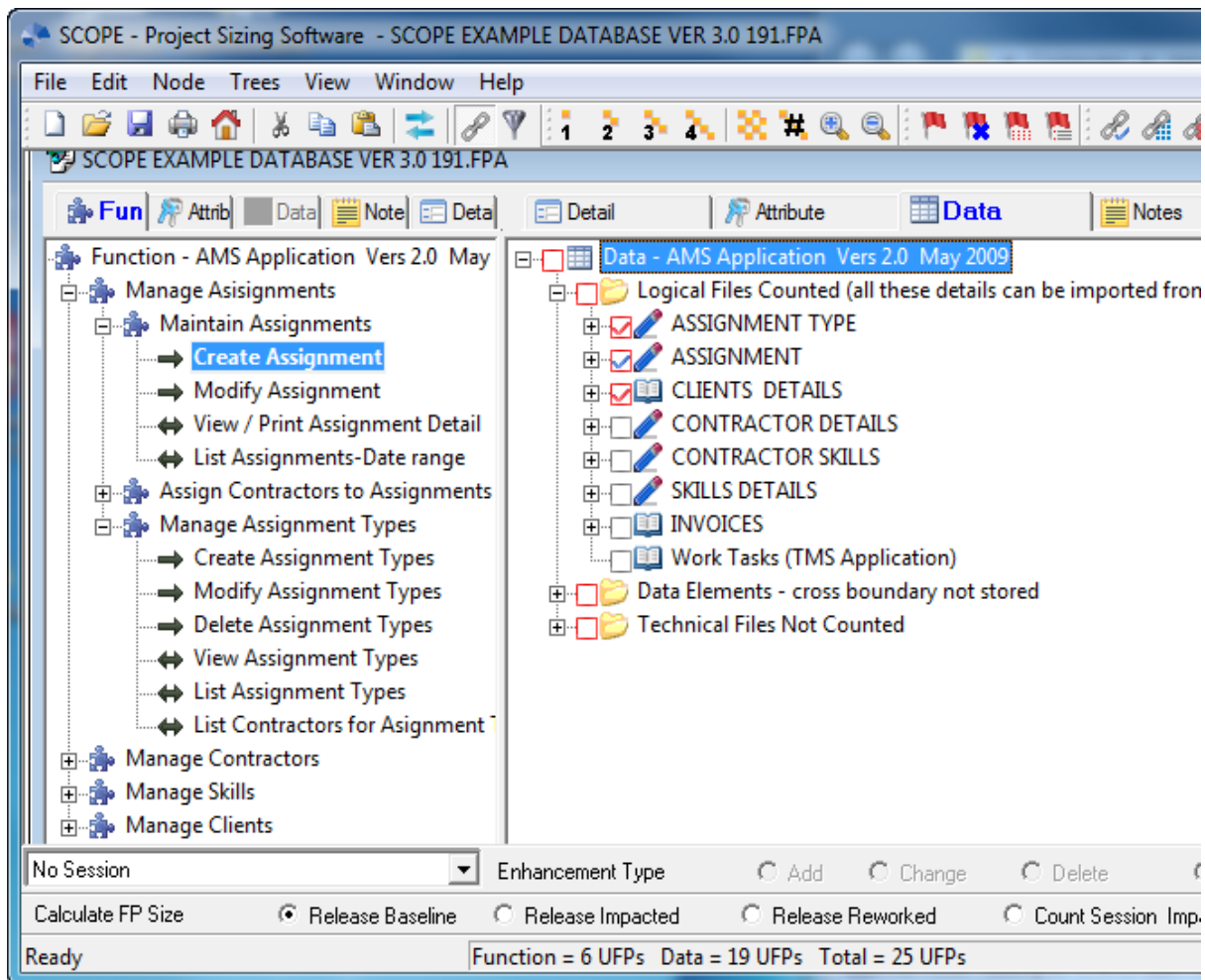
If you display two trees at the same time, you can:

- Link a node in one tree with a node or nodes in the other. To globally link multiple nodes, right click on the parent node and select Link, Set All from the pop-up menu.
- Flag selected nodes by using the Filter feature on the top row of buttons, and then using the boolean options on the button menu for your filter, or the short cuts (Alt1=YES, Alt2=OR Alt3=NO , Alt4=CLEAR). You can also manually flag nodes by selecting the Flag Icon or Alt F. To globally flag multiple nodes , right click on the parent node and select Flag, Set **All** from the pop-up menu.

In the **Details** view, you can:

- See expanded details for the node you have selected in the tree view (on the opposite side of the screen). The fields displayed in the details will vary according to the type of node you have selected.
- Edit these node details.

2.4.2 Quick Counting - Transactions and Files

2.4.2.1 <u>SCOPE includes many features to speed up your counting.</u>

1. **Using the Multiplier**

   If you want to group the details of multiple Processes into one Process node then enter the number of Processes in the **Multiplier** field. E.g. where you know there are 4 Maintenance functions for a Customer of average complexity (each 4 function points), name the Process 'Maintain Customer' and enter 4 into the multiplier. The function points calculated for the Process are multiplied by 4 to total 16. **SCOPE** will display the calculated function points for the Process at the bottom right of the **Detail** screen.   *NOTE: If you do not want a node to be counted then set the multiplier to zero and the nodes will be excluded from the count results and display in 'blue' text on the screen. Alternatively you can make the node type "undefined" and **SCOPE** will assign zero function points.*

2. **Create Many Transactions at Once - Template Function Groups**

   If you want to quickly generate many maintenance, and reporting processes for an object e.g. Create Customer, Modify Customer, View Customer, then all you need to do is insert the Object Name in the Insert Function Group Dialogue Box. (CTRL + T) **SCOPE** will generate whole branches of processes with their type and complexity defaulted, to enable you to hundreds of function points of count standard functionality in minutes.

3. **Bulk Change of Type , Complexity or Enhancement Impact using Short cuts**

Locate your cursor on the Parent Node and select the appropriate **SCOPE** short cut key combination to perform the bulk change.

4. **Auto Insert a Specific Node Type, Complexity or Complexity Result Source**

If you have a whole list of Reports that you know are Average complexity, then select the relevant default options you want **SCOPE** to use (ie. Output Type, Average Complexity) Under Options / Function Point Count Default Values. When you press the Insert Key all new nodes will have these characteristics.

5. **Auto Insert Last Used Node Name and go to Inserted Node**

If you have a whole list of nodes with very similar names then use this option to allow you to just change the text that is different. Select these options Under Options / User Options / Node Name Insert defaults.

6. **Copy and Paste Branches and Links**

If you have sets of transactions (processes) that are similar to another branch, then just copy and paste the branch and use the Find and Replace option to bulk change the names of the nodes. If you have set up all the links to other trees for one node use the copy the links (CRTL +L) and (ALT + L) to paste the links option

2.4.3 Quick Counting - Keyboard Short Cuts and FP Counting Options

2.4.3.1 <u>Default Short Cuts</u>

The following Automated features help speed up your counting:

- **Cursor position 'jumps' to last inserted node** – This feature speeds up data entry enabling immediate editing of the last inserted node. When positioned at a parent node and inserting a child node, the cursor will focus on the child node enabling immediate editing of the name. (You can optionally toggle this feature on or off via Main Menu /Options/User Options /Node Name Insert Defaults /Auto Edit Last Inserted Node Name")

- **SCOPE retains name of last inserted node** – This feature speeds up data entry of nodes with similar names. When inserting a node under any tree, **SCOPE** retains the name of the last tree node entered and allows you to then modify the name. (You can optionally toggle this feature on or off via Main Menu /Options/User Options /Node Name Insert Defaults /Use Last Inserted Node Name")

- **Double click to see Node Details** - provides quick entry of Node Details (You can optionally toggle this feature on or off via Main Menu /Options/User Options /Node Name Insert Defaults /Double Click Displays Nodes Details Screen")

2.4.3.2 <u>Keyboard Counting Shortcuts</u>

SCOPE has numerous shortcuts to speed up your counting ie. short cuts to Change process and data - type, complexity and enhancement impact (see Function Point Counting Shortcuts)

2.4.4 Quick Counting - Template Function Groups

 Often software that is being counted has groups of similar functionality e.g. groups of similar types of elementary processes for a group of data. For example an Employee System would have the following functionality such as:

- *Manage Department Information*
    - *Add New Department - Input - Average Complexity*
    - *Modify Department Details - Input - Average Complexity*
    - *Delete Department Details - Input - Low Complexity*
    - *View Department Details - Enquiry- Average Complexity*
    - *Browse Departments Details- Enquiry- Average Complexity*
    - *Report Department Details - Output - Average Complexity*
- *Manage Division Information*
    - *Add New Division - Input - Average Complexity*
    - *Modify Division Details - Input - Average Complexity*
    - *Delete Division Details - Input - Low Complexity*
    - *View Division Details - Enquiry- Average Complexity*
    - *Browse Divisions Details- Enquiry- Average Complexity*
    - *Report Division Details - Output - Average Complexity*

SCOPE allows you to quickly count 'standard' functionality by generating function blocks of transactions that have their name, type and complexity automatically assigned to previously defined default values. This is particularly useful in early counting.

For example: Often a logical file will have one or all of the following transactions - Create, Modify, Delete, View, Browse/List and, or Report.   To generate all of these transactions and their file links, just locate your cursor on the logical file and select to

insert a 'Template Function Group' and **SCOPE** will automatically generate all the transactions for you. You can create multiple Template Function Groups and set up their default name, type and complexity and whether they update or only read a file.

Once you have set up your default templates **SCOPE** allows you to import and export them for future use by yourself or your colleagues.

In the screen below the User has selected to Insert Template Function Group to quickly insert the maintenance processes for a new set of functionality around a "*Loyalty Member*". By selecting the Template "*Standard (one)"* from the list and typing in the words "Loyalty Member" as the object name , **SCOPE** has automatically created the 6 elementary processes on the tree using the 'object' and assigning the correct 'type' and 'complexity' e.g. *Add Loyalty Member* is an External Input of Average complexity.

2.4.5 Function Tree - Insert Template Function Group

On the Function Tree, right click and select to **Insert Template Function Group.** **SCOPE** will display the following dialogue box to allow you to select which type of Template Group you want to generate.
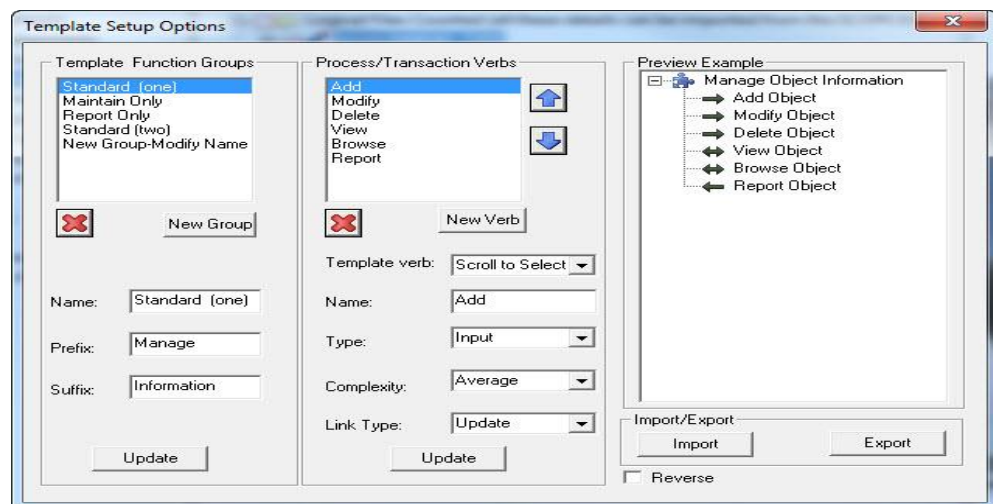
- **Select Template** is where you select from the list of existing Template Groups on your **SCOPE** database.

- **Insert Object Name** is where you insert the name of the 'object' of the functionality. For example in an accounts system an 'object' could be Invoices and we would want to generate processes that 'Create an Invoice', 'Delete an Invoice', 'Cancel and Invoice' etc. In the following example Loyalty Member was the Object and we created a list of processes for that object using our Template Function Group - Standard (one).
- **Add** will generate the Elementary Processes defined by the Verbs in the selected Template. These will be generated as a new branch on your function tree. Just keep changing the Object Name and pressing Add to generate multiple Function Groups.
- **Setup** allows you to create your own Template Function Groups in addition to the default Templates installed with SCOPE.

2.4.6 Data Tree - Insert Template Function Group

- Locate the cursor on the **Function Tree** either on the Root node or on a Function Folder Node.
- Click on the **Data Tree** and highlight a Data Group which is the 'object' for which you want to generate functionality
- Right click and select to **Insert Template Function Group. SCOPE** will display the dialogue box to allow you to select which type of Template Group you want to generate.
- Follow instructions as per the Function Tree
- When the Function branch is created you will see that all the processes have automatically linked to the selected Data Group with the Link Type (Update or Read-Only) that was pre-assigned for the Process verb in the template.

In the example below the Function Group "*Manage ASSIGNMENT LOCATION DETAILS Information*" was automatically generated when the cursor was located on *ASSIGNMENT LOCATION DETAILS* ILF. All the Inputs have been assigned Update links to the *ASSIGNMENT LOCATION DETAILS File.*
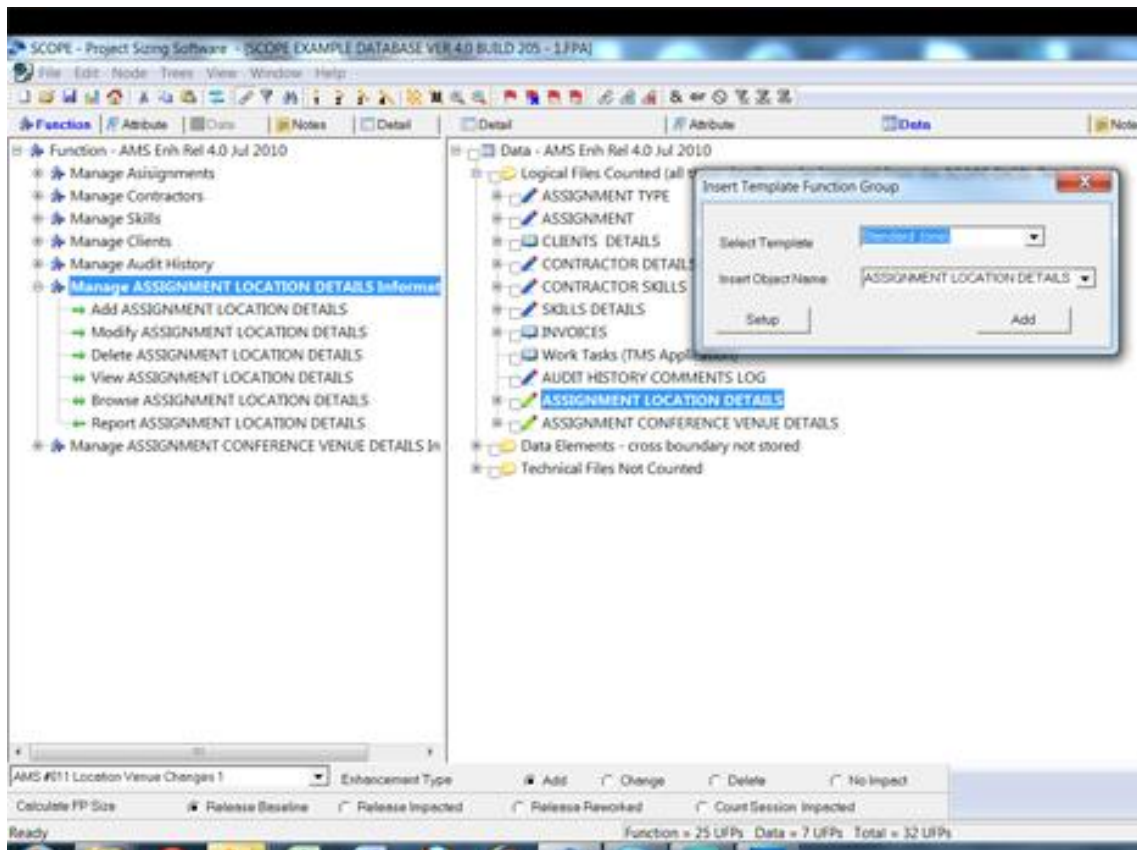
2.4.7 Setup Template Function Groups

Template Setup Options can be modified by selecting **Setup** button on the **Insert Template Group** Dialogue box, or from under **View** on the Main Menu.
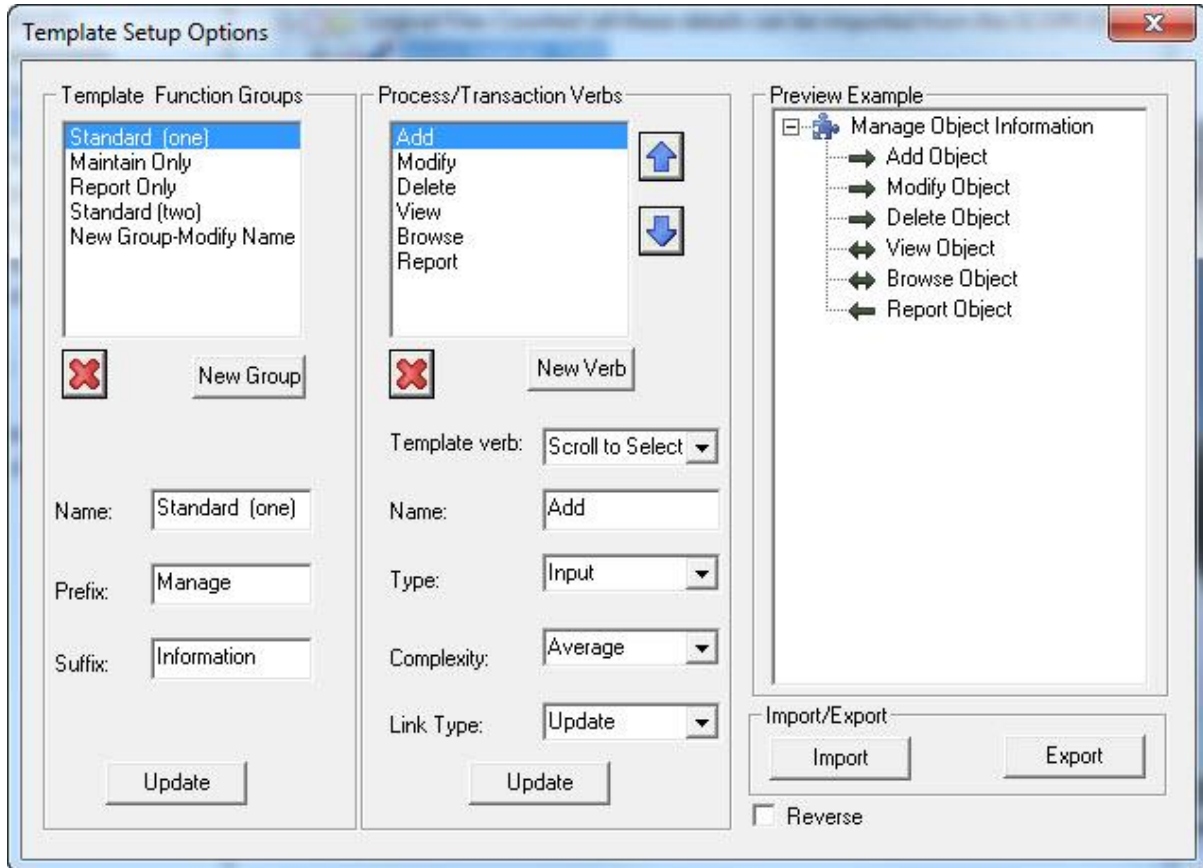
In this dialogue box you can set up your own customised Template Function Groups, suitable for your organisation, and add the appropriate verbs to be assigned to the processes, that are standard for your own naming conventions.

Create a new Template Function Group

Steps:
- Selecting **New Group** and give it a **Name.**
- The Prefix is the word that will be inserted in front of the "noun' name in the Function Branch e.g. in the Standard (one) template Group in the example

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it is the word 'Manage' prefixing the "*Manage Loyalty Member Information*" function.

- The Suffix is the word that will be inserted in front of the "noun' name in the Function Branch e.g. in the Standard (one) template Group in the example it is the word 'Information' in the suffix of the "*Manage Loyalty Member Information*" function.

- Select **Update** to update the Template Function Groups with your new Group.

- However you will need to create some appropriate Process/Transaction verbs for your new Template Function Group.

- To change details for a Template Function Group just make changes then select **Update**

Process/Transaction Verbs

SCOPE has a list of predefined Verbs that are currently used to describe elementary processes e.g. add, modify, delete, cancel, transfer, report, list, browse, view, enquire etc. These verbs have been pre-assigned the most common default 'type' and 'complexity'. For example the verb 'Add' in the following screen has been defaulted to an External Input with Average complexity and would update a logical File. If you want to Change Verbs then make your changes and select to **Update.**

Create a new Process/Transaction Verb by:

- selecting **New Verb** and give it a **Name**
- the **Complexity** is the complexity that will be assigned to the elementary process when the function group is generated (Low, Average or High)
- the **Type** is the type that will be assigned to the elementary process when the function group is generated (Input, Output or Enquiry)
- the **Link Type** is the access type that will be assigned to the elementary process if the Function Group is generated from a Data Group. i.e. see Generating A Function Group from a Data Group
- select **Update** to save the Template Function Group so it will now have your new Verb

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- see the **Preview Example** to see how you Function Group will look when generated by SCOPE using the Insert Template Function Group option

- to change details for a **Process/Transaction Verbs** just make changes then select **Update**

2.4.7.1 Reversing the Order of the Verb and Nouns in Template Function Groups

The syntax of some Languages (e.g. German) requires the Verb to be located after the Object name. Select the 'Reverse Option' at the bottom right hand side of this screen to change the order of the noun and verb.
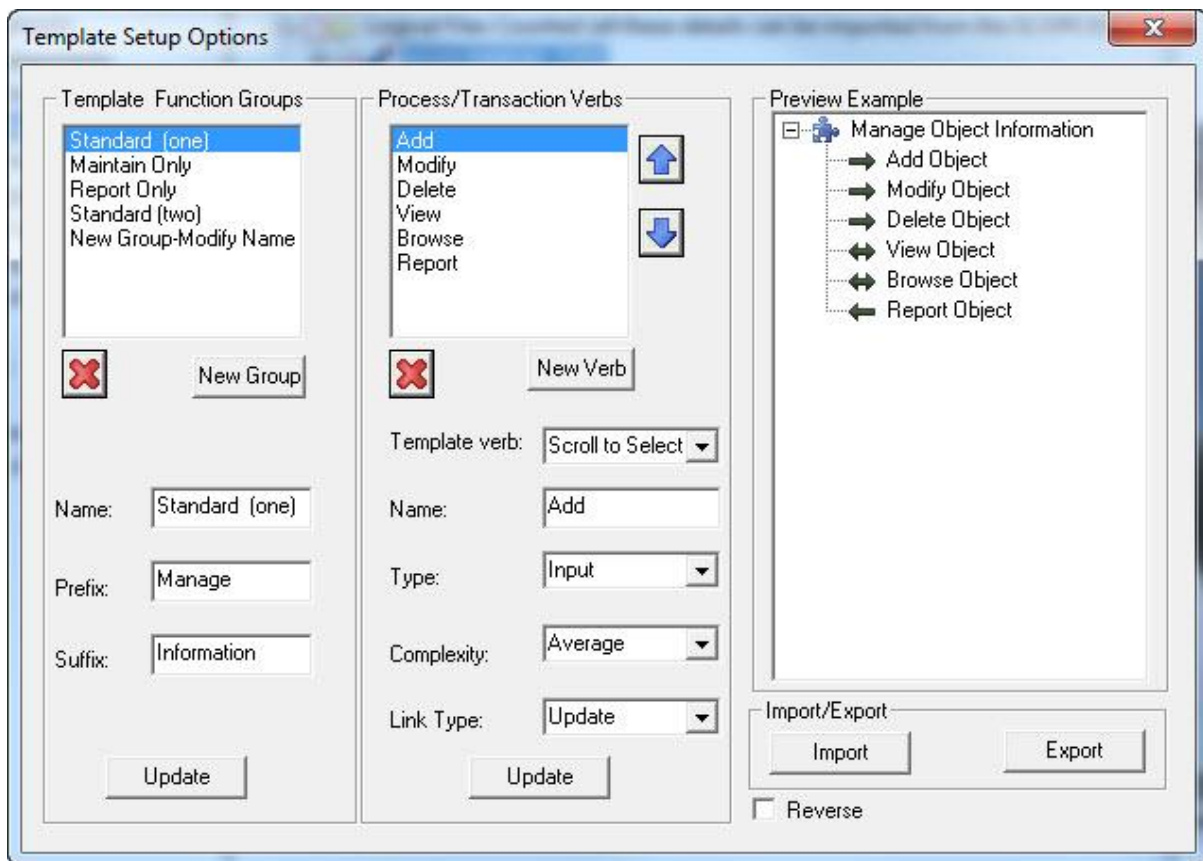
2.4.7.2 Importing and Exporting Template Function Groups

Export your Template Function Groups to save as a file that can be later **Imported** into another SCOPE database and merged with any existing Template Function Groups.

2.4.8 Comparing Results from Two SCOPE Counts

 Compare Results in SCOPE Reports for Auditing

2.4.8.1 Automatic Audit Feature for Comparing Counts

Using the 'Compare' option in the Report List Window, you can run any two SCOPE reports (WORD, EXCEL, RTF or PDF) and automatically compare the differences. The compare mode compares each line of the report and highlights any fields that have been changed, added or removed. The SCOPE reports which output to EXCEL® have been specifically formatted to facilitate comparisons and the FP Details reports also include Audit tracking information (when the node was created/modified and by whom). This feature enables you to identify differences in two counts if you are not sure when or how a count was changed.

The Compare feature allows comparisons across all SCOPE reports not just Function Point Count Reports.

2.4.8.2 Steps to Comparing two SCOPE Reports

1. In the Report Selection Screen   select to run the SCOPE Reports you want compare. You must choose the same SCOPE Report Name for each Report but you do not need to run the two reports at the same time or even on the same SCOPE database. ie. you can run them on different SCOPE databases, on different Releases, different Counts etc. and just save the output report files to a directory. You can also compare your own generated reports to a SCOPE report saved previously by another user.

2. When running the report you want to compare, select to output the Report to MS WORD or MS EXCEL. The *recommended* format for comparison is to select to output the reports to EXCEL, since the **SCOPE** EXCEL reports have been specifically formatted to not have any extra headings and footers and tab stops which will complicate the comparisons.

3. The two reports you are comparing need to be of the same type eg. both WORD or both EXCEL

4. In the Report Selection Screen 📊 under the Compare dialogue box, select 'Browse File Left' and 'Browse File Right' to select the path names of the two reports to compare.

5. Press the Compare Button.

6. **SCOPE** triggers the WinMerge® Application and pre-loads your selected Reports for comparison (see image below)

7. WinMerge® automates the comparison of the two reports - comparing them 'line by line' highlighting any differences in individual fields, identifying any inserted rows or and deleted rows.

8. Audit Information - **SCOPE** exports all the audit monitoring information (Create date, Modify date, User name who made the change) to all the detailed FP count EXCEL report files . Any differences between the two reports can be established can determine when the change was made and by whom.

2.4.9 Extended Length for Names and Descriptions

SCOPE allows you to enter up to 255 characters for all names of all your Processes, Data Groups, Notes and Attributes etc. Description field lengths are almost unlimited. You can enter and report a full description for all types of Tree Nodes including Function, Process, Data Group, RET and DET. Cut and paste extensive documentation into Notes.

2.4.10 Advanced Ease of Use and Time Saving Data Entry

Counting Transactions

Counting Logical Files

All features in **SCOPE** are performed and displayed on the single main screen avoiding the time consuming tasks of navigating through overlapping multiple windows. All features and short-cuts are typical of those set by Microsoft Windows® products.

The MS Explorer® like Trees in **SCOPE** enable you to intuitively view a significant proportion of the functionality of your software application in a single screen.

See also how to insert multiple transactions for a data group with a just a mouse click - Template Function Groups

2.4.11   Tracks Rework for Enhancement and Development Projects

Set Up Multiple Counts for Same Release

SCOPE also enables multiple counts to be performed on the same functional model throughout the development life cycle. As a new function is added, and subsequently changed several times at different stages of the life cycle, **SCOPE** tracks the rework. It is able to report the net impact, the net result of the delivered software and the cumulative size of the rework.

SCOPE records an audit trail of all tree nodes of who created the node and who changed it with dates, times and user names. (See Audit Trail of **SCOPE** Changes)

See also Types of Functional Size Reporting

2.4.12   Multiple Counts on the Same Baseline

Set Up Multiple Counts for Same Release

Import Export Counts within a Release

SCOPE's unique configuration capability enables it to manage concurrent Enhancement counts ensuring other counts are not overwritten when updating the master Application counts (Production Releases). This feature enables a project manager to '**SCOPE**' multiple change requests on the **work in progress release** and

track the impact of each individual count on the overall release and to record Benchmarking Metrics at Change Request level.

SCOPE's allows a user to record multiple function point counts for the same Release of an application and to selectively report and edit them. If the count is no longer required then it can be deleted (select **Delete Count Session** from the Software Applications List when located on the count). Once the Count Session is deleted, the Release Baseline will be left as it was before the count was recorded. (Similar to WORD when you select to "Reject all Changes") .When you select to delete a count you will be prompted to select if you want to **Delete Added** and/or **Delete Deleted** processes and data groups that were impacted for the count.

If you select the box to delete the **Added** processes and data groups **SCOPE** will delete all the nodes that were added new as part of the count. You can use this feature to 'fix up' a baseline. i.e. Create a count called 'Fix up Baseline' then add in the processes and data groups that you believe should have been included. Have your new nodes checked then delete the Count Session but un-select to **Delete Added**, these nodes will remain in your Baseline but not be recorded as part of the Release.

 If you select to delete the **Deleted** processes and data groups then **SCOPE** will remove all nodes marked as deleted. This is a useful way to 'clean up a hierarchy'. i.e. create a Count Session called 'Clean up' then mark all processes and data groups that need to be removed to make the count correct. Have someone validate your decision, then select to delete the Count Session called "Clean up". All the nodes marked as deleted will be removed from the hierarchy.

 See also Import / Export Count Sessions

2.4.13   Merging Counts Sessions into the same Baseline

Import Export Counts within a Release

SCOPE will allow you to merge data created in different databases by exporting the data from one database, into a saved file which can be imported into the same or different database and merged with the existing data. From the Applications List select the horizontal arrow icons to export and import .

Applications - can be exported/ imported with all their Releases, Counts, related Projects and Benchmarking data

Releases - can be exported/ imported with all Counts, related Projects and Benchmarking data

Count Sessions - SCOPE will allow you to export a selected Count Session to be imported later into another Release within either the same **SCOPE** database file or a different database. This is essentially a 'merge' option where **SCOPE** merges the imported Count Session into the Release, so the Release now reflects the latest impacts and the imported Count Session becomes one of the Counts for the Release. See **Import / Export Count Sessions**

2.4.14   Audit Trail of History of Changes to Counts

SCOPE will automatically record details of which Author who created or modified any tree node (Functions, Data, Attributes or Notes), as well as when the change was made. The information is displayed at the bottom of the Details screen for the Node. It tracks all nodes for all trees.

By default the machine designated user name will be reported as the author of the change, or you can manually over-ride this and input your own name as the author for your session (Main Menu, Options/User Options, UserName.).   When reviewing counts, you can search the trees for those nodes created or modified by a particular user, on selected date ranges. The resulting highlighted nodes are flagged on screen and can be reported selectively on any of the **SCOPE** reports using the "Select Flagged Nodes" option in the Report Selection box.

This audit option allows you to review any changes to a count and have a full history of when those changes were made and by whom. This is particularly useful for **SCOPE** Corporate multi-user environments when multiple users can maintain a count. Use 'Find and Replace' to search on Dates changes were made or Author's name. If you are unsure of who made any changes then put an "*" in the search box all changes by all Authors for the selected dates will be highlighted.

To get a report of listing of all the nodes (Process, Files, Notes, Attributes) and who changed them, and when, select to run one of the Details reports with the Output Format to be MS Excel. The last 4 four columns in the report list all the Audit information. Use the Compare Function to compare two reports for differences.
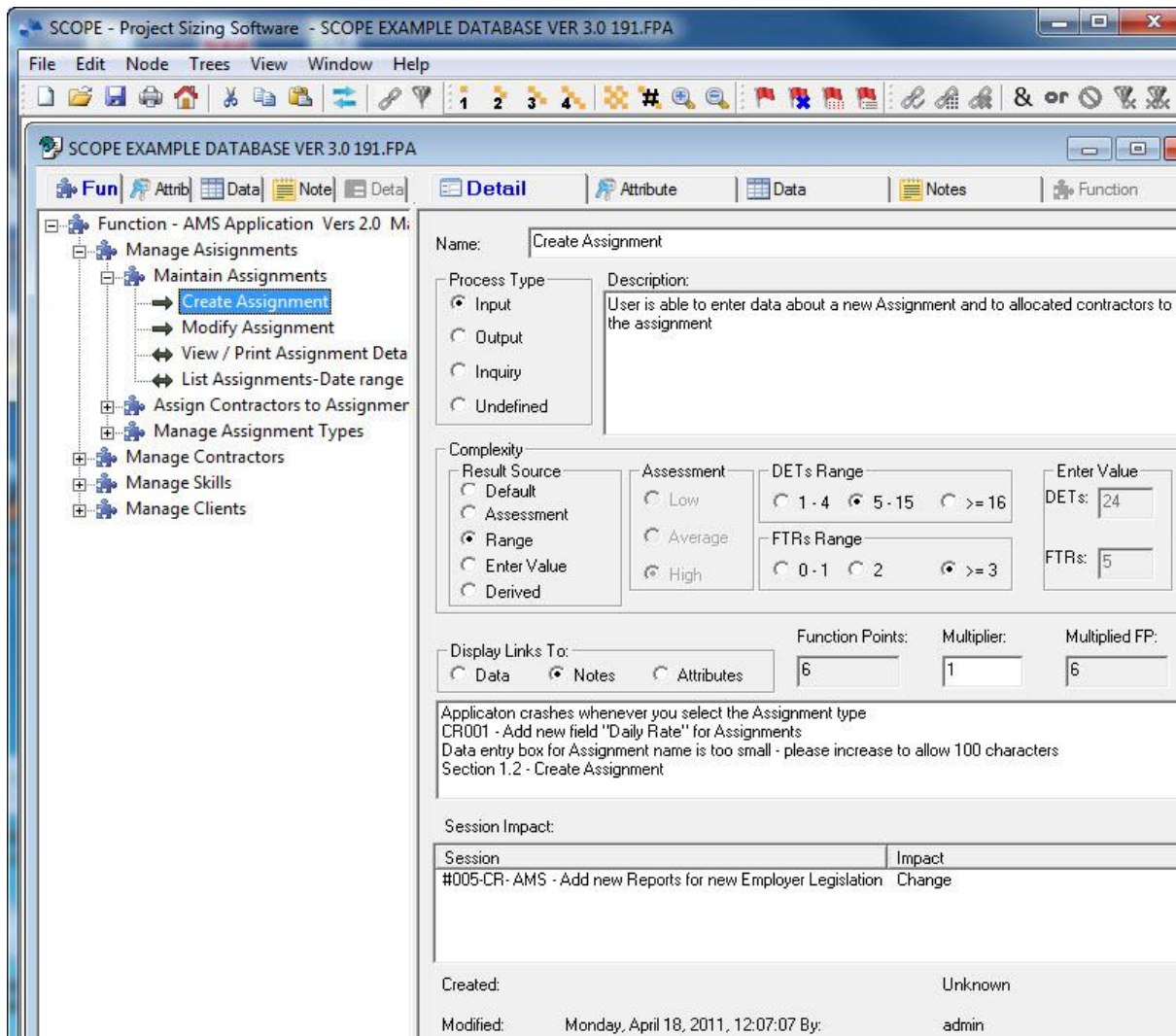
2.5 Layout and Shortcut Features

2.5.1 Keyboard Shortcuts

2.5.1.1 Function Point Counting Shortcuts

Key(s)	Field Modified	Action
Ctrl+ 1	Set Enhancement Type	Process / Data Group to **ADD**
Ctrl+ 2	Set Enhancement Type	Process / Data Group to **CHANGE**
Ctrl+ 3	Set Enhancement Type	Process / Data Group to **DELETE**
Ctrl+ 4	Set Enhancement Type	Process / Data Group to **NO IMPACT**
Ctrl + SHIFT + i	Set Process Type	**INPUT**
Ctrl + SHIFT + o	Set Process Type	**OUTPUT**
Ctrl + SHIFT + q	Set Process Type	**INQUIRY**
Ctrl + SHIFT + u	Set Process Type	**UNDEFINED**

Ctrl + SHIFT + g	Set File Type	**INTERNAL LOGICAL FILE**
Ctrl + SHIFT + e	Set File Type	**EXTERNAL INTERFACE FILE**
Ctrl + SHIFT + f	Set File Type	**UNDEFINED or to FOLDER**
Ctrl + SHIFT + g	Set File Type	**INTERNAL LOGICAL FILE**
Ctrl + SHIFT + l	Set Complexity	**L**ow
Ctrl + SHIFT + a	Set Complexity	**A**verage
Ctrl + SHIFT + h	Set Complexity	**H**igh
Ctrl + L	Copy Links	Copies links from All Trees from Current Node
Alt + L	Paste Links	Pastes the links that have been copied to all children of selected node. User can select which links.
Ctrl + T	Template Group	Inserts a Template Group
Ctrl + R	Autofil Name	Autofills the name with the last name used

TAB	Details Screen	Cursor jumps to next input Field in Details screen

2.5.1.2 <u>Keyboard navigation shortcuts</u>

Key(s)	Action
<u>**Left Arrow**</u> ➡	Select the node at the next highest level and collapse the current branch of the tree
<u>**right Arrow**</u>⬅	Expand the current branch of the tree and select the node at the next level down the tree
<u>**Up Arrow**</u> ⬆	Select the next node up within the current branch of the tree
<u>**Down Arrow**</u>⬇	Select the previous node down within the current branch of the tree
Ctrl+N	Create a new **SCOPE** file, Application, Release or Count Session
Ctrl+O	Open an existing **SCOPE** file
Ctrl+S 💾	Save all changes to the current **SCOPE** file
Ctrl+P 📊	Go to Report Selection List

Alt+Shift+O	Opens File Menu
Double Click Left Mouse	Opens a Release or Count Session when in the Applications List. Opens the Details Screen for the current node in the opposite window when in Hierarchy Window.

2.5.1.3 Keyboard Function Key shortcuts

Key(s)	Action
F2 **ALT+Enter** **Double click name**	Rename currently highlighted text - Edit Node Name
F5	Refresh Function Point calculation on Status Line. This option can be turned on and off using Menu, View, Options, Dynamic FP Calculation
F1	Online Help

2.5.1.4 Utility shortcuts

Key(s)	Action
Alt+Ins	Insert a level 1 parent node
Alt+Ins+Shift	Insert a level 2 parent node (Data Tree only)
Insert	Insert a lowest level child node
Esc	Undo changes made to the current node name
Shift Up Arrow	Move the current node up the tree
Shift Down Arrow	Move the current node down the tree
Delete	Delete the current node
Ctrl+C	Copy the current selection to the Windows clipboard
Ctrl+F	Search and Replace
Ctrl+X	Cut the current selection to the Windows clipboard

Ctrl+V	Paste the contents of the Windows clipboard at the current position
Ctrl+T	Insert Template Function Group
Alt+F	Toggles to Flag/unFlag the current node
Space bar	Toggle a Link on or off in Link mode
Alt+1	Set Filter Condition to "Yes" in Filter mode
Alt+2	Set Filter Condition to "Or" in Filter mode
Alt+3	Set Filter Condition to "No" in Filter mode
Alt+4	Clear Filter condition in Filter mode

2.5.2 Using the Mouse to Copy and Move

Building Hierarchy Trees

You can use the mouse to copy and move nodes in the tree in a similar way to Windows Explorer TM.

- Click on the node you wish to **move**, drag it to the new location, and release the mouse to drop it. By default, dragging a node moves it.
- If you want to **copy** a node, hold down the **Ctrl** key when you release the mouse button.
- To move a node up or down a branch in the tree press Shift Key and UP or DOWN Arrow.

When you move or copy a node you will be prompted to respond if you also want to move or copy the **Session** impact types and **Links** for the node. If you answer **No** then only the node details will be transferred.

To move nodes up and down the Application, Project or Benchmarking Metrics Trees use the up and down arrows.

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2.5.3 Search and Find and Replace

SCOPE will allow you to ⊞search for any item by name on any tree and replace it with alternative text. By selecting the MORE>> option, the search can be further customised to search for Whole words, Case sensitive or From Current Position.

Search and Replace in Function Point Counting Tree Screens : >>MORE offers additional options of searching on:
- o   Node Name and / or Description text
- o   Author's Name who Created or Modified the Node
- o   Date Ranges to search for when the Node was Created or Modified

 To use the search function select ⊞ Icon , press CTRL F, or go to Edit on the main menu and select Find and Replace. You can select to search up or down the tree. By selecting the More>> button you can further refine your search options.
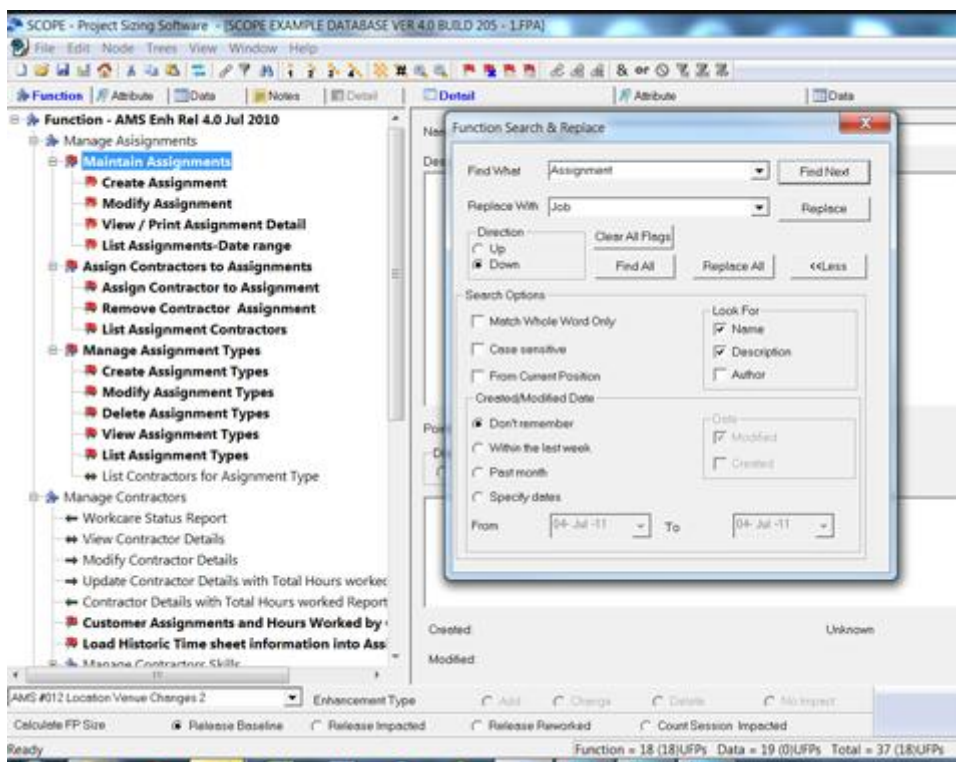
All the nodes that satisfy the search criteria are highlighted and **flagged**. Since the nodes are Flagged they can now be used to as a filter to:

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- Selectively report just the flagged nodes
- Selectively link to just the flagged nodes

You can "accumulate" the flagged, highlighted nodes by selecting to search on other criteria. The new search results will "add onto" the previous search results, so the flagged nodes accumulate. To clear the flagged nodes select **Clear All Flags** from either the Search and Replace Dialogue box, under Node on the Main Menu, or selecting the "Unflag Nested" Icon on the tools menu.

see Flags and Filters

2.5.4 Toolbars

There are several predefined toolbars and buttons to simplify common tasks. To see a description of a toolbar button, move your mouse over the button (without clicking it) and a short hint will be displayed. Some of the buttons also have longer help text, which is displayed in the status line at the bottom of the screen.

Toolbars are normally displayed in a single row underneath the menus at the top of the screen. If you wish, you can drag any of the toolbars to any side of the screen, where it will dock automatically. Toolbars can also be made to 'float' by dragging them from their current location and releasing the mouse without being near a window edge.

You can control which toolbars are displayed using **Options–Toolbars** from the main menu.

2.5.5 Expanding and Collapsing Trees

There are several sets of commands for expanding trees to show additional levels and collapsing them to show only the higher levels. These work in the same way as Windows Explorer™ and many other standard tree based applications:

- Mouse commands – click the + and – signs next to nodes.
- Keyboard commands - expand or collapse the tree based on the currently selected node. **SCOPE** remembers which nodes were expanded previously after the branch of the tree is collapsed (i.e. if the branch is expanded again, it will be restored to its previous condition).

The expand tree Buttons across the top of the screen allow you to select the degree of expansion from 1 level to 4 levels.

The Expand Groups button (g) will expand the tree to just the Function Level of each branch. Expand (n) levels allows you to choose the level of expansion.

2.5.6 Sorting Tree Nodes

Building Hierarchy Trees

SCOPE allows you to sort the nodes on any of the trees. You can **SORT** the whole tree or just from a selected branch downwards on the following fields:

- **Names of nodes of any Branch of any Tree** - This is very useful for documenting your counts so that you can easily locate an item within a list. For example you may insert your Data Groups as you identify them and then select to sort the list when you finish, enabling easy checking for completeness.

- **Links for any Branch of any Tree** - This is very useful when you have long lists of Data Groups or Notes and need to know exactly which ones are linked to the currently highlighted process, without navigating the length of the tree.

- **Type for any Function and Data Trees** - This standardises the documentation of your counts and facilitates locating processes, by sorting all your processes under each branch into Inputs, Outputs and Enquiries and your Data Groups into Internal Logical Files and External Interface Files.

Locate your cursor on the branch node you want sorted and right click the mouse. If you want all Levels below this level sorted then select (Sort Branch – All Levels) or if you just want to sort the direct descendent children of the current node select (Sort Next Child Level Only).

2.5.7 Moving and Copying Nodes

Building Hierarchy Trees

SCOPE makes it easy to expand and collapse trees, and to insert, delete, move, copy and paste nodes in a tree.

Nodes can only be moved within the same Release and within the same tree. To move a node or a branch of nodes use the Windows Drag and Drop feature i.e. highlight and hold down the left hand mouse key and drag the node(s) to their target destination.

Nodes can be copied within the same Release, or into any other Release that is in a currently open **SCOPE** database. However they may only be pasted into the same tree type that they were copied from.

To copy a node or a branch of nodes, use the Windows copy / paste commands i.e. highlight and hold down the left hand mouse key and the Ctrl key and drag the copied node(s) to their target destination.

All Copy / Paste commands are available from the Edit menu, Right Click Mouse menu or the shortcut keys.

If you only want to copy the 'links' associated with a node, then highlight the node you want to select Links from and either right click the mouse and select 'Copy Links' from the Edit Menu (Ctrl+L) Highlight the target node that will receive the links and select Paste Links (Alt+L). This function leaves the target node unchanged and only 'adds' the copied links to any existing links.

Note: you can also use the SCOPE Export Tree option under Edit to export a node , branch or whole tree. SCOPE saves the exported Tree Nodes into an XML file that can be later imported back into a SCOPE Release using the Import Tree function. See also Import / Export Within SCOPE database

See also Using the Mouse to Copy and Move and Keyboard Shortcuts

2.5.8 Status Line

The status line (at the bottom of the Main Screen) provides the following information.

- **Help text** at the left of the status line shows warnings and other messages. It also describes buttons when you move the mouse over a toolbar button.

- **Functional Size** - When the Function Tree is displayed, the numeric value in the middle of the status bar shows the Functional Size for the Release, or the selected node in unadjusted function points. See - *Types of Functional Size Reporting* for more details. If you have selected (i.e. flagged) particular processes or data groups using the Filter option or by manually Flagging. Then the functional size of the selected items is displayed in brackets on the status bar. **SCOPE** reports the Type of Functional Size (Baseline, Impacted, Reworked) depending on which option is selected on the status bar.

  HINT: To update/refresh the displayed value in the count, select F5. The functional size value updates dynamically as you move around the function tree. For very large counts you can speed up navigation by turning off the display of the functional size by selecting View, Screen Display Options from the Main Menu. Turn off the check box titled "Dynamic FP Calculation". To re-calculate the FP size at any time press F5.

- **Nodes Dynamic Address** at the right of the status line displays the position of the currently selected node in outline numbered format. ie. Hierarchy Number. This address changes you move around the hierarchy and the highlighted node changes. The dynamic node address, automatically updates as nodes are inserted and deleted from the tree. (see example below Hierarchy Number = 1.1.1)

- **Count Session List** - lists all the Count Sessions within the current Release. Select the Count Session you want to display from the Combo Box.
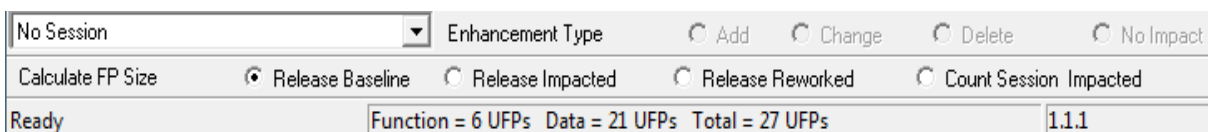
2.5.9 Changing Language Screen Display and Reports

SCOPE is multi-lingual and provides the User with the option to change the Language for the screen displays, messages, menus and reports.

When you install **SCOPE** it automatically defaults to the Language pre-set by the operating system of your computer. To change this language at any time after installation:

Open **View** on the Main Menu and select **User Options**.   The last Option is Language. If you click **Manual** then **SCOPE** allows you to select from the list of available languages. The default language is English.   If **SCOPE** does not display your language then please contact us at www.totalmetrics.com.

Languages include:
- Dutch
- Portuguese
- Spanish
- Italian
- French
- German
- Japanese
- Chinese
- Korean
- English
- etc.

User Options

Access Runtime location: |

Snapshot Runtime location
❌ Manual   C:/Program Files (x86)/Snapshot Viewer/SNAPVIEW.EXE

Toolbars at startup
❌ Standard   ✅ Expand   ✅ Flag   ✅ Analysis   ✅ Status

Status Bar
✅ Dynamic FP Calculation
❌ Only Flagged Data Nodes used for FP Calculation

Node Name Insert Defaults
❌ Use Last Inserted Node Name
❌ Auto Edit Inserted Node Name
✅ Double Click Displays Node's Detail Screen
✅ On/Off Tooltips

Auto Save   10 Min ▼

Language
✅ Manual   Select   English ▼

Username
❌ Manual   admin

OK   Cancel

2.6 Version Features

2.6.1 Overview of SCOPE 4.1 Features

Published October 2012.

 SCOPE 4.1has focussed on increasing the efficiency and ease of using SCOPE to count function points. In addition to speeding up data entry, it includes more informative audit and reporting, with import functions for all your project metrics. The new SCOPE Lite™, SCOPE Metrics™ and SCOPE Viewer™ editions combine together to provide you with an extremely cost-effective FP tool solution, for all your FP Users.

The Key Features delivered by SCOPE 4.1 include:

2.6.1.1 Automatic Load of Metrics Data from Excel

SCOPE 4.1 has import templates for quick loading of your Metrics data from MS Excel® for all your Applications, Releases, Projects or Change Requests. Your project teams can enter or import their effort and defect and/or environment data for all their projects into the SCOPE template ready for a bulk import into SCOPE. On import you can select to [Create New] Applications/Releases/ Projects or Change Requests if these are not already recorded in SCOPE or you can [Merge] the imported data with existing SCOPE metrics data. If you need to modify the imported data, it is as simple as entering the new data in the Excel template and re-importing or editing it directly in SCOPE. Once your effort and defect data is recorded in SCOPE you can use its Benchmark reporting capability to create all your Management Benchmark Performance reports.
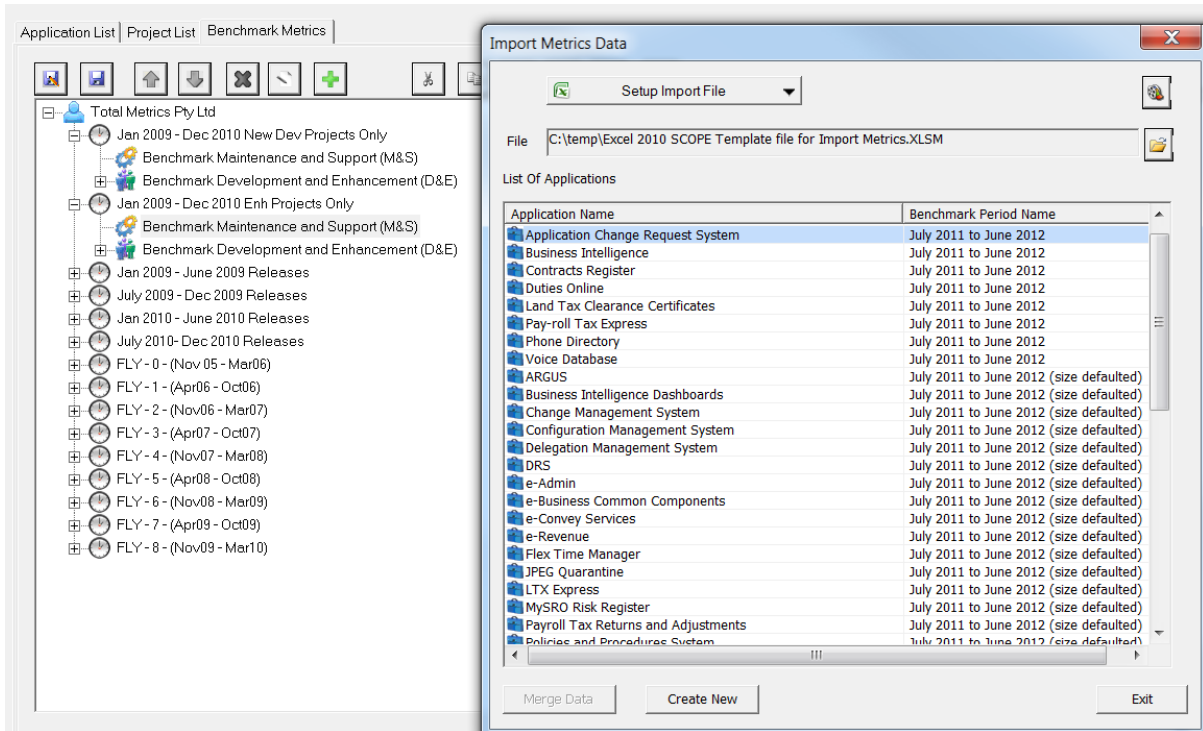
2.6.1.2 Automatic Audit Feature for Comparing Counts

SCOPE 4.1 has a new 'Compare' option in the Report List Window, so you can run any two **SCOPE** reports (WORD, EXCEL, RTF or PDF) and automatically compare the differences.   The compare mode compares each line of the report and highlights any text that has been changed, added or removed. The **SCOPE** 4.1 reports which output to EXCEL® have been specifically reformatted to facilitate comparisons and the FP Details reports now include Audit tracking information (when the node was created/modified and by whom).

2.6.1.3 <u>Interfaces with SEER SEM®</u>

SCOPE 4.1 enables the export of Project or Release function point size and their environment data to a SEER SEM® formatted 'project' file. When the file is opened in SEER SEM® Project Estimation software, the project size and environment data is pre-loaded ready for estimating.

2.6.1.4 <u>Quick Linking of Projects and Applications Impacted</u>

The Applications List in SCOPE 4.1 graphically displays the relationship of Projects to Applications, Releases, and Count Sessions so you can highlight (flag) all Count Sessions linked to a project and quickly edit relationships.
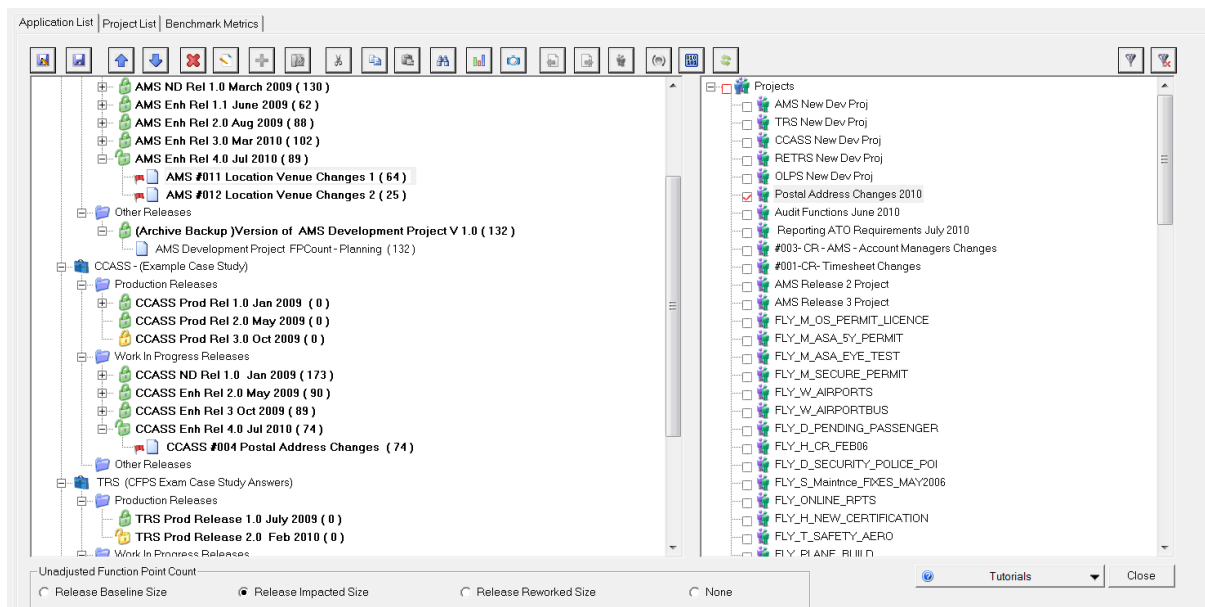
2.6.1.5 <u>Detailed FP Count Reporting Across Multiple Projects and Releases</u>

SCOPE 4.1 has two new reports that aggregate all the FP Counting Details at Process and Data Group level for one or many:

Projects across one or many applications – listing all processes and data groups impacted by each project in the selection, grouped and totalled by Application, Count Session, Project and Project set. (see report Project – Functional Size Totals)

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Releases across one or many applications – listing all processes and data groups impacted by each Release in the selection, grouped and totalled by Application, Count Session, Release and Release set. (see report Release – Functional Size Totals)

Now you can report all your Project Count and Release Count information in single itemised report.

2.6.1.6 Hyperlinks to URLs or External Documents

SCOPE 4.1 - Details screens - allows you to link any tree node or software entity (Application, Release, Project, and Count Session) to either a URL or file directory path. This is particularly useful for documenting your counts by cross-referencing source documents.

2.6.1.7 Quick Estimates of FP Size

SCOPE 4.1 links into Total Metrics FP Outline™ quick FP Sizing Estimates tool for estimating the size of your applications, development or Enhancement Projects

2.6.1.8 Customisable Templates for Numerical Attributes

The previous 4.0 release of **SCOPE** introduced the Numerical Attributes feature which enabled function point counts to be profiled for Productivity Analysis, Estimating, NESMA Impact factors, Earned Value reporting etc. **SCOPE** 4.1 goes a step further by allowing you to update and add to the inbuilt Template set so you can re-use your customised Numerical Attribute values in all your counts. (See Options <Numerical Template Attribute Options>)

2.6.1.9 Icons to Track the Progress of your Function Point Counts

SCOPE 4.1 enables you to assign a 'status' to your Function Point counts to visually track their progress in the Applications List. Status can be recorded as 'Not Started', 'In Progress', 'On Hold', 'Completed', 'Approved'.

2.6.1.10 <u>User Interface Updates and New User Friendly Features</u>

- Over 20 new Shortcuts for all high use data entry data eg.

  - CTRL+Shift+O sets all child Processes to be External Outputs.

  - CTRL+Shift+L sets complexity of all child Processes to be Low (Refer **SCOPE** Help - Key Board Shortcuts for all new 4.1 Shortcuts.)

- Excel Reports have been all reformatted to enable easy analysis , audit and export

- Icons listed on all menu items

- All List Reports now sequence on Hierarchy Position and include Hierarchy ID and Totals

- Users can now customise and re-use their Excel Benchmark Reports Templates

2.6.2 Overview of New SCOPE 4.0 Features

Published October
2011

2.6.2.1 SCOPE Metrics™

SCOPE Metrics™ is delivered with **SCOPE Professional 4.0™** and **SCOPE Corporate 4.0™**. It can also be purchased separately as a standalone metrics module and used to record data for size, effort, defects, and environment attributes; for all your applications and projects. The data fields are compliant with the collection standards set by the International Software Benchmarking Standards Group (ISBSG) for Development and Enhancement (D&E) and Maintenance and Support (M&S) metrics. You can selectively assign Projects and/or Applications to your customised Benchmarking periods for comparative performance reporting and trends analysis. The standalone module is ideal for organisations that need to report productivity and quality metrics based on functional size but do not need the full function point counting repository capability of **SCOPE**. At the press of a button you can email your selected D&E projects and M&S applications data submission to ISBSGs for their repository.

2.6.2.2   IT Performance Reporting

SCOPE provides full online and print reporting of productivity, quality and size metrics, both as tabular data and interactive pivot charts. Select to report by Work Package (Count Session), Project, Release, Application and/or Period. Customise the in built reports or add your own to the report template and interactively include and exclude displayed data from your graphs.
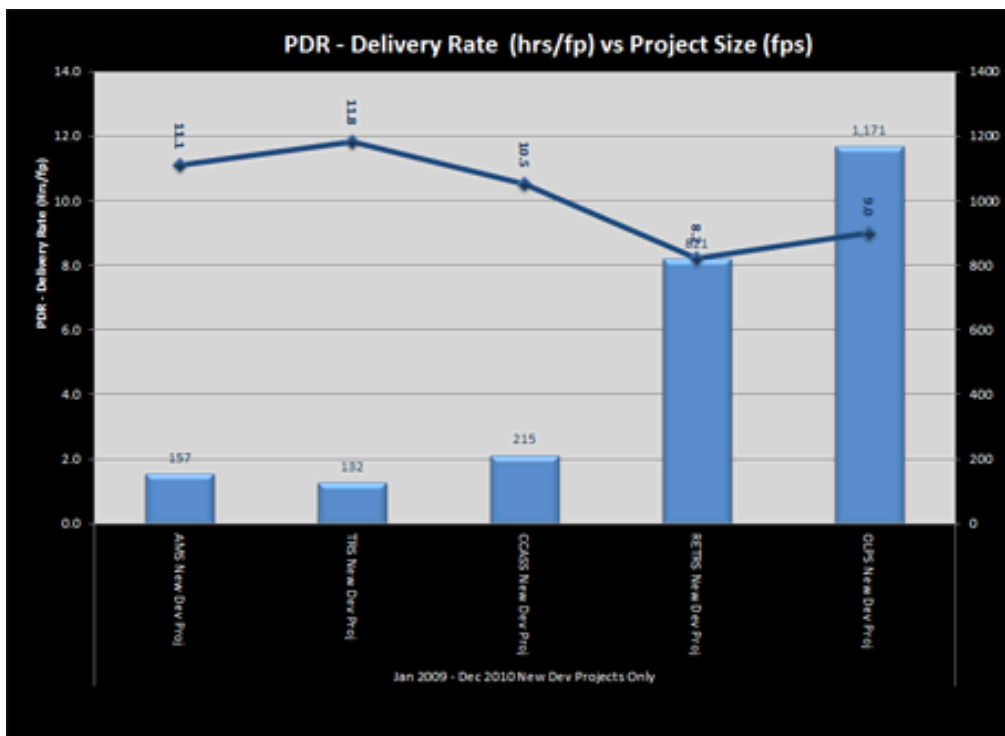
2.6.2.3 Web Enabled Business Analytics Portal for Industry Benchmarking

SCOPE CONNECT™ subscribers can utilise the latest technologies and frameworks of the semantic web to identify, integrate, query and visualise their metrics data. **SCOPE CONNECT™** portal provides drill down reporting and dynamic filtering of the

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ISBSG database to enable you to 'slice and dice' your own metrics data to benchmark against relevant Industry projects.

2.6.2.4 Apply 'numerical quantifiers' to SCOPE Function Point Values

SCOPE 4.0 has customisable 'numeric' attributes that can be linked to the Process and Data tree. Either use the inbuilt Numeric Attribute Templates provided, or create your own Numeric Categories. For example you can create new or customise existing numerical attributes by setting up:

• Different Project Delivery Rates (PDR- hours/fp) for different functional areas and SCOPE will calculate the effort hours to deliver the linked functionality

• Earned Value reporting by assigning 'percentage complete' to project functionality and SCOPE will calculate the 'earned value' function points for management reporting

• NESMA Enhancement Impact Factors and calculate the NESMA function points or set up your own customised impact factors.
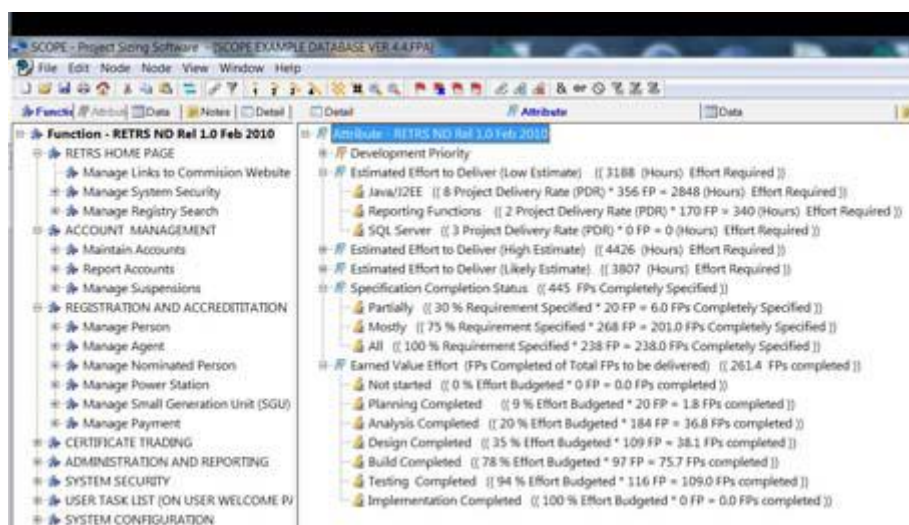
2.6.2.5 New User Interface

SCOPE has modernised its user interface:

- Industry Windows 7 standard icons replace control buttons for all basic functions.

- Additional shortcuts for Application List, Project List and Benchmark Metrics screens

- All screens enable basic functions (e.g. Save, Search, Move up /down, Copy/Paste)

- Benchmark Metrics Module enables multi-select of Tree nodes for all operations

- Hierarchy screens have Zoom In/Out for customised visibility

2.6.2.6 Other Features

- Snapshot and Export whole Applications with their all Releases and Counts for import into to a new or existing database

- Cut and paste nodes and change tree sequence position of any node on the Applications List, Project List or Benchmark Metrics trees using arrow icons to move nodes up or down

- Assign Enhancement Types from either LHS or RHS tree

- Optimised speed for **SCOPE** functions. Complex functions (import and convert database) now have a status bar to report progress.

2.6.3 Overview of New SCOPE 3.0 Features

Published May 2010

2.6.3.1 SCOPE 3.0 has Flexible License Options – Single User or Multi-user?

• **SCOPE 3.0 Corporate** - is the new multi-user license type designed for large organisations that require concurrent access by multiple users to a **SCOPE** database.   It enables storage of all your function point counts in a central repository that can be updated and /or viewed simultaneously by any number of **SCOPE** Corporate 3.0 and **SCOPE** Viewer^{TM} users.

• **SCOPE 3.0 Professional** – has all the features of **SCOPE** 3.0 Corporate but operates in the same mode as previous versions of **SCOPE** and is ideal for organisations that prefer to store their **SCOPE** counts locally and only need single user access at any one time to the database.

Contact us now to upgrade your current licenses from **SCOPE** Professional to **SCOPE** Corporate to take advantage of having global accessibility to your counts.

2.6.3.2 Complete Audit trail of all Count Updates

SCOPE 3.0 will automatically record details of which User created or modified any tree node as well as when the change was made. By default the machine designated user name will be reported as the author of the change, or you can input your own name as the author for your session (View- User Options menu). When reviewing counts, you can search the trees for those nodes created or modified by a particular user, on selected date ranges. The

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resulting highlighted nodes are flagged on screen and can be reported selectively on any of the **SCOPE** reports using the "Select Flagged Nodes" option in the Report Selection box.

This new audit option allows you to review any changes to a count and have a full history of when those changes were made and by whom. This is particularly useful for **SCOPE** *Corporate multi-user environments when multiple users can maintain a count.*

2.6.3.3   Snapshot a Project and all its Count Sessions

 SCOPE 3.0 allows you to select a Project on the Project List to 'Snapshot' into its own database. The new database will only include the Project's related Count Sessions, for all the Applications impacted by the project.   This new function is similar to the existing 'Snapshot Count' function but it exports all the counts assigned to the Project into a single new database.

 Allows a counter to create a single database with just their projects impacted counts so they can be worked on as a project group. Other users reviewing the project count can be shown only the Count Sessions relevant to their project.

2.6.3.4   Automatically Saves your data at user defined intervals

SCOPE will automatically save your data at prescribed time intervals to avoid you losing critical changes when experiencing power or network failures.   If you would like to manually control the save option then just select to change the frequency of the 'save' or disable it under 'User Options'

2.6.3.5 New Hierarchy Style Function Point Count Details – all on a single Report

The new "Hierarchy FP Size Attribute Summary Reports" combines the Process Hierarchy and Data Hierarchy into a single report that only includes those lower level nodes relevant to the Count Session or Release currently selected. Each displayed node reports the function point count details such as Process Type and FPs but additionally identifies which nodes are assigned to the currently flagged Attributes. It also reports impacts to DETs and RETs. You can selectively 'flag' up to 5 different Attributes from the same or different Categories to be highlighted and summed on the report.

We developed this report at the request of our users and believe it will soon be SCOPE's most popular report.

2.6.3.6 Other Features and updates - SCOPE 3.0 responds to your at your requests.

- Hierarchy Details Report - Function and Data - The functional size of each process and data group are now right justified and totalled for each Hierarchy report.

- Import Count Sessions – now as additional inbuilt intelligence that automatically determines the correct location of imported nodes

- Online report - 'flagged' data FPs - User Options, choose either

  o   report all the data which is linked to flagged functions, OR

  o   only report flagged data which is linked to flagged functions.

- Imports directly ALL FPW Versions - imports all FPW FP detailed data - Most counts in less than a minute for all FPW versions 4 to 7

- Template Set Up Options   - Allows the user to select the order of the noun and verb to suit the grammar requirements of the language they are operating in (see "Reverse" option)

2.6.4 Overview of SCOPE 2.1 Features

Published August 2008

2.6.4.1 Project Productivity and Size Reporting

The Project List is now available as a tab on the Project and Applications List Screen. The Project List displays all Projects with their associated Count Sessions and count sizes along with the Project aggregated size. If a project's effort is recorded within the Project Details, then the Project Delivery Rate (PDR) of the

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project is also displayed and reported. Highlight the count and it will display its associated Release and Application, double click it to open it.

Easy aggregation and reporting of a Projects' counts across multiple Applications.

2.6.4.2 Everyone can now have free access to view all Count Details with SCOPE Viewer™.

SCOPE counts can now be viewed by the user or count reviewer using the free downloadable reader **SCOPE** Viewer™. This free publicly available **SCOPE** reader is downloadable from the Total Metrics WWW site allows viewing and reporting on all aspects of the count.

SCOPE ensures that you can easily share your count results with anyone; they can run their own reports and review all your counting decisions. Saves you time by not needing to run multiple reports to distribute.

2.6.4.3 Selectively extract "SnapShots" of Releases or Counts

SCOPE allows you 'extract' a Release with all its counts or just a Count Session for a Release and all their details and save them in a new **SCOPE** Database. This provides an added level of security of your portfolio data in that it allows you to extract only the Counts relevant to the counter. Once they have made their changes to the count then the whole Release or just the Count Session can be exported and imported back into the master Repository in **SCOPE**.

SCOPE "SNAPSHOT" allows the Count administrator to control access to sensitive counts in the Master Repository, by extracting on the relevant count information for counters to work on. Allows counters to count remotely on a small database for additional speed, then merge their count back into the current baseline at a later date. It also allows a counter to SNAPSHOT their count to distribute for review with SCOPE Viewer™

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2.6.4.4 Automatic Recovery

 If your operating system crashes or your network fails, while you have an open **SCOPE** database, the next time you open **SCOPE** it will ask if you want to recover your unsaved file. If you confirm then your previous set of changes will be saved and your database re-instated.

SCOPE now ensures that you will never again lose data due to untimely system interrupts.

2.6.4.5 Reporting all Trees 'As Displayed'

SCOPE allows extra refinement to all reporting so that only the nodes 'expanded' on the trees as they are currently displayed on screen, will print on the reports. The selection can be further narrowed by using the existing report filters of only reporting from the branch downwards, flagged nodes or only the nodes impacted by the Count Session or Release

This feature further enables customised reporting so you only report what you need to see.

2.6.4.6 Reporting Count Values filtered by Attributes

SCOPE will report the actual number of function points, and their percentage contribution for the processes and data groups assigned to the different attributes. These percentages are reported with respect to the entire Baseline Count or can be further refined to only report for the particular Release or Count Session. (See "Reports – "Attribute FP Size Profiles").

This new report allows you to interactively report the percentage of functionality that satisfies different attributes. E.g. The percentage of 'High Priority' functionality compared to 'Optional' or percentage of a package that needs' reconfiguring' rather than be 'coded'. Customise your attributes so you can report on your own profiles to support your decision making.

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2.6.4.7 Process and Data Groups assigned a 'zero' multiplier

- are now display highlighted 'blue'.

Immediately highlights if a process or data group has been 'turned off' and is not contributing to the count.

2.6.4.8 The Notes Icon now shows when it includes a description

if a Note has additional text in the description field, the Notes Icon changes from 📒

to 📝

Allows you to quickly discern if there is additional information about the Note in the description that may be of interest.

2.6.5 Overview of SCOPE 2.2 Features

Published June 2009

2.6.5.1 SCOPE now speaks your language

 SCOPE 2.2 and **SCOPE Viewer™** are now multi-lingual. You can choose the language for your screen displays, messages and reports. When installed SCOPE defaults to the language set by your operating system. When you are running SCOPE you can change the language to the language of your choice including:

- *English*

- *Portuguese*

- *French*

- *German*

- *Italian*

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- *Chinese*

- *Japanese*

- *Korean*

- *Dutch*

- *Spanish*

- *etc*

Now you can function point count in your language and report to your users in their language.

2.6.5.2 Automated Counting - SCOPE Function Block Templates

SCOPE 2.2 allows you to quickly count 'standard' functionality by generating function blocks of transactions that have their name type and complexity automatically assigned to previously defined default values. This is particularly useful in early counting.

For example: Often a logical file will have one or all of the following transactions - Create, Modify, Delete, View, Browse/List and, or Report.   To generate all of these transactions and their file links, just locate your cursor on the logical file and select to insert a 'Template Function Group' and SCOPE will automatically generate all the transactions for you. You can create multiple Template Function Groups and set up default name, type and complexity and whether they update or only read a file.

 Once you have set up your default templates SCOPE allows you to import and export them for future use by yourself or your colleagues.

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2003 – 2012
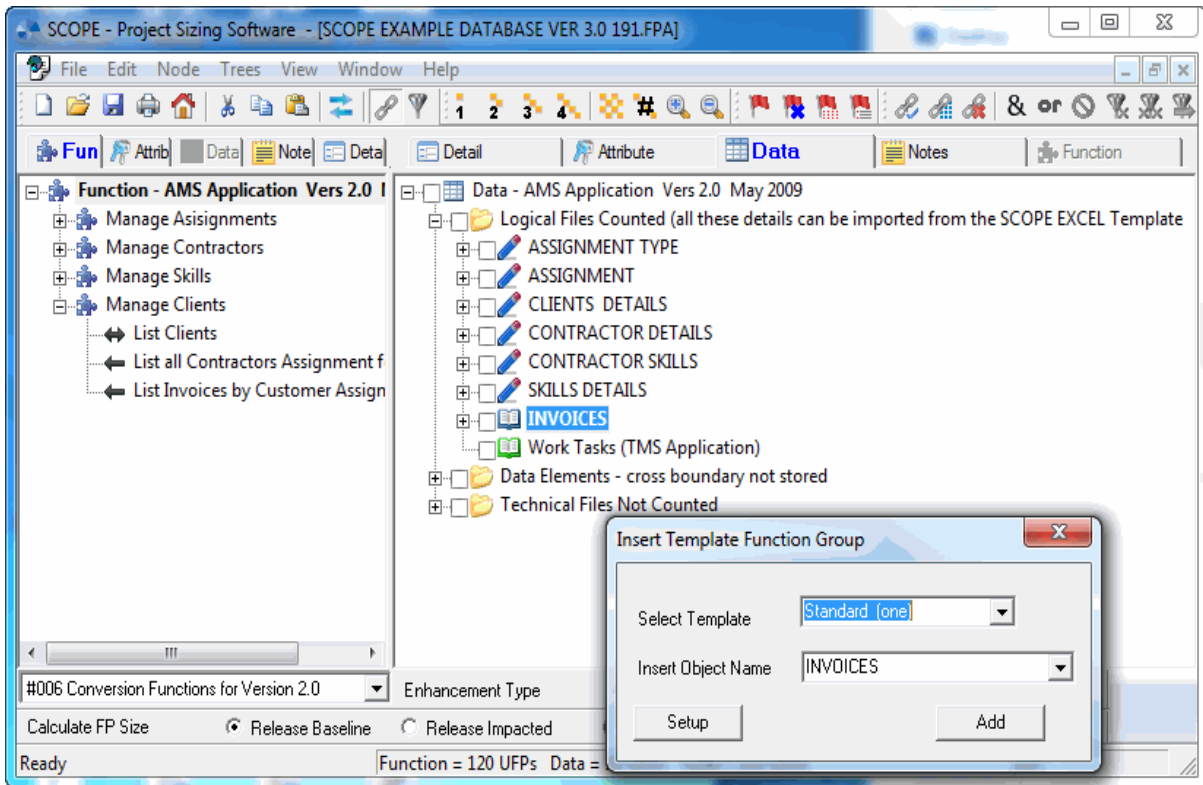
2.6.6 Overview of SCOPE 2.0 Features

Published September 2007

2.6.6.1 <u>Multiple counters simultaneously count the same Baseline</u>

Enables you to count your Change Requests off-line and then merge your count back into the master copy of the Work in Progress Release so other counters' changes are retained when your changes are recorded. Alternatively you can merge a previous count for a project that you put on hold into your latest Baseline.

> *You can now easily have multiple counters counting multiple change requests concurrently on the same baseline. If you have counted a project based on an old baseline that was put on hold, you can export it from the old Release count and import it to apply to the current Release hierarchy.* See Import / Export Count Sessions

2.6.6.2 <u>Count what you want when you want</u>

SCOPE allows you to count projects against a current Work in Progress Release baseline, then if the Project is not completed in time for the Production Release to be updated, or if the Project did not go ahead as planned, just select to hold it over for the next Release. SCOPE will not update the baseline with the count and will create a new Work in Progress Release which will include the delayed count.

> *SCOPE responds to the needs of a busy IT shop that require 'what-if' counts for planning purposes but do not want to lose the information or have it become out of date before the project is actually implemented. SCOPE will retain the information of the count over time and exclude it from updating the Baseline until you decide to do so. See Excluding Counts from Baseline Update*

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2.6.6.3 <u>Count Conversion Functionality</u>

Select to exclude it from the Baseline Update – **SCOPE** allows you to create a Count
Session within a project specifically to count conversion functionality. It will be
counted as part of the Release size for the project but can be selectively not applied
when updating the Production Baseline count.

> **SCOPE** *lets you decide which counts within a Release will be applied to the
> Baseline. See Excluding Counts from Baseline Update*

2.6.6.4 <u>Reporting the Project aggregated size & Productivity Rate</u>

SCOPE reports the size of a project's Count Sessions in each Application impacted
by the project. It aggregates the sizes and determines the total project size and the
project delivery rate (PDR) for the project in the Project Details Report.

> *This feature enables reporting and comparison of project productivity rates.
> See SCOPE Report List and Project Metrics for ISBSG*

2.6.6.5 <u>Application Portfolio Metrics Reports</u>

SCOPE reports all sizes of all Releases and Count Sessions for all Applications in
the Applications Portfolio. This feature is available online and in hard copy.

> *This feature enables you to view and compare Release sizes and Baseline
> Growth over time for all applications in unadjusted or adjusted function points.
> See SCOPE Report List*

2.6.6.6 <u>New features that will increase your productivity</u>

- o Online Dynamic Reporting of Count Sizes – Select the option on the status bar to dynamically report Baseline Size, Reworked Size or Impacted Size for the Release or Session **SCOPE** displays at the bottom of the hierarchy screens.

  Saves time running online reports by reporting the latest size value dynamically as you count. See Types of Functional Size Reporting

- o Export Metrics for Import into other Products – Select to export :

  - All Metrics Results - for a Release, Project or a single count to an XML file for easy import into your own metrics repository or an industry database. See Export XML to a Metrics Repository

  - Functional Size Results into a CSV format compatible for import into SPR Knowledge Plan®. See Export to SPR KnowledgePlan (CSV)

*Seamless integration of **SCOPE** results into your estimation and metrics repositories.*

2.6.6.7 <u>Listing of Notes, Attributes and Data in the Detail Screens</u>

See at a glance a list of the linked notes, data and attributes when viewing the details of each Process or Data Group, double click on the list to take you to the selected link.

Speeds up counting and count reviews, as everything is on a single screen.

See Viewing Linked Processes, Data , Notes and Attributes

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2.6.6.8 <u>Online Reporting of the Size of All Releases</u>

Count Sessions in the Applications List Screen – You can see at a glance the size of all Count Sessions and all Releases for all Applications in the Application List Screen. Size can be optionally reported as Baseline Size, Reworked Size or Impacted Size for Release or Session.

> *This feature saves creating reports on individual Count Sessions and Releases to compare values.*

2.6.6.9 <u>Group Data Groups into Folders on the Data Hierarchy</u>

SCOPE enables you to group related Data Groups under a Data Group on the data hierarchy for ease of documentation and understanding. For example Folders could be for Accounts, or Customer related Data Groups or alternatively a folder for your Reference Files, Configuration Files, Rule Tables and your External Interface files, grouped by the applications where they reside.

> *This feature facilitates easier understanding, completeness of documentation and easier maintenance of your counts.* see The Data Tree

2.6.6.10 <u>Reporting Function and Data Type size on the Hierarchy Reports</u>

SCOPE now also reports the type and size of each process and data group on the hierarchy report. At group level it reports the aggregated size of the child nodes.

> *This feature enables easier checking of the count completeness and accuracy as all processes and data groups are positioned where they occur in the functional model. See* **SCOPE** *Report List*

2.6.7 Overview of SCOPE 1.9 Features

Published July 2006.

2.6.7.1 Export Reports

- **SCOPE** enables you to send and save any of the tabular or text reports to:

- Microsoft EXCEL®

- Microsoft WORD®

- HTML

*Making it easy to embed **SCOPE** reports into your management reports or manipulate the data in an EXCEL® spread sheet.*

2.6.7.2 Across Release Reporting

Additional tabular and graphical reports that enable you to compare counts across a Release.

You can now easily compare sizes of individual Change Requests within a Release.

2.6.7.3   Automatic Counting of Processes and Data Group

 SCOPE will automatically derive the complexity of a process based on the number of Data Groups and DETs linked to it.

*You can now easily import the attributes of your Data Groups from an external source. You can then select which Data Groups are referenced (FTRs) and which DETs are used by the Process. **SCOPE** then derives the complexity of the linked processes and data groups automatically. This is particularly useful for automatically calculating the number of Data Groups you have linked to your processes.*

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Enhanced Searching and Flagging Capability

2.6.7.4 SCOPE allows you to select to:

- **Search** and find text in any node of any tree and 'highlight and flag' the search results

- **Flag all impacted processes** and data groups for an entire Release or just a Count Session so that you can selectively report or link them

- **Select to link / unlink** to either flagged nodes only or to un-flagged nodes only

SCOPE has advanced reporting features that can be applied selectively to flagged functions. The capability to 'automate' the flagging means that you can select functions for reporting or to be linked to another node with a minimum of key strokes. The highlighting of all functions impacted within this Release allows you to see the effect of all the Change Requests that have been applied within this Release period.

The ability to Link just to Flagged nodes facilitates linking between trees. E.g. search for "Customer" on the Process tree will highlight and Flag all "Customer" related processes, then select the "Customer" Data Group and Link to Flagged Nodes. You can choose to link as Update or Read Only.

2.6.7.5 Clone Links

You can now select to copy only the links on a source node and paste the links to a target node and optionally to all of its descendents.

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This feature speeds up your documentation by cloning the links you have previously created on a node to be copied and assigned to any other nodes and/or their children.

2.6.7.6 Set Links for Data Groups

You can now select to link to a set of dependents and choose whether the link access type is Read Only or Update. **SCOPE** also allows you to select to leave existing links or overwrite.

This feature speeds up linking of Processes to Data Groups particularly when you want to document how the DETs and FTRs are accessed.

2.6.7.7 Cursor position 'jumps' to last inserted node

 When positioned at a parent node and inserting a child node, the cursor will focus on the child node enabling immediate editing of the name.

This feature speeds up data entry enabling immediate editing of the last inserted node.

2.6.7.8 SCOPE retains name of last inserted node

9.   When inserting a node under any tree, **SCOPE** retains the name of the last tree node entered and allows you to then modify the name. (You can optionally toggle this feature on or off via View/Preferences/Auto Fill Name")

This feature speeds up data entry of nodes with similar names

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2.6.7.9 Report Comments in Descriptions saved

SCOPE saves your customised text in the report description in a drop down list so you can reuse it for multiple reports.

This feature speeds up the customisation of your report headings, enabling you to record specific comments on a set of reports.

2.6.7.10   Set defaults for data entry of Function and Data Nodes

SCOPE previously defaulted the inserted processes to the industry default values of 'Average complexity Inputs' and the inserted data groups to 'Low complexity of an undefined type'. You can now select your own defaults for Type and Complexity under "**View /Preferences**"

This feature speeds up data entry of similar nodes eg. A long list of high complexity reports can be entered by just pressing the Ins Key..

2.6.7.11   Convert a 'RET to a Data Group' / 'Data Group to a RET'

SCOPE allows you to correct any errors in data entry by allowing you to convert an incorrectly grouped Data Group to a RET and vice versa.

This feature enables you to easily correct your counts when you have grouped your RETS and Data Groups incorrectly. It is particularly useful when you import a list of physical tables with their attributes from EXCEL® and you want to regroup them into FTRs and RETs.

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2.6.7.12   <u>User Preferences to select defaults</u>

SCOPE allows you to save time counting by setting the default for the following options when you select to Insert a new node:

- **Type of Process or Data Group** e.g. Input, Output, Enquiry

- **Complexity of Process** or **Data Group** e.g. Low , Average or High

- **Result Source** – i.e. Range, Derived, User Input, Default, Assessment (see View - Preferences)

2.6.7.13   <u>Speeded up display</u>

SCOPE has significantly speeded up any functions that require searching and displaying the hierarchy. Remember to select to turn off the **Dynamic FP Calculation** to make **SCOPE** work even faster (see View – Options under main menu).

2.6.7.14   <u>Autofill Name Inserts</u>

SCOPE will autofill the name of a new node with the name last used for that type of node. This speeds up documenting your count when you have consecutive nodes with similar names. To use this feature select Autofill Name under View - Preferences.

3 Managing your Function Point Counts

3.1 Estimating Functional Size

3.1.1 FP Outline - Estimating Project and Application Size

Quick and Easy Function Point sizes - Using   the quick Function Point Counting Wizard

FP Outline™ is the latest software utility from Total Metrics suite of tools and services supporting Functional Size Measurement. The software provides the expertise to quickly determine the size of a project or the application portfolio in minutes rather than days, weeks or months consumed using traditional IFPUG counting methods.

Click the "Estimate Functional Size" button on the Applications List screen in SCOPE to trigger the size estimation Wizard.

3.1.2 When could you use FP Outline™?

 Early quick sizing has many uses, but we have found it particularly useful in the following situations:

- Early project estimation –quickly determine the project's functional size, even before specifications are completed, then apply the productivity coefficients to estimate effort, cost and duration.

- Outsourcing Contract Negotiation – establish the functional size of an organisations software to be maintained by the supplier at due diligence stage

- Value your software assets – establish the functional size of an organisations software to determine its replacement cost for asset valuation and accounting purposes

- Budget approvals – use the functional size and projected productivity rates to verify your estimates for management budget approvals.

- Benchmarking – establish the functional size of an organisations projects and applications for quick determination of product quality and development and support efficiency and effectiveness.

- Release Management– establish the functional size of a change request to determine if it is possible to include in the planned release.

- Get quick ballpark figure for your functional size and then…. when time, budgets and priorities permit, do detailed function point counting using **SCOPE** Project Sizing Software™ to develop detailed IFPUG 4.2 compliant counts to verify your estimates and manage project **SCOPE**. Both products are fully integrated so that all your estimates and actual counts are recorded in the same database.

3.1.3 How does FP Outline™ work?

FP Outline™ uses a series of algorithms derived from thousands of projects and applications counted over the last 14 years by IFPUG certified counters. The algorithms are based on over 40 relationships derived between known project and application attributes and the measured functional size. Many of these relationships are between the physical aspects of the project that are easily measured, and the logical functional size.   All you have to be able to provide data on the 'physical measures' which in most cases are easy to collect, then FP Outline™ does the rest.

For example there is a very predictive relationship between the number of pages of a functional specification and the function point count for a project. This makes sense when you consider that all functionality that is 'counted' must be specified, the more functionality delivered by the project the more pages of specification. Just count the pages of specification!

This is just one relationship that forms the basis for the 20 questions asked by FP Outline™   to 'predict' the size of your project or application.

FP Outline™ reports the approximate size in function points with an appraisal of the level of confidence that FP Outline™ had in determining the answer. The accuracy of the predicted size will depend on which questions you answer, and the accuracy to which you answer them. Our users are amazed at its predictive ability when they compare the size calculated by FP Outline™ the actual measured size using the IFPUG 4.2 methodology.

3.1.4 How accurate are the size predictions?

Total Metrics has been using the methodology underpinning FP Outline™   for over 14 years and has been able to demonstrate its accuracy, in both project (new development and enhancement) and application baseline counts for over 2000 applications and projects world wide.

3.1.5 Actual Case Study:

A large Telecommunications company, planning to outsource the maintenance of a set of 45 applications needed to urgently provide the functional size of their portfolio to the prospective supplier. Total Metrics took 6 effort days using the FP Outline™ methodology to establish the applications portfolio size at 30,710 UFPs.   The predicted size was later verified using the IFPUG 4.2 methodology and consumed 122 effort days to count. The actual measured size (25,326 ufps) was only -17.53% different to the predicted size. Our predictions tend to typically lie within a +/-15%

range   e.

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3.2 Managing Applications Projects and Counts

3.2.1 Applications

3.2.1.1 Applications - Overview

Software Applications List

The List of Software Applications screen displays when you first open a **SCOPE** database. It can also be selected from under the main menu home option or **File - Project and Application List.** When selected it displays a dialog box listing the various software applications for which you have function point counts stored in the **SCOPE** database file.
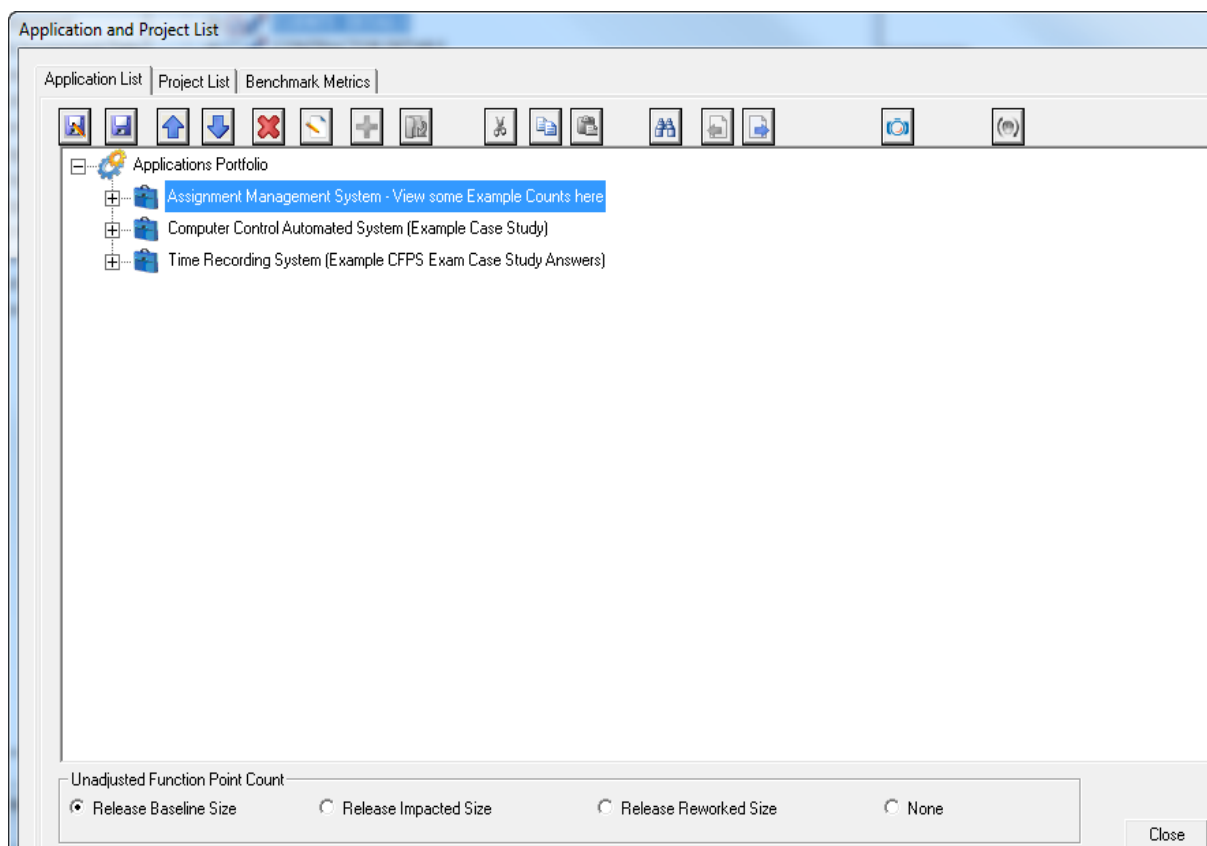
SCOPE can store the functional models of different versions of a software application known as **Releases**. **Releases** are listed under each application in one of three

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predefined groups depending on the status of the **Release**. See Releases - Overview

3.2.1.2 <u>Set up a New Application</u>

Set Up a New Application

Create a new Software Application

Select menu home option to view the Application List or select **File - Project and Application List** from the main menu. Locate your cursor at the top of the tree on

Applications Portfolio and select to create a new Application. Enter the new software application name and descriptive details. Expand the **Release** trees for your new application name by clicking on the [+] beside the application name.

Modify Software Application Details

Highlight the Application you want to modify. Select the **Details** icon to modify its descriptive and metrics details.

Then Create a New Release and Create a new Count Session in order to start your measurement

3.2.2 Releases

3.2.2.1 <u>Releases - Overview</u>

Set Up New Count- Baseline Count

SCOPE records function point counts for both Baseline Counts and Projects Counts and stores them under either:

Production Releases

This is the Baseline count of the version of the application that is currently in production. Baseline Counts for past Production Releases are also stored in this group in the order in which they were recorded in **SCOPE**. The very latest Baseline Count is the last on the List and is called the "Latest Release" in **SCOPE** and is designated a (Gold Lock Icon). It is this Release that provides the baseline release on which future modifications are made.

Work In Progress Releases

This is a copy of a functional model of the version of the software that is being worked on by the project team. If the software is new, then it may be the functional model of the first version of the software during its development. If the software exists, i.e. the application is in production, then it may be a model copied from the Latest Production Release and being worked on by the project team for an enhancement project. If the software to be counted is a new development project then record the count session by first setting up the Release as the first Release under Work in Progress Releases. When the development project is complete use the **Update to Baseline** option to create the new baseline count in the Production Releases. **SCOPE** creates a copy of the functional model for the Development project as a **Production Release**.

If you want to record the function point count for modifications (i.e., changes in functionality) to the software application by the project, then set up a Count Session under the Work In Progress Release.

If the Work in Progress Release is impacted by multiple change requests and each of these need to be separately recorded and functionally sized, then select to Add a Count Session for each Change Request. You can associate each Count Session with a Project. Open the Count Session ( ) to record the impact of the changes to the Release specific to the Change Request. Each Work in Progress Release can have multiple Count Sessions recording their impact concurrently. I.e., a Process or Data Group can be recorded as being impacted (added, changed or deleted) by multiple Count Sessions.

When all changes to the functionality from the projects within a Release have been recorded on the Work in Progress Release model then it can be used to Update to Baseline. If you highlight a Release that has update rights (green open padlock) and select Update to Baseline then all 'impacts' recorded on the work in progress model are accepted and the net result is the new baseline version which is automatically copied into the Production Releases. This is now the new Latest Release and it has the Update Rights, where 'update rights' are assigned to the Release that was the last to be changed. i.e. the current version of the model against which changes can be made and these changes can be used to update the baseline. (Note: you can manually select a Release to have the Update Rights by selecting it under Release Details Screen)

Other Releases

This is an archive area for releases. Any version of the application stored here is also editable, and can be based upon any other release version (including a Work In Progress Release). Typical usage would be to store a 'snapshot' of a release at any point in time. Versions within **Other Releases** cannot be used to update the

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baseline. If you want to use a release in Other Releases to update the baseline then create a New Work in Progress Release based on the selected Other Release, then ensure it has Update Rights.

(See also Set Up a New Release)

3.2.2.2 <u>Release Status</u>

Software Applications List

Release Status

A padlock icon beside each Release denotes the status of the Release. The colour and state of the padlock identifies each type of Release and which Release is the Latest Release of the software. The Latest Release is the one to select when changes to its functionality need to be recorded. The Icon can be either Green or Gold and will be in one of two possible states, Locked or Unlocked:

- **Gold Padlock Icon** -   - Is only assigned to the "Latest" **Production Releases**
- **Green Padlock Icon** -   - Is only assigned to all other Releases

Unlocked

If the padlock is green then this indicates that the functional model for this Release has the "Update Rights" to be used to update the baseline Production Release, i.e. this is the functional model on which any changes to the functionality should be recorded.   Only an Unlocked **Work in Progress Release** can be used to update the baseline Production Release. Once the update is complete the Work in Progress Release is Locked and the update rights have been passed over to the new baseline Latest Release (its icon is set as a gold **unlocked** padlock).

If the padlock is gold then this is the latest Release and holds the baseline count for the application. This is the Master count which is used as the base for creating the next Work in Progress Release to record future changes to the application.

Locked: 🔒 🔓

If the padlock is Gold 🔓 and locked it indicates that this Release has been copied to create a **Work in Progress Release** and has most likely changed since it was copied.

If the padlock is Green 🔒 and locked it indicates that this **Release** will not be able to update the baseline **Production Release** since it does not have **'update rights'**.

*NOTE: The User can override the status of a **Release** (i.e. colour and status of padlock) by editing the fields called **Update Rights** and **Latest Release** when editing the **Release** details. (See Set up a New Release for more details.)*

3.2.2.3 Set up a New Release

Set up New Release

In the Application List screen (🏠), select the type of **Release** you want to measure.

- If your software already exists and you want to develop a baseline model (Application Baseline Count) then select **Production Releases** and ➕ a **new Release** and its details. The **Icon** for this new release is an open gold padlock indicating that it is the **latest release** and can be edited (has **update rights**), (see Software Applications).

- If the software application model is already recorded in **SCOPE** and you want to measure the impact of a user Change Request on the software (Enhancement Project Count) then select **Work in Progress Releases** branch under the Application.

- If any Work in Progress Release has the update rights (i.e. its Icon is an open 🔓 padlock) then this is the release that is currently being sized for different change requests. Select this release to make your changes.

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- If there are no Work in Progress Releases or none of them has the update rights then you will need to create a new release. If a Production Release exists then copy the Latest Production Release that has update rights (gold open padlock icon) by highlighting it and using CTRL C or select   copy icon. Locate your cursor on the Work in Progress Node and select the paste icon or CTRL V.

- If there are no production releases you can use a previous Work in Progress Release and delete the counts or just select the option a **new Release** and start your functional model again.

Only a Work in Progress Release with an Open Padlock can be selected to update the Baseline in the Production Releases by selecting the icon "**Update to Baseline**" button in the **Application List**. The default in SCOPE is to have the last Release in the Release List as being the one that is being edited and therefore selected as the 'Latest Release' with 'Update Rights'. If you want to transfer 'Update Rights' to another Release then highlight the Release and select the Details Button. In the Details screen de-select Update Rights.   Highlight the Release you wish to transfer these rights to and in the Details screen select to give it Update Rights.

3.2.2.4 View / Report Count Sessions for Releases

View all the Count Sessions Linked to a Release:

- In the Applications List Tab - Highlight the Release and press + to expand the branch to show the linked Count Sessions.

- You can also run a number of reports   that list all the count sessions for the Release and their metrics these include.

- *Count Session Details (Release)* - Highlight the Release in the Applications List and select the report under Benchmark Details Branch

- *Release - Functional Size Totals* - Highlight the Release in the Applications List and select the report under Function Point Count Results Branch

To report the function point counting *details* for all the Count Sessions / Change Requests associated with a Release select : Reports / Benchmarking Details / **Release - Functional Size Totals**
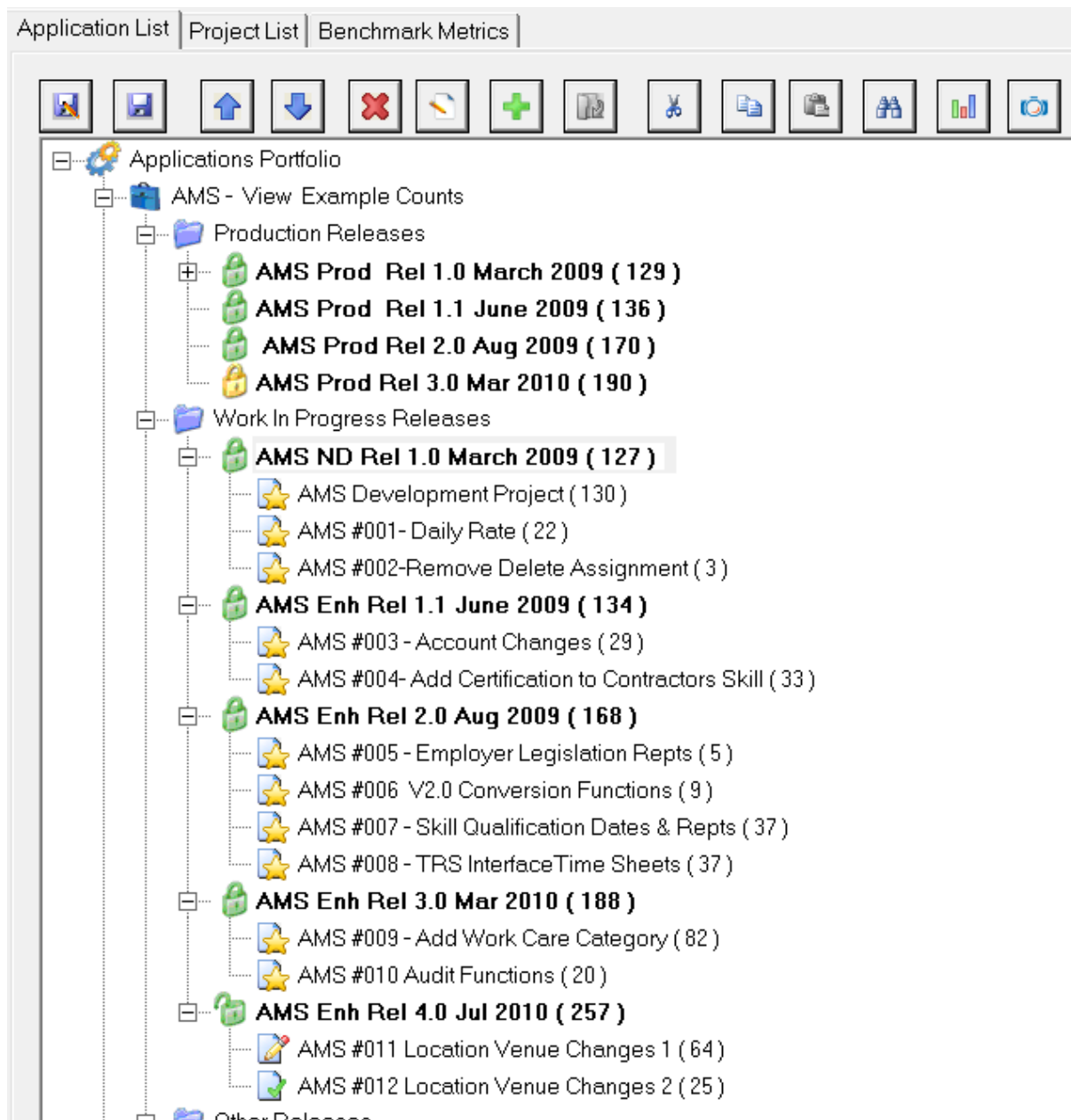
3.2.3 Count Sessions

3.2.3.1 Count Sessions - Overview

An important concept of working with **SCOPE** is that of the Count Session **(Session)** tracks the changes (impacts) of the User Requirements for the software within a particular release. **A Count Session** would typically be set up for a **Change Request** or a group of Change Requests. It corresponds to an Enhancement Count in the IFPUG Terminology if the change is to an existing application. For a planned application, then the Count Session would correspond to a Development Count.

  The Project implementing the Change Requests can be created in the Project list along with the type of project selected when entering the **Count Session** Details. As a special case a **Count Session** can also be set up to record the background of a functional sizing activity for a Baseline **Production Release.**

Hint: A **Project** *can be linked to many different Count Sessions within many different Applications. This enables you to size the* **SCOPE** *of change of a Business Requirement which has a project that impacts multiple applications. The total project size (sum of all the counts for all the applications linked to the project) is reported in the* **Project Details Report** *or online for each project in the Project List by selecting the radio button "Project Impacted Size".*

One **Release** may have many **Count Sessions**. The Releases are displayed in the list in '**bolded typeface**' with a padlock icon whilst the Count Sessions are displayed under a Release as 'regular typeface' and have a calliper icon.
(See Create a new Count Session)

To start a new **Count Session**, to record the size of a Change Request, highlight the name of the latest **Work in Progress Release** in the list of Software Applications. (Select Home on main menu), and click the button to add a new **Count Session**. Enter details about the Count Session. To record functional changes associated with the **Count Session** highlight the **Count Session** name under the Release and double click or select **Open**. See Starting your First Function Point Count

SCOPE keeps track of the modifications required by a Change Request by recording the changes as 'impacts' on the Function Tree and Data Tree. Each impact is associated with a **Count Session**. . To start your count, locate the Function Tree or Data Tree on which you want to record the changes on the LHS window.
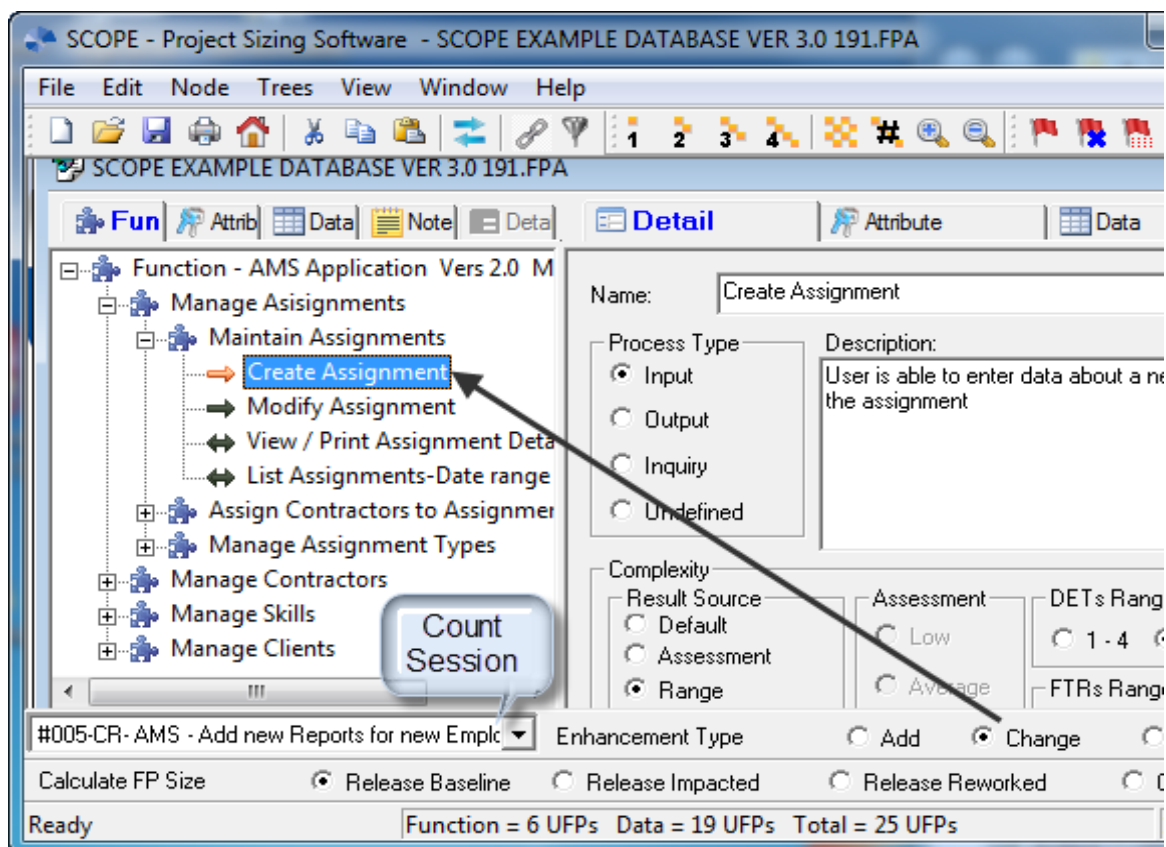
The impact on a Process or Data Group is recorded by highlighting the node on its tree (on the LHS screen) and registering the **Type of Impact** using the radio button

on the status bar at the base of the LHS hierarchy. The Type of Impact options you have to choose from are:

- **Add**
- **Change**
- **Delete**
- **No Impact**

Any *new* functions added whilst you are in a **Count Session** will be automatically allocated an impact type of **'Add'**. SCOPE displays the 'tracking' of impact type within a **Session** by highlighting the impacted Process and Data Group Icons with a different colour depending on the impact type allocated.

Node Icons – Impact Type

- **Green** = Add
- **Orange** = Change
- **Red** = Delete
- **Black** = No Impact

To view the name of the **Count Session** for which the impacts are being recorded, see the drop-down list of **Sessions** for this release, which is displayed next to the **Impact Type** on the status bar at the bottom of the screen. To record the impact for any other **Session** for this release, first select that **Session** name from the list. If any single Process or Data Group has been impacted by multiple **Sessions** then the names of these multiple **Sessions** and their impact types are displayed in a window within the 'details' view for the Process or Data Group.

For example a new Process (**Add** impact type) may be changed during the development life-cycle by two additional change requests. Each change request will be associated with a **Count Session** and the impact type of '**Change**' will be recorded. The details screen will display the names of the three Sessions and their '**Add**' and '**Change**' impacts types. The 'rework' factor will record the three impacts

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and report the cumulative effect in the **Release Rework Report** (i.e. multiply the function points for the Process (=4) by the rework factor (=3) and give a total of (12).

NOTE : Tracking **Impact Type** for each Change Request (**Session**) with a colour is similar to the Microsoft WORD 'tracking option' used in document editing sessions, where a different colour is used to highlight new added words, or existing changed words or deleted words. Whereas Microsoft WORD changes the font colour for the different types of modifications and for different Users, **SCOPE** keeps the colour allocated to the impact type, the same, but only displays one ''User's changes', i.e. on one **Sessions** modifications, at any one time and only the modifications for the selected Session are indicated by the icon colour. However, as in Microsoft WORD, **SCOPE** records all the impacts of all the **Count Sessions** on the *same* **Release** model so their cumulative effect can be displayed and reported. Reporting the cumulative effect or 'rework' is similar to displaying all the current changes on the screen in Microsoft WORD, whereas the **Baseline Release Report** is equivalent to Microsoft WORD's option of leaving Tracking on but 'not displayed on the screen'. I.e., it gives the net result and does not include the deleted functions. Updating to Baseline, is the same as "Accepting all Changes" where the NET effect of the additions, changes and deletions is the resultant model in the Production Release.

The ability to record concurrent impacts from more than one count **Session** facilitates configuration control of change requests within a particular release. It ensures that modifications from concurrent projects do not overwrite each other when the production baseline release is updated with the result of the latest impact.

3.2.3.2 Set up a New Count Session

The following video tutorials explain in detail how to Set up New Count Sessions. *If the video display does not fit your screen, then please adjust the resolution to the highest settings.*

Set Up New Count-Baseline Count

Set Up Multiple Counts for Same Release

Set Up New Count - Enhancement Count
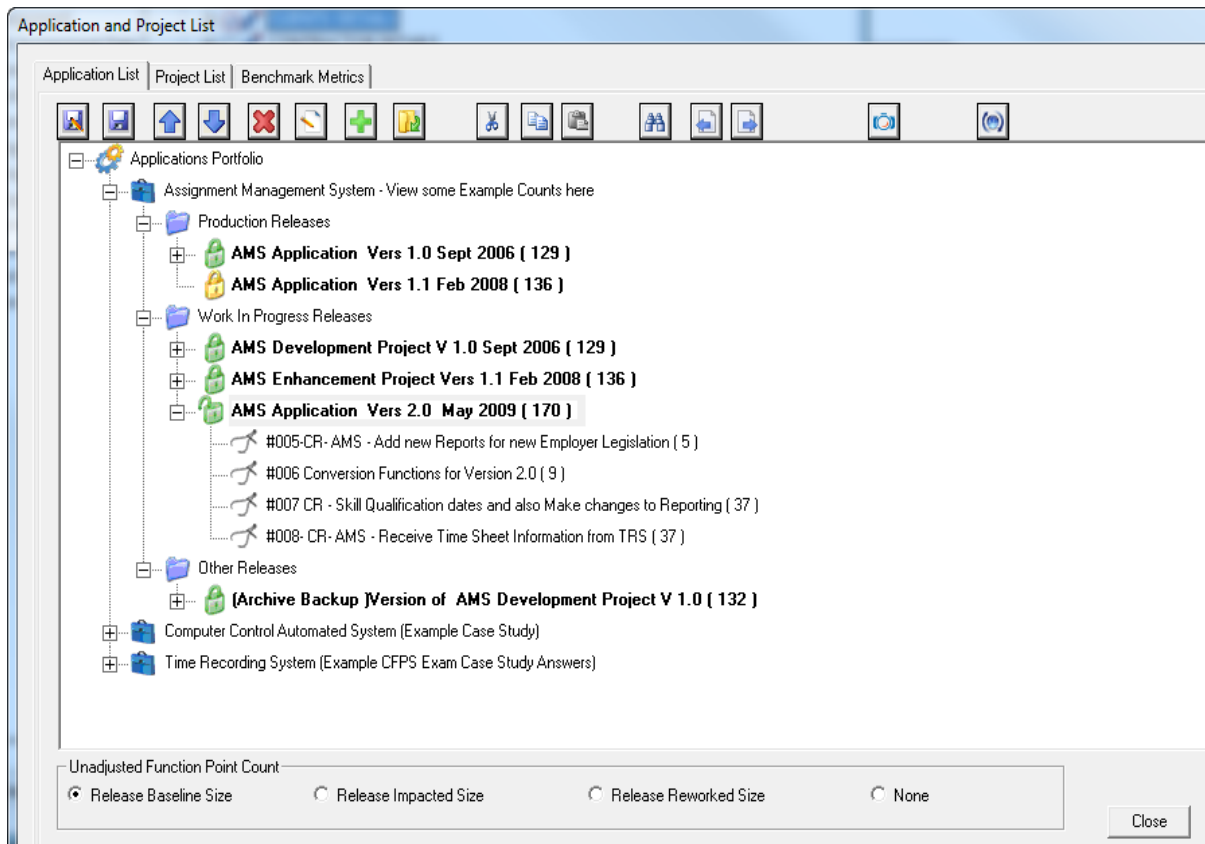
Highlight the **Release** and select to a new **Count Session**. In the details screen for the **Count Session**, if the **Count Session** is associated with a particular project then select the project name from the list. (See Project List.) When you have completed the details highlight the name of the **Count Session** and **Open** either by double-click or selecting the Open Icon.

Count Sessions are used to record:
- the functions delivered by a new Development project, or
- if the software exists to register the impact of an Enhancement project's Change Requests on a Release of your software application

The **Function Tree** displays on the main screen when you **Open** a **Session**.

You can display the **main screen** with the Function Tree at any time by selecting Home or under **File-Project and Application List** menu and then selecting the **Session**.

HINT: If you want to track the impact of a Change Request (Development or Enhancement Project Function Point Count) then highlight your selected Release and Add a Count Session and its details. If you just want to make changes without the changes being tracked then when you open the count on the Tree Screen bottom left hand side and select "No Session" from the drop down list of the names of available Sessions in the Release. When in "No Session" changes are not tracked.

 See Also Count Sessions

3.2.3.3 <u>Fixing Up an Incorrect Count</u>

If you are reviewing a count that has been completed in SCOPE and you realise that the original Baseline count is incorrect ie. there are missing elementary processes or Logical Files or there are ones that should not be there, the following are ways you can easily fix this.

<u>Fixing a Count - without an audit trail</u>

- When you open a count at the bottom status bar on the LHS is the drop down list of the Count Sessions for the Release. Select the option "No Session" . This displays the Hierarchy from a Release viewpoint and as such no Enhancement Impacts on any Process or Data Group are displayed.

- Whilst in the "No Session View" add , change and delete any Functions, Processes, Data Groups etc. that need fixing. Any changes you make will not be recorded as a count session and the only 'audit' trail left will be the Create and Modify dates on the nodes that have been added or changed.

<u>Fixing a Count - with an audit trail</u>

- Create a count called *'Fix up Baseline'* then create new the processes and data groups that you believe should have been included in the hierarchy

- Mark as Enhancement Type "Delete' all the Nodes that should not have been included in the hierarchy.

- Modify the nodes that need to be changed and mark them as Enhancement Type "Change".

- If required have someone validate your decisions. Save and close the Count.

- In the Applications List select to then select to delete the Count Session *'Fix up Baseline'* **but un-select** the option to **Delete Added**, this allows these new Nodes you added to will remain in your Baseline but not be recorded as part of the Release Impact size.

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Change the Count Session in the Display

Above the status line at the bottom of the Function Point Counting Hierarchy screen is a pull-down list of available **Count Sessions** for the displayed **Release**. If you select "**No Session**" then the **Release** model will not allow **Impact Types** to be displayed or recorded.

> *HINT: If you need to fix up a baseline count for missing functionality, then select No Session and make your changes so that they will not be recorded as part of a count session and add to the size of your current projects.*

 If you have opened the **Release** model by selecting to open a **Count Session** then you can display and record **Impact Types** for that particular **Session**. You can open a particular **Count Session** at any time by selecting the name of the **Session** from the pull-down menu list. If you are located on a node that has been impacted by another **Session** for this **Release** then **SCOPE** will display the list of Sessions that impacted the node with **Impact Type** for each session in the Node's **Details** view.

An alternative way to change the Count Session currently displayed is to select File / Project and Applications List and select to Open another Count Session.

3.2.4 Projects

3.2.4.1 Projects - Overview

The Project List, lists the software development or enhancement projects that have had User Requirements that change the functionality delivered by the software applications in your **SCOPE** database.

See **Link Projects to Count Sessions**

  Linking Counts to Projects
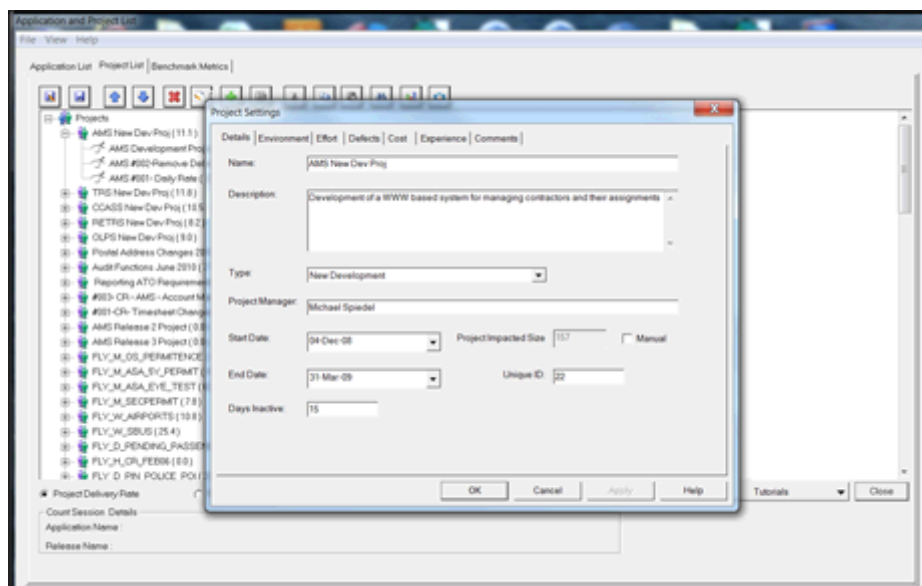
The **Project Details Report** includes the size of each of the Count Sessions that are linked to the Project and a total functional size for the project. It also reports the Project Delivery Rate (PDR) in hours per function point and the dollar cost per function point for the Project. This information is also reported online in the Project List by selecting either *Project Delivery Rate* or *Project Impact Size* radio button.
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3.2.4.2 <u>Set up a New Project</u>

Set Up Project

Set up a **New Project** from under home or select File / **Project and Application List** and selecting the **Project List** Tab or when in the Count Session Details screen select the Project List Button.

A Project Corresponds to a Business Initiative. As such it may have requirements that impact many applications within an Organisations Software Portfolio.

A Project may be a New Development or a set of Requirements for Changes to one or more existing applications i.e. an Enhancement Project

SCOPE allows you to set up a Project and then link the project to the Count Sessions for each Application Impacted. Total Project size and productivity can then be determined by running the **Project Details Report** or online in the **Project List** screen**.**

*HINT: To just work on the counts relevant to your own Project, highlight a Project and press the Snapshot Project Icon on the Project List to select all the linked Count Sessions for a Project to be exported to a new **SCOPE** database.*

3.2.4.3 <u>Link Projects to Count Sessions</u>

Linking Counts to Projects

Set Up New Count-Enhancement Count

A project can be associated with one or more Count Sessions for one or more Applications. A Count Session can only be linked to a single Project .

You can select to link a Count Session to a particular Project either by:

- Selecting the Project List Tab on the Project and Application List Screen, highlight the Project and select **Add Count Session**, the Applications List will display all the available Count Sessions. Highlight the Count Session you want associated with the Project and **Select**.
- In the Applications List Tab highlight the Count Session and select to Link it to a Project in the Right hand screen. Click again to unlink the Count Session from the Project
- When editing the Details for a Count Session, in the Count Session Details screen, select the Project from the **Project List** option. Click to remove the Count Session from the Project.

To report the function point counting details for all the Count Sessions / Change Requests in a Project select : Reports / Benchmarking Details / **Project - Functional Size Totals**

3.2.4.4 <u>View / Report Count Sessions for Project</u>

There are a number of ways to view all the Count Sessions Linked to a Project :

1. In the Applications List Tab - Highlight the Project and select the Filter icon at the top right hand menu. All Count Sessions linked to the Project across all Applications and Releases will be flagged and highlighted. (see example below). To clear highlighted Count Sessions select

2. In the Project List Tab - Highlight the Project and press + to expand the branch to show the linked Count Sessions. The details of the Release and Application to which the Count Session belongs is displayed in the Count Session Details box at the bottom of the screen.

You can also run a number of reports that list all the count sessions for the Project and their metrics these include.

- *Count Session Details (Project)* - Highlight the Project in the Applications List and select the report under Benchmark Details Branch

- *Project - Functional Size Totals* - Highlight the Project in the Project List and select the report under Function Point Count Results Branch

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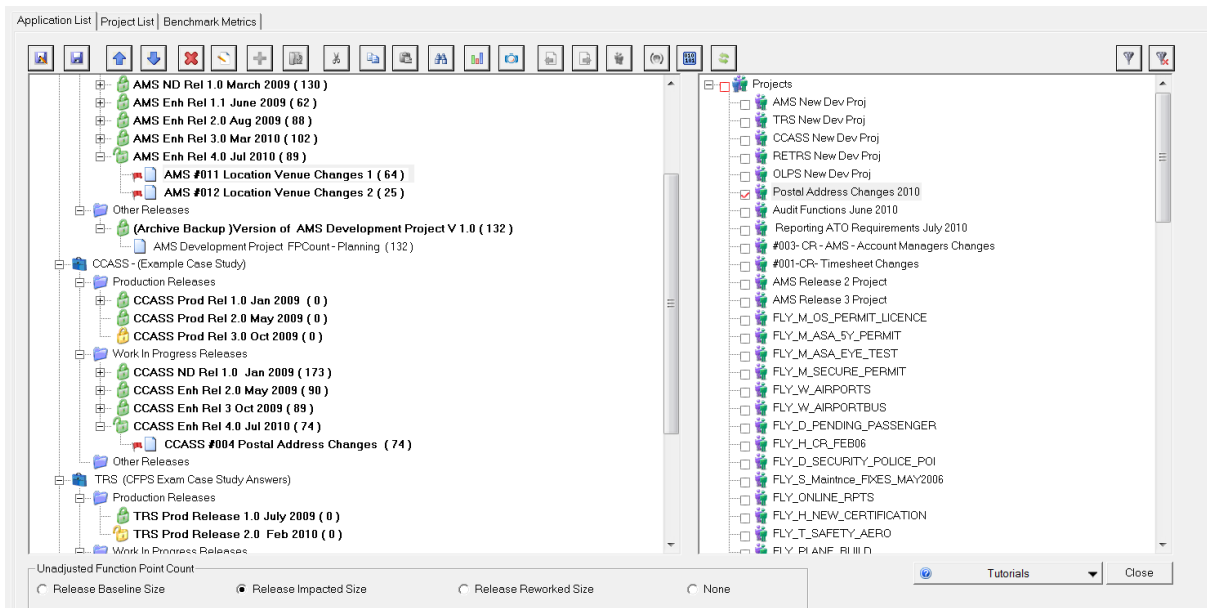
Function Point Count Detail Report

Project - Functional Size Totals

Processes and Data Groups

Name	Type	Impact	DETs	FTRs RETs	Compl exity	UFPs	X Factor	Total UFPs
		(/=Add)(C=Change)(D=Delete)						

Audit Functions June 2010
TRS (CFPS Exam Case Study Answers)
TRS Enh Rel 2.0 Feb 2010
TRS Audit Functions - #CR101

Processes

Name	Type	Impact	DETs	FTRs RETs	Complexity	UFPs	X Factor	Total UFPs
Add Audit Log Comments History	Input	A	-	-	Average	4	1	4
Modify Audit Log Comments History	Input	A	-	-	Average	4	1	4
Delete Audit Log Comments History	Input	A	-	-	Average	4	1	4
View Audit Log Comments History	Inquiry	A	-	-	Low	3	1	3
Browse Audit Log Comments History	Inquiry	A	-	-	Low	3	1	3
Report Audit Log Comments History	Output	A	-	-	High	7	1	7
				Processes			(6)	25

Data Groups

Name	Type	Impact	DETs	FTRs RETs	Complexity	UFPs	X Factor	Total UFPs
Audit Log Comments History	Internal File (ILF)	A	-	-	Low	7	1	7
				Data Groups			(1)	7
	TOTAL (Count Session Size (UFPs))						(7)	32

TRS Enh Rel 2.0 Feb 2010 - Functional Size Totals (7) 32

AMS - View Example Counts
AMS Enh Rel 3.0 Mar 2010
AMS #010 Audit Functions

Processes

Name	Type	Impact	DETs	FTRs RETs	Complexity	UFPs	X Factor	Total UFPs
View Audit Logs	Inquiry	A	0	0	Low	3	1	3
Summarize Audit Logs	Output	A	0	0	Low	4	1	4
							Total Metrics	

(Report#89   Release 4_1   221
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SCOPE Project Sizing Software™
Wednesday, July 11, 2012
6:26:16 PM

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3.2.4.5 <u>Project Metrics for ISBSG</u>

Exporting Data to ISBSG

The project characteristics and metrics data (effort, cost, duration etc) can be entered into **SCOPE** for later use in productivity analysis. These characteristics and metrics are consistent with those required by the International Software Benchmarking Standards Group (ISBSG see WWW.ISBSG.org) for input into their repository.

To Print Project Details, Highlight the Project, select Report - Benchmark Marking Details - Project Details
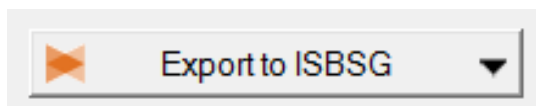
Under the Benchmark Metrics Tab, select   to export Project Details and all the function point metrics to ISBSG see: Benchmark Metrics

Note: ISBSG can accept XML input since January 2011.

3.2.5 Value Adjustment Factor

3.2.5.1 <u>Value Adjustment Factor - Overview</u>

SCOPE functionality is compliant with the two ISO standards for Functional Size :

- ISO/IEC 14143-1 - Functional Size - Definition and Concepts
- ISO/IEC 20926 :   Information technology -- Software and systems engineering --— Software measurement — IFPUG functional size measurement method

Both these standards exclude the use of Value Adjustment factor in the derivation of functional size. Therefore for the majority of size reporting within SCOPE is reported as *unadjusted* size and complies with the ISO definition of Functional Size Measurement.

Industry standards for reporting functional size (e.g. ISBSG) all report the *un*adjusted size. For valid comparisons Total Metrics would strongly recommend that you do **not** use *adjusted* size in either your performance reporting , contract management or your benchmarking.

3.2.5.2 <u>Recording the Value Adjustment Factor Characteristics</u>

Select **Value Adjustment Factor (VAF)** to record the degree of influence a set (14) of quality and technical characteristics **General System Characteristics** (GSCs) have on the application.

The degrees of influence range on a scale of zero (being no influence) to five (being strong influence).

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The types of **GSCs** are listed, together with the IFPUG description. Select the appropriate number to rate the **GSC** and optionally enter a descriptive note to support your choice.

Any **GSC** that you have not rated will assume the average rating of '3'. If you do not rate any of the **GSCs**, then the default Industry VAF (value =1.0) will be used in calculations.   The VAF is used to calculate the **Product Size** for the selected release in Adjusted **Function Points**.

To Report the Value Adjustment Factor – from the main menu choose - File – Report Selection Description - Release Value Adjustment Factor.

You can Import and Export the Value Adjustment Factor between Releases within the same **SCOPE** database or different **SCOPE** databases. See Assessing the Value Adjustment Factor

You output a report for the Value Adjustment Factor - See Report Selection/ Benchmarking Details / Release Value Adjustment Factor

3.2.5.3 <u>Assessing the Value Adjustment Factor</u>

NOTE: Assessing the VAF and using Adjusted function points is no longer recommended in IFPUG CPM 4.3 , nor is it used by the ISBSG group when reporting functional size. It is highly recommended that if your organisation is using Adjusted Function Points for size that they review this strategy to comply with the ISO standards on functional size.

This can be optionally used to record the features of the software and adjusts the Functional Size to a delivered product size.

When the main screen is displaying the hierarchy trees for a particular Release select File – **Adjustment Factor** from the main menu. The **General**

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Characteristics (GSCs) will display as defined in IFPUG 4.3. These have a default rating of '3' (for average influence) and the **Rating** check box will be empty. Highlight the General Systems Characteristic that you want to rate and select the appropriate rating number from 0 to 5. As soon as you move the rating from 3 to another value the GSC is recorded as having been rated and the check box will be ticked.

If you rate any single GSC then the VAF will be calculated assuming the other non-rated GSCs to have a value of '3'.

If you do not select to rate any GSC then the VAF will default to the Industry average default value of 1.00.

Value Adjustment Factor reports will highlight when the VAF or GSCs have assumed a default value.

To Report the **Value Adjustment Factor** - From the main menu select File – Report Selection – Others – Value Adjustment Factor. (sSee Other Reports).
The **Value Adjustment Factor** can be imported and exported between Releases within the same or different Applications and/ or **SCOPE** databases.

*Note: The Value Adjustment Factor is an optional step in the IFPUG 4.3 and the IFPUG ISO standard for Functional Sizing. The **Un**adjusted function point count is the ISO/IEC 14143-1 compliant functional size.*

3.3 Performing a Function Point Count

3.3.1 Setting up the Model to Count

3.3.1.1 <u>Counting Transactions</u>

<u>The Function Tree</u>

Counting Transactions

This is where you build a representation of the software application's functionality. The name at the root node of the **Function Tree** is the name of the **Release** model displayed. You can edit the Release name by selecting to Edit the Release from the List of Software Applications.

As you understand more about your software application's requirements, you construct a more detailed hierarchical model of Functions and Processes within your software. Functions can be nested within other Functions to any depth, like branches in a tree. Processes are the leaves of the tree and represent the lowest level of Process decomposition and cannot be nested.

Functions represent chunks of functionality. You choose to fill in as much detail as you want by inserting nested functions, which are then divided into Processes at a finite level. Examples of typical Functions would be: *Maintain Customer Information, Manage Invoicing.*

A Process is considered by IFPUG 4.3 to be the smallest unit of work that is meaningful to the end user and on completion leaves the application in a consistent state.
Examples: *Add a new Customer, Modify Customer Details, Delete a Customer, View Customer Details, List Outstanding Invoices, Print Customer Invoice.*

HINT: Processes are equivalent to the IFPUG Elementary Processes. For those users not familiar with IFPUG CPM 4.3 rules, Elementary Processes roughly equate to 'USE CASES' which have been decomposed to the level of a single user function.

Functional size derived from the Function tree is based on the type of Process (Input, Output or Enquiry) and the combined effect of the number of Data Groups accessed (File Types Referenced (FTRs)) and the number of fields (Data Element Types (DETs)) the Process needs to share with the User. Where a:

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- **FTR** is a Data Group listed on the Data Group Tree.
- **DET** is a unique user recognisable field that may or may not be stored on a Data Group.

You can choose the level of detail you to decompose your functional hierarchy. If you do not want to go down to each individual process level then insert a number into the Multiplier field within the Process Details screen and **SCOPE** will multiply the function points for the identified process by the value of the multiplier. E.g. If you know that there are 25 Sales Reports and they are all of Average Complexity then put a 25 into the Multiplier field within the Process named Sales Reports. The function points calculated will be 25 *5 = 125.

Note : If you have identified a user function that is not counted in IFPUG function points e.g. Menu but you want to record that you have found it but not counted it, then you can still include it in the Function Tree but assign it a Multiplier of zero so that it does not contribute to functional size. We would recommend that you assign a NOTE to provide your reasons for not counting it, or put the reasons in the Description field. You may also want to create an Attribute called "Technical/Quality Feature" and assign it to the node you do not want counted.

3.3.1.2 Counting Data

The Data Tree

Counting Logical Files
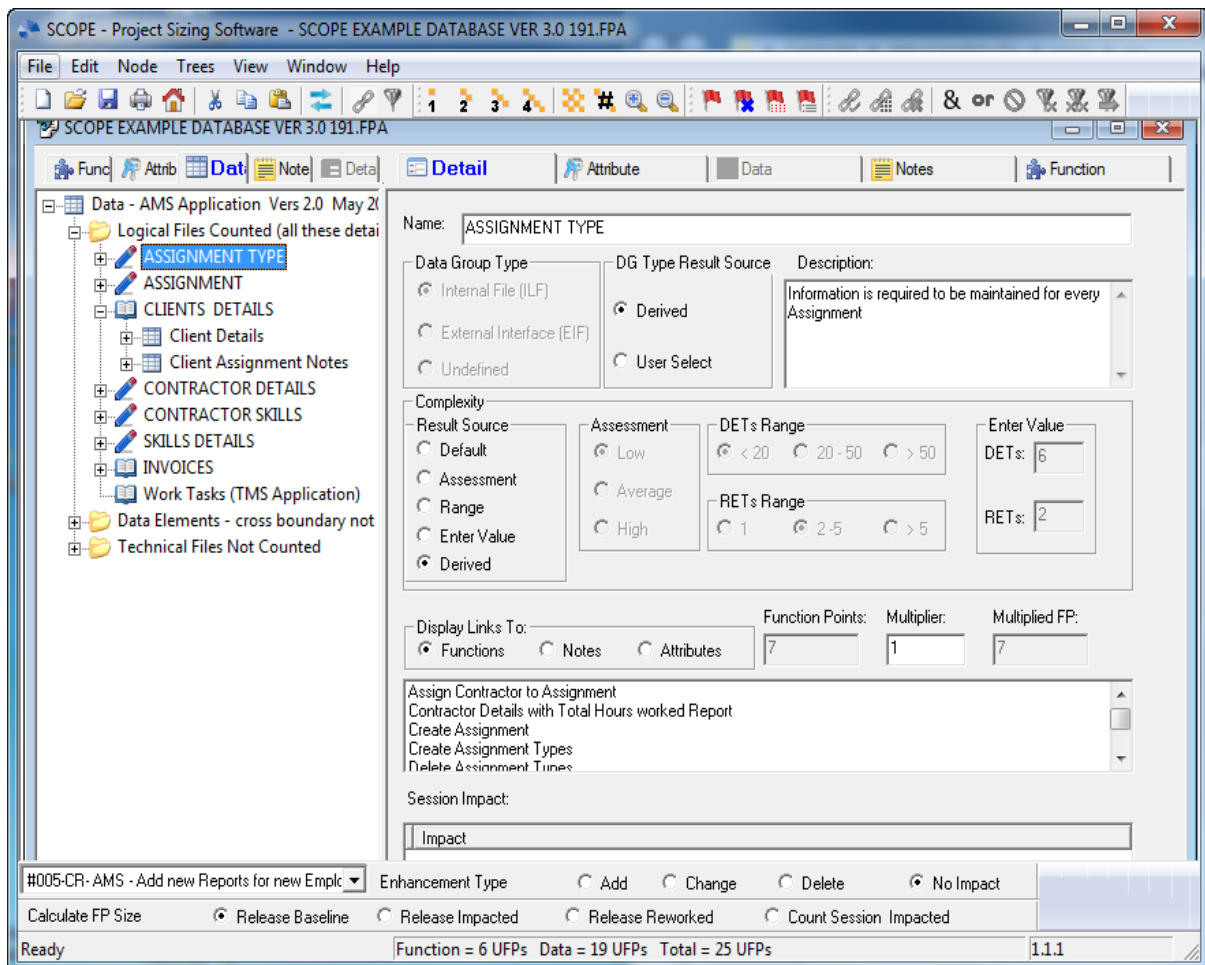
This tree represents the data storage and data retrieval functionality of your software application.

Detailed Recording of Data Groups

Counting Logical Files

SCOPE allows you to create a detailed hierarchical model of your data as well as your functional processes. You can:

- group your related Data Groups (ILFs and EIFs) into **Data Group Folders** for cataloguing purposes
- record the of **Record Element Types** (RET) for each Data Group
- record each individual **Data Element Types** (DET) for each RET

This hierarchical model aids in:

- more easily understood documentation of your count
- faster counting when you need to quickly find a particular Data Group
- enabling you to document any Tables in your application that have been excluded from being counted because they are physical tables not Logical Data Groups *e.g. create a Folder called "Physical Tables" and list the Code tables and Technical tables that are part of the application but not counted under IFPUG Rules. Then set the multiplier to '0' for these tables. Attach a Note to the tables listing the reasons why they have been excluded from the count.*
- enabling you to list DETs that are used by processes and cross the boundary but are not stored on Logical Data Groups. These DETs can be linked to the processes that use them and used to automatically derive the size of the Process. *e.g. create a Data Group Folder called "Transient DETs", then record the DETs that cross the boundary but are not stored on an ILF or EIF e.g. Message DETs, Control DETs, Totals, Derived fields etc. Link all DETs to each Process that uses them and select Result Source= Derived to have* **SCOPE** *automatically count DETs , FTRs and derive the complexity of the process.*

SCOPE also allows you to derive the complexity of a process automatically using the number of FTRs (Logical Data Groups) and DETs linked to the process, so the more completely you are able to document your count then the more accurately it can be sized.

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Hint: If you already have a softcopy list of the names of your Data Groups, RETs and DETs, in a data dictionary then cut and paste the list into the **Master_SCOPE_Excel_Import_Template** *spreadsheet. (located under the directory where you installed SCOPE) Follow the instructions in the ReadMe sheet and then import the list of FTRs, RETs and DETs into your* **SCOPE** *count. See* Import Existing Counts from CSV

Functional size derived from the data tree is based on the type of Data Group and the combined effect of the number of Record Element Types (RETs) and Data Element Types (DETs) it contains. Where a:

- **RET** is a unique user recognisable sub-group of DETs within a data group.
- **DET** is a unique user recognisable field.

The data tree is the only tree with Four types of nodes instead of two. (See also Detailed Recording of Data Groups)

The Four node types are:

- **Data Group Folder**, is the parent level 1 node, that can exist by itself (i.e. without any nested child nodes), or can optionally contain a collection of Data Groups, or DETs (but not a mixture of both). E.g. *CRM System Reference Files = Customer Discount Rules, Customer Billing Rules, Files from other Applications.* You can create a hierarchy of Data Group Folders to assist you in grouping your Logical Files.
- **Data Group**, is the parent level 2 node, that can exist by itself (i.e. without any nested child nodes), or can optionally contain a collection of RETs, or a collection of DETs (but not a mixture of both). E.g. *Invoice File = Data Group.*
- **RET**, is a child node of a Data Group and may optionally contain a collection of DETs. E.g. *Invoice Header, Invoice Item Details are sub-groups of the Invoice Data Group.*

- **DET** is the lowest level node and may be a child of a Data Group or RET. E.g. *Invoice Number, Invoice Date are fields within the Invoice File Data Group and are child nodes of the Invoice Header RET.*

As with the Function Tree, you can choose the level of detail you wish to enter.

HINT: It is good function point counting practice to map your Logical Data Groups listed in the Data Tree to the name of their corresponding Physical File in the Notes Tree. Create a Notes SET called "Physical Tables" and insert the name of each physical table as a Note. Link each table to their corresponding Logical File. This assists with impact analysis of future Change Requests and provides useful documentation for anyone auditing your function point count.

3.3.2 Setting up the Count

3.3.2.1 <u>Start a new Measurement</u>

To start your first Function Point count - under File select to open a new or an existing **SCOPE** database file.

SCOPE will open with the Software Applications List. Before starting to actually function point count you need to:

1. Set up a New Application
2. Set up a New Release
3. Set up a New Project
4. Set up a new Count Session

See also Basic Steps of an FPA Count and Count Using Function and Data Trees

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If you have an existing counts in:

- o An MS Excel® spreadsheet then import the spreadsheet into an existing database. (see Import Counts from MS Excel)
- o FPW database then select to import it (see Import from FPW)

You may decide to create a new **SCOPE** database file for each application depending on how you want your Function Point Counters to manage their counts.

If your applications are very large and you have many of them, then we would suggest that you create a **SCOPE** database file for each Application. This avoids contention of multiple counters wanting to access the same **SCOPE** database file, at the same time.

In order to have Reporting of Size across your Software Portfolio you have to have a central Repository of Counts. We would recommend that you set up a Master **SCOPE** database file and have an administrator manage its configuration, such that on a regular basis it is updated by the completed approved Releases and their Count Session.

3.3.2.2 <u>Recording and Counting Transactions</u>

Counting Transactions

The **Function Tree** and the **Data Tree** are used to model the functionality delivered by the software that will be function point counted.   The Function Tree is where the Transactions (Elementary Processes) are recorded. The Data Tree is where the Data Groups or logical files (ILFs and EIFs) are counted. The **Attributes Tree** and **Notes Tree** are used for selective profiling and documenting the functionality, (see Types of Hierarchy Trees).

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HINT: The lowest level of the function tree (process level) is the level at which function points are assigned. If you do not wish to take the time to model your software then create a single Function node and just list your processes below.

3.3.2.3 <u>Recording Processes on the Function Tree</u>

- Press **Alt+Ins** to insert **Function Folder** nodes. These represent the major functional areas of the software. Insert the name of the node on the RH side Detail view or double click the node name or press F2 to rename.

- Continue decomposing the software hierarchically by inserting functions until you reach a stage where you identify individual elementary Processes.

- Press **Ins** to insert an elementary **Process**.

- Use the detail view (select the Details Tab at the top of the screen or double click the node) to enter the Functional Size details of **Process Type** and **Complexity**. The Process type defaults to Input and the complexity to **Average**.

- Select any of the following options from Result Source to override the default complexity:

  - **Range**: select the appropriate range of **DETs** (unique fields entering or exiting the Process) and **FTRs** (unique Data Groups accessed by the Process)

  - **Assessment**: select **Low**, **Average** or **High**

  - **Enter Value**: insert the actual number of **DETs** and **FTRs**

  - **Default**: accept the industry default value of **Average**

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- **Derived**: calculates complexity from the number of **Data Groups** (**FTRs**) and **DETs** linked to the process

See features that **SCOPE** has included to really speed up your counting
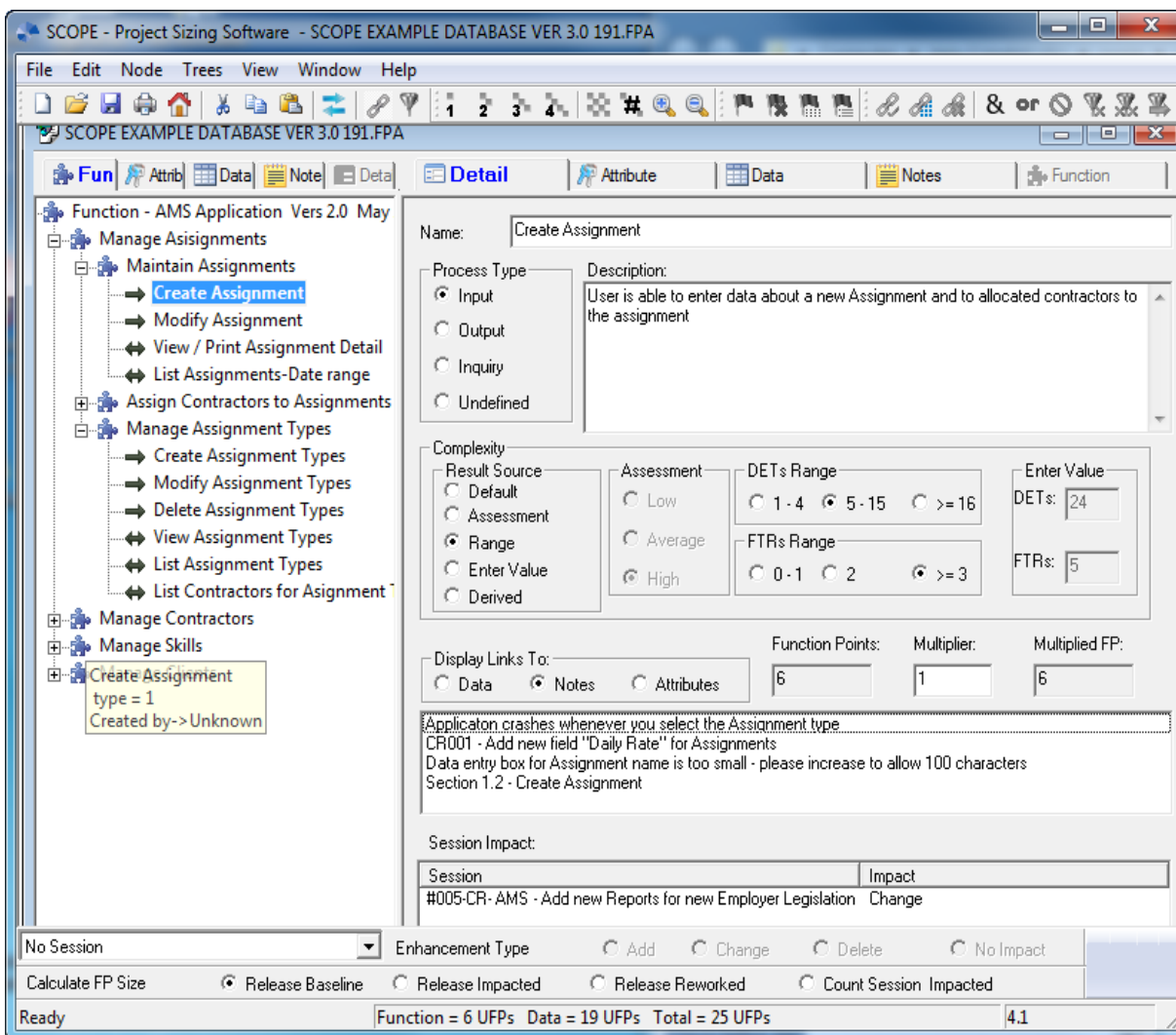
3.3.2.4 Basic Steps of an FPA Count

Set Up New Count-Baseline Count

Set Up New Count-Enhancement Count

When you first open a Count Session the Function Hierarchy Tree is displayed. This is where your software is modelled as a hierarchical structure. Your first step is to determine the main functional areas within the software application to be measured and enter them into **SCOPE** as **Functions** (use Alt INS Key) in the **Function Tree Hierarchy**. Continue breaking down each Function until you get to the lowest elementary **Process** to be performed within the software application. Enter each **Process** (use Ins Key) into **SCOPE**.

Working from the application's functional specification, in the Detail screen classify each elementary **Process** as either an:
- Input i.e. something that enables the user to input data into the software to be stored
- Output i.e. something that enables the user to extract derived information from the software
- Inquiry i.e. something that enables the user to query stored data

Select to display the **Data Tree Hierarchy** by selecting the **Data** Tab at the top of the screen on the RHS window.   Determine the categories of logical files in your software and create some File Folders. Under each **Data Group** Folder identify the logical groups of data in your software and enter each **Data Group (ILF or EIF)** into **SCOPE** under the appropriate Folder the **Data Tree Hierarchy**. **Data groups** may be further decomposed into sub-groupings of **Record Element Types (RETs)**. You can also enter the fields (**Data Element Types-DETs**) under each **RET** sub-grouping.

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Working from the application's functional specification, in the Detail Screen classify each Data Group as either an:

- Internal File (ILF) i.e. something that stores data input from the user's transactions, i.e. Processes on the Function Tree update ILFs
- External File (EIF) i.e. something that stores data accessed by the user's transactions. i.e. Processes on the Function Tree only read EIFs

Use the detail screen to classify Processes and data groups as either low, average or high complexity.

SCOPE will assign a weighting in function point units to the software's functional and data components using a set of prescribed formula's, based on the type and complexity you have selected.

NOTE: **SCOPE** *defaults Processes to be Inputs of average complexity and data groups to be of a type undefined and low complexity. You can change these defaults by selecting VIEW, Function Point Count Default Values, from the Main Menu.*

After the assessment of each Process and Data Group is complete, the **Functional Size** in *Unadjusted* Function Points can be reported for the whole application, or any selected part of it or just for those functions and data impacted by a change request.
  The size is reported in the status bar at the bottom of the screen or can be seen in detail by selecting the Reporting Selection option under the Main Menu.

SCOPE:
- Can be used to measure the size of a functional branch of the hierarchy by selecting a node at any level
- Can use Flags to select sets of function and or Process nodes, for selective measurement
- Can be used to selectively record and report functions impacted by a project using an impact Count Session

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SCOPE allows you to perform the optional step of evaluating an application's General Systems Characteristics to calculate the **Value Adjustment Factor** for the application for that Release. The Functional Size can then be combined with a **Value Adjustment Factor** to take into account quality and technical characteristics, which will then give a product size in **Adjusted Function Points**.

3.3.2.5 Types of Trees in the SCOPE Model

The four types of Trees in SCOPE

- **Function** trees display Functions and Processes that can be performed by the software applications. This is where you hierarchically functionally decompose an application's functionality.
- **Data** trees display data groups, RETs and DETs. This is where you map out the projects data
- Structures in hierarchical form.
- **Attribute** trees represent the characteristics of the Functions, Data and Notes and are the   conditions that are used for selective analysis.
- **Notes** trees hold text information related to nodes in the other trees.

Function and **Data** trees contribute to the functional size; whilst **Attribute** and **Notes** trees do not directly contribute, but add valuable documentation and demographic information during profiling and analysis.

3.3.2.6 <u>Recording and Counting Files</u>

The **Function Tree** and the **Data Tree** are used to model the functionality delivered by the software that will be function point counted.   The Function Tree is where the Transactions (Elementary Processes) are recorded. The Data Tree is where the Data Groups or logical files (ILFs and EIFs) are counted. The **Attributes Tree** and **Notes Tree** are used for selective profiling and documenting the functionality, (see Types of Hierarchy Trees).

HINT: The second level of the Data Tree (Data Group Level) is the level at which Logical Files are inserted and function points are assigned to each Logical File. If you do not wish to take the time to model your software then create a single Data Group Folder and just list your Data Groups (Logical Files) below it.

Recording Data Groups on the Data Tree

- Select the **Data** tab at the top of the screen to view the **Data Tree**. Highlight the top node and Right Click the mouse and select Insert Data Group Folder to create a Folder in which to group your list of logical files. Creating Folders enables you to group logical files that are related for ease of finding and easy understanding of your count. E.g. Accounts Related Files, Customer Related Files. Press F2 to rename the folder.

- Highlight the top node or the Data Group Folder and press **Alt+Ins** to insert **Data Group** nodes. These represent the major data entities or classes of objects accessed by the software. Insert the name of the Data Group on the opposite side by selecting the **Detail** or double click the Data Group name or press F2 to rename.

- Use the detail view (select Details Tab above the status bar) to enter the Functional Size details of **Data Group** Type and **Complexity**.

- The **Data Group** type defaults to **Undefined** and the complexity to **Low**. Override the default **Data Group** type using the **User Select** option under **DG Type Result Source**. By default the **Data Group** is **Derived** from how it is accessed by Processes **Linked** to it.

- If functions or Processes that **Update** the **Data Group** are **Linked** to the **Data Group** then the Data Group Type derived is an I**nternal Logical File (ILF)**.

- When you select to link a process to a Data Group, the access type defaults to **READ ONLY**, indicating that the process only reads the Data Group and does not update it. The READ ONLY access type is identified by a RED TICK. ☑ . If you the process actually updates the data group then click on the link box a second time and the second mouse click changes the link to a blue ☑ to designate the data group is **UPDATED**. The next click resets the status to **UNLINKED** status to the UNLINKED state of a blank box1 .

- As you move down the Function Tree and highlight each process, **SCOPE** dynamically displays the list of data groups linked to that process and the colour of the link (tick colour) indicates the access type for each data group

- Alternatively you can elect to change the access type of the link by right clicking the mouse button when located on the data group and selecting the access type from a drop down list (UPDATE or READ ONLY)

- Select any of the following options from **Complexity Result Source** to override the default complexity :

  - **Range**: select the appropriate range of DETs (unique fields stored by the data group) and RETs (unique sub-groups of DETs)

  - **Assessment**: select **Low**, **Average** or **High**

  - **Enter Value**: insert the actual number of **DETs** and **RETs**

  - **Default: accept the default value of Low**

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- **Derived**: calculates complexity from the number of **RETs** and **DETs** recorded as child nodes under the data group
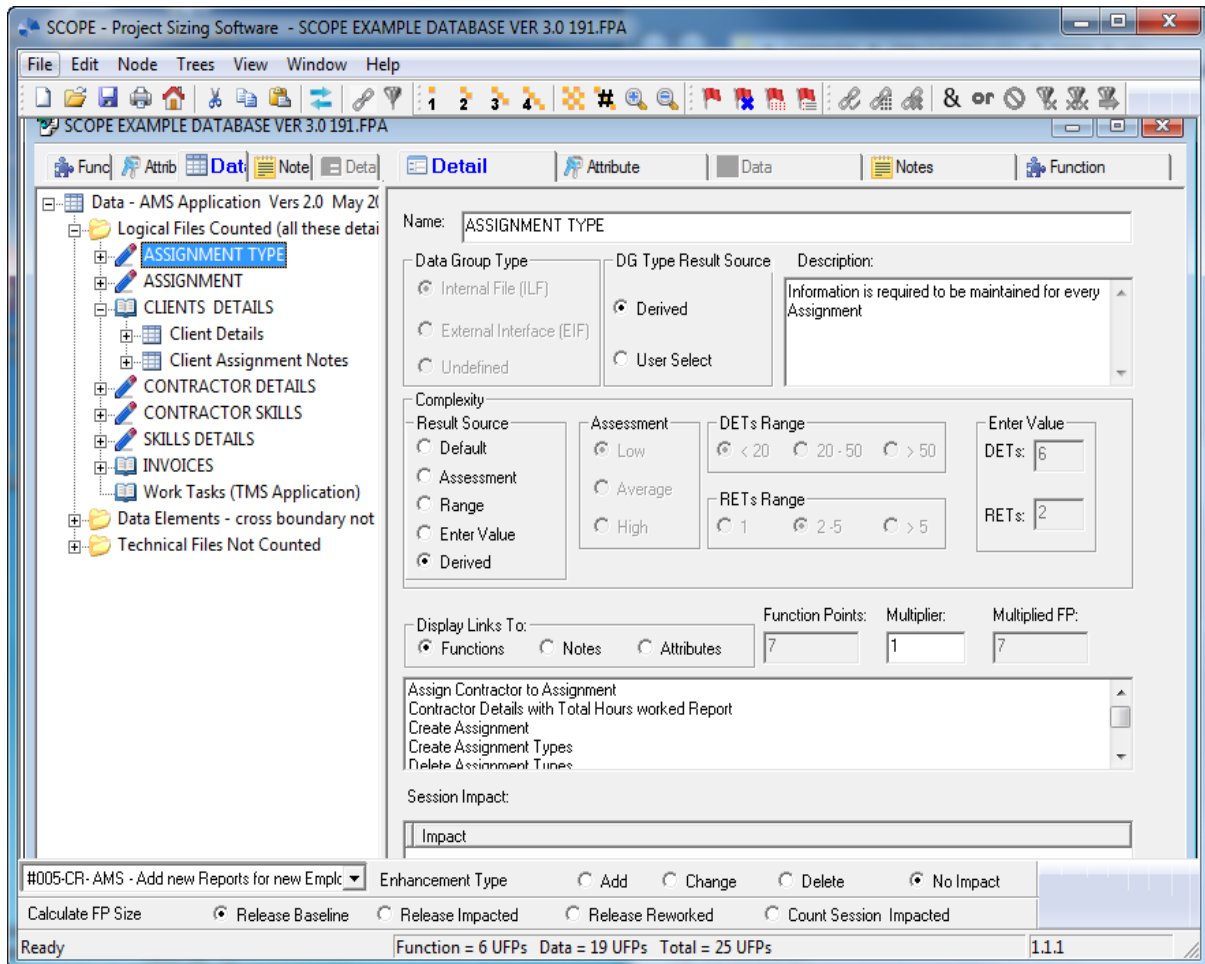
SCOPE enables you to record individual RETs and DETs and their details by inserting child nodes under each Data Group. These are only used to calculate complexity when the Derived option is selected. For very detailed documented counts **SCOPE** allows you to link processes to the DETs that they use. This is useful when a DET is impacted by a Change Request; **SCOPE** will highlight all the processes that use that DET.

If you want to group the details of multiple data groups into one Data Group node then enter the number of data groups in the Multiplier field. E.g. where you know there are 6 Tax Rates Reference Files of low complexity (each 7 function points), name the Data Group 'Tax Reference Files' and enter 6 into the multiplier. The function points calculated for the Data Group are multiplied by 6 to total 42. **SCOPE** will display the calculated function points for the Data Group at the bottom right of the Detail screen.

3.3.3 Documenting your Count

3.3.3.1 Linking to External URLs or Files

Hyper links to External files from SCOPE Objects

SCOPE allows you to insert hyper links to either a URL or a stored file. These hyper links can be set up in any of the following **SCOPE** objects to link that object to an external file or URL for additional documentation or support for that object.

Examples of ways you could use this hyper link feature would be to link :

- a process to the specification document for the process

- a note to the email which generated the note

- process to the screen image for that process etc.

3.3.3.2 **SCOPE Objects with Hyper link capability**

 The ability to insert hyper links is in the details screen dialogue boxes of the following:

- Functions / Processes

- Files / RETs /DETs

- Note Sets / Notes

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- Attribute Categories / Attributes

- Applications

- Releases

- Projects

- Count Sessions

Counting Conversion Functionality

3.3.3.3 <u>Counting Conversion Functionality</u>

IFPUG 4.3 CPM provides guidelines for measuring Conversion Functionality. In summary it recommends that you include in your project size as conversion functionality, any elementary processes and logical files that required to convert existing functionality to satisfy the new requirements of the software but this conversion functionality is not implemented with the software.

There are two suggested methods for counting Conversion Functionality in SCOPE both have the same overall result.

<u>Recommended Method : Create "Conversion" Count Session</u>

- Create a specific Count Session within the Release and name the Count Session so you know it is Conversion Functionality e.g. "CR0129- Conversion functionality"

- Link the "Conversion" Count Session to your Project

- Open the "Conversion" Count Session and mark as impacted (Added) the elementary processes and logical files that satisfy the IFPUG definition for being conversion functionality.

- When the Release is selected to "Update to Baseline" select to "*Exclude*" the Count Session (e.g. "CR0129- Conversion functionality") from the Update.

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This will ensure that none of your conversion functionality will be included in the Production Release Baseline size.

- Result : Conversion Functionality will correctly be included (recorded as impact = Added) in both the Work in Progress-Release Size and also the Project Size, but will NOT be included in the Baseline Size.

Alternative Method : Use an Attribute to identify "Conversion" functionality

- Open the Count Session that has the "Conversion" functionality mark as impacted (Deleted) the elementary processes and logical files that satisfy the IFPUG definition for being conversion functionality.

- Create an Attribute Category called "Project Requirements Type" , then under the Category create two Attributes - called "*Conversion Functionality*" and "*Delivered Functionality*". Link the Attribute "*Conversion Functionality*" to all the functionality you identified as being counted as 'Conversion Functionality.

- When the Release is selected to "Update to Baseline" accept to include all Count Sessions. SCOPE will automatically remove all functionality that is marked as Deleted.

- Result : Conversion Functionality will correctly be included (but recorded as impact = Deleted) in both the Work in Progress- Release Size and also the Project Size, but will NOT be included in the Baseline Size.

3.3.3.4 Linking Trees

Building Hierarchy Trees

Counting Transactions

Counting Logical Files

A **Link** joins two nodes on different trees. It records the relationship between the nodes and enables you to later analysis the application based on selected nodes and their **Links**, using criteria that you define. Examples of the types of analysis are:

- Report the Functional Size of all Processes that access (are Linked to) the Invoice Data Group.
- Report the Functional Size of all Processes and data groups that are to be developed in the first version of the software (i.e. are Linked to the Mandatory attribute).
- Report all the errors for the Invoice Processes that have been allocated a severity 1 rating. (All Notes Linked to the invoice Processes that have been Linked to the severity 1 attribute.)

To set **Links**:

- Display two trees by clicking the appropriate tabs (they must be different trees, you cannot set Links within the same tree).
- Choose Link mode from the menu (Trees–Link) or the Link Mode icon at the top of the screen (HINT: icon looks like a bent paperclip).
- On the left side select the node you wish to Link from, on the right side highlight the node you wish to Link to and click on the checkbox next to the node (or nodes) or press the space bar to set the Link. A red tick is displayed in the linked node.

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To display the trees on the opposite sides, use the 'flip' icon along the top of the screen and display the converse view. Alternatively select **Trees – Flip Views** menu or press **CTRL+Tab.**

Hint: If you are linking the same node to many nodes on other trees it is easier to locate the tree with the node to be linked on the Left side tree and use the Set All option found by Right clicking the mouse and selecting Links from the Pop-up menu.

Hint: The flip icon can also be used to refresh the screen.

To Set and Clear Links quickly:

- Select the node you want to link to on the LHS Tree. Highlight the Parent Node on the RHS Tree. Right Click the mouse and select **Link – Set All** and **SCOPE** will set links to all the children of the Parent Node. Select **Link - Clear All**, to unlink all child nodes.

- Use the **Search and Replace** function to find and **Flag** all nodes that satisfy specific search criteria. Then use the **Link –To Flagged Nodes** to automatically link the currently selected LHS node to all the flagged nodes on the RHS Tree. To link to everything that is not currently flagged select the **Link – To Un-flagged Nodes** option. You can selectively clear current links by selecting either the Link – Clear **Un-flagged Nodes** or **Clear Flagged Nodes** options.

- If an existing node already has all the links that you would like a new node to inherit, then they can be cloned to one or many other nodes. Select Edit – Copy Links (CNTL-L) to copy the links on the source node, highlight your target node and select to Paste the links (Edit – Paste Links ALT-L). You can select to paste the links to the just the target node or to all of its descendents.

Linking Processes to the Data Groups they access is a special case of cross-reference linking in SCOPE

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The colour of the link (tick box) can be changed to provide a dynamic display of the way each process accesses the data group. I.e. As you link a Data Group / RET or DET to a process, the screen dynamically displays the access type. The first mouse click to set up the link defaults to a red ☑ to indicate the Data is READ ONLY by the process, a second mouse click changes the link to a blue ☑ to designate the data group is UPDATED and the next click resets the status to the Unlinked state of a blank box ☐. As you move down the Function Tree and highlight each process, **SCOPE** dynamically displays the type of access using different coloured text.
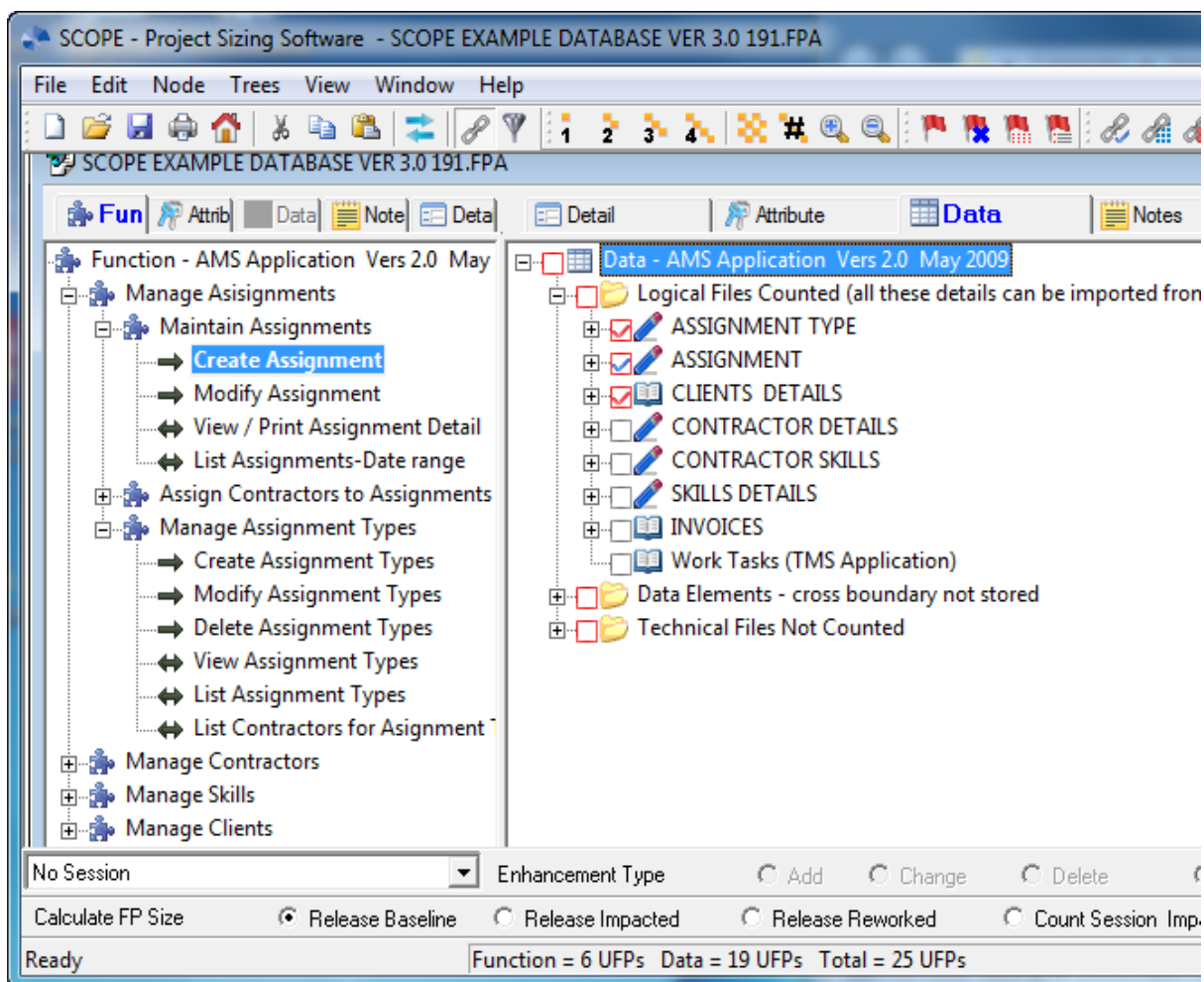
To **Quickly Link Process and Data Groups, RETs and DETs** right click on a Parent node or the Root node either on the Function Tree or the Data Tree   and select to Link – Set All (Read Only) or Set All (Update). **SCOPE** will link to all Child

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nodes but will NOT overwrite existing links. If you want to change the existing links then select to Clear All, then select to Link as Update or Read Only.
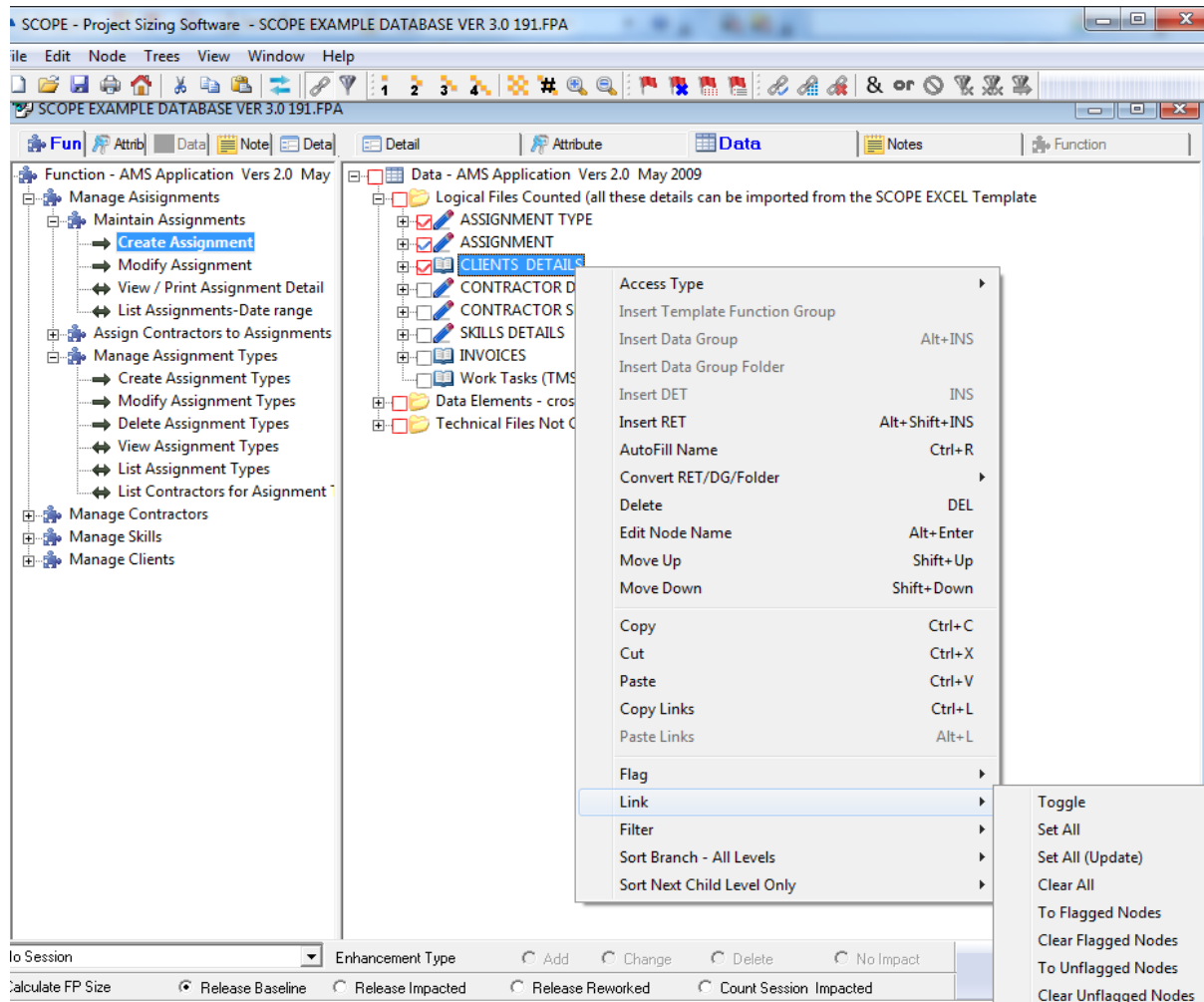
Copy 'Links Only' from another Node

If you have already set up the links for a node and then realise that other nodes need the same links, you can selectively copy just the links so that the other nodes can inherit some or all the links.

To do this - highlight the source node (i.e. it has the links you want to copy) then select < **Copy Links**> from Edit under the Main Menu (or use **CNTR L**). Highlight the target node and select <**Paste Links**> from the Main Menu (or use **ALT L**).

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A dialogue box displays to allow you to paste selected link types (process, attribute, notes and data) and to restrict the paste to the just the highlighted target node or choose to paste links to all its children (i.e. from current position down). The default <OK> pastes all link types just to the target node.
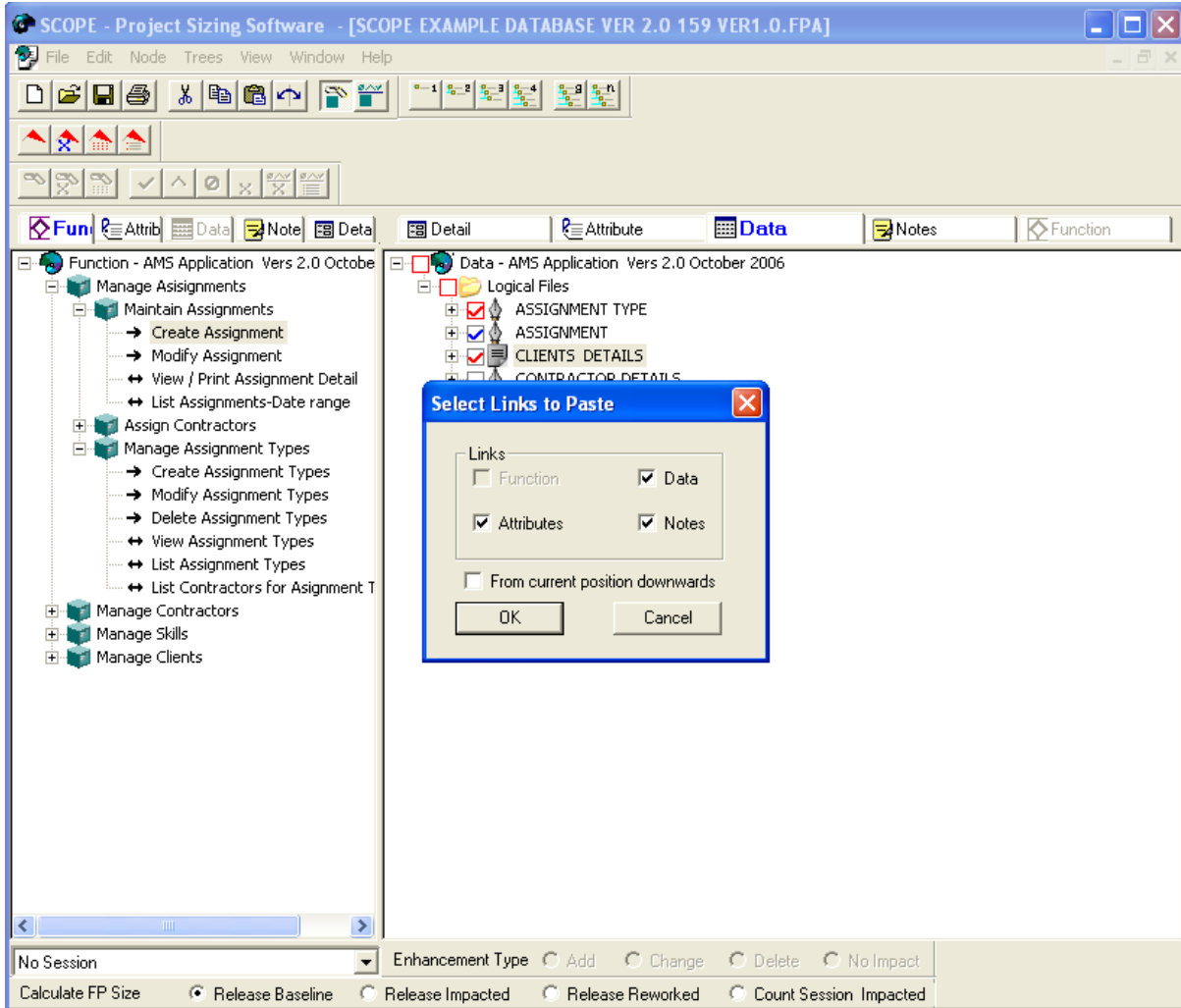
3.3.3.5 Recording the Relationships between Functions and Data

Counting Logical Files

Counting Transactions
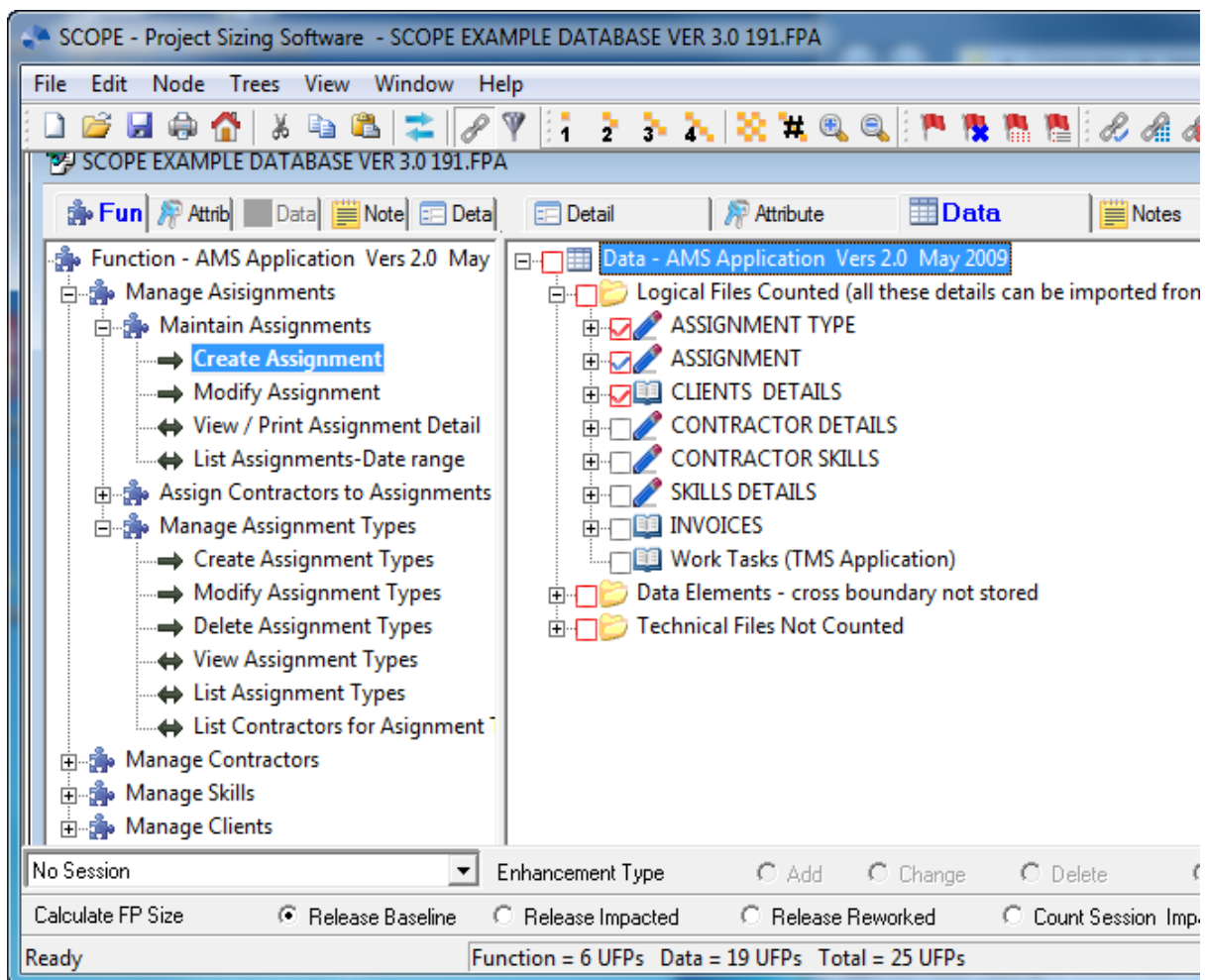
To record how each Function or Process uses the data groups, display the **Function Tree** on the LH screen and select **Link Mode**. (See Linking Trees.) Display the **Data Tree** on the RH side and click on the box next to the Data Node name. A ✓ displays to record that you have set the **Link**. **SCOPE** assumes by default that the

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Access Type is **Read Only** (Red tick). To change the Access Type of a Linked Data **Node** display the **Data Tree** on the RH side, select the data node and click the tick will change colour from **Red** for **Read Only** to **Blue** for **Update,** a second click will remove the link. Alternatively you can view the access type and change it by right clicking the mouse, when located on the Data Node and select **Access Type**, then select **Update** or **Read Only**. **Access Type** <u>can only be set</u> if the data node is already **Linked** to a function or Process node.

SCOPE allows linking of individual processes to DETs listed in the Data Groups Tree. If a DET is linked then the link is automatically assumed also by the parent RET and the Data Group. If you link at this level then **SCOPE** will count the linked DETs when it derives the number of DETs and FTRs for the Process.

*HINT: If you want to include additional DETs,that are not stored on a Logical File, in the DETs counted for a linked process, then create a **File Folder** in the Data Groups Tree to store these DETs and then link them. Examples of DETs that cross the boundary but are not stored are Messages, Action Control DETs, Calculated totals etc.*

3.3.3.6 <u>Viewing Linked Processes, Data, Notes and Attributes</u>

Counting Transactions

Profiling and Filtering Counts-Filters and Flags

SCOPE provides the function point counter with the ability to document their function point count to the highest level of accuracy such that all processes can be linked to:

- **Data Groups** - i.e. the process is linked to the DETs, RETs and FTRs that the accesses and the type of access (Read or Update) can also be assigned.

- **Notes** - any textual comments relevant to the process

- **Attributes** - any key words relevant to the profile the process

Similar linking to Processes, Notes and Attributes can be done by any node on the Data Tree.

These links for a particular process or data node can be viewed via two different methods, in Links Mode, highlight the process:

- select the tab for the tree type on the opposing window for the tree that you want to view the nodes linked to this process. The links for selected process display as a red tick against the nodes in the opposite Tree.

- double clicking on the process to display the details screen and then select '**Display Links to**' option in the Details screen to select which tree you want to see the linked nodes. The linked nodes then display as a list, rather than a tree, thus enabling all links to be viewed in one screen

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- To preview or print the various linked lists see Report Selection / Linked Tree List/....
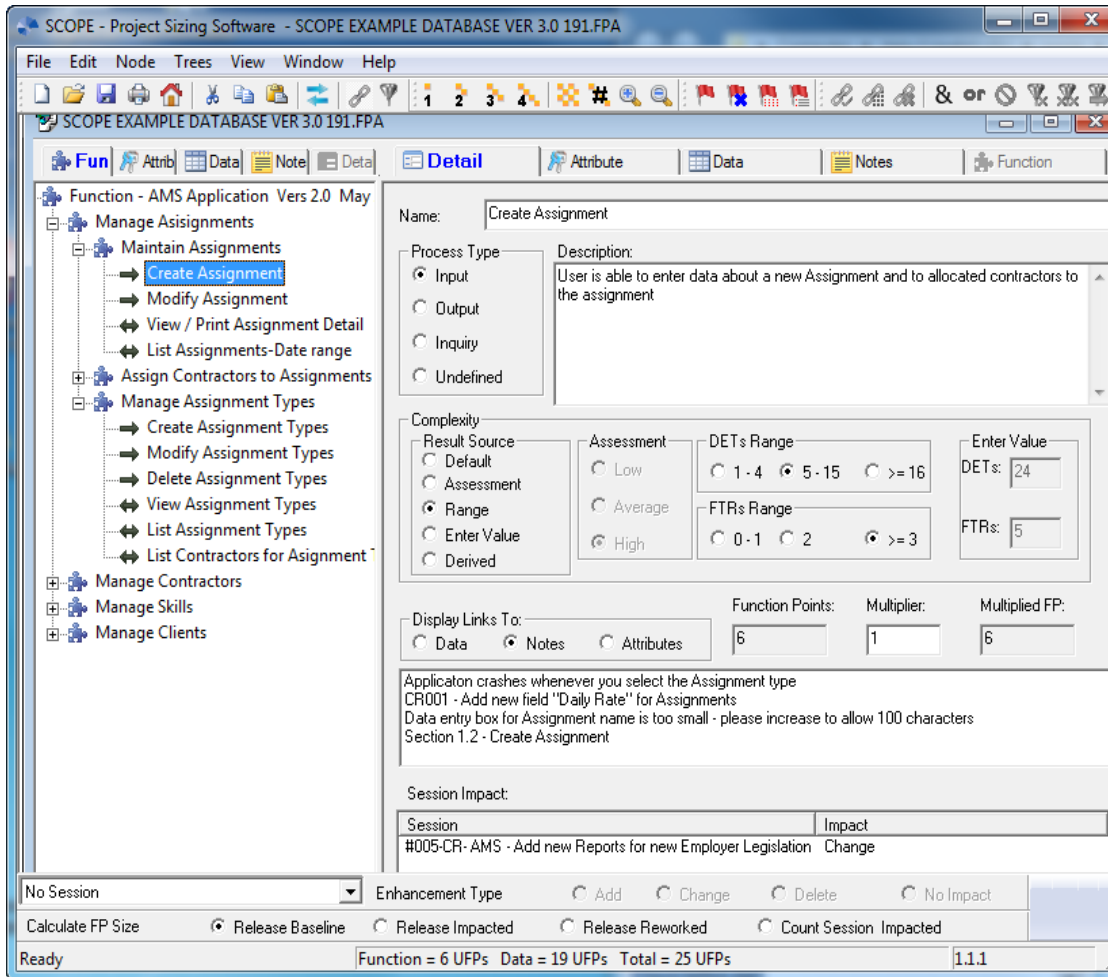
3.3.4 Notes

3.3.4.1 The Notes Tree

This tree holds text information that can be Linked to nodes in any other tree. Typical usages could be to record as Notes to be linked to processes or data:

- Any counting assumptions
- Queries against the specification
- Identified bugs during acceptance testing
- Cross-reference to the specification
- Physical tables, screens or programs etc.

Notes are organised into **Sets**. You can nest **Sets** to any depth

If your NOTE has additional text in the description then the Icon changes from 🗒 to 🗒. If the Note has a hyperlink to another file or a URL then the icon will have a small triangle in the right hand bottom corner as in the highlighted node below.
The date the Note was created and when it was last modified displays under the description along with the name of the User Name of the person who edited the Note.

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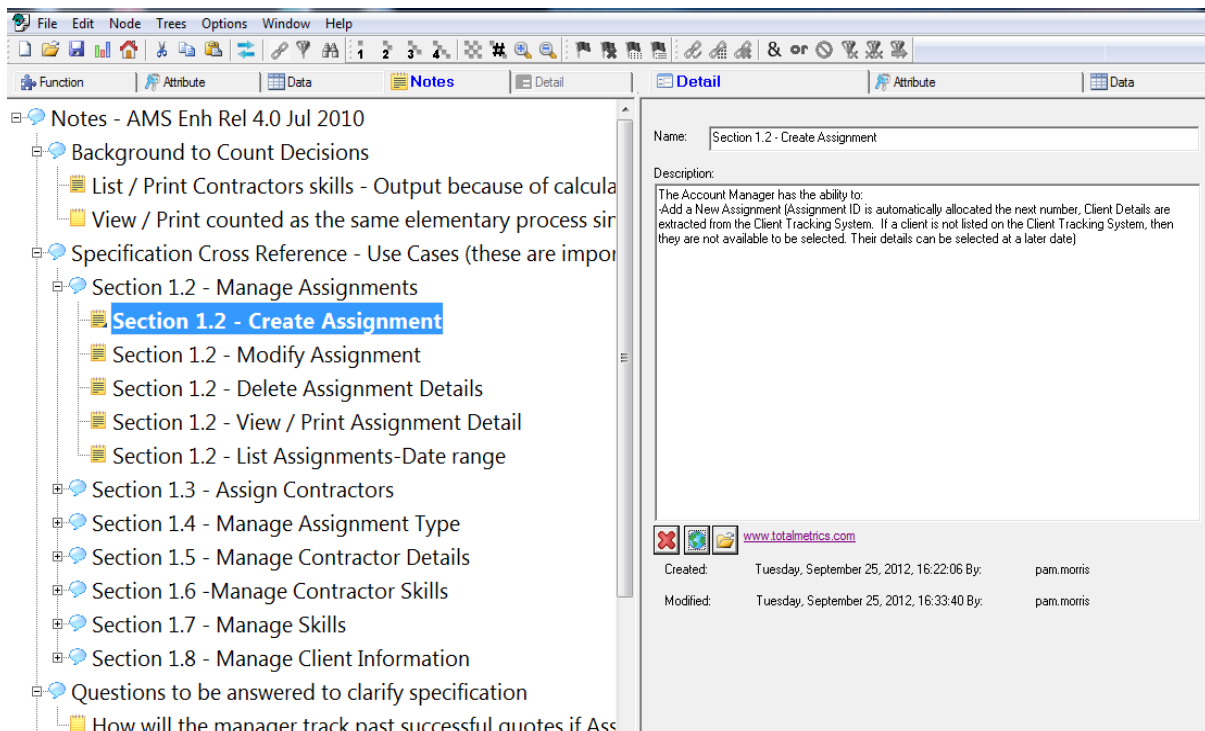
3.3.5 Attributes

3.3.5.1 The Attribute Tree

Attributes have two types of Classes:

- **Standard Attributes**- behave like Key Words and can be used to profile your count - this section deals with Standard Attributes.
- **Numerical Attributes** - are used as multiplying scaling factors for quantitative reporting. For more information on Numerical Attribute Categories see Setting Up Numeric Attributes for Reporting
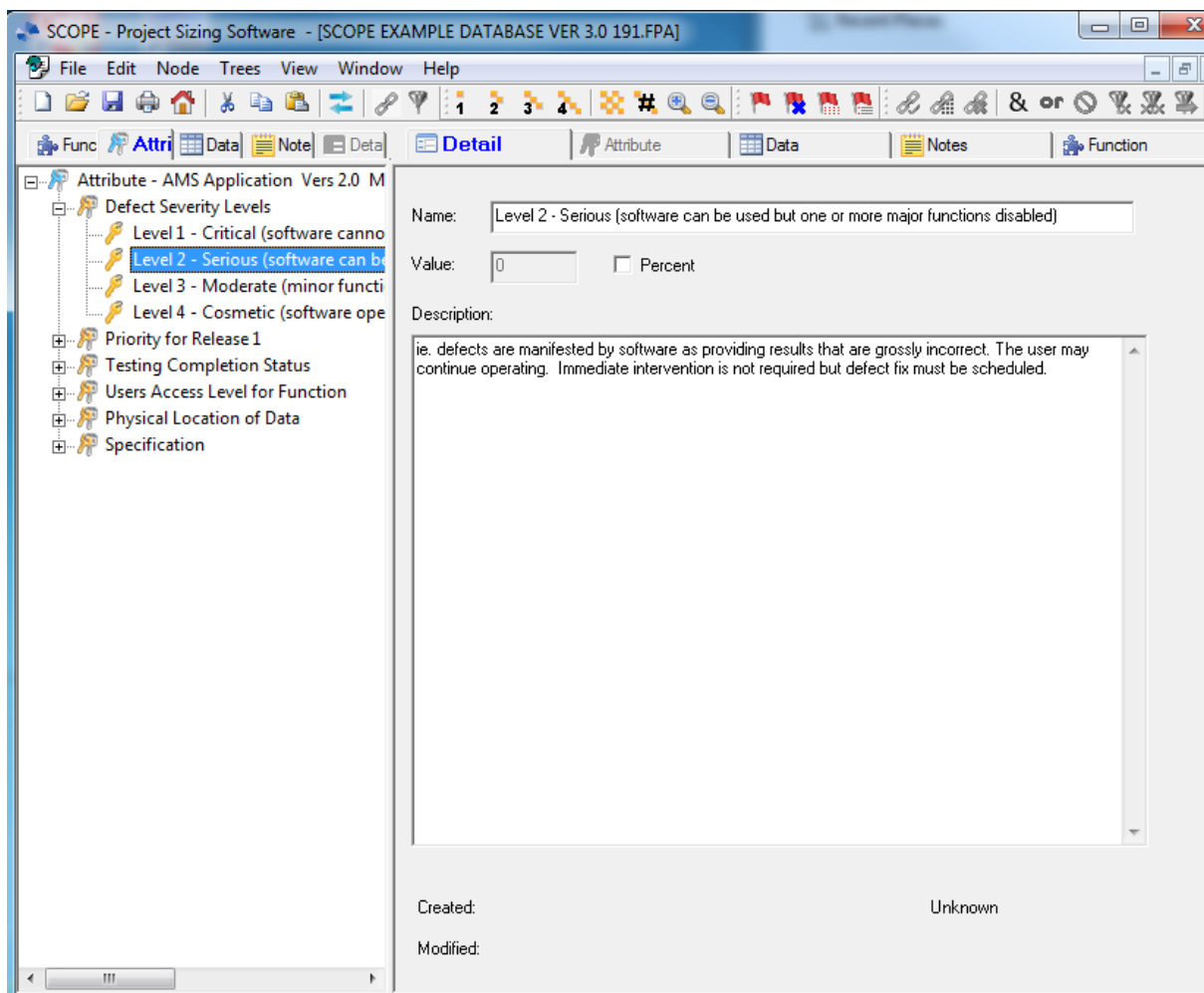
The Attribute tree represents the characteristics and conditions that you want to assign to nodes in other trees in order to selectively group them for analysis. For example, you may have an **Attribute Category** called Priority for Implementation, with the priority levels (Mandatory, Optional, Later) as its **Attributes**. You could then assign the priority for implementation to the individual Processes and Data Groups using the **Link Nodes** function, and use the Filters and Flags to analyse and report the total Function Points assigned determined to be mandatory for this Release.

The more information that is placed within an attribute tree and **Linked** to other tree nodes, the more detailed and comprehensive your analysis can be.

3.3.5.2 Creating Attributes to selectively report your software

Profiling and Filtering Counts-Filters and Flags
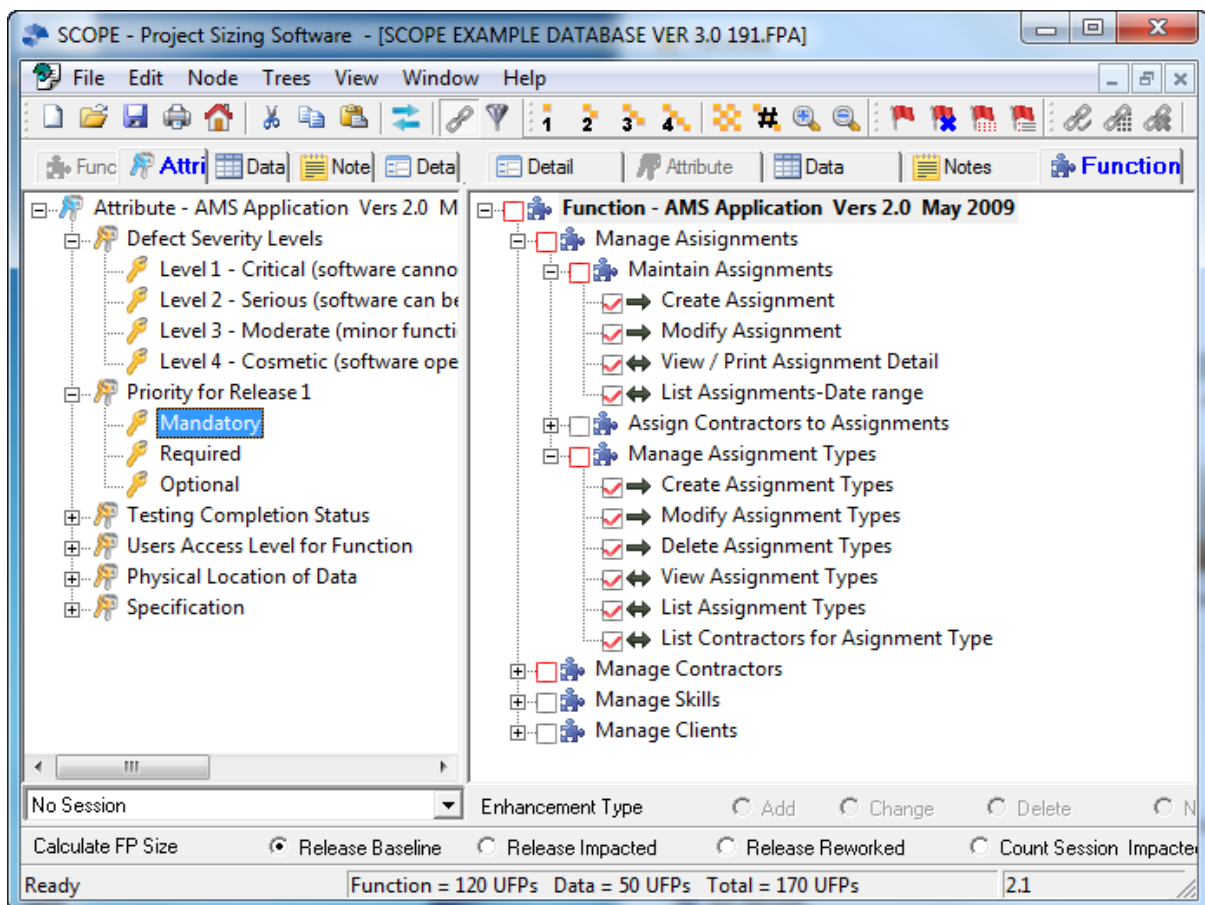
Select the **Attributes** tab at the top of the screen to open the Attributes Tree. Related Attributes can be grouped into **Categories** for easy access and selective reporting. First insert an Attribute **Category** (**Alt+Ins**) and give it a collective name. For example you may want to use Attributes to record which Processes will be included in the First Version of the software and which have been left for a later version. Name the Category, "Priority" and then insert an **Attribute** (Press **Ins**) representing each of the different Priority Levels you want to allocate to the functions and data. When you have created your Attributes, select **Link mode** to **Link** the Attribute to the Processes or Data Groups.

You may link more than one Attribute under the same Category to the same Function, Data Group or Note. For example you may want to use Attributes to identify which functions are available to each security access level. Some functions may be available to all levels and others only to some levels.

Attributes may also be linked to Notes.

Other suggestions for Attribute Categories could be:
- **Development Environment**: to record which language platform will be used to deliver the function or to determine the appropriate productivity rates to apply for different proportions of the functionality. E.g. Attributes could be C++, Access and Java etc.
- **Project Team**: to record which project teams are responsible for which functions, to compare the size of the functionality that each is to deliver. Attributes would be the Team Names.
- **Specification Quality**: to record if the specification for that function or Data Group is complete, partially complete or non-existent. This would enable quantitative reporting on the completeness of the specification of the software.
- **Defect Severity Level**: to record the severity rating for each of the bugs identified in the Notes linked to the functions.

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- **Business Area**: software functions can then be linked to the Business area that has requested their implementation.
- **Restructuring**: identifies functionality that has been restructured to assist in evaluating productivity gains by Change Requests that impact these functions compared to those which have not yet been restructured.

Hint: it is easier to locate the Attribute Tree on the LH side if you want to link a single Attribute to many Processes or Data Groups or Notes. (Right click and use the Link-set All function)
How are Attributes different to Notes?

3.3.5.3 <u>Reporting using Attributes</u>

SCOPE has a number of Reporting options that selectively report the count using the Attributes as the Selection Filter. This allows you to profile what is printed on any of the SCOPE reports.

- ○ **Hierarchy FP Size Attribute Summary Reports -** If you manually 'Flag' up to 5 Attributes (use the Toggle Flag Icon on the Main Menu or highlight the Attribute and press ALT+F). Then select a Hierarchy FP Size Attribute Summary Report, it will show all the Process and Data Nodes currently assigned to these flagged Attributes and the FPs for each Attribute will be totalled for the report.
- ○ **Attribute FP Size Profile Reports -** Reports the percentage of the Functionality selected that has been assigned to each attribute within a Category. If you just want to select particular Attribute Categories for reporting then with the Attribute Tree on the Left, highlight the Category and select to print the Attribute FP Size Report, selecting "From Current Position". SCOPE will report the relative percentage contribution of each of the attributes to the overall Baseline and Release and Count Session.
- ○ **All FP and List Reports** - with the Attribute Tree on the Left Hand side, manually Flag the Attributes (ALF+F) you want to report on. When selecting any of the reports, also select the option "Select Flagged Nodes" and the

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report will only include those nodes actually linked to the Attributes you flagged.

3.3.5.4 <u>How are Attributes different to Notes?</u>

SCOPE has methods ways of further documenting your functional model of your software:

- Attributes
- Notes

The difference between these two types of trees is that:

Attributes are set up as 'key words' that are used to profile your software model to selectively report only those Processes or Data Groups that have that particular key word as their Attribute. Since there may be several options of available **SCOPE** allows you to group your Attributes into Categories. An example of a common Attribute Category could be "Business Area"; this could be further broken down into specific business areas responsible for specifying the functionality. Each of these Business Areas would be listed as an Attribute e.g. HR, Accounts, Marketing etc. Processes specific to that business area could then be associated by linking to that node on the Attribute Tree. Usually every process would be linked to one or more attributes in a Category. Typically an organisation would have a standard set of Attribute Categories defined so that they can profile the reporting in a standardised way.

Attributes can have values assigned to them so they can be used to selectively quantify your functionality (Processes and Data Groups). See Numerical Attributes

Notes in comparison are usually created to be specific to one Process or Data Group but they may be linked to more than one node in the case of a generic Note. Notes are designed to be used for textual descriptions about a Process or Data

Group, rather than for using as a means of profiling the model. Typically Notes are specific to a particular Application, Release or Count Session, rather than being applicable for all Applications within an organisation.

SCOPE has multiple hierarchy trees that provide a multi-dimensional map of the software application's functionality. This map enables you to develop 'what if' scenarios for measuring different sets of functions, based upon selected nodes in other Trees.

For example, you might choose to map specific functions against a particular **Category** of **Attributes** such as different developers, implementation priorities or user types. Mappings may be made between any other **SCOPE** tree to the **Attributes Tree**. Once these mappings (or **Links**) have been set-up, they can be recalled at any time and used to selectively profile the application's size for a particular attribute. For example linking to a high priority attribute enables you to measure the application's projected size based on the 'what-if' scenario that only the high priority functions would be implemented.

Numerical Attributes are a special class of Attribute Category that allow your count to be profiled quantitatively for project governance , project monitoring etc.

For example, different sets of Notes can be used to record assumptions about the specification background for counting decisions, references to project or other related documentation, bug reports, test cases etc. Individual **Notes** can be written under each of these **Note Sets** and, if desired, **Linked** to nodes in one or more other trees.

3.3.5.5 Detailed Analysis and Tracking using Notes and Attributes

Profiling and Filtering Counts-Filters and Flags

If you need to further document the functionality of your software then you can create **Notes**, and then link the Notes to one or many nodes on the other trees.

You can selectively report on all Process and Data nodes linked to a particular Note or group of Notes.
 (*see Flags and Filters*)

Functionality can be selectively reported based on its characteristics. You can set up any number of types of characteristics or **Attributes** on which you would like to profile the software. Once you have created a Note or an Attribute they can be linked to any node on any other Tree but their own.
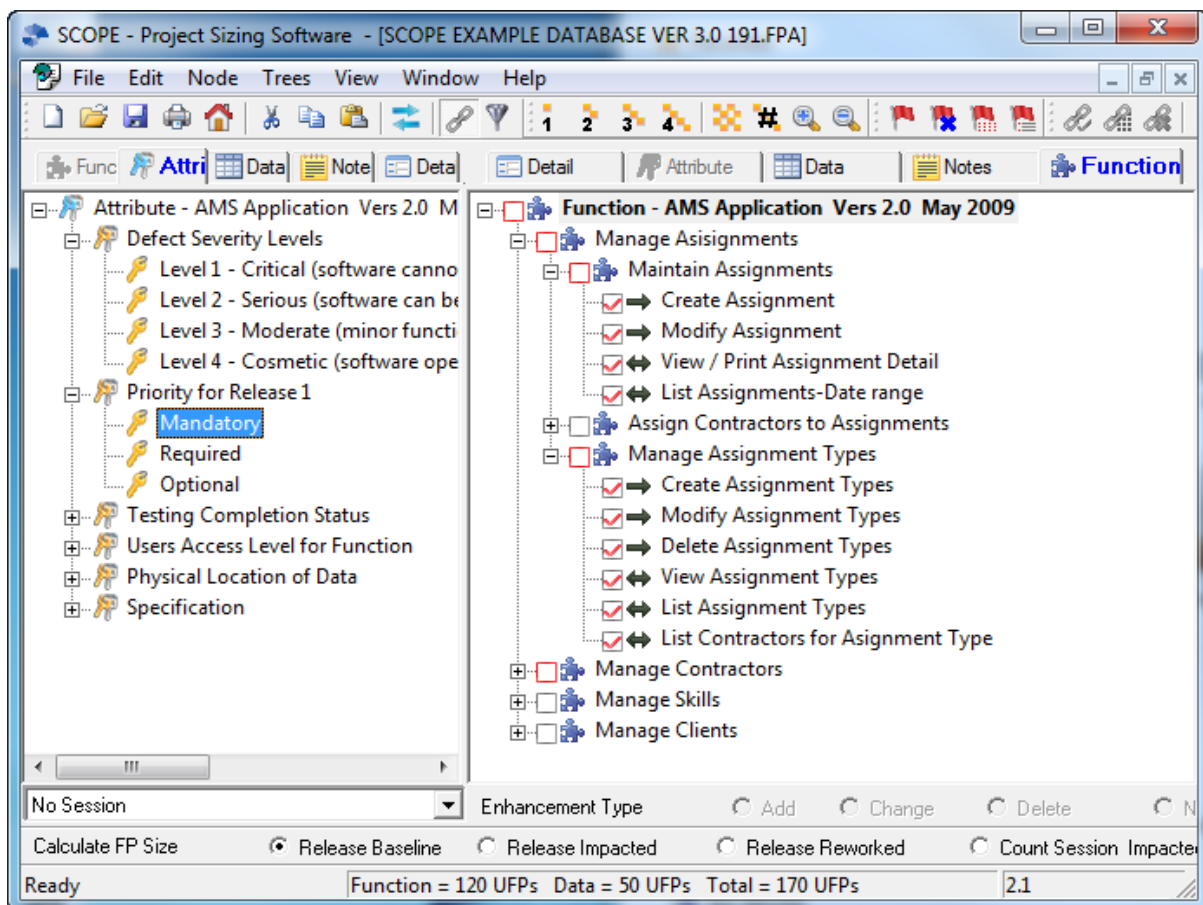
Select the Notes tab at the top of the screen to open the Notes Tree. Similar types of Notes can be grouped into Note **Sets** for easy access and selective reporting. First insert a Note **Set** (Alt+Ins) and give it a collective name. For example you may want to use the Notes to record function point counting assumptions. Name the Note Set "FPA Assumptions" and then insert a Note (Ins) to record each assumption. You may want to further group these assumptions into ones that you have checked and ones that need checking. In that case create a **Set** called "Checked" and "Not Checked" under the **Set** called "FPA Assumptions". Then insert your Notes under the appropriate parent **Set**. When you have created your Note, select Link mode to Link the Note to the Processes or Data Groups about which the assumption has been made. Notes may also be linked to Attributes.

Other suggestions for Notes Sets could be:

- Questions – to record questions you need to clarify with the application's experts
- Specification – to record your specifications for change requests, business rules etc in a note which could be linked to the relevant Process
- Errors – to record software bugs noted for each Process and data group. The severity level could be further classified using an Attribute called Severity Level
- List of Physical Files - to cross reference to logical files. This is particularly useful when validating someone else's counts or when the users identify a physical file they need changed for an enhancement, it allows easy identification of the corresponding Logical File.

Hint: it is easier to locate the Note Tree on the LH side if you want to link a single Note to many Processes, Data Groups or Attributes. Right click on the parent node of the group you want link on the RH screen, select Link, Set All and all child nodes will be automatically linked.

How are Attributes different to Notes?

3.3.5.5.1   Numerical Attributes

3.3.6 Overview Numeric Attributes for Reporting

Setting up Numerical Attributes

3.3.6.1 <u>Overview</u>

Numerical Attributes allow you to create and assign 'quantifying variables' to your functional size measures so you can report a result using Function Points as the other quantifying variable for Project Management Reporting.

 SCOPE takes the 'quantifying variable' you set up in the Numerical Category and uses it as a 'multiplier' for the function points it calculates, to create a derived result.

 For example if your quantifying variable is Project Delivery rate measured in Units of "hours per fp". Then SCOPE will take the rate and multiply it by Function Points calculated to get "hours" to deliver that many function points.

 Since they can be used to report any variable using any unit, then both the variable and the units need to be first to be set up. The setup of the Numerical Category can be completed two ways:

 1. Set up *Template* Numerical Category - for ongoing 're-use' - one set up in the database it is available across all Releases and is automatically loaded into a new Release. It can be also selectively loaded into any Release in the database. see Instructions in Set up Numerical Attributes - (Template).

2. Setup *One-off* Numerical Category - specific for this Release's Attributes Tree. It can be manually copied and pasted (exported / imported) into another Release tree. See instructions in Set up Numerical Attributes - (non-Template).

3.3.6.2 <u>Setting up a Numerical Category</u>

Numerical Categories are completely customisable, you can create your own, use the built in Numerical Template Categories. Once inserted they can be modified to suit your needs.

In the screen display below you can see how the Name, Units and Variable text is inserted into the reported result to provide meaning to the answer

Variable: this is the scaling factor you want to apply to the Function points to get a result. e.g. project delivery rate = PDR hrs/fp. The individual **Values** (e.g. Java = 9 hrs /fp) for this scaling factor are recorded in the Attribute details screen.

Units: these are units reported for the result of the multiplication.

For example if the **Variable** =

- PDR (hours per function point) then the **units** for the result after multiplying by function points will be 'hours'

- Cost Effectiveness ($/function point) then the **units** for the result after multiplying by function points will be 'dollars'

- Worked FPs (percentage) then the **units** for the result after multiplying by function points will be 'function points'

Once you have set up a Numerical Category, you will need to set up the Numerical Attributes with the relevant **Values** to be used as the multiplying scaling factor.

 Example 1. Setting up a Numerical Category for PDR - On the left side of the Screen is the Details for the Numerical Category. You can see how each of the above fields in the detail screen on the left are reported in the result on the screen on the right.

 Units = *(Hours) Effort Required*

Variable = *Project Delivery Rate (PDR)*
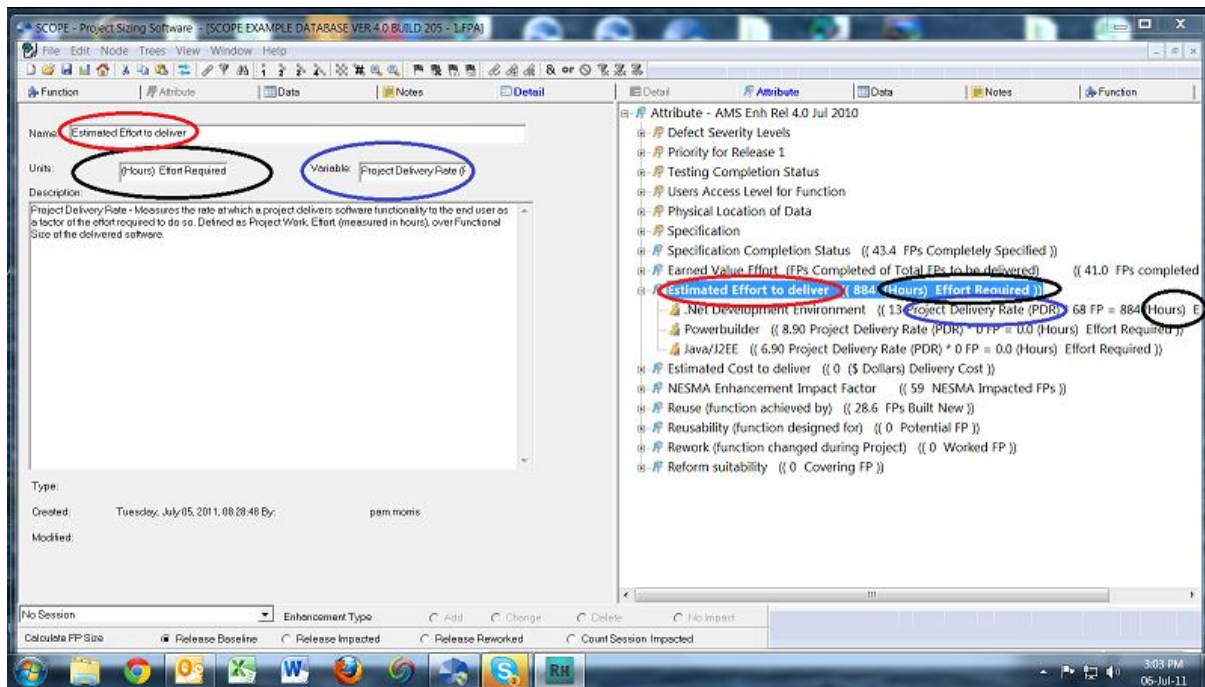
3.3.6.3 Setting up a Numerical Attribute

Insert 📝**Numerical Attributes** under the Numerical Category to set up the **Values** for the possible scaling factors that can be applied to the function points calculated.

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For example if the **Variable** = PDR then we need to set up different PDR **Values** for different technologies.

Attribute 1 = .Net Development Environment **Value = 13.0**

Attribute 2 = Powerbuilder **Value = 8.9**

Attribute 2 = Java/J2EE **Value = 6.9**

Numerical attributes are 'mutually exclusive' ie. a process or a data group can only be linked to ONE numerical attribute within a Numerical Category.

$$(286 + 115.7)$$
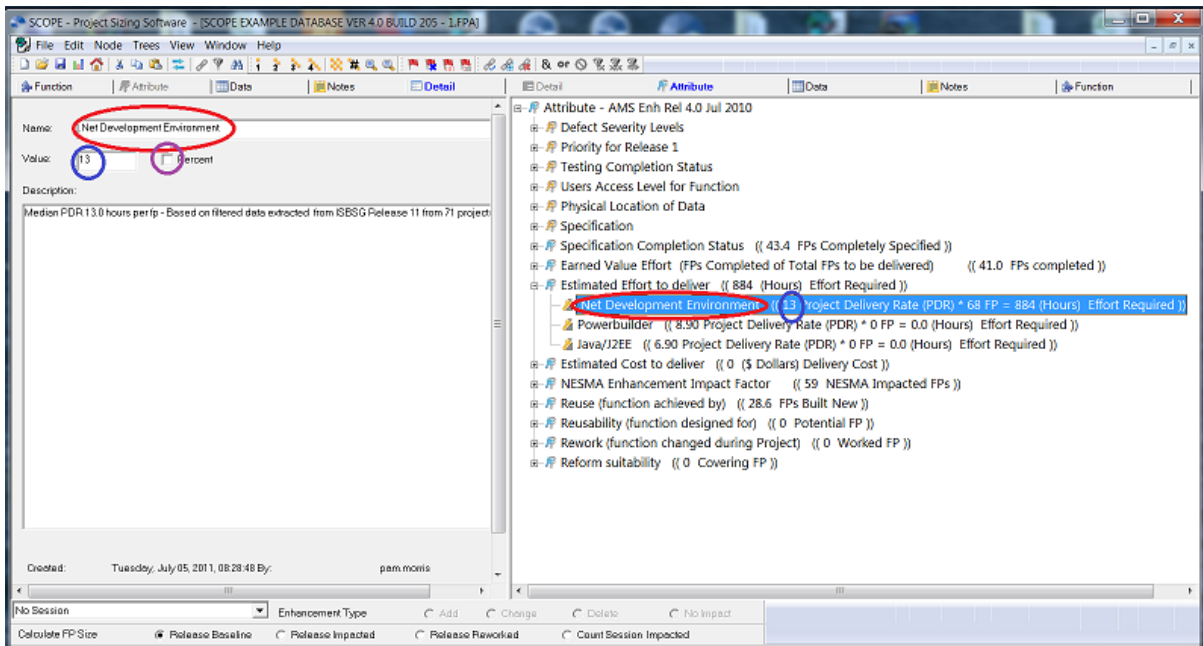
Estimated Project Effort ((401.7 (Hours)))

.Net Development ((13 hrs/fp * 22 FP = 286 (Hours)))

((*Value Variable* * *x FP* = *X Units*))

Powerbuilder ((8.90 hrs/fp * 13 FP = 115.7 (Hours)))

((*Value Variable* * *x FP* = *X Units*))

Category

Name:	Estimated Project Effort			
Units:	(Hours)		Variable:	hrs/fp

Attribute

Name:	.Net Development	
Value:	13	☐ Percent

For examples on how Numerical Attributes can be used see:

- Earned Value Project Monitoring

- Estimating Project Effort

- Package Implementation Costing

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3.3.6.4 <u>Setting Up Numerical Attribute - (Templates)</u>

Set Up Numerical Attribute Template Tutorial

The Numerical Attributes feature enables function point counts to be profiled for Productivity Analysis, Estimating, NESMA Impact factors, Earned Value reporting .

SCOPE includes an in built set of standard Numerical Attribute Templates which it pre-loads with each new Release.

The setup Numerical Template Attribute Option is available under :

- Main Menu - Options <Numerical Template Attribute Options>

- Attribute Tree - Option Insert Template Category - right click on the [Setup] button in the Insert Template Dialogue box

  This option enables you to update and add to the in built Template set, and save them so you can re-use your customised Numerical Attribute values in all your counts with the current database.

  In the Template Setup Options Dialogue box left hand panel enables you to create new Numerical Categories and Attributes and set them up with their appropriate Units, and Values. The right had side panel dynamically displays an example of how **SCOPE** will use the information for its calculations. See Numerical Attributes for more information as to how **SCOPE** uses the fields, Units, Variable and Value to do

its calculations. Try out some examples yourself to work out how to report your profiling of the count.

Below is an example of using Numerical Attributes to calculate the estimated Effort to deliver a project when the attributes have been linked to the impacted functionality. For details on what is required for the fields - Units, Variable and Value please see Setting Up Numeric Attributes for Reporting.

1. Select [Add] in the **Category** box to set up a New Category, when you have completed all fields select [Update] button

Each **Category** needs to have :

- a unique Name

- a Unit defined - where the Units are the result of multiplying the attribute variable value by the number of function points linked to the Attribute. In the example below the Units = hours, this is the result when the Attributes variable value "13" for variable "hrs / function point" are multiplied by the calculated function points (X).

- the Variable defined - where the variable is what you are multiplying against the function points to get the result.

2. Select [Add] in the **Attributes** box to set up one or more new Numerical Attributes. When you have completed all fields select the [Update] button

Each **Attribute** needs to have :

- a unique name

- a value defined for the Variable e.g. if the variable is hrs/fp then for this attribute ".Net Development" the value inserted in the example below is "13" hrs/fp

- a Value Type defined - as either decimal number (default) or a percentage (
tick the Percent box).

After pressing [Update] check at the Preview Example box to check that your
Category and its Attributes will report as expected. This Numerical Attribute
Template is now saved with your database and will be available for inserting into all
Releases. To see how to load your Numerical Attribute Templates into your Attribute
tree within your Release - see Loading Numerical Template Categories.
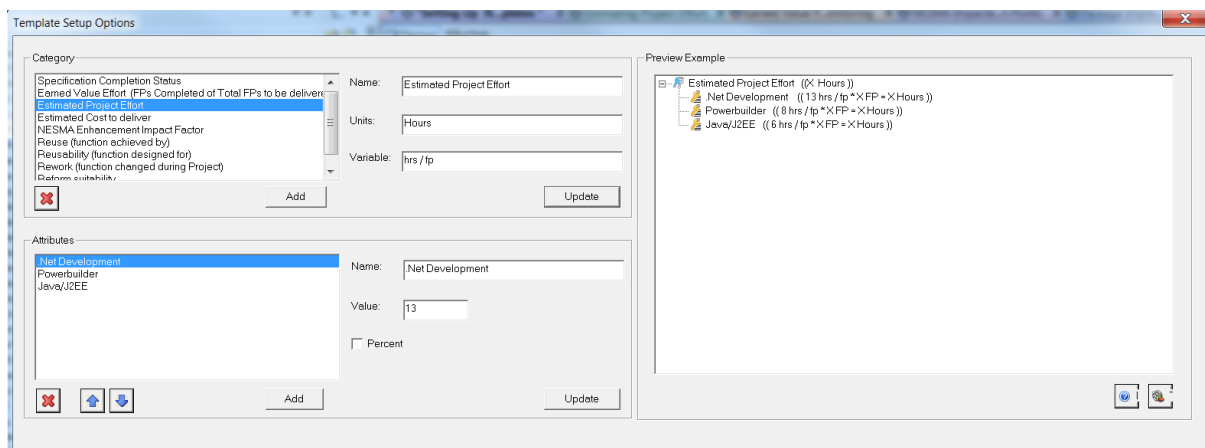
3.3.6.5 Set up Numerical Attributes - (non-Template)

Locate your cursor on a branch or the top of the Attribute Tree and right click to
Insert a **Numerical Category**

Open the Details screen (double click on Numerical Category name or select Detail
tab in other window)

Complete the **Name**, **Description**, **Units** and **Variable** fields as described in Setting
Up Numeric Attributes for Reporting.

3.3.6.6 <u>Numerical Template Categories</u>

SCOPE has a set of built-in Numerical Categories that you can use as templates.
These are automatically inserted into a new release when it is created or you can
load them into an existing Release. You can select to load them singularly or all of
them at once.

If you decide to customise them then you can use Copy/Paste to copy your own
customised templates to other Releases.

To load the SCOPE **Template Categories**:

1. Right click on the Attribute Tree, select "Insert Template Category"
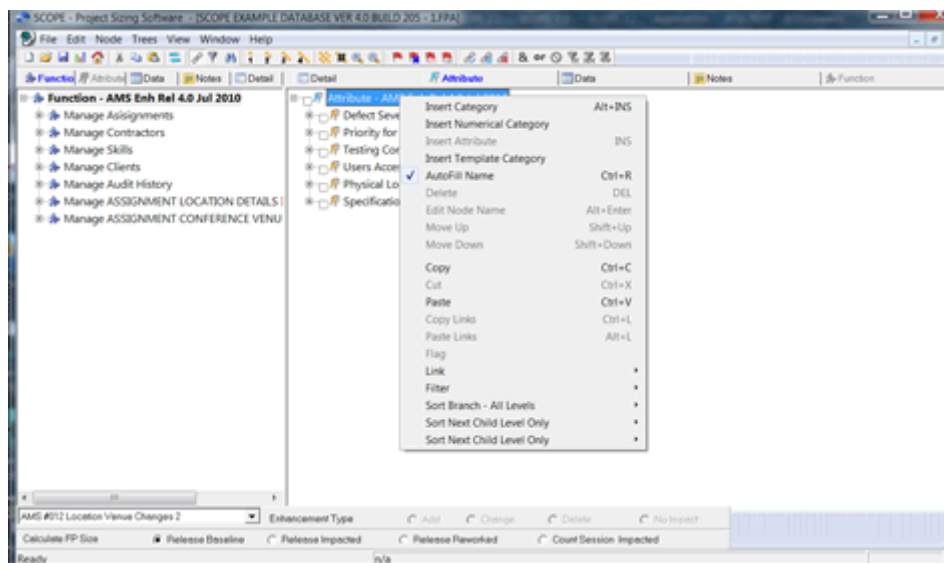
2. Select the Template you want to insert from the drop down box or "All
   Templates" to insert all the SCOPE template Numerical Categories and press
   "Add" Button to insert it in your Attributes Tree as another Category
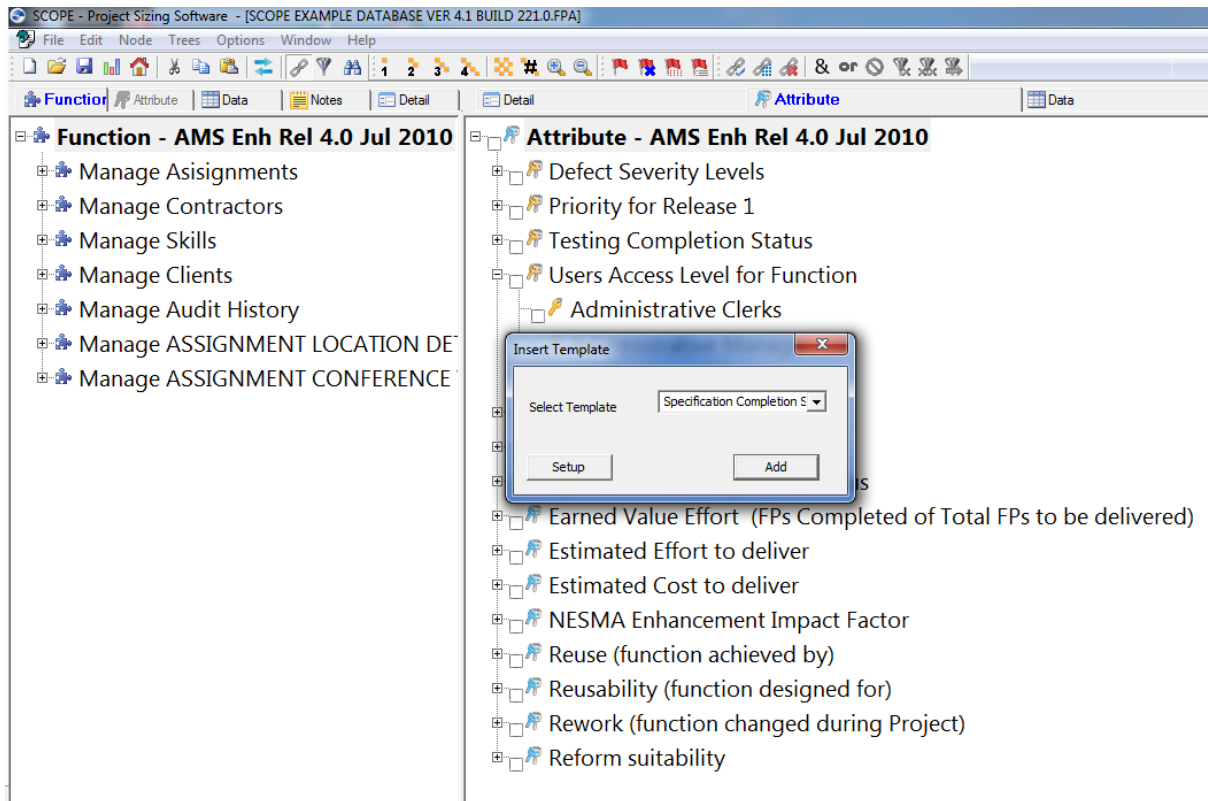
3. **SCOPE** will load the selected Categories, their attributes and their preset
   Values and Units for reporting.

4. If you do not find the Category you need in the list or if you would like to
   create a new Category Press "Setup"

5. Edit the templates to suit your own reporting needs.
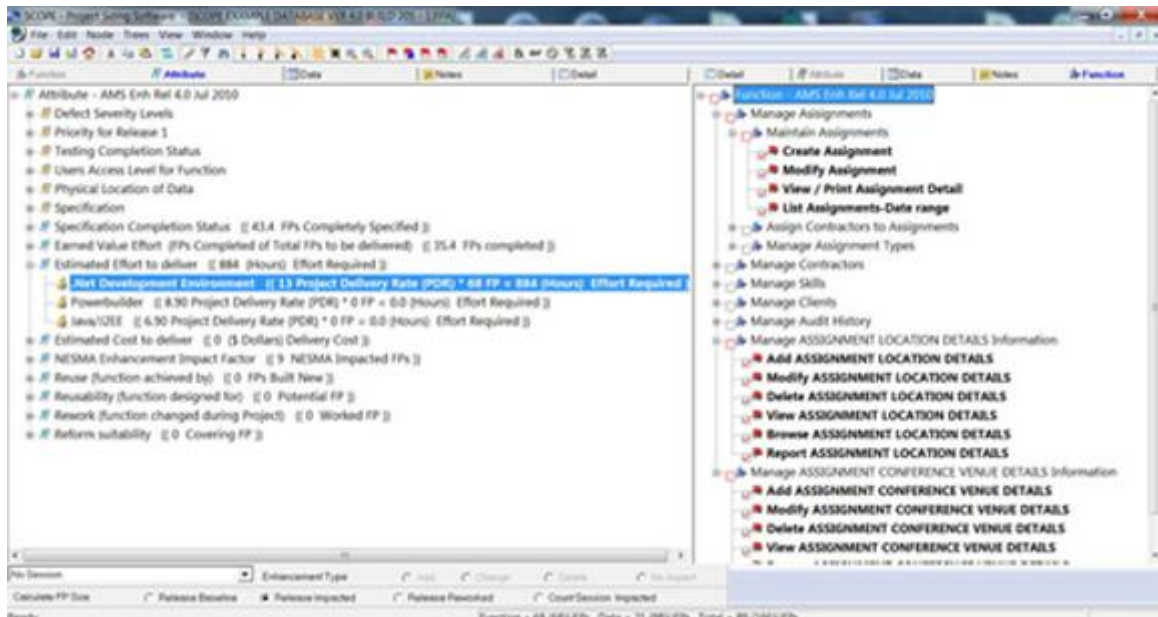
PRESS F5 to recalculate Numerical Attribute Results

3.3.6.7   Linking Numeric Attributes

To select only those Processes or data groups that are part of the Release or Count Session, right click on the Function Tree and Data Tree and select "Flag" - "Session Impacted". SCOPE will highlight (Flag) all nodes that are impacted by the selected Count Session or by the Release if "No Session" is selected.

Highlight the ✍ Attribute on the LHS Attribute tree and Right Click, select "Link" - " To Flagged Nodes".
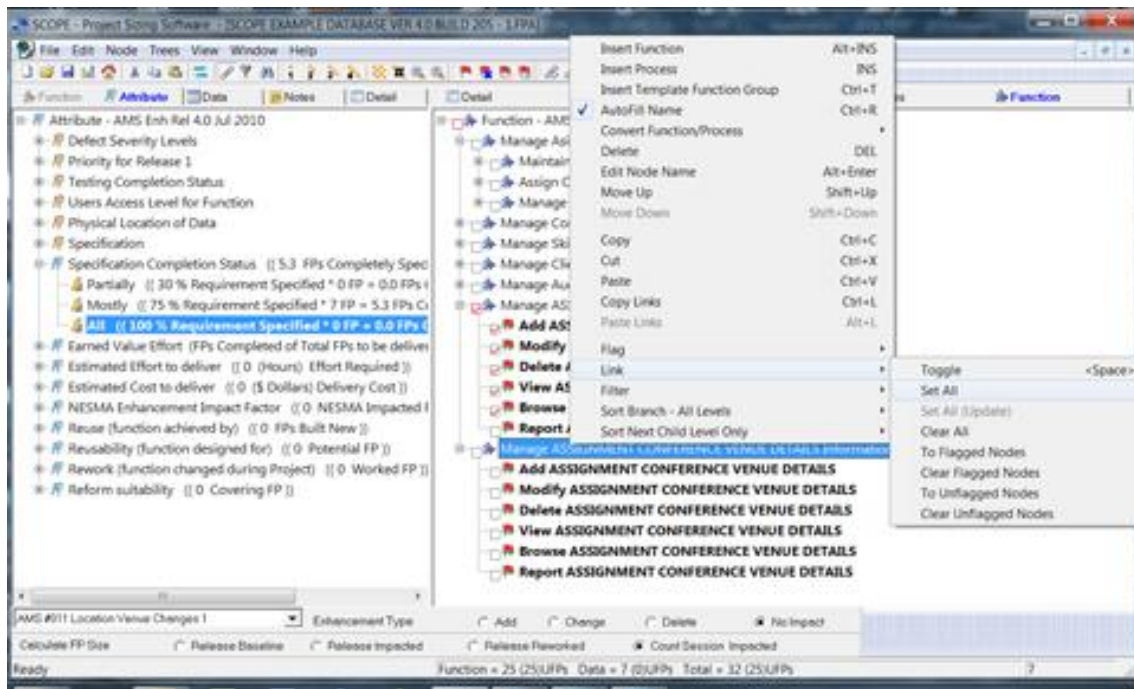
To understand more about Numerical Categories and Numerical Attributes see:

Setting Up Numeric Attributes for Reporting

PRESS F5 to recalculate Numerical Attribute Results

3.3.7 Finalising your Count

3.3.7.1 Excluding Counts from Baseline Update

The Count Sessions for a Release can be selectively used to update the

Production Baseline Release. If a change request for some reason was not

implemented or you do not want the Count to reflect its outcome in the baseline then

SCOPE will let you decided how you want it handled.

Situations when this may occur are when the **Count Session** was:

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- **Not approved** and the project did not proceed, then the Count Session can be deleted and the integrity of the Release is retained.

- **Not actually implemented** but the project is still in progress or is planned to be implemented at some time in the future. In this case **SCOPE** allows you to selectively exclude that Count Session from the Update to Baseline i.e. puts the Count Session on **Hold** and **SCOPE** will create a new WIP Release, based on the new Baseline Count but also includes the 'Held Over' Count Session so that is now part of the Latest Release Count. It will be removed from the previous WIP Release where it was originally created.

- **Conversion functionality** or any functionality delivered by the project but not in the Production Release. **SCOPE** allows you to select to **NOT Apply** the Count Session to the particular Baseline Update. The Count Session will remain in the Work in Progress Release where it was created but its impacts will not be considered in the Update to

seline.

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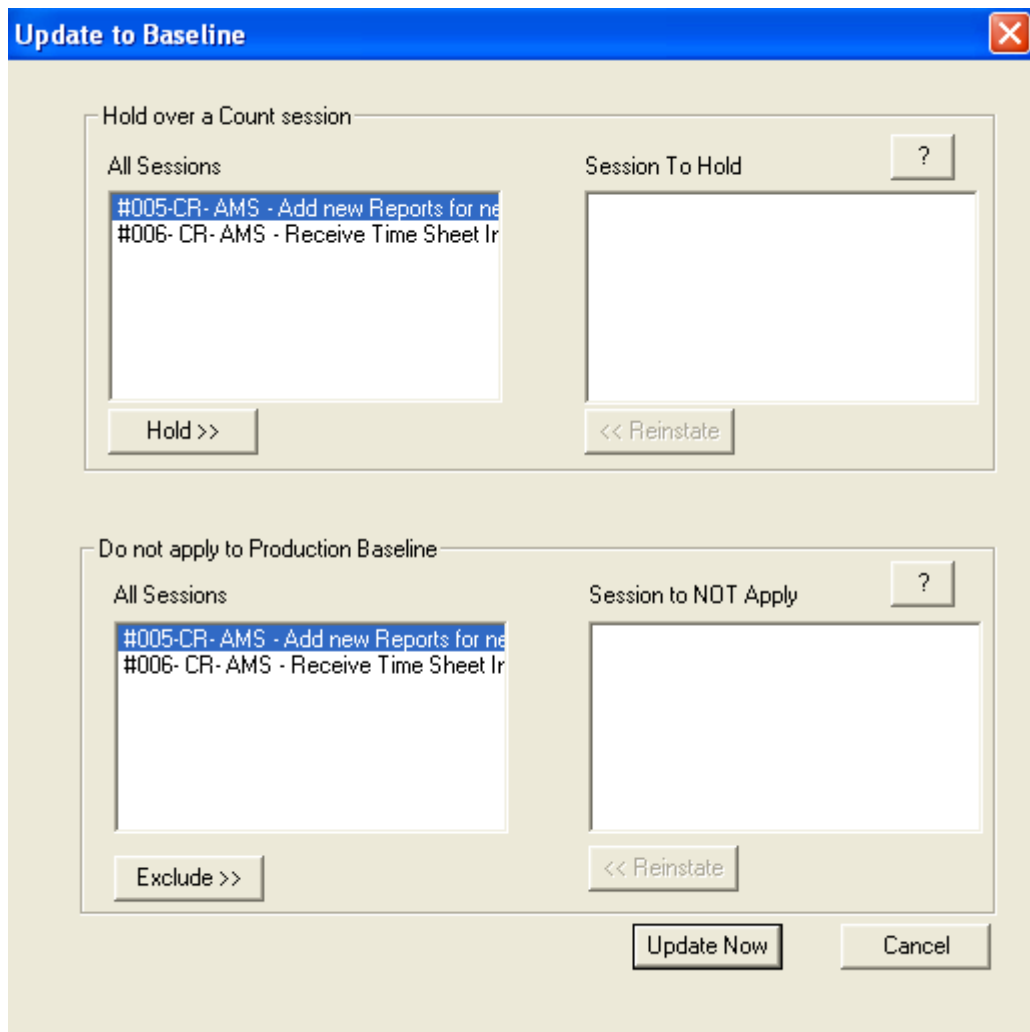
3.3.7.2 Updating Baseline Counts

Update to Baseline

SCOPE allows you to record all your project counts as Count Sessions on a copy of the Production Baseline that you have created in the Work in Progress Release Group. Once all the project counts are complete and the Release has been put into production by the development team, you need to update you baseline count so it reflects the size of the implemented software.

In order to Update your Baseline Count for the Application you need to locate your cursor on the Latest Release in WIP (open green padlock), and then select the Icon **Update to Baseline. SCOPE** will create a new Baseline Count under the Production Release Branch under the Application. When you select to Update to Baseline, you will be prompted to select to Hold Over or Exclude Counts from the Update.

In the new Baseline Count, **SCOPE** automatically

- o   removes any processes or Data Groups that have been identified as being **Deleted**

- o   includes in the new Baseline size the **New** processes and Data Groups

- o   includes in the new Baseline size the final result of the **Changed** processes and Data Groups.

During the updating process **SCOPE** removes all the history of the Count Sessions i.e. which Count Sessions impacted which processes and Data Groups and just

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creates a Baseline Count that represents the Net Result after all of the Count Sessions for the selected WIP Release have been applied.

The new Baseline Count in Production now has a gold padlock and it is locked. This indicates that it represents the very latest Production Release Count and that there are no WIP Releases currently making changes to it.

Note: The Update to Baseline works in a similar way to MS WORD when the User selects to "Accept all Changes", the resulting document now has the net result of all the editing performed on the working draft.

4 Importing and Exporting Data SCOPE Database

4.1 Importing / Exporting SCOPE data into SCOPE

4.1.1 Export Single Snapshot of Count, Project, Release or Application

SCOPE allows you 'extract' via a snapshot and save into a new database a:

- o **Application** with all its Releases and Count Sessions

- o **Release** with all its Count Sessions

- o **Count Session** for a Release - has all the nodes in the Release but with only the selected Count Session impacts highlighted

- o **Project** within a SCOPE database - exports ALL Count Sessions across all Applications impacted by the Project. For each Count Session in the project it exports all the nodes in the Release but with only the selected Count Session impacts highlighted

All Snap Shot files include all the relevant details about the Application, Release, Project and Count Session, SCOPE saves these details in a new SCOPE Database. This provides an added level of security of your portfolio data in that it allows you to extract only the Counts relevant to the counter or the person who is viewing the count results. Once the extracted counts are updated or reviewed then the counts for the whole Release or just the Count Session can then be exported and imported back into the master Repository in SCOPE.

SCOPE "SNAPSHOT" allows the Count administrator to control access to sensitive counts in the Master Repository, by extracting on the relevant count information for

counters to work on.   It allows counters to count remotely on a small database for additional speed and then merge their count back into the current baseline at a later date. It also allows a counter to SNAPSHOT their count to distribute for review with SCOPE Viewer™

Note: The 'snapshot' database created is a standard **SCOPE** database but only has one Application or one Release and its Count Sessions stored.

To create a Snapshot database in the Project and Applications List, highlight the Release, Project or the Count Session you want to be extracted to the new database and select the Snapshot icon. **SCOPE** will prompt you to name the new database. This new database can be opened with either **SCOPE** or **SCOPE** Viewer™.

This feature is useful under the following circumstances:
- o **Send a count to a non-SCOPE user for review** - the administrator just 'snapshots' the relevant count and sends the database to the user with instructions on how to download **SCOPE** Viewer™. The user can view all aspects of the count, all links, notes, attributes, details and descriptions without needing to have a licence for **SCOPE**.

- o **Extract all the Count Sessions for a Project into a single SCOPE database and send these to a counter to complete the Project Count** - the administrator just 'snapshots' the relevant Project in the Project List and sends the database to the counter. When the counter has finished counting the Project they can 'export' the Count Sessions for Import by the Administrator.

- o **Administrative Control of Your Counts** i.e. you have a 'master' database of **SCOPE** counts which is controlled by an administrator, who wants to quality check all counts prior to them being applied to the master version of the Release. Each time a counter wants to count on the current Release, the Administrator takes a snapshot of the current Release and sends it to the counter. When they

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have finished counting they export their count for import into the Administrators master database after it has been verified.

> *HINT: To do this select to Export the latest **Release** from the Master into another temporary **SCOPE** database where a counter can create and work on their Count Session. When the administrator approves the count it is then Exported from the temporary database and Imported back into the latest Release within the Master database.*

- o **Multiple Counts to be completed Concurrently** - you have many Change Requests for Applications on the same database that need to be counted by multiple counters at the same time.

> *HINT: To do this select to Snapshot the latest **Release** from the Master Database to one or many temporary **SCOPE** databases where each counter will then create and work on their own Count Sessions. When each count is approved, they are then individually Exported from their temporary databases and Imported back into the latest Release in the Master database.*

- o **Retain Security for highly sensitive counts** - the administrator just 'snapshots' the count that is relevant to the counter so that they cannot view other project counts.

4.1.2 Import / Export Applications and Releases

Import Export Counts within a Release

Import Export Releases

SCOPE will allow you to export a whole Application and all its Releases and all its counts and all their details or just a node, branch or whole tree to an XML file of your choice. The XML file can then be saved for later import. You can import into the same or different Count, Release or Application within the same **SCOPE** database file or a different one. This option is useful when you want to merge the Application or Release counts into another **SCOPE** database. If you just want to extract the Application and its Releases to a clean empty **SCOPE** database then use the Snapshot option.

Import /Export a Whole Application or Single Release

This function allows you to merge Release counts performed off-line or stored in another **SCOPE** database into a common master **SCOPE** Database.

To **Import** or **Export** an Application or Release and all its count details, select Home and open the Applications List Tab. Highlight the Application node or expand and highlight a single Release for the Import /Export of the Release.

Export Application / Release

Highlight the Application or Release name and select the Export Icon. **SCOPE** will prompt you to name the XML file where your exported count will be saved.

Import Release

Highlight the Application Portfolio Group or Release Group (i.e. Production Release, Work in Progress or Other Releases) and select the Import Icon.
 SCOPE will prompt you to select the XML file where your count to be imported was saved. The Application or Release will be then imported and inserted as the last Application or the last Release in the Release Group.

Use the down and up arrows to shift the imported Application or Release to your preferred position.

4.1.3 Import / Export Count Sessions

Import Export Counts within a Release

Merging Counts within a Release

SCOPE will allow you to export a selected Count Session to be imported later into another Release within either the same **SCOPE** database file or a different one. This is essentially a 'merge' option where **SCOPE** merges the imported Count Session into the Release, so the Release now reflects the latest impacts and the imported Count Session becomes one of the Counts for the Release. Use this option to 'merge' counts from one database to another, if you just want to 'extract' a count to work on it then to merge it back into the original database, then use the Export Single Snapshot of Count Session or Release option by selecting 'Snapshot' when highlighting the count.

This feature is useful under the following circumstances:
- **Administrative Control of Your Counts** i.e. you have a 'master' database of **SCOPE** counts which is controlled by an administrator, who wants to quality

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check all counts prior to them being applied to the master version of the Release.

> *HINT: To do this Export the latest **Release** from Master into another temporary **SCOPE** database where a counter can create and work on their Count Session. When the administrator approves the count it is then Exported from the temporary database and Imported back into the latest Release within the Master database.*

o **Multiple Counts to be completed Concurrently** - you have many Change Requests for Applications on the same database that need to be counted by multiple counters at the same time.

> *HINT: To do this Export the latest **Release** from the Master Database to one or many temporary **SCOPE** databases where each counter will then create and work on their own Count Sessions. When each count is approved, they are then individually Exported from their temporary databases and Imported back into the latest Release in the Master database.*

o **A count on an Old baseline needs to be applied to the Latest Version** - i.e. You have completed a count for a project some time ago on an old version of the baseline and now the user wants to go ahead with the project and you do not want to have to spend the time to recount it based on the latest Release baseline structure.

> *HINT: To do this Export the count from the older version of the baseline and then Import it back into the latest Release in the Master database.*

Note: Counts can be imported and exported between Releases for the same application, different applications, or the same or different **SCOPE** databases.

<u>Setting up a Count Session to be Imported / Exported</u>

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1. Set up the target Release Structure where you where you want to create your new count session. This can be done several ways e.g.:
   - copy the whole **SCOPE** Master Database which has the Release count into which you want to create your new Count Session. Leave any existing counts in the Release
   - create a new **SCOPE** Database and create a new application node and then export the selected Release from the source **SCOPE** Master Database into the Work in Progress Releases branch under the new application in the temporary database
   - create a new Release, based on an existing Release using the New Release function on the Software Applications List

2. In the new target Release create your New Count Session. (See Create a new Count Session)

3. Open the new Count Session and make your changes and Save.

Export Count Session

1. Select **Export Count Session** either :

   - under Edit / Export on the main menu while you have the Count Session open

   - from the Software Applications List while you have the Count Session highlighted

2. **SCOPE** prompts you to name the Count Session file (*.SCS) and select the target directory for where it is saved.

Import Count Session
1. Open the **SCOPE** Master Database and Import the Count Session into the Latest Release by selecting **Import Count Session** either :

- - under Edit / Import on the main menu while you have the Latest Release open

  - from the Software Applications List while you have the Release highlighted

2. **SCOPE** prompts you to select the Count Session file (*.SCS) and select the directory where it is saved.

See also Import / Export Release and Export Single Snapshot of Count Session or Release

4.1.4 Import / Export Trees and Parts of Trees

Import and Exports Trees or Parts of Trees

Import /Export Whole Trees or Parts of Trees
This feature allows you to import and export whole trees or parts of trees which make up your functional model of your software. This is useful when you have:
- counted similar functionality in another application and you want to copy it over to this Release count to avoid re-typing
- made a generic list of assumptions in another count and you want to have access to them in this count
- added in functionality in a previous Release but removed it as part of a de-scoping activity and you want to put it back in again
- created a generic attribute list and you want the common set of attributes applied to all your counts
- had several different counters counting the same application and you want o merge their counts into a single functional hierarchy and data list

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<u>Export a Whole Tree or Part of a Tree</u>

Locate your cursor on the branch to be exported and select **Export Tree** from under the Edit menu. **SCOPE** will prompt you with the XML file name where your exported branch will be saved.

<u>Import a Whole Tree or Part of a Tree</u>

Locate your cursor on the branch where you want the imported nodes to be pasted and select **Import Tree** from under Edit/Import on the main menu. **SCOPE** will prompt to check if you want to import Count Session Impacts and / or links to other Trees.

If the nodes you are importing have been impacted by a Count Session then you will be prompted to select to import a Count Session. In this case, **SCOPE** will add that Count Session to the List of Sessions for the current target Release.

See also Using the Mouse to Copy and Move

4.2 Importing Other Application Data into **SCOPE**

4.2.1 Import from FPW™ All Versions

SCOPE imports all the detailed count data from function point counting tools such as Function Point Workbench to the **SCOPE** format without losing any transaction, data, labels or note details. It also imports all links.   The IMPORT from FPW option enables you to import your earlier counts created by Version 4 (1994) up to the Version 7 (2009) of the <u>Function Point WORKBENCH™</u> (FPW) software.

IMPORTANT - If you experience any difficulty with the import - With Microsoft Explorer™ copy the FPW database directory (i.e. all .db and .px files) to a directory under your local root directory or to your desktop.
*(Note: Reducing the pathname of the source directory **assists earlier** operating systems (e.g. MS XP) to access to the paradox files)*

Converting FPW 4 to FPW 7 Databases

SCOPE will automatically convert FPW 4 to FPW 7 databases by first locating your FPW database only one level from the Root node on your computer then selecting the Import from FPW function on the main menu.

On selecting **Import**, SCOPE prompts you for the full pathname:

- o of the source directory currently storing all the FPW .db and .px files (e.g. c:/FPW_Source_database)
- o of the destination directory for the SCOPE database. Requires you to input a new file name for the SCOPE .FPA database in which to store the converted FPW data

After you have input the new file name, press Import and SCOPE will display a message asking you to be patient for very large databases as they may take several minutes to import. SCOPE converts all the .db and .px files from the FPW database into a single SCOPE *.FPA database file, saved under the new file name you input. If you experience any problems you may want to try the Advanced Import Option.

Please contact Total Metrics support if you experience any difficulty and our support team will assist you.

4.2.2 Advanced Import from FPW

4.2.3 FPW Conversion

SCOPE enables the Program Full Convert to first convert the FPW paradox files to Microsoft Access tables prior to the SCOPE Import. In some instances Users find that their network security installations prevent SCOPE from triggering the Full Convert Program.

In this case complete the following steps.

1. On your Computers 'Start bar' use the "Search Programs and Files" option to search for **Full Convert Enterprise 5.0** (do not update this version to the latest version , use the one installed on your computer as part of your SCOPE Install).

2. Select to run **Full Convert Enterprise 5.0**

3. In the *Welcome to Full Convert* window, select option "Create New conversion" then follow the steps below.

   Step 1.

   Left hand side list of Available source databases – select "Paradox"

   Right hand side under Paradox Database Folder browse for the directory where the FPW .db and .px files are stored. (Should have 22 db and 22 px files). Press <NEXT>

   Step 2.

   Left hand side list of Available Target databases – select "Access"

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Right hand side under Access File Name browse for the directory where you want the .mdb converted files are stored.

Press <NEXT> (note remember this directory and file name that you entered, as you will be prompted in SCOPE to browse for it)

You will be notified that the specified database does not exist and be asked to create it. Press <OK>

Step 3

All 22 FPW Paradox files will be listed in the Right hand side panel "Convert".

Select <NEXT> to convert them all to .mdb files.

Step 4.

Select the option " I want to convert immediately" . Press <Convert.

When the message "Conversion is about to begin" displays. Press <√ Continue>

A summary result report displays. Should report that all 22 Tables were created. Press <√ OK>

The full list of all the tables in the newly created Access Database will then display.

Step 5.

Select to Exit **Full Convert Enterprise 5.0**. You do not need to save the steps unless you want to reuse them again in the future.

4.2.4 FPW Import Into SCOPE

- Open SCOPE and select from the File Menu <FILE> <Import from FPW™>

- In the dialogue box "Import from Function Point Workbench ™"

- In the Destination SCOPE Database - Select a destination directory and file name

- Press <More>>> button and browse for the name of the mdb ACCESS database you created in **Full Convert Enterprise 5.0**

- Press <Import>

- Press<OK>

Please contact Total Metrics support if you experience any difficulty and our support team will assist you.

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4.2.5 Import Counts from MS Excel®

Import a Count from Excel

Your counts previously performed in Excel can be imported directly into **SCOPE** by selecting the function Import from EXCEL Template under Edit/Import on the main menu. In order to import your counts you first need to extract all the count details into the **SCOPE** EXCEL template. **SCOPE** will only import from this template.

You can import 4 different sets of size related information I.e. **Transactions**, **Files**, **Notes** and **Attributes** from an MS EXCEL® file and saved in comma delimited file format (*.CSV).

Steps:

1. Open the EXCEL® workbook "*Master SCOPE EXCEL Import Template.XLS*" which was installed in the same Directory as **SCOPE**

2. Save a copy of the workbook under a working directory

3. If you already have your count stored in an EXCEL® spreadsheet then you will need to copy it into the Transactions - Processes and Files - Data Groups spreadsheets in the "*Master SCOPE EXCEL Import Template*" Workbook. These worksheets have a specific content required for each column. You may want to convert your existing spreadsheet data to that required by the "*Master SCOPE EXCEL Import Template*" Workbook, before copying it.

4. Once you believe the data is in the correct format, select to copy the data from your count. Use the Option **"Paste Special"**, and select to Paste "**Values**" to paste your count data into your working copy of the "*Master SCOPE EXCEL Import Template*" Workbook. The validation rules in the template will check your data prior to importing it into **SCOPE** and highlight any errors in your content as **Red text**.

5. If you are pasting **text** stored in **software other than EXCEL**, (e.g. MS WORD), then copy the text into a temporary EXCEL spreadsheet. Select to copy the text from the temporary sheet, and using the option "Paste Special", and selecting to Paste "Values", paste into the" *Master SCOPE EXCEL Import*

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Template" Workbook. This ensures that the pasted values are validated prior to importing into **SCOPE**.

6. Check the count spreadsheets (Transaction - Processes and Files -Data Groups) for any **invalid data** which will be highlighted **in Red**. Check for any additional error messages are in the column after the last input column.   Correct any erroneous data using the data entry input message as a guide for the correct values required. Enter data directly into the template for any additional rows you require to be imported into **SCOPE**.

7. The only **mandatory column** in any of the four spreadsheets is the first Column **A**. If you want your function point count details transferred to **SCOPE** then you will need to complete columns **C** and **D** and either **E**, **F**, **G+H**, to record the complexity or alternatively use Column **I** to just record the FPs awarded to your elementary processes or Data Groups and **SCOPE** will derive the complexity. Use Column **J** to record the enhancement impact type (add, change, delete).

8. **Do not leave any blank lines** in your list to be imported. As soon as **SCOPE** encounters a blank line it assumes the end of the list of data to be imported.

9. If you have a set of Notes or Attributes you would like recorded for the count in **SCOPE** then insert the list in the Notes List or Categories / Attributes worksheets. These items can be linked to their relevant functions once imported.

10. Once you have completed your data entry select to save your workbook as an *.XLS file.

11. For each worksheet you want to import select to save as a Comma Delimited File (CSV), using the SAVE AS option under Files and selecting **CSV** (Comma delimited) (*.CSV) when selecting the "**Save As Type**". Select OK and YES when prompted about saving and losing the formatting.

12. Save your file with relevant name and a CSV extension. You will need to save each worksheet (Transactions, Data, Notes) you want imported as its own CSV file name. For ease of importing, save related count files you want imported as a set in the same directory. When you close MS EXCEL you will

be asked again to confirm to save the file. Only answer Yes if you have made changes since you last saved.

13. Open **SCOPE** and select under Files on the main menu select to import your function point count (Import from CSV) by selecting the relevant CSV for your Transactions, Files and Notes.

14. If you want to import a list of Functions / Processes or Data Groups into an existing **SCOPE** count then open the Release, highlight the tree you want to import into. Highlight the node under which you want the list to be inserted and select to Import Tree from **SCOPE** EXCEL template under Edit on the main menu. From the browsed list select the relevant CSV file for that Tree Type.

4.2.6 Importing Bulk Metrics Data from EXCEL

Importing Metrics Data from Excel Spreadsheets

4.2.6.1 Selecting the Import Data

In the Benchmark Metrics Tab, on the main menu select the Import button . The Import Metrics Data Screen Displays. Select the "File Open - Browse" icon to select the directory folder where you have saved your completed **SCOPE** Metrics Import Templates . Select the EXCEL file for import and **SCOPE** will recognise the type of data stored (CRs / Projects / Releases/ Applications) and display all the records for Import.

Note: In order to import data you need to be located on the appropriate branch of your Benchmark Data Hierarchy. In all cases you will have first needed to set up the Benchmark Period for which the data will be reported. Once a Benchmark Period has been set up you can import M&S data for Applications or Development and Enhancement Data for Releases, Projects and Change Requests:

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To import :

1. ▢**Change Request Data** - from template type *ImportChangeRequests.xlsm*

   see tutorial

   - *Ensure the Release for the Change Request (CR)has already been added to the Benchmark Releases Branch and locate your cursor on the name of a Release. In the List of Imported CRs highlight one or more CRs (use CTRL) that you want to import and SCOPE will "Create New" CRs under the Release and import all their metrics data.*

   - *If you want to merge the CR data in the imported spreadsheet with the metrics data already stored in a CR that exists in a Release and/or has been assigned to a project, then highlight the name of the CR in the Release or Project and select a CR from the Import List. Press the "Merge Data" button.*

   - *If you want import metrics data for CRs for Projects but the CRs do not already exist in SCOPE. You first need to ensure that the Release for the CR exists and import the CR data for the Release. This means the Release has to be added to the Benchmark Period first. Then assign the CR to the appropriate Project .*

2. *👥***Project Data** - from template type   *ImportProject.xlsm* see tutorial
   - *Position your cursor on the Benchmark Projects Branch under the Period. In the List of Imported Projects h*ighlight one or more Projects (use CTRL) that you want to import and SCOPE will "Create New" Projects under the Branch and import all their metrics data.

   - *If you want to merge the Project data in the imported spreadsheet with the metrics data already stored in a Project then highlight the name of the existing Project in the Benchmark Projects Branch and select a Project from the Import List. Press the "Merge Data" button.*

3. *🔒***Release Data** - from template type *ImportRelease.xlsm* see tutorial

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- *Position your cursor on the Benchmark Releases Branch under the Period. In the List of Imported Releases highlight one or more Releases (use CTRL) that you want to import and SCOPE will "Create New" Releases under the Branch and import all their metrics data.*

- *If you want to merge the Release data into a Release that already exists in SCOPE, you first need to Add the Release to the Benchmark Releases Branch in the Benchmark Period.   Then to merge the information from the imported spreadsheet with the data already stored in the Release, highlight the name of the existing Release in the Benchmark Releases Branch and select a Release from the Import List. Press the "Merge Data" button.*

4. **Applications MS Data** - from template type *ImportApplication.xlsm see tutorial*

- *Position your cursor on the Benchmark Maintenance and Support (M&S) Branch under the Period. In the List of Imported Applications highlight one or more Applications (use CTRL) that you want to import and SCOPE will "Create New" Applications under the Branch and import all their metrics data. This will create New Applications in your database.*

- *If you want to merge the Application data into an Applications that already exists in SCOPE, you first need to Add the Application to the Benchmark Period. Then to merge the information from the imported spreadsheet with the data already stored in the Application , highlight the name of the existing Application in the Benchmark Maintenance and Support (M&S) Branch and select an Application from the Import List. Press the "Merge Data" button.*

Remember if you make a mistake, just fix the Template and import again using "Merge Data". SCOPE will only import the fields that are not NULL and will only import the rows in the spreadsheet (ie. Applications, Releases, Projects or CRs) that you select and highlight. ie. it will show all rows in the import spreadsheet but only

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import the ones you select. If you want to empty all fields then you will need to put '0' values into the spreadsheet or delete them manually in **SCOPE**.

If you have input fields into the spreadsheet and they are not imported into **SCOPE** it means that the field you entered was invalid. Fix the spreadsheet and import again.

-
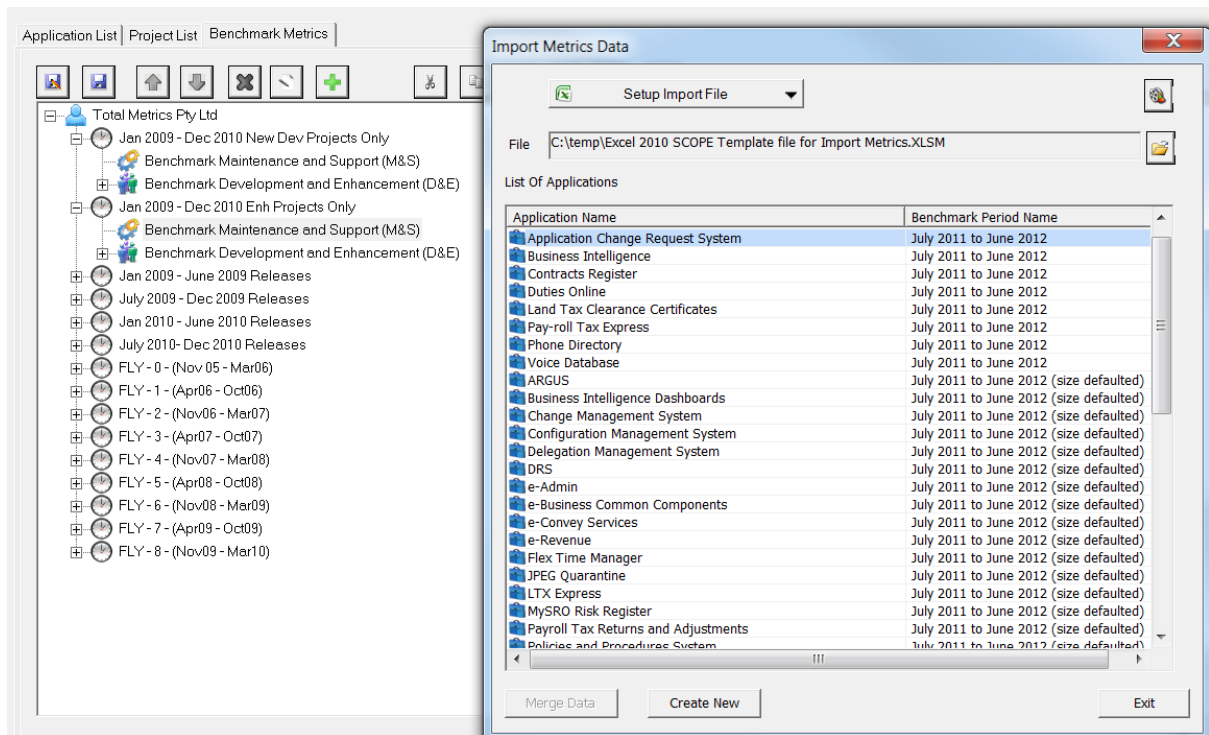
4.3 Exporting Data to Other Applications / ISBSG

4.3.1 Export to SPR KnowledgePLAN® (CSV)

SCOPE exports a summary of the currently selected Release or Count Session's Functional Size Results and Value Adjustment factor into a CSV format compatible for import into SPR KnowledgePLAN®.

Open the selected Release or Count Session you want to estimate in KnowledgePLAN® and select **Export to SPR KnowledgePLAN®** under Edit / Export.

SCOPE prompts the user to name the file and the directory to save the Exported *.CSV file format.

This CSV format is a very generic layout and this function may also be used to create Function Point Results for import into other software of your choice.

4.3.2 Export to SEER SEM Estimation Software

see Export Project to SEER SEM and Export Release to SEER SEM

Complete the recording of functional size in **SCOPE** and all relevant details for the Count Sessions, Project and Releases prior to selecting to export.

In the Applications List screen highlight the Release or Project you wish to estimate using SEER SEM® Software.

Select the Export to SEER Icon in the top menu .

SCOPE will export the highlighted Project or Release function point size and their environment data to a SEER SEM® formatted 'project' file.

This file is saved under the User Profile *MyDocuments* directory under the name:

- ExportProjectSEER.txt - for Project Data

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- ExportReleaseSEER.txt - for Release Data

When the selected .txt file is opened in SEER SEM® Project Estimation software, the Project/Release size and environment data is pre-loaded ready for estimating.

4.3.3 Export XML to a Metrics Repository

Select **Export to Metrics Repository** (XML) from under Edit / Export when you have a Release open. **SCOPE** prompts you to name the directory and the exported XML file. This export has been designed to export all the associated attributes and metrics calculated and stored within **SCOPE** for example it exports all the fields identified as being mandatory by the International Software Benchmarking Standards Group's (ISBSGs) project data repository.

SCOPE exports _all the fields_ that are in the **SCOPE** Description and Summary Reports for the associated:

- o Application

- o Release

- o Project

- o Count Session(s)

If you are located at Release Level (i.e. No Sessions are Open), then Count Sessions' Details will be exported.

If you have a Count Session Open within the Release then only that Count Session's Details will be exported.

If you require to export all the Benchmark Metrics data recorded for the Count Sessions, Projects and Releases, and Applications we recommend that you use the Benchmark Metrics Reporting Option. ie. Select the Projects , Releases, or Applications that you want to report on within the Benchmark Metrics tab and run the EXCEL reports. These reports create an XML export file. The XML file is saved

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in the same directory as the EXCEL report file. In many cases these export XML files may provide the information you are wanting to import into other applications.

The schemas defining the data format for these XML files are located under the Programs Folder / TotalMetrics/ SCOPE

- DevelopmentAndEnhancementProjects.xsd

- DevelopmentAndEnhancementReleases.xsd

- MaintenanceAndSupport.xsd

4.3.4 Export ISBSG Industry Benchmark Metrics

Exporting data to ISBSG

Record and report all your productivity and quality performance data in the SCOPE Benchmark Metrics module. SCOPE designers worked with the ISBSG to ensure that the SCOPE data collection set is compliant with the ISBSG Repository standards.

SCOPE allows you to record size, effort, defect and environment attribute data for Development and Enhancement (D&E) projects and Applications Maintenance and Support (M&S) . You can either record this metrics data directly into SCOPE or import it from EXCEL spreadsheets. This enables you to do your own internal benchmarking, productivity and quality trends analysis and/ or external benchmarking to ISBSG data.

Export to ISBSG ▼

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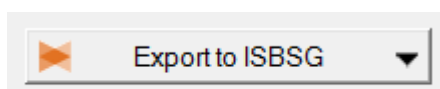
SCOPE allows easy project and M&S data submission to the ISBSG database, by allowing you to select which projects you want to submit and then just select to preview your submission and export and email it to ISBSG . If you want to utilise this XML / spreadsheet data internally within your organisat ion then just save the Xcel spreadsheet.

SCOPE reports your performance metrics either in a table, MS EXCEL pivot charts or via an interactive www based portal.

5 Managing Benchmark Performance Metrics

5.1 Setting Up Benchmark Metrics

5.1.1 Setting Up Applications and Projects for Benchmarking

You can set up Benchmarking Metrics Data by setting up the Applications, Releases, Projects and Count Sessions in :

- SCOPE and entering metrics data as described below, or
- EXCEL and aggregating metrics data from different sources (eg Portfolio Management, Time Sheet recording or Defect Tracking software) then importing metrics data from EXCEL into SCOPE.

In order to input benchmarking metrics into SCOPE for :

- **Maintenance and Support** - you first need to set up the Application in SCOPE
- **Development and Enhancement** - you first need to set up the:
    - Applications that are impacted by the Project - see Set up a New Application

- Release in the Application that the Project will impact - see Set up a New Release

If you are recording Metrics data about **Projects** and do not want to record the data at individual Change Request Level for the Project then just set up a new:

- Project in the Project List - see Set up a New Project

If you are recording Metrics data about **Releases** and do not want to record the data at individual Change Request Level for the Release then just set up a new:

- Release under the Work in Progress Releases for the Application - see see Set up a New Release

If you are recording Metrics data about **Projects** or **Releases** and _do_ want to record the data at individual Change Request Level then just set up a new:

- Count Session in the Release - see Set up a New Count Session
- Project in the Project Lists - see Set up a New Project
- Add the Count Session to the Project - see Link Projects to Count Sessions

 Setting Up Benchmark Metrics

Before embarking on a Benchmarking activity we would recommend that you read Guidelines to Effective Benchmarking and Benchmarking Terms of Reference

What is a Benchmark Period

Record and report all your productivity and quality performance data in the SCOPE Benchmark Metrics module. You can do this directly by entering data into SCOPE or, by importing your metrics data from the SCOPE Excel Templates. See Importing Metrics Data from Excel Spreadsheets

SCOPE designers worked with the ISBSG to ensure that the SCOPE data collection set is compliant with the standards set by the ISBSG Repository .

Different organisations have different ways of grouping the 'work' their project teams do to develop and enhance software. SCOPE accommodates most of these of

groupings and allows you to record functional size and benchmark metrics against these various types of 'groups'. Before entering your size, effort , defect and cost data into **SCOPE** look at the level at which your project teams functionally size their software, record their time, allocate budget and assign defects. Then determine which is the most appropriate 'grouping' in **SCOPE** to record, compare and report your benchmark data.

ISBSG can accept data provided at any of the following groupings.

SCOPE 'groupings' of work:

- A "**Count Session**" is what some organizations call a "Change Request" or "Work package". i.e. it is a defined set of changes to User Functionality for a single application. This discrete set of changes (new functions, changed functions and deleted functions) may be implemented by separate teams or sequentially by the same team. A series of Work packages implemented within a set period of time and put into production at the same time represent a "Release" of the Application. Each Work package, within a Release impacts the same Application but their requirements may be quite unrelated and be paid for by a different "Project " budget.

- A "**Release**" is a collection of Count Sessions (Change Requests /Work packages) that were implemented for a *single* Application within a period of time, and released into production at the same time. *e.g. Windows 7 is a 'release' of Windows, and* **SCOPE** *4.0 is a Release of* **SCOPE** *that was made up of a series of Work packages that were implemented in a 12 month period.* So a Release will only be associated with one application and therefore each Work package within that Release will usually have a similar technical environment.

- A "**Project**" is similar to a Release except it is a collection of Change Requests /Count Sessions /Work packages, that were implemented for *one or more* Applications to satisfy a particular Business Requirement. *e.g. 'Implement new Taxation Legislation'* is a Project with its own budget which will have Change requests that impact one or more Applications. So a "Project" is often more difficult to benchmark since it may be associated with

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more than one application and may therefore be implemented with several different technologies, different teams, different languages, different locations.

A **Count Session** can belong to *both* a Project *and* a Release and within SCOPE can be recorded once but aggregated and reported for both groupings. The following SCOPE Architecture diagram illustrates how the relationships and data can be recorded within SCOPE. In order to record metrics data at Release Level or Count Session Level you first need to set up the Application that the Release belongs to, in the Applications List. Then set up the Release for the Application under the branch 'Work in Progress' Releases and if applicable set up its contributing Count Sessions under the Release. If your Count Sessions are also part of a Project. Then set up the Project in the Project List and Add the Count Session to the Project. Any metrics data recorded in :

- **Count Session** can be aggregated and reported at : Application Level, Release Level, Project Level.

- **Release** Level can be aggregated and reported at : Application Level, Release Level

- **Project** Level can be aggregated and reported at : Project Level.

So the more detail you record your metrics the more sophisticated the reporting.

Before you can record your metrics data in SCOPE you first need to set up the relevant Applications, Releases, Projects and Count Sessions in the Applications List and the Project List. see Setting Up Applications and Projects for Benchmarking

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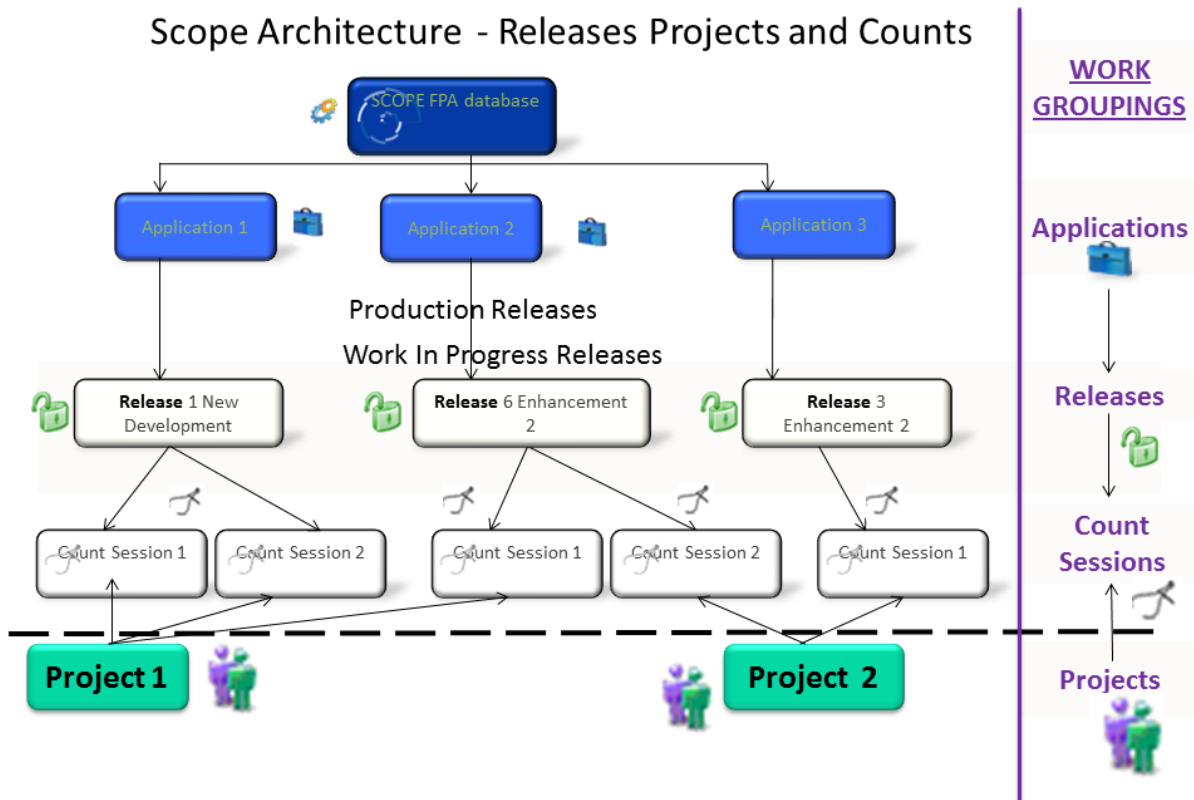
See also SCOPE Relationships - Applications Releases Projects Counts

Decide which grouping most closely aligns with how you collect your size, effort and defect data and enter your metrics data into that Grouping. To set up your Benchmark Period data see Recording Metrics Data

5.1.2 Recording Benchmark Metrics Data

Prior to Recording your Metrics Data in Benchmark Metrics you will need to set up your Applications, Releases, Projects and Count Sessions in the Application List and the Project List.

- **See** Setting Up Applications and Projects for Benchmarking
- **See** Importing Metrics Data from Excel

Assigning Project Metrics to Benchmark Periods

Importing Metrics Data from Excel Spreadsheets

5.1.2.1 ORGANISATION

Click the details icon to record the contact details for your organisation. These details will be extracted into any XML extracts you export from the Benchmark Data. They are also included in the the text of the email you send to the ISBSG Administrator if you elect to submit your benchmarking data, but the details are not recorded with the XML data file sent in the email attachment. You can remove or change the details in the email before sending. The contact information enables the ISBSG administrator to contact you if they need clarifications about your submitted data, but ensures that your data remains anonymous when forwarded to the Repository Administrator.

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Under ORGANISATION you can then set up ⊞ any number of "Benchmarking Periods" to group your metrics data for comparison and reporting.

5.1.2.2 <u>BENCHMARK PERIOD</u>

Benchmark Periods can be set up as a 'collection repository' for the set of Projects, Releases, or Applications that you want to benchmark as a set, compare to each other or group together to compare against another Benchmark Period set.

For ISBSG submission the Benchmarking Period is the period in which maintenance and support measures submitted to the ISBSG have been collected for the application. Note that this is not the period over which the application has been maintained by the organisation. The recommendation is that a submission should contain data for a period of 12 months, though a shorter period can be accepted. Data for alternative periods will be scaled appropriately to 12 months before analysis.

Typically a Benchmark Period would be for a particular period of time (e.g. Projects 2010 - 2011). But they may also represent a group of related Projects. e.g. assign all the New Development Projects written in Java developed in the last 3 years into a period called "Java ND : 2009 - 2001".

Example: you may want to set up a Benchmark Period to be "January to June 2011" and all the Projects that are implemented in that period are then assigned to that Benchmarking Period Set. The next Benchmarking Period could be "July to December 2011" and all Projects that are implemented in that period are assigned here. That would allow you to aggregate your projects results by Period to determine if your productivity was improving over time.

Set the Start and End Date for the Period to document the Reporting Period.

5.1.2.3 Benchmark Development and Enhancement (D&E)

SCOPE allows you to record ▨ data for size, effort , defect, cost, experience levels and environment attribute at what ever work group level suits your organization and how they collect their time sheets and defects. i.e. you can elect to collect at the following levels:

- **Benchmark Projects -** click the Details Icon to record size, effort and defect data for a Project at Project Level or record it at **Count Session** level and roll-up (derive) into a total for the Project. If you decide to derive Project totals from the Change Requests (Count Sessions) you can then manually override the derived total for the Project to include data allocated at Project level. *ie. SCOPE will sum all the defects recorded at Count Session Level and total them for the Project. However you may also want include defects that were recorded against the project but could not be attributed to a particular Change Request. These extra defects can be manually recorded at Project Level.*

- **Benchmark Releases** - click the Details Icon to record size, effort and defect data for a Release at Release Level or record metrics at **Count Session** level and roll-up (derive) the individual Count Session

values into a total for the Release.   If you decide to derive totals from the Count Sessions you can then choose to manually override the derived total for the Release . *ie. SCOPE will sum all the effort recorded at Count Session Level and total it for the Release. However effort hours may have been expended at Release level. These additional hours for the Release Management and Release Integration and System Testing can be added in manually at Release Level.*

A Project or Release can only be assigned to **one** Benchmarking Period. If you want to move it to another Benchmarking Period then either 'Cut and Paste' it or delete it and add it again. Deleting from the Benchmarking Period does not actually 'delete' the Project or Release it just removes the Project or Release from being reported within that Benchmarking Period.

For details on how to complete each of the Benchmark Metrics tabs in Count Sessions, Projects and Releases see:

- Effort Data (D&E - Projects and Releases)
- Defect Data (D&E - Projects and Releases)
- Cost Data (D&E - Projects and Releases)
- Environment Data (D&E - Projects and Releases)
- Experience Data (D&E - Projects and Releases)
- Comments Data (D&E - Projects and Releases)
- Size Data (D&E - Projects and Releases)

5.1.2.4 Benchmark Maintenance and Support (M&S)

SCOPE allows you to record data for size, effort , defect, cost, usage and documentation quality attribute for each Application maintained and/or supported.

- **Benchmark Applications -** you can record your maintenance and support metrics data for your Applications for any period you elect. If

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you want to benchmark quarterly, biannually or annually, then just set the Period duration that the data has been collected for in the Benchmark Period.

For details on how to complete each of the Benchmark Metrics tabs in the Applications Period Metrics Details:

- Effort Data (M&S - Applications)
- Size Data (M&S - Applications)
- Usage Data (M&S - Applications)
- Documentation Data (M&S - Applications)
- Environment Data (M&S - Applications)
- Documentation Data (M&S - Applications)
- Comments on Data (M&S - Applications)

View reports on your Benchmark data.

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5.1.3 Setting Up Metrics Data in EXCEL

 Setup Benchmark Metrics Data in EXCEL for Import into SCOPE

5.1.3.1 <u>Selecting the Template as the Import File</u>

In the Benchmark Metrics Tab, on the main menu select the Import button . The **Import Metrics Data** Screen Displays. Select the "Setup Import File" button and the drop-down list will display the 4 different types of Metrics Import Templates for you to select the one you need.

1. **Change Request Data** - Opens the template *ImportChangeRequests.xlsm*

2. **Project Data** - Opens the template *ImportProject.xlsm*

3. **Release Data** - Opens the template *ImportRelease.xlsm*

4. **Applications MS Data** - Opens the template *ImportApplication.xlsm*

Select the template best suited to the type of Metrics Data you need to import. SCOPE will copy the template to the Directory Folder you choose under the Browse for Folder Screen. Use the 'Save As' option to save your file with a new name. Once your data is input into the spreadsheet it can be imported directly into SCOPE.

NOTE: These template files are stored under your Windows User Name directory "MyDocuments/Total Metrics". You can copy them from this directory to another directory folder of you choice and rename.

If you have any issues with editing the Spreadsheets see Trouble Shooting - Enabling the EXCEL Template Macros

5.1.3.2 <u>Guidelines for Inputting Data in the Metrics Templates</u>

Steps for loading data into the 🅇SCOPE Metrics Templates - manually or from external source

1. First ensure the source data is in the same format as the fields in the template worksheet i.e. Numeric or text.
2. The NAME of the Application/ Project/ Release or Change Request which is to be imported is the only mandatory field required for the import. If you want to load metrics data for one of these entities (Application/ Project/ Release or Change Request) and an entity of that name is already stored in the **SCOPE** database then enter that same Name stored in **SCOPE** into this workbook. Note, this name does not have to be identical, just identifiable when you select to merge the imported data with existing data.
3. If the field is a drop down list - (GREY coloured columns that display a predefined set of ISBSG standard values) then please select a value from the List if entering data manually. If you are pasting data from another source, then ensure that the input data contains the same valid values. If you want to know which values are valid for each field then use the Excel function to ' Unhide the Worksheet' to display the list eg The valid values for the "Development Team Country" field can be found in the hidden Worksheet called "Country - 39". You cannot add to these lists of Valid Values, **SCOPE** will not recognise any new values.
4. **DO NOT DELETE** rows or columns in the spreadsheet - you will corrupt all the links required to complete the import.
5. Data can be entered either by:
   - Manual Input - key the data directly by keying into the cell in each sheet OR
   - Automatic Input - Copy and Paste the relevant data which has been formatted into rows and the appropriate columns from the source data. Source data can be either in another XCEL spread sheet OR a table

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(e.g. WORD or ACCESS). Please ensure that you do not delete rows and any data pasted is a valid value.

4. If Errors are identified in the data then the Sheet will report a message "FIX" in the right hand column of the data entry row. This typically occurs when you have entered data into a row that does not have a Project Name, Release Name etc.

5. Please fix all reported errors before attempting to import data into SCOPE.

6. You can leave fields empty in the spreadsheet and only input fields that you want to import or overwrite in SCOPE. If a field is empty in the spreadsheet and already has a value in SCOPE it will not be overwritten. This enables you to continually refine your input if your data arrives over time or the original import had incorrect values.

7. At the time of import SCOPE will give you flexibility to choose which rows of spreadsheet data (CRs/ Projects/ Releases / Applications) you want to import and which to exclude.

Note: DO NOT MAKE CHANGES TO THESE EXCEL TEMPLATES. They have been specifically formatted for SCOPE. If you ignore the validation guidelines then during the import process, SCOPE will reject any invalid fields or empty fields and treat them as NULL. If you have suggestions for improvements for this import then please let us know by contacting SCOPE support.

5.1.3.3 EXCEL Metrics Templates - Which one to Choose?

5.1.3.4 EXCEL Import Templates

You can to enter Project related metrics such as effort, defects, cost and environment data) to combine with your Function Point size data directly into SCOPE. These metrics can then be used for benchmark and performance reporting. (see Setting up Benchmark Metrics)

To speed up this data entry, SCOPE has alternative method of inputting Metrics data by importing them from *SCOPE Metrics Import Templates*. These Excel templates enable organisations to convert their metrics data from their original source into EXCEL for bulk importing into SCOPE.

There are 4 *SCOPE Metrics Import Templates*.
1. *ImportChangeRequests.xlsm*
2. *ImportProject.xlsm*
3. *ImportRelease.xlsm*
4. *ImportApplication.xlsm*

Choose the template that best suits your organisations method for collecting metrics and reporting them.
eg. if your project teams ;
- work on defined Change Requests and all effort is recorded by Change Request then template #1. *ImportChangeRequests.xlsm* would be best suited for you to transfer your data from your time sheeting system.
- work as a Project team but may work on one or many Change requests at a time, so effort and other metrics are collected at Project Level, then template #2. *ImportProject.xlsm* would be best suited to record effort, costs defects etc.
- work on a Release of an Application which may have one or many Change requests, belonging to one or more Projects and effort and other metrics are

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collected at Release Level, then template #3. *ImportRelease.xlsm* would be best suited to record effort, costs defects etc.

Templates #1 to #3 collect metrics related to Development and Enhancement. Template #4 is specifically for Maintenance and Support metrics for Applications.

All these templates are stored in the *MyDocuments* directory under your Windows User Name.   When using these templates, after copying and renaming them , we would recommend that you do not try and modify any validation rules or formats, as they have been specifically set up to facilitate import of data into SCOPE. Many of the fields have reserved values as defined by the ISBSG data collection requirements. SCOPE has specifically restricted the validation on the data entry to be compliant with the ISBSG data collection requirements. Do not change these as SCOPE will not import values that are not ISBSG compliant.

Follow instructions in Setting Up your Metrics Data in Excel to complete the templates for import.

SCOPE Excel Templates have been developed for MS EXCEL® **2007 and 2010**. We do not expect them to work as expected if you use older versions of MS Excel.
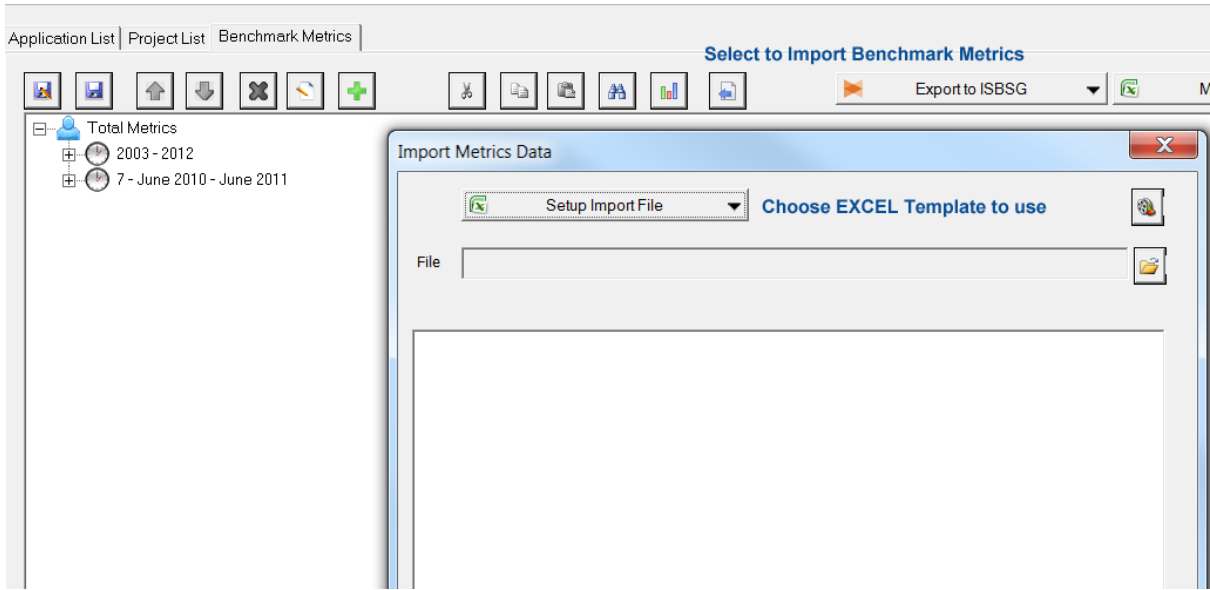
5.1.4 Benchmark M&S Applications

5.1.4.1 <u>Environment Data - M&S - Applications</u>

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

To enter the environment attributes for an Application, select the Details Icon whilst located on the Application Name either in the Applications List or the Benchmark Metrics List.

Comparative Benchmarking has demonstrated that environmental attributes of an Application impacts the productivity achieved by both the development and enhancement (D&E) and the maintenance and support (M&S) teams. If you are planning to submit your Benchmark D&E or M&S data to ISBSG or to benchmark your own data to industry it is important that you complete all these Application Environment fields.

Platform - Defines the primary software development platform, (as determined by the operating system used). Each project is classified as: PC, Mid Range, Main Frame or Multi platform. ISBSG classify the development platform of the project to be the environment in which the software was developed, based on primarily the development operating system. This question provides primary input to that classification. A Multi platform environment would include aspects of more than one of the categories Mainframe, Midrange, or PC.

Unique ID - used by ISBSG . If you submit M&S Metrics for an Application, then ISBSG will allocate you a unique ID for each Application submitted. This enables ISBSG to track subsequent submissions in other Benchmarking Periods for that Application.

Primary Programming Language - for an explanation for what to enter in this field see **Environment Data (D&E - Projects and Releases)**

Secondary Programming Language - The secondary programming language is that used to program the bulk of the application after the primary programming language.

KSLOC% - Amount of code should be the number of *Logical* KSLOC in the relevant language (primary, 2nd or 3rd, etc). However, if more convenient it may be expressed as a percentage figure, with total Logical KSLOC for application. Logical KSLOC includes job control statements, format statements and data declarations but excludes comment and unmodified utility software. Physical KSLOC includes all the above.

Language Level - for an explanation for what to enter in this field see **Environment Data (D&E - Projects and Releases)**

5.1.4.2 Documentation Data - M&S

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

It is likely that the availability of relevant documentation will significantly reduce the maintenance effort and thus enhance productivity. **SCOPE** lists the documents available to the maintenance team. The quality and availability of the documentation is expected to be a significant factor in the cost of maintenance. Rate the extent the documents are available and up-to-date
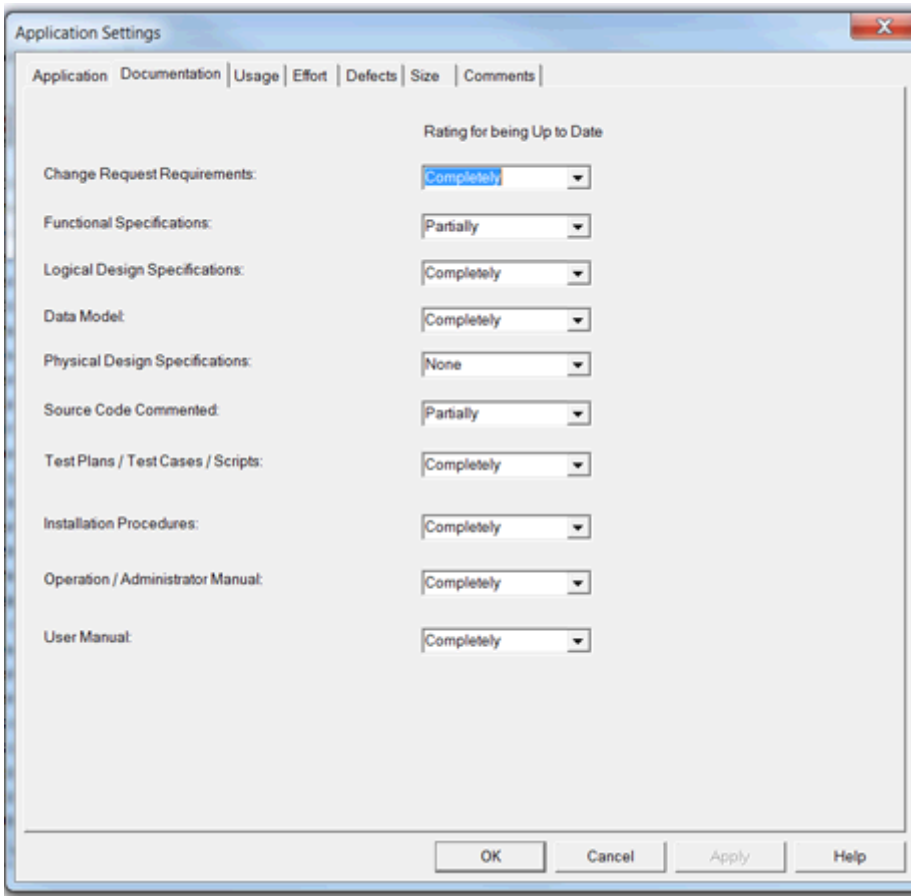
5.1.4.3 Usage Data - M&S - Applications

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

Experience indicates that the extent of use of an Application will impact the effort and cost to maintain and support the application. These Usage Attributes assist in profiling applications and explaining variances in support efficiency.

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Execution Frequency - This is the operational regime of the software product. The expectation is that a high performance and execution frequency will have higher maintenance costs

System Availability - This is the required availability of the system i.e. is it required for 7 hours/day 6 days of the week or 24hrs for 7 days of the week.

Data collected about the extent of **Usage** of the application for the following classifications:

- **Distinct Installations** - Number of distinct installations for which the maintenance and support effort is required. A 'distinct installation' is an individual installation of the complete software system.
- User Locations - Number of user locations is a simple count of the number of geographically separate locations for which support is provided.
- **Distinct End Users** - Number of distinct end users is those having access to the system, regardless of whether they use the system regularly or occasionally.
- **Concurrent Users** - Number of concurrent end users is the number of users on-line at the same time (applies to single distinct installation). This data is held as a maximum and average number.

5.1.4.4 Effort Data - M&S - Applications

Recording Application M and S Metrics

You can record metrics data either : -

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

Without effort data, you will not be able to perform any significant benchmarking analysis. If only the total hours is known, then enter just the Total Hours. If the hours of effort are known for each of the Maintenance and Support Activities then please enter the details. Click derived for **SCOPE** to sum the values into the Total field.

If however the breakdown is known then please also enter this in the separate fields. Please enter as much detail as possible.

5.1.4.5 Maintenance Effort

Maintenance Effort is time spent on activities and tasks required to keep a system operational after its implementation into Production. Maintenance tasks are categorized as follows:

- **Perfective** maintenance - The modification of a software application after delivery to improve performance or maintainability. Note: perfective maintenance provides enhancements (improvements) for users, improvement of program documentation, and re-coding to improve software performance, maintainability, or other software attributes.

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- **Preventative** maintenance - The modification of a software application after delivery to detect and correct latent faults in the software product before they become effective faults. This might include redesign or expansion of the database in order to accommodate increases in data occurrences. It is recognised that such activities may well be bundled for the purposes of regression, integration and user acceptance testing

- **Adaptive** maintenance - The modification of software product, performed after delivery, to keep a software product usable in a changed or changing environment. Note: adaptive maintenance provides enhancements necessary to accommodate changes in the environment in which a software product must operate. The changes are those that must be made to keep pace with the changing environment. For example, the operating system may be upgraded and some changes may be made to accommodate the new operating system. Note: for the purposes of the ISBSG M&S standard the adaptive maintenance to be included is that often called minor enhancements (see entry in Glossary) and are taken to require less than five staff days of effort

- **Corrective** maintenance - The reactive modification of a software product performed after delivery to correct discovered problems. Note: the modification repairs the software product to satisfy requirements.

- **Management** effort - This is the time that cannot be directly attributed to the maintenance of an application (e.g. Administration or Personnel management).

5.1.4.6 Support Effort

- **User Help and Advice** - Effort hours spent on Help Desk Calls for this application made during the benchmarking period. These may be direct calls, emails or issues raised via a query logging system.

- **Problem Investigation** - Effort hours spent on support activity of problem investigation, which is carried out in order to determine if a reported incident is in fact a defect, or an error in user documentation or training or merely a user error.

- **Queries and Quick Service** - Effort hours spent on one-time questions that are not part of the application and can be delivered by the support team on request of the user. .A Query is a one-time extraction from the application data . A Quick Service is the provision of a one-time service that involves some manipulation of the data in the database

- **Management** effort - This is the time that cannot be directly attributed to the support of an application (e.g. Administration or Personnel management).

Maintenance and Support Team Size - The number of people (in whole numbers) regardless of their availability who are assigned to maintenance and support of this application.

5.1.4.7 Defect Data - M&S

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

The number of defects detected in each of the categories for the application <u>for the period</u> about which data is being collected. The number of defects found in production is an indicator of the maturity of the Development Processes capability to find and remove defects.

The Defects are rated by severity. For more details on the severity ratings see :
Effort Data (D&E - Projects and Releases)

5.1.4.8 Size Data - M&S - Applications

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

Application Size - An objective measure of the size of the software maintained and supported. Evidence shows that there is a strong correlation between the effort hours spent on Maintenance and Support and the functional size of the application being supported. This correlation is much weaker for Lines of Code (KSLOC)
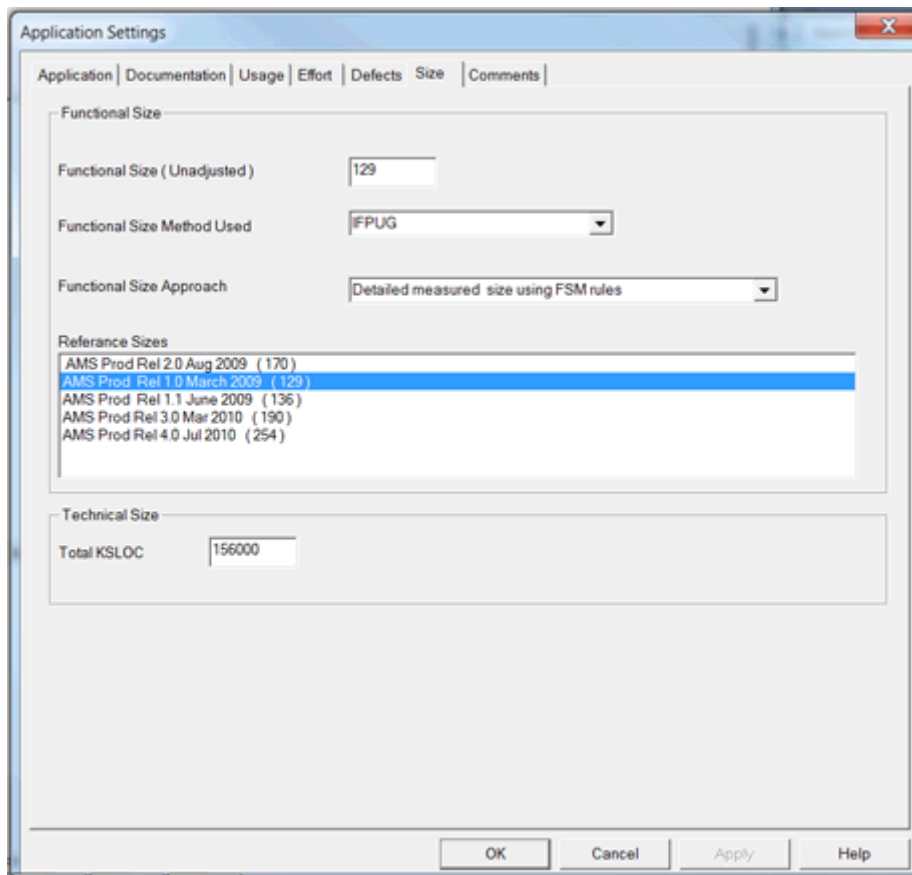
5.1.4.9 Functional Size

- **Functional Size**: This measure is derived by quantifying the Functional User Requirements (i.e. what functions the software must support). This excludes Quality and Technical Requirements i.e. it is the unadjusted size. Units of functional size are Function Points. **SCOPE** displays a reference list of Baseline sizes that can be optionally recorded in the Application Baseline Releases to allow you to insert the size relevant to the Benchmarking Period for which the Application is currently being assessed. You do not have had to record your function point counts in **SCOPE** in order to insert the Functional size value in the M&S data for the Application.

Hint - Open **SCOPE** EXAMPLE DATABASE which is installed with **SCOPE** for an example of an Application and its Releases and Projects where size has been entered manually. (FLY Application)

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- **Functional Size Method Used -** There are currently 5 Functional Size Measurement Methods for measuring functional size. Functional Size measured using SCOPE software is in IFPUG Function points.
- **Functional Size Approach** - this is an indicator of the accuracy of the size

5.1.4.10   Technical Size

Technical size is a measure of the source code that runs the application. This is a measure of **Logical** Lines of Code. Units of technical size are thousands of lines of code. Code instructions are defined as: All program instructions created by project personnel and processed into machine code by some combination of pre-processors, compilers and assemblers. It excludes comment and unmodified utility software. It includes Job control statements, format statements and data declarations (see Software Engineering Economics, Barry Boehm).

KSLOC - unit of measure of one thousand logical lines of code. e.g. 5000 lines of source code = 5 KSLOC

5.1.4.11   Comments on Data - M&S

Recording Application M and S Metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

Enter data in the comments fields to assist in the analysis of your Benchmarking Data. This may be used to clarify how you collected, derived, aggregated the data values in the various fields entered for the Application for the Benchmarking Period . This information is included in the data extract sent to ISBSG to assist them in categorizing your data.

5.1.5 Benchmark D&E Projects and Releases

5.1.5.1 Environment Data (D&E - Projects and Releases)

Recording Project Development and Enhancement metrics

You can record metrics data either :

- into **SCOPE** as described below
- into the EXCEL Metrics Template for import into **SCOPE**.

Comparative Benchmarking has demonstrated that the factor that most significantly impacts the productivity achieved by the project team (cost drivers) is the Primary Programming Language used to code the software. Other environmental factors have also been shown to impact productivity. If you are planning to submit your Benchmark data to ISBSG or to benchmark your own data to industry it is important that you complete these fields.

 Select from the drop down lists the item which best describes your environment.

Primary Programming Language - The primary language used to create the source code/objects. JAVA, C++, PL/1, Natural, Cobol etc.

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Language Level - defines the sophistication of the programming environment in terms of the 'generation' that the language is classified.

- **2 GL** - Second-generation programming language is a generational way to categorize assembly languages. The term was coined to provide a distinction from higher level third-generation programming languages (3GL) such as COBOL and earlier machine code languages. Second-generation programming languages have the following properties: The code can be read and written by a programmer. To run on a computer it must be converted into a machine readable form, a process called assembly. The language is specific to a particular processor family and environment. Second-generation languages are sometimes used in kernels and device drivers (though C is generally employed for this in modern kernels), but more often find use in extremely intensive processing such as games, video editing, graphic manipulation/rendering.

- **3 GL** - A third-generation programming language (3GL) is a refinement of a second-generation programming language. The second generation of programming languages brought logical structure to software. The third generation brought refinements to make the languages more programmer-friendly. This includes features like improved support for aggregate data types, and expressing concepts in a way that favours the programmer, not the computer (e.g. no longer needing to state the length of multi-character (string) literals in Fortran). A third generation language improves over a second generation language by having the computer take care of non-essential details, not the programmer. High level language is a synonym for third-generation programming language. First introduced in the late 1950s, Fortran, ALGOL, and COBOL are early examples of this sort of language. Most popular general-purpose languages today, such as C, C++, C#, Java, BASIC and Delphi, are also third-generation languages. Most 3GLs support structured programming.

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- **4GL** - A fourth-generation programming language (1970s-1990) (abbreviated 4GL) is a programming language or programming environment designed with a specific purpose in mind, such as the development of commercial business software. A number of different types of 4GLs exist:

  - Table-driven (codeless) programming, usually running with a runtime framework and libraries. Instead of using code, the developer defines his logic by selecting an operation in a pre-defined list of memory or data table manipulation commands.

  - Report-generator programming languages take a description of the data format and the report to generate and from that they either generate the required report directly or they generate a program to generate the report.

  - Forms generators manage online interactions with the application system users or generate programs to do so.

  - Data management 4GLs such as SAS, SPSS and Stata provide sophisticated coding commands for data manipulation, file reshaping, case selection and data documentation in the preparation of data for statistical analysis and reporting

Type of Server - The services provided by the host/server computer(s) to the software application or product.

Stakeholders - Project stakeholders are those entities within or outside an organization which sponsor a project, or have an interest or a gain upon a successful completion of a project. They may have a positive or negative influence in the project completion. Stakeholders are anyone who has an interest in the project and provide feedback to influence its outcome. Project stakeholders are individuals and

organizations that are actively involved in the project, or whose interests may be affected as a result of project execution or project completion. The project management team must identify the stakeholders, determine their requirements and expectations, and to the extent possible, manage their influence in relation to the requirements to ensure a successful project. The following are examples of project stakeholders: Upper management, Project customer, Resource Managers, Line Managers, Product user group.

Percent not project work - People need to work at a range of non-project activities such as training, administration, leave and marketing. Very rarely are 100% of work hours devoted to project work over the whole duration of a project.

5.1.5.2 <u>Size Data (D&E - Projects and Releases)</u>

See Setting Up Benchmark Metrics

You can record metrics data either :

- into **SCOPE** as described below

- into the EXCEL Metrics Template for import into **SCOPE**.

Software size enables the quality and productivity metrics to be 'normalized' per unit of software output. For a more detailed explanation as to why Functional Size is the best recognized method for measuring IT output see : Why Measure Functional Size?

SCOPE was designed to enable you to measure functional size for Count Sessions, Releases, Projects or Application Baselines and automatically load the resulting calculated size into

However if you have know the functional size (unadjusted function points) of your Count Session , Project or Release and you did not record it in **SCOPE** then you can enter it manually under the Details tab against "Project Impacted Size" or if you did record it in **SCOPE** you can leave the derived value or override the **SCOPE** calculated figure. Whatever is entered in this field will be used for Benchmarking reporting.

 You do not have had to record you function point counts in **SCOPE** in order to insert the Functional size value in the D&E data for the Project. *Hint - Open SCOPE EXAMPLE DATABASE which is installed with SCOPE for an example of an*

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Application and its Releases and Projects where size has been entered manually. (FLY Application)

ISBSG applies a quality rating to the size data provided based on the information you provide about how you did the measurement of size. If you want to submit your data to ISBSG or record the count background for your own purposes, then complete the Resources and Background details in all the Count Sessions for the Project.

5.1.5.3 Effort Data (D&E - Projects and Releases)

You can record metrics data either :

- into **SCOPE** as described below

- into the EXCEL Metrics Template for import into **SCOPE**.

Effort is collected the same way for Count Session, Project or Release.

The Hours collected include all personnel effort that is directed towards the completion of a particular project including out-of-hours effort, whether paid or unpaid. Hours also include the effort of Client representatives in addition to that of Information Technology personnel. Effort is measured in whole HOURS.

A good test as to whether an activity constitutes PROJECT WORK EFFORT is to ask the question: "Would the activity be undertaken if there was no project?"

Effort excludes hours spent on NON-PROJECT ACTIVITIES such as:

- Public Holidays

- Annual Leave

- Sick Leave

- Training (Non-Project).

Record the effort of the development team effort (in hours) expended in each major activity of the 'generic' project phases (see below). If you tick ☑ Derived for any phase then **SCOPE** will sum the hours for each of the Count Sessions that are linked to the Project or Release and put the total against the total Hours for the Project or Release.

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The User can manually override the derived value by 'clicking off' the Derived Option and inserting the value manually in the field.

If you do not record effort at the Phase Level then just record the Total Hours value.

To assist in comparative benchmarking analysis tick which ☑ of the:

- roles of people were included in the Effort hours e.g. Effort includes Development Team / End Users etc.

- activities/phases the effort was expended and contributed to the Total Hours

- if the Effort recorded includes unpaid overtime effort

ISBSG defines Project effort as being divided by project phases and the major tasks making up each phase.

Plan Hours - includes effort spent on:

- Preliminary Investigations

- Overall Project Planning

- Feasibility Study

- Cost Benefit Study

- Project Initiation Report

- Terms of Reference

Specify Hours - includes effort spent on:

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- Systems Analysis

- Requirements Specification

- Review & Rework Requirements Specification.

- Architecture Design/Specification

- Review & Rework Architecture Specification

Design Hours - includes effort spent on:

- Functional / External Design

- Create Physical / Internal Design(s)

- Review and Rework Design(s)

Build Hours - includes effort spent on:

- Package Selection

- Construct Code & Program Software

- Review or Inspect & Rework Code

- Package customisation / interfaces

- Unit Test

- Integrate Software

Test Hours - includes effort spent on:

- Plan System or Performance Testing

- System Testing

- Performance Testing

- Create & Run Automated Tests

- Acceptance Testing

Implement Hours - includes effort spent on:

- Prepare Releases for Delivery

- Install Software Releases for Users

- Prepare User Documentation

- Prepare & Deliver User Training

- Provide User Support

The following table is provided as a guide for those organisations that use the ISO/IEC 12207 Standard Project Steps

Requirements Elicitation - **Specify**

System Requirements Analysis - **Specify**

System Architecture Design - **Specify**

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Software Requirements Analysis - **Specify**

Software Design - **Design**

Software Construct (Code & Unit Test) - **Build**

Software Integration - **Build**

Software Testing - **Test**

System Integration - **Test**

System Testing - **Test**

Software Installation - **Implement**

User Support - **Implement**

5.1.5.4 Defect Data (D&E - Projects and Releases)

You can record metrics data either :

- into SCOPE as described below

- into the EXCEL Metrics Template for import into SCOPE.

 A defect is a problem, which if not corrected, could cause an application to either fail or to produce incorrect results. Defects are collected the same way for Count Session, Project or Release.

 SCOPE enables you to record the number of defects detected (found) in a particular Project Phase or found within the first month of use of the software after implementation. You can record defects at the detailed level of Phase and Severity or just enter the Total values, depending on how you collect defect data in your organization.

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Defects are categorized into **3 levels of severity**:

- **Minor** defect: does not make the software unusable in any way (e.g. a modification required to a report). A defect that may or has resulted in low-key disruption to business operations, causing for example, user inefficiency. The software suffers a failure, but it is still operable. For example: data values may be wrong or corrupted in a way that is tolerable for a limited period, or some minor aspect of functionality is unavailable. Business operations can continue with little degradation and any degradation is not evident to the businesses customers (see also UKSMA Defect Measurement Standard). Note: for the purposes of this ISBSG Data Collection standards, cosmetic defects are combined with minor defects to form a single value.

- **Major** defect: causes part of the software to become unusable. A severe defect that may seriously or has seriously degraded but not disabled some business function, amounting to failure. The business operation can continue at a lower rate of activity or only a portion of a business function is disabled. For example: customer details can still be entered but credit information cannot be confirmed; the customer facing operation is impacted, but this may not be evident to the customer (see also UKSMA Defect Measurement Standard).

- **Extreme** defect: failure causing the software to become totally unusable. A very severe defect that may render or has rendered the system inoperable - that is some business function is now no longer possible -manual procedures if they exist may have to be brought into operation. Examples could be: the software will not run or stops during operation; there is seriously wrong or corrupted data; the incident seriously impacts upon customer-facing operations and customers are aware of the incident (see also UKSMA Defect Measurement Standard).

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If you check:

- ✅ *Sum all From Count Sessions* - then **SCOPE** will sum all the defects for all the Count Sessions assigned to the Release or Project and automatically load the cells.
- ✅ *Derived* - then **SCOPE** will total the defects in that same row of adjacent cells.

If you wish to override the derived results then un-check the box and manually enter the number of defects.

5.1.5.5 Cost Data (D&E - Projects and Releases)

You can record metrics data either :

- into **SCOPE** as described below

- into the EXCEL Metrics Template for import into **SCOPE**.

Cost is collected the same way for Count Session, Project or Release.

 Where the cost is the price paid, (either through money, time or labour, etc.) to acquire, produce, accomplish or maintain the software product. These costs included:

1. Sub-contractor costs, in-house labour, supplier costs

2. Hardware purchased specifically for the project, or hardware costs specifically assigned to the project.

3. Licence costs for purchased packages (include even it these costs were passed on to the customer, they are Customer/ End user Costs).

4. Include all Development Team, End User and IT Operations group effort costs.

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Select the currency code for the Currency for which the costs are calculated.

To rate the accuracy of the costs recorded you are asked how the costs were derived. The following methods of collecting COST are believed to be the most common:

- Cost Recorded - daily recording of all COST incurred by each person on project related tasks e.g. hours worked converted to cost to pay for effort.

- Cost Derived - where costs are not recorded daily but are derived from other sources such as invoices, bank statements, etc.

- Combination of Recorded and Derived.

5.1.5.6 Experience Data (D&E - Projects and Releases)

You can record metrics data either :

- into **SCOPE** as described below

- into the EXCEL Metrics Template for import into **SCOPE**.

The experience of the project developers and their stakeholders has been shown to impact project performance. Collecting this information may explain variances in project productivity.

5.1.5.7 Comments on Data (D&E - Projects and Releases)

You can record metrics data either :

- into **SCOPE** as described below

- into the EXCEL Metrics Template for import into **SCOPE**.

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For a Project or Release . This information is included in the data extract sent to ISBSG to assist them in categorizing your data.

5.2 Guidelines for Effective Benchmarking

5.2.1 Overview

Benchmarking the Applications Development, and Maintenance and Support (AD/M) Environment can potentially provide significant insights into the performance of IT processes and identify how and where they can be most effectively improved. However, many organisations initiate a Benchmarking Activity, without first fully determining the objective of the benchmark, the benefits they hope to achieve, or establishing the criteria by which projects and applications will be selected and compared. This Chapter explores the reasons why organisations choose to benchmark, identifies the potential benefits of benchmarking, and highlights the pitfalls of failing to appropriately plan the benchmarking activity or introduce rigor into the benchmarking process to ensure its success.

5.2.2 Why Benchmark?

Benchmarking involves the measurement and comparison of the performance and outcomes (products) from selected IT processes for the purpose of improvement, establishing a competitive position, and/or to provide input into management decision-making. Whilst many IT organisations routinely collect cost, effort, defect, and in some cases functional size data, they rarely go the extra step of turning this raw 'data' into 'information' that would facilitate change. Benchmarking is the activity that turns data into information by measuring current practices, comparing current performance to past performance, or peer performance, and interpreting the results. Usually organisations start by focusing on internal benchmarking to target areas for improvement before going the next step of comparing themselves to external business units or wider industry performance. However this is not always the case; it often takes the results of an industry comparison to identify the high cost of poor IT practices which then motivates management to rethink their AD/M strategy and start some internal measurement. As a result of a benchmark report, management may

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choose to reduce costs by outsourcing their IT Development and Support or alternatively by targeting internal processes for improvement. Benchmarking also enables organisations to assess their performance against their competitors, and evaluate the benefits and cost savings of investing in new tools, techniques or technologies.

5.2.3 Benchmarking Risks

In more recent years benchmarking has been progressively used as a means to assess and compare the cost-effectiveness of IT suppliers. Most large fixed term outsourcing contracts include clauses that financially reward or penalize the supplier, based on the supplier's performance against an industry benchmark or an established client performance baseline. These bonus/penalty incentives are often priced as a percentage of the total worth of the contract and can result in payments of millions of dollars flowing either way. In some cases, as the contract expiry approaches, the contract requires an 'independent' organization to benchmark the supplier's performance, prior to renewal. If the outcome of the performance comparison is positive then both client and supplier are encouraged to continue, but if the outcome is negative then it may result in contract cancellation. Given the ongoing cost of a benchmarking activity, the potentially high risk of incurring large payouts and/or contract cancellation, it is surprising how few organisations define a rigorous process around the benchmarking activity and develop an agreed 'Terms of Reference' for the benchmarking activity, prior to starting.

5.2.4 Benchmarking Terms of Reference

This is an extract from an original article by Pam Morris - Total Metrics - published in IFPUG Book on Software Measurement 2011

5.2.4.1 <u>Terms of Reference</u>

It is our recommendation that before engaging a benchmark supplier, or funding an in-house benchmarking program, that the sponsors work with the benchmarker and stakeholders to establish the 'Terms of Reference' for the benchmarking activity. These terms should include the agreed position for each of the following:

1. **Strategic Intent of the Benchmark**

   o How will the results be used?

2. **Type of Benchmark**

   o Internal and/or external?

3. **Benchmark Performance Metrics**

   o What are the processes or products required to be assessed to satisfy the goals of the benchmark and how will they be measured?

4. **Standards for Measures**

   o What are the agreed units of measurement, data accuracy and validation requirements?

5. **SCOPE of the Benchmark**

   o What are the inclusion and exclusion criteria for projects and applications?

6. **Frequency of Benchmark**

o When and how often should measures be collected and reported?

7. **Benchmark Peers**

o What are the criteria by which equivalent sample data will be selected for comparison?

8. **Benchmarking Report**

o Who will be the audience, and what will be the report's structure, content and level of detail provided, to support the results?

9. **Dispute Resolution Process**

o What is the process that will be followed should disagreement arise about the validity of the benchmarking results?

5.2.5 Strategic Intent of the Benchmark

Sponsors of the benchmark need to work with IT Management to establish:

• The objectives of the benchmarking activity i.e. what are the results required to demonstrate; within what period, and for what purpose. What are the criteria by which the benchmark will be judged to be successful. Common reasons for benchmarking include monitoring:

o Process improvement initiatives

o Outsourcing contract performance against targets

o Consistency in performance across organisational units

o Benefits achieved from new investments or decisions compared to benefits claimed

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o Performance compared to competitors or industry as a whole

• The stakeholders, i.e. who will be responsible for the benchmark's design, data collection, analysis, review, approval, sign off and funding.

5.2.6 Type of Benchmark

Establish whether the organisation will benchmark:

• Internally to demonstrate improvement trends over time for the organisations internal processes, or

• Externally to compare internal results with external independent organisational units, or Industry as a whole.

Organizations that are aware of their own limitations will recognise their need to improve without first being compared externally to demonstrate how much improvement is required. As a first step, it is recommended that organizations start by internally benchmarking, and then when their own measurement and benchmarking processes are established, do some external benchmarking to establish their industry competitiveness. However, prior to determining standards for the collection, analysis and reporting of their benchmark metrics, they should first identify their proposed strategy for externally benchmarking. This enables their internal benchmarking framework to be aligned to that of the External Benchmark Data Set, thereby facilitating the next step of External Benchmarking without any rework to realign the data.

5.2.7 Benchmark Performance Metrics

Benchmarking AD/M should ideally monitor the performance all of the four perspectives identified in the Balanced Scorecard approach - Financial, Customer,

Business Processes, Learning and Growth. Whilst this is the ideal approach, in our experience IT organizations focus their initial IT benchmarking activities on areas that directly impact their IT costs. They measure the cost effectiveness and quality of their IT processes and products by optimising the following Key Result Areas (KRAs):

- Cost-effectiveness of the process – are they getting 'value' for money invested?

- Efficiency of the process – how 'productively' is their software being developed or maintained?

- Speed of Delivery – how 'quickly' can they deliver software product or 'solve a problem'

- Quality of the product – how 'good' is the software product or service they deliver

- Quality of the process – how much time and money was wasted in 'rework'

- Customer Satisfaction – how well does their delivery of software products and related services meet and or exceed their customer's expectations.

Benchmarking is not a 'one size fits all activity'. Many 'Benchmarking Service Providers' offer turn-key solutions that fail to take into account the individual needs of their clients. By clearly defining the strategic intent of the benchmark before engaging a Benchmark Provider an organisation ensures that client organisational goals are met and the solution being offered provides a good "fit". Once this is decided they can then focus on benchmarking Key Performance Indicators (KPIs) that demonstrate achievement of those goals. For example, for many telecommunications and financial sector companies, maintaining competitor advantage is the key to their success, so they need their IT department to constantly deliver new, innovative products to their market. In this case, 'speed of delivery'

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becomes their highest priority to optimise their competitive position. In comparison, recent budget cuts for Government Agencies may focus their improvement needs on maximizing their IT cost-effectiveness. Before starting a benchmarking activity identify the key organisational goals and their corresponding KRAs, then one or two KPIs within that area that will demonstrate the achievement of the identified goals. When conducting an external benchmark some compromise may need to be made in the selection of KPI's as these must align to performance measures for which industry/peer data is available.

5.2.8 Standards for Measures

 When comparing between projects, business units and/or organisations you need to ensure that the measurement units collected are equivalent. This is not merely a matter of stating that cost will be measured in US dollars, size will be measured in Function Points and effort will be measured in days. Whilst 'cost' of software projects is probably the most carefully collected project metric, and the most important for the organization to monitor, it is a very difficult unit of measure to benchmark over time. This is becoming increasingly the case in a world of off-shore multi-country development, where currency conversion rates fluctuate daily and salary rates rise with different rates of inflation across countries and time.
 Comparing dollars spent per function point this year, to previous years, requires multiple adjustments and each adjustment has the potential to introduce errors. Instead most organizations choose to measure cost effectiveness by measuring the effort input instead of cost input. Whilst it may seem straight forward to measure the Project Productivity Rate as the number of function points delivered per person per day, in order to really compare 'apples to apples', the benchmarking analysis needs to ensure that for each of the participating organisational units the following characteristics of the size and effort measures are consistent:

• **Type of Function Points recorded** i.e. IFPUG, COSMIC or NESMA function points? Has the size reported been actually measured or is it an approximation derived by converting Lines of Source Code to function points? Which version of the Functional Size methodology (IFPUG 4.0 to 4.3?) has been used and has all data in the sample set been measured with using this same version?

• **Type of Day recorded** i.e. not all organisations work the same number of hours in a day. If days were calculated by dividing time sheet hours by 8, then how was the number of hours collected? Did they include all the hours 'worked' including overtime (10 hours = 1.25 days), only hours 'paid' thereby excluding 2 hours unpaid overtime? (8 hours = 1 day). Did they collect hours from project codes on time sheets and include only productive working hours dedicated to the project i.e. excluding breaks, non-project meetings, email etc? (6 hour day = 0.75 days).

• **Accuracy of the Measures** i.e. did they accurately measure the function points and extract exact effort hours from time sheets or did they roughly estimate size using approximation techniques or multiply the team size by the months allocated to the projects to get hours and days?

• **SCOPE of the Effort Measures** i.e. did they include all the effort of all the people that contributed to the project including the steering group, administration staff, business users, operational staff, or did they just include the time of the project manager, analysts, programmers and testing team?

• **SCOPE of the Size Measures** i.e. when measuring functional size, did they measure all the software delivered to the Users, including package functionality delivered unchanged or did they just measure the functionality built and/or configured by the project team?

• **SCOPE of the Project Life Cycle Activities included in the effort data** – did the project team work on the whole lifecycle from planning through to implementation or did the business area complete the planning and requirements before handing the project to the development team? Did the

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project effort figures include or exclude all the activities included in the project budget such as, the extensive research into project technology choices during the planning stage, the data loading activity for all the data files and the extensive worldwide training of thousands of end users?

Every organisation has different ways of measuring and recording their metrics. The resulting productivity rate may vary up to 10 fold depending on which of the various combinations of the above choices are made for measuring effort and size. To avoid basing decisions on invalid comparisons, agreed standards need to be established at the beginning of the benchmarking activity for each of the measures supporting the selected KPIs for each contributing organizational unit. Each measure needs to be clearly defined and communicated to all participants involved in the collection, recording and analysis of the data. If some data is inconsistent with the standards then it should be either excluded from the benchmark or transformed to be consistent and appropriate error margins noted and applied to the results.

To simplify this process, and facilitate external industry benchmarking, it is recommended that organisations adopt the defacto data collection standards and definitions for measuring AD/M developed by the International Software Benchmarking Standards Group (ISBSG).

The ISBSG community recognized the need for formal standardisation of AD/M measurement and in 2004 developed the first working draft of a Benchmarking Standard which became the basis for the new ISO/IEC framework of Benchmarking standards. The first part of a 5 part framework for Benchmarking Information Technology was approved in May 2011, to become an ISO International standard (ISO/IEC 29155-1. Systems and software engineering -- Information technology project performance benchmarking framework -- Part 1: Concepts and definitions.)

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Seventeen countries participated in the review of the interim drafts and the final approval vote for the standard. This international collaborative process ensures the result is robust and the outcome is accepted across the IT industry. The ISBSG is already a recognised industry leader in setting standards for data collection. A number of software metrics related tools vendors and Benchmarking Providers have adopted the ISBSG data collection and reporting standards and have integrated the ISBSG data set in their tools

5.2.9 SCOPE of the Benchmark

Not all of the software implementation projects or software applications supported are suitable candidates for inclusion in the Benchmarking activity or can be grouped into a homogeneous set for comparison.   All candidate projects and applications should be investigated and categorised on the following types of characteristics in order to make a decision about their acceptability into the benchmarking set, or if they need to be grouped and compared separately:

   • **Different Delivery Options** - different types of projects include different development activities as part of their delivery. For example a package implementation with little customization has significantly reduced effort expended on design and coding activities, care would need to be taken to determine if it is appropriate to include these types of projects in a benchmarking set of bespoke software projects.

   • **Different Types of Requirements** – whilst most projects require delivery of both non-functional and functional requirements, some focus primarily on enhancing the non-functional (technical and/or quality) characteristics of the software or fixing defects. Examples of technical projects are: a platform upgrade, reorganising the database structure to optimise performance, refactoring code to optimise flexibility or upgrading the look and feel of the user interface to enhance usability. Whilst these projects may consume large amounts of development team effort, they deliver few, if any, function points. It

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is therefore inappropriate to include technical or 'defect fixing' projects into productivity comparisons which include projects that primarily deliver user functionality.

• **Different Resourcing Profiles** – projects that only include the planning, requirements specification and acceptance testing effort, with all other life cycle processes being outsourced, should not be grouped into a data set that includes projects where effort has been recorded for all phases of the project life cycle.

• **Different Technology Profiles** – the ISBSG have identified several technology based attributes that significantly impact the rate of delivery of a project including the coding language, the development platform (environment) and the database technology. Be aware that it is difficult to establish and compare trends over time if there is wide variation in the mix of the technology profiles within a single project or of the projects in the benchmarking set.

• **Different Size Profiles** – as a risk mitigation strategy, very large scale projects (>3000 fps) often require more formal administrative governance processes, more rigorous development processes, more complete project documentation and utilisation of speciality resources, compared to average sized projects (300 to 1500 fps).   All of which add additional overhead effort to the project which negatively impacts productivity. Interestingly very small projects (<50fps) that follow the same formal development process as larger projects also tend to show low productivity rates (up to 5 fold lower than medium sized projects), due to the disproportionate overhead of administration, management and documentation effort. These small projects (<50 fps) also show wide variations (up to 10 fold) in productivity and therefore should be

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excluded from Benchmarking data sets. When aggregating projects in the benchmarking set ensure that there is an even mix of project sizes, or group projects into benchmarking sets of comparable size bands.

• **Diverse and/or Large User Base** – projects that have a very diverse set of business user stakeholders with significantly different functional and cultural requirements, consume more effort to develop, maintain and support, than projects with a single set of homogenous users.

• **Different Functional Domains** – the ISO/IEC framework standards for functional size measurement (ISO/IEC 14143-parts 1 to 6) recognises that software functionality can be classified into different functional domains. E.g. 'Process rich' real time and process control software compared to 'data rich' information management software. Whilst the IFPUG method measures in all domains, the characteristics of the domain will influence the size result. For example in data rich domains the stored data will contribute more significantly to the final result than in process rich or strongly algorithmic domains. The differing contribution of the data to the final size will impact the measured productivity and quality metrics. Care should be taken to ensure that benchmarking data sets comprise software from similar domains.

• **Different Project Classifications** – different organisations have different definitions for what constitutes an IT project. Some define a 'project' as the implementation of a business initiative (e.g. implement a new Government Goods and Services Tax) others regard a Project as a Work Package implemented by a Project Team. A business initiative project may have requirements to modify many applications and will comprise multiple sub-projects, where a sub-project is equivalent to a Change Request or Work

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Package with discrete requirements for each application. The 'project' will have its own overhead activities required to manage and integrate all Work Packages. These overhead activities cannot be attributed to a particular Work Package, but to the project as a whole.   The sub-projects will have their own effort, cost and size profiles.   Often the Sub-projects are implemented in different technologies since they impact different applications, further compounding issues of aggregating metrics and profiling the project.   Similar issues arise with definitions of a project when treating a new Release of an Application as a 'Project' to be benchmarked. Typically the Release is made up of multiple Change Requests and each Change Request is implemented by its own 'project' team. Release overheads are incurred in a number of activities such as Release Management, Planning, System testing, Integration and Acceptance testing. These activities are usually not recorded at the Change Request level.

When benchmarking against industry 'projects' you need to ensure that you are comparing against a 'Project/Release' or a 'Sub-Project/ Work Package' since the productivity rates of the Project/Release type 'project' will be decreased by the overhead effort and cost.

It is recommended that prior to selecting the projects or applications to be benchmarked they are first grouped into like 'projects' and then classified using the above categories, to either ensure that each of the benchmarking sets consists of an even mix of all types, or if this is not able to be achieved, that they are grouped into 'like' categories for comparison exclusively within those categories.

5.2.10   Frequency of Benchmark

The frequency in which data is collected, analysed and reported will be determined by the goals of the Benchmarking activity. However, when determining how often these activities need to be done the following need to be considered:

• **Project Durations and Demonstrating Trends** - if the benchmarking objective is to demonstrate the benefits of implementing new tools or technologies, it may take several cycles before these benefits become evident. The learning curve experienced when adopting new practices often shows a negative effect on productivity for anything up to 18 months after implementation. In addition, if project durations are over 1 to 2 years then it may take several years to demonstrate any benefits. In this case it may be best to baseline the metrics, then benchmark again after two years in order observe a result. Benchmarking trends in a KPI assumes that 'everything else' stays the same and any improvements observed are due to the changes implemented, or any failure to see improvement is due to failure of the change to be effective. Unfortunately the IT world does not 'stand still' while you benchmark. IT technology, tools and techniques tend to be in a continual state of evolution. Over successive benchmarking periods, external forces of change will be introduced and will have an impact. The challenge to the benchmarker is to capture these variables and identify their influence on the results. It is therefore imperative that the benchmarker is fully apprised of all the "soft" factors that are likely to impact the "hard" benchmark metrics.

• **Allocating Projects to Benchmarking Periods** - projects with long durations may span several benchmarking periods. Some benchmarkers implement 'macro' benchmarking whereby they collect all the effort and costs consumed for a 12 month period from the financial and time sheeting systems and then divide by the function points delivered in that period. Issues arise when projects span several periods so their inputs (effort and cost) are included in

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all the periods but their outputs (function points delivered) are only included in the final period. This phenomenon skews the productivity to be very low for initial periods and very high for the last period. A work-around can be achieved by proportioning the function points across the periods based on an 'earned-value' type approach.

• **Usefulness of the Result** – if the benchmark periods are set too widely apart, by the time the data is analysed and reported the usefulness of the information may have diminished, as often the course of time has changed the relevance of the results to current practices. The late delivery of results may identify an issue that, for maximum effectiveness, should have been identified and addressed at the point it occurred. For example, in the referenced case study the organisation only reported their benchmark results annually. By the time they identified that their new strategy, to implement small projects in response to stakeholder demands, was costing them 5 times as much as aggregating requirements into larger projects, it had already cost them millions of dollars. When benchmarking is used for process improvement and there are long delays in reporting, it is difficult to do a root cause analysis on why a project is an exception, if the project team has since disbanded and the history is lost. However, if benchmarks are reported at intervals that are too short, normal deviations from the median, or 'noise' in the results, can be incorrectly interpreted as a trend and responded to inappropriately. Select a benchmarking period that is aligned with the organization's decision making processes, so the recommendations in the benchmarking report can be actioned promptly. For example, results should be reported prior to decisions on budget allocations, or timed to be presented before steering group strategy meetings.

• **Statistical Validity of the Result** – before deciding on a benchmark period you need to assess how many projects will be implemented in that period that

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satisfy the inclusion criteria for the benchmark; and you need to have collected sufficient data to support the benchmark. In order for the result to be statistically significant you need a valid sample size and a valid methodology for selecting the sample. The rule of thumb is to sample at least 10% of the total instances, and the sample set to be not less than 30. Ideally the margin of error for the result is less than 10%, with a confidence level of 95%. However, this is difficult to achieve if you are benchmarking retrospectively and you need to rely on data that has been collected prior to the benchmarking Terms of Reference being established. Prior to starting the benchmarking activity the stakeholders should agree on what is an acceptable margin of error and desired confidence level in the result. This is important since large outsourcing contracts are known to impose year on year performance improvement targets for suppliers of 10%. If the sample set is small and the margin of error is greater than 10% then the benchmarking activity will not be sensitive enough to demonstrate any productivity gains achieved.

5.2.11   Benchmarking Peers

Previous discussions have highlighted the factors to categorise individual projects and applications to ensure that sample sets of data for internal benchmarking are comparable. However, when an external data benchmarking set is derived from industry, or selected from one or more external organizations, then additional factors need to be considered.

• **Organisational Type of the Benchmarking Partner needs to be comparable**, e.g. care should be taken comparing the results from a large IT development shop with those from a small boutique developer, as they will have significantly different development environments. Large government and banking and financial institutions stand out as having productivity rates that are generally lower than other types of organisations. These organisations typically have projects that impact very large, monolithic, multi-layered legacy

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systems. The productivity of their enhancement projects is negatively impacted by their applications' inherently complex internal structure; multiple interfaces; out of date systems documentation; and inaccessibility to developers who are familiar with all of the underlying functionality. Compounding the technical issues, any major project decision is required to be approved by multiple levels of bureaucracy, adding further delays and consuming additional effort and costs.

• **Different User Priorities** – the end use of the software (e.g. military, medical, financial etc.) may dictate the rigour applied to the software development process. A requirement for high quality bug-free software will focus development activities and priorities on prevention of defect injection and maximum defect clearance rates rather than project cost effectiveness and efficiency. Different end user priorities need to be considered when selecting appropriate benchmarking partners.

• **Quality of the External Dataset** – due to the reticence of organizations to make their performance data publicly accessible, the most common way for organisations to externally benchmark against industry data is either by engaging an external benchmark provider organisation that has their own data repository, or by purchasing industry data from the ISBSG. Benchmarking clients' need to fully investigate the provenance of the dataset they are going to be compared against (based on the criteria outlined in the Terms of Reference above) prior to deciding on their approach. The ISBSG's Dataset has the advantage of being a very cost effective solution and an 'open repository'. I.e. ISBSG provide detailed demographics of their industry sourced benchmark data and their data includes all attributes of the projects, while maintaining the anonymity of submitters. Most benchmark provider organizations have a more 'black box' approach and only disclose the aggregated summarised results of their benchmark dataset, making it more difficult for a client to independently

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assess the relevance and validity of comparing it with their own data.   The ISBSG data also discloses the age of its data which is important in a fast changing IT environment. Over 70% of the Maintenance and Support data and over 30% of the Development and Enhancement data is less than 4 years old. It is also very widely representative in that it is voluntarily submitted by IT organisations from over 20 countries. Each project set is independently validated by ISBSG for its integrity and assigned a quality rating, so the user can decide on whether to include or exclude a particular project or application from the benchmark set. However, the client organisation should also be realistic in their expectations of the external benchmark dataset. The normal process of submission, validation and analysis of external benchmark data means that the data can be up to 18 months old before it is formally "published" as part of the benchmark set. A client who is undertaking leading edge developments may have difficulty finding comparable data sets.

• **Filtering of Submission Data in an External Dataset** – If a dataset has been contributed to voluntarily then the submitters typically select their 'best' projects for inclusion. The resultant mean KPIs derived from the data set tend to represent the 'best in class' rather than industry norms. In our experience with the ISBSG data the industry norm is closer to the 25 percentile of performance than the mean.   In contrast, benchmarking datasets that have been derived from adhoc sampling methods, have median and mean values that align more closely to the median and mean values found in industry. The submission profile of the industry dataset needs to be known and understood when comparing and reporting the data and determining where an organisation is positioned compared to industry.

5.2.12 Benchmarking Report

Prior to commencing the benchmarking process it is recommended that the sponsors and key stakeholders agree on how the information will be reported. They need to decide on the reports:

- **Structure and content** – i.e. table of contents and the format of the results.

- **Level of granularity** – i.e. will the data reported be aggregated by project, application or organizational unit?

- **Presentation technology** – i.e. will the data be embedded as graphs in a document or provided online via a business analytics portal allowing interactive drill down capability?

- **Confidentiality and Audience** – who will have access to the report results and how will it be distributed?

- **Review Process and Acceptance criteria** – i.e. who will establish the reasonableness of the data prior to draft publication; who is responsible to for approving the final report and actioning its recommendations?

- **Feedback process** – for improvement of benchmarking activity i.e. what is the process for continual improvement of the benchmarking process?

5.2.13 Dispute Resolution Process

If the Terms of Reference are established prior to the benchmarking activity and agreed by all parties, then any areas of contention should be resolved prior to the results being published. However, as mentioned earlier, in some circumstances there are significant financial risks for an organization that believes that it has been unfairly compared. It is recommended that if benchmarking is incorporated into contractual performance requirements then a formal dispute resolution process also be included as part of the contract.

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5.2.14   Summary

Whilst the above warnings appear to indicate that comparative benchmarking is difficult to achieve, in our experience this is not the case. It is surprising in reality to see the results of pooling data into a benchmarking set and how well they align with results from external data sets from a similar environment. In our experience the rules of thumb derived from industry data are able to accurately predict the scale of effort or the cost of a project, indicating that the measures from one data set can be used to predict the results for another.

However, as consultants who have worked for over 20 years in the benchmarking industry we are constantly confronted with contracts that require performance targets based on a single number to be derived from a large heterogeneous data set. Such benchmarks are unlikely to deliver useful results and client expectations need to be managed from the outset. The Terms of Reference described above are provided as guidance for consideration when embarking on a benchmarking activity. Only some variables will apply to your unique situation. If they do apply, consider their impact and choose to accommodate or ignore them from an informed position; fail to consider them at your own risk.

Bibliography

- Morris, P. January 2004. Levels of Function Point Counting.

- http://www.totalmetrics.com/function-point-resources/downloads/Levels-of-Function-Point-Counting.pdf.

- ISBSG Data Collection Questionnaire (DCQ). http://www.isbsg.org/ISBSGnew.nsf/WebPages/286528C58F55415BCA2574 74001C7B48?open .

- Select IFPUG/NESMA DCQ.

- http://www.isbsg.org/ISBSGnew.nsf/WebPages/286528C58F55415BCA2574 74001C7B48?open

- Select M&S DCQ (MS Word doc)

- Morris, P. 2010. Cost of Speed. IFPUG Metrics Views. July 2010. Vol. 4. Issue 1: 14-18.

- http://www.ifpug.org/newsletterArchives/newsletters/July%202010%20MetricViews.pdf

- Rules, G. 2005. Rules Relative Size Scale.

- http://www.smsexemplar.com/wp-content/uploads/RulesRelativeSizeScale-v1b.pdf.

- Morris, P. 2010. Cost of Speed. IFPUG Metrics Views. July 2010. Vol. 4. Issue 1: 14-18.

- International Software Benchmarking Standards Group (ISBSG). http://www.isbsg.org/.

6 SCOPE Reporting

6.1 SCOPE Available Reports

6.1.1 SCOPE Report List

Reporting Counts

Use the Menu Option **Report Selection** (or Ctrl P) to list the available reports for **printing** or **preview**. Press + to expand the report group to select one or more individual reports for sending to the printer or viewing all content online. Reports displayed online can be saved as a PDF file using Acrobat Distiller (select to Print) or sent as an email attachment via MSOutlook. Clicking on the top branch will select all reports (select to Send). Reports can also be exported to HTML, MS EXCEL or MS WORD.

NOTE: If the reports do not display in Preview Mode, Go to View, Screen Display Options and insert the location of the Runtime Version of Microsoft Access. This has been installed when SCOPE was installed but the directory location may not be the default. Use MS Explorer to find the correct directory. Insert the full pathname e.g. C:\Program Files\Microsoft Access Runtime\Office10.

To only include nodes from a selected branch in the report, first locate the cursor on the appropriate tree branch in the main screen. Then in the report list 'check' the box marked '**from current position**'.   If your report has fewer items than expected then you need to check exactly where the cursor is located on every Tree, as it only reports from that node downwards.

To further refine the selection of nodes to be included on reports, assign **Flags** to the selected tree nodes in Filter Mode using the boolean selections (**&,** ,) and 'check' the box marked '**Select Flagged nodes**' in the Report Selection screen

or just locate on the nodes you want to print and select the 'Flag' icon from the main menu. (See *Flags and Filters*)

The main report groups are:

6.1.1.1 <u>Benchmarking Details Reports</u>

These reports, describe the background of the release models stored in **SCOPE**. Reports include the:

- Application Details - including all effort and defect Metrics for the Application by Period
- Count Session, Project Details and Release Details - including all effort and defect Metrics
- Project Functional Size Details - aggregates all the details of Transactions and Files impacted by the project across multiple Applications and Change Requests.
- Release Functional Size Details - aggregates all the details of Transactions and Files impacted by the Release across Change Requests.
- Release Details
- Release Notes List
- Release Value Adjustment Factor

6.1.1.2 <u>Hierarchy Tree Reports</u>

Provide a diagrammatic outline-view of each of the four Hierarchy Trees. The Function Hierarchy and Data Hierarchy Reports also provide an option to print the Function Point Counting details next to each node i.e. type, and Fps awarded. (See also **Hierarchy FP Size Attribute Summary** below which combines FP count details, Summary reports with Hierarchy structure for both Function and Data Trees)

6.1.1.3 Linked Tree Lists

Provide a comprehensive list of the cross-referenced nodes Linking the Hierarchy Trees to each other. For Data Group / Function Linked Lists it also reports the type relationship between the Data Group and Process i.e. Update or Read Only.

Totals the number of linked function points for each group.

6.1.1.4 Function Point Count Result Reports and All Counts for a Release

See also- Reporting the Functional Size in Function Points.

These reports provide both detailed and summary reports relevant to the Functional Size of the currently selected Release Model. The different types of Functional Size reports include and exclude different functionality as described in Table below. The Functional Size result will include all functionality on both the function and the data hierarchy unless you have selected to include only a branch from the current position or only selected Flagged nodes within a branch using the Filter Option. In that case the Functional Size reported will only be for the selected Flagged nodes.

NOTE: When MS Excel is selected for the report output the reports also inlcude the audit data for each node

6.1.1.5 All Counts for a Release

These reports list a summary of all the Count Session Sizes both as a table and as a comparative Bar Chart and Pie Chart, detailing the relative contribution of each Count Session to the total Release Size.

6.1.1.6 Detail Reports

These reports include, Process and Data Group Detail reports. I.e. all linked items and all functional size details each Process and Data Group that has been selected.

6.1.1.7 Portfolio Size Reports

These reports list the size (baseline, impacted, reworked) of all Count Sessions, all Releases for all Applications within the currently opened **SCOPE** database, in either adjusted or unadjusted function points.

6.1.1.8   Attribute FP Size Profiles

These Reports profile your counts for the % that is linked to each attribute within a Category. I.e. if you have identified processes as being mandatory to user or optional to the user and created Attributes called Mandatory and Optional then **SCOPE** will report the percentage of the count that has been allocated Mandatory and Optional.

If you have assigned Numerical Attributes then **SCOPE** will report the quantified results in the Numerical Attribute - FP Size Reports.

6.1.1.9 Hierarchy FP Size Attribute Summary Recommended

These reports are a combination of all the information available on the Hierarchy FP Detail Reports, Function Attribute Lists and the **SCOPE** FP Count Result Reports (Detail and Summary). However they are unique in that are in a hierarchy format and they only display the nodes that are Relevant to the current selection. They are the only **SCOPE** reports that uniquely identify for any single process and or data group, the combination of attributes assigned to these nodes and to total them by Attributes. They also identify the relevant

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impact types for the Nodes.   The single report includes both the Function Hierarchy and the Data Hierarchy and the FP count summary reports.

The tables below describe the name, content and calculations behind each Report Type.

Description	SCOPE Report Name	Measures	Processes and Data Included	IFPUG Terminology
Baseline Reports				
Report the Net Functional Size of a Production Release	***Baseline Application***	Size of delivered application	All delivered	Application Function Point Count
Release Reports				
Report the Functional Size of Work in Progress Releases and Other Releases	***Baseline Release***	Size of delivered Release	All functionality delivered into production at completion of the Release (excludes any 'deleted' by a **Count Session**)	Development Project Function Point Count

	Release Rework	*Cumulative* size of functionality worked on by all Change Requests within this Release	Selects all impacted (added, changed and deleted) functionality for all **Count Sessions** within this Release	Not available
	Release Impacted	The size of unique functions worked on by all Change Requests within this Release	All functionality delivered by this Release. Selects all impacted (added, changed and deleted) for all **Count Sessions**	Enhancement Project Function Point Count (for more than one Change Request)
	Count Session Impact	Size of all functionality impacted by the currently selected Change Request	Selects all impacted (added, changed and deleted) by the currently selected **Count Session**	Enhancement Project Function Point Count (for a single Change Request)

Linked Tree List Reports

Linked List	SCOPE Report Name	Nodes Included	IFPUG Terminology
Reports the relationship of the Links between each of the four Trees	*Attribute Data* *Attribute Note* *Attribute Function* *Data Attribute* *Data Notes* *Data Function* *Notes Attribute* *Notes Data* *Notes Function* *Function Attribute* *Function Data* *Function Notes*	Selects **all** Nodes currently linked. If Flagged Nodes or From Current Position is selected then those nodes are also included.	Not Available

Detail Reports for Processes and Data Groups

Process and Data Detail Reports	SCOPE Report Name	Measures	Processes and Data Included	IFPUG Terminology
Report the Functional Size details of each selected individual Process or Data Group. It also lists the names of all the **Linked** nodes (Attributes and Notes.)	*Process Detail Report* *Data Group Detail Report*	Detailed description of each individual Process or Data Group and their **Linked** Notes, Attributes	Selects **all** Processes and all data groups for the Release	Not Available
Reports the General System Characteristics and their ratings. (See Assessing the *Value Adjustment Factor*)	*Value Adjustment Factor Report*		Reports the VAF value for current Release selected	Value Adjustment Factor

Process and Data Detail Reports	SCOPE Report Name	Measures	Processes and Data Included	IFPUG Terminology

Reports the Functional Size of all the Count Sessions within a Release both as a Summary and a Graphical Chart	*Release Impacted Size – All Sessions Counts - CHART* *Release Impacted Size – All Sessions Counts - Summary*	For all Counts recorded under the current Release it reports the Size of all functionality impacted by all Change Requests for the Release	Selects all impacted (added, changed and deleted) by each **Count Session within the Release**	Enhancement Project Function Point Count (for the Release – note this is an aggregated count of all change requests)

All Counts for a Release - Reports

These tabular and graphical reports list the results of all counts for the currently selected Release.

Portfolio Size - Reports

Reports the baseline impacted and reworked size for all Production, WIP Releases and their Counts, in both adjusted and unadjusted function points.

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6.1.2 Online and Print - over 50 Different Reports

Reporting Counts

SCOPE has advanced cross-referencing and reporting functionality to enable you to easily do online 'what-if' analysis and produce over 50 different reports for immediate viewing.

Previewed Functional Size Measurement and Benchmarking Details reports can be saved or printed in the following formats:

- Snapshot Viewer ® files (Snapshot Viewer is free from Microsoft and downloadable from the WWW)
- Snapshot Viewer ® files and sent as an Email Attachment from the Report Preview window
- PDF files (if you have a copy of Adobe Distiller**®**)
- MS Office® Image Writer files (Users with MSOffice 2003 or later)
- MS EXCEL® workbook ((Users with MS Access 2000 or later)
- MS WORD® RTF document ((Users with MS Access 2000 or later).

Benchmarking Data can also be exported and reported in :

- MS EXCEL® - **SCOPE** Analytics Pivot Chart reports
- Clear Blue Water® WWW based Analytics Portal - **SCOPE** Connect for drill down and interactive ISBSG reporting

6.2 General Reporting Features

6.2.1 Previewing Printing Saving and Exporting Reports

All Functional Size Reports can be previewed online and/or printed.   If you re reporting two different versions of the same count information and need to compare the differences in the reports, then you can use the Compare two reports option in the Report Selection screen.

6.2.2 Saving a set of Reports

When you preview reports they are automatically saved in your User Profile directory under 'My documents'. SCOPE saves all generated reports under their respective report name. If there is already a report there of that same name it replaces it. To save as set of generated reports, go to My Documents folder and sort the directory by date, to pick up the latest set of Reports and copy / rename or zip them as required.

6.2.3 Selecting / Filtering Report Content

The Functional Size can be reported in Summary or in Detail.

Detail reports list all the counting details for individual Processes and Data Groups. Whilst the Summary reports summarise the results and group the totals in a variety of ways to assist in comparison and analysis, The Functional Size of a Release can be reported either as a total value for the whole release or by selecting the options in the Report Selection Screen you can include and exclude functionality.
All of the following Functional Size reports will report on the whole Release or only selected parts of the release if you select any or all of the following options:

- **From Current Position** - the report only includes the Processes and Data nodes linked to those Processes from that point on the selected branch downwards.

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- **Select Flagged Nodes** - the report only includes the Flagged Processes and Flagged data nodes.
- **As Displayed** - the report only reports the nodes currently displayed on the selected Hierarchies. When reporting the Hierarchy Trees **SCOPE** reports the branches only to the level they are currently expanded.

If you choose combinations of the above options then **SCOPE** combines the filter to report the net result of these options.

You are able to annotate the purpose and content of your report by recording your own **Report Description** in the **Report Selection Screen**. The description can be used to provide extra information or instructions to the audience reading the report or to record the filters used for the report. **SCOPE** will save a list of your report descriptions which can be reselected at any time in the future. If you do not want the current displayed description to print on your report header then just delete the text in the description box.

SCOPE allows you to preview and print your reports and export them to MS WORD or MS EXCEL or HTML. You are also able to send the reports via email or in Adobe PDF format (see Report Selection).

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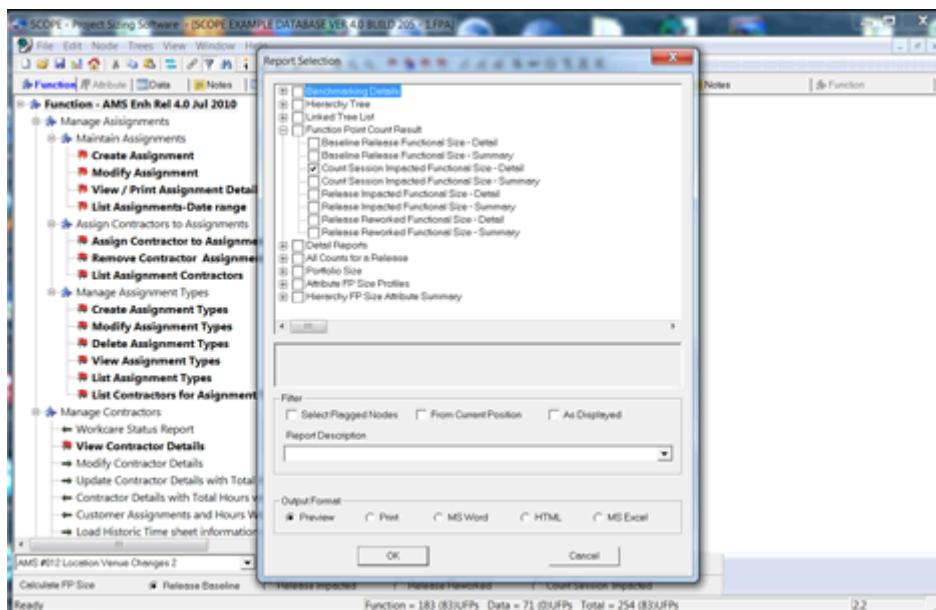
6.2.4 Sending SCOPE Reports via Email

If you want to enable someone else to view the output from your function point count you can do this several ways:

1. Send all the Count Information and Instructions to download SCOPE Viewer
Use the Snapshot Release or Count function to extract the count data to a clean SCOPE database. Email the database as an attachment with instructions to the person receiving it, to download SCOPE Viewer and install so they can view all the count details and run any extra reports.

2. Email the Reports as you View them Online
SCOPE uses a MS product Snapshot Viewer® to preview reports.
You can right click on the attachment and select Save As to save the Snapshot Viewer Report or send to another user.
For other users to view a Snapshot viewer file they need to double click on the file name, to display or print the report. If their Windows system does not already have Snapviewer installed then they can download the Snapshot Viewer application free from the Microsoft website :http://support.microsoft.com/kb/175274

Click on the link, save the file on your PC and then run the install program. This will install Snapshot viewer on your PC. Then just click on the files and they can be previewed, printed and saved.

3. Email the Reports extracted into MS WORD®
Select to print the reports with an output format of a MS WORD® document or MS Excel® Spread sheet and then save the file and email as an attachment.

6.2.5 Convert SCOPE Reports to Text

There are several ways that you can convert the **SCOPE** reports to text format to be embedded in other documents. In the **Report Selection Screen** select the Output Format as:

1. **MS Word**[®], **Ms Excel**[®] or **HTML**, then saves the created document or spreadsheet.
2. **Preview** the report using MS Snapshot Viewer[®] and select to save the report to MS Office[®] Image Writer or as an Adobe[®] PDF format or send via Email (you can also save the .snp file using the save as option under Outlook)

*Note: The conversion of **SCOPE** reports from Snapshot Viewer format to MS Word[®] and MS Excel[®] uses a inbuilt MS Office Utility. This MS Office utilities conversion function is outside the control of the **SCOPE** software, and sometimes changes the layout of the report.*

See also Report Selection and Sending **SCOPE** Reports via Email and Embedding **SCOPE** Reports into a Client Report

6.2.6 Embedding SCOPE Reports into a Client Report

Embedding SCOPE Reports into a Client Report

If you want to have **SCOPE** reports embedded into another document then this can be done by either creating the **SCOPE** report in WORD or EXCEL and then inserting into a WORD document or alternatively creating the WORD report and saving it as a PDF file and then merging **SCOPE** reports into the PDF file.

See also Convert **SCOPE** Reports to Text

6.2.7 Exporting SCOPE reports into MS Office® WORD and EXCEL documents

• Select <**Report Selection**> from under the Main Menu, select the report you want to export and the format from the Report Selection dialogue box. **SCOPE** will launch the selected MS application to enable you to view the report.

NOTE: Before selecting to export a report of the same name to the same target MS Application a second time, you will need to save the previous report with another name or close it. See also Convert **SCOPE** Reports to Text
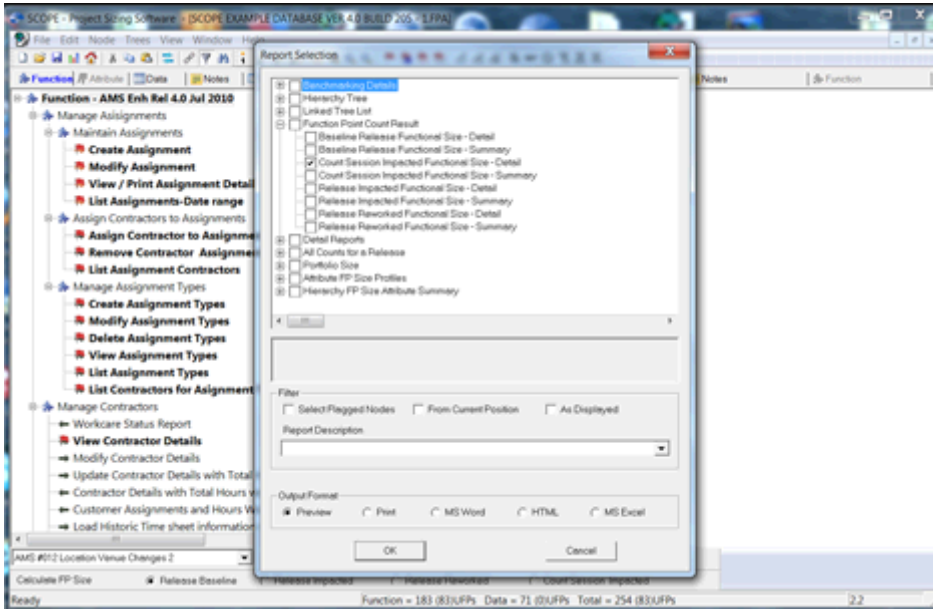
6.2.8 Merging a SCOPE PDF file into another PDF File

1. Select to preview your report in **SCOPE** or if the SnapShot Viewer File has been saved, double click to open the (*.snp) file.
2. From "File" in the main menu, select Print and select the printer as Adobe (Note: you need to have the Adobe Distiller software previously loaded).
3. Check Adobe PDF settings and ensure that 'Do not send fonts to Adobe PDF' is unselected.
4. Select Print and select the directory for the location of the saved PDF file.
5. Open Adobe and from main menu and select "Create PDF".
6. Select from the option for "Multiple files".
7. Select to "Add" files using the "browse" option - select one file at a time if a particular order is required in the finished PDF file.
8. Select "OK" to create the aggregated PDF file.
9. The **SCOPE** Count Reports have now been appended to the client report as a PDF file.
10. Client report is now ready to be created as a PDF file

6.2.9 Merging Annotating and Searching SCOPE Reports

If you have MS Office® 2003 or later you can select to **Preview** the Report in the Report Selection screen and then when it displays in Snapshot Viewer select to Print the Report to the printer called MS Office® Image Writer.

MS Office® Image Writer will open and then allow you to:

- Annotate the Report
- Insert text boxes
- Merge this report with other SCOPE reports or other documents
- Search for specific text (select Tools, Recognize Text for OCR)

See also Convert SCOPE Reports to Text and Exporting SCOPE Reports to MS WORD® and MS EXCEL®

6.3 Functional Size Reporting

6.3.1 Reporting the Functional Size in Function Points

Reporting Counts

SCOPE conforms to the requirements of the ISO standard 14143-1 and the IFPUG ISO standard 20926 and therefore reports the functional size as _Un_adjusted Function Points unless stated otherwise.

SCOPE reports the functional size either:

- Online
    - o displaying the size for each Application, Release and Count in the Project and Applications List Screen
    - o for a currently displayed Release, and its Count Session in the Tree Hierarchy Screen

o for a currently displayed Release, Count from the Reports List by selecting to Preview the Report or to send to HTML, MS Word® or MS Excel® and then previewing using those applications.

- Hardcopy
  - o for a currently displayed Release, Count from the Reports Selection Screen (Main Menu under File) by selecting to Print the Report

Online Dynamic Display of Functional Size

The Functional Size in Unadjusted function points is reported on the status bar below the Main Screen. It reports the **Release Baseline Functional Size, Release Impacted Functional Size, Release Reworked Functional Size and the Count Session Impacted Functional Size** depending on which one is selected. It reports the size (in unadjusted function points) for the function and Data Group nodes below those that are currently selected on the Function Tree.

I.e. if you are located on the Root Node then the Baseline Functional Size reported will be for all Processes and Data Groups in the Release.
E.g. Function = 100 UFPs, Data = 25 UFPs Total = 125 UFPs

If your cursor is positioned on a child node of the Function Tree then the Baseline Functional Size reported would be for all Processes and the Data Groups linked to those Processes from the current cursor position downwards.

Reporting Flagged Functions
If you have selected to flag four Processes worth 4 function points each, then the size of the 'Flagged' nodes is reported in brackets. All the Data Linked to the Flagged Functions is reported, irrespective of whether the Data Nodes have been Flagged. In the following example 4 Processes were flagged of which 1 of them was linked to 2 Data Groups. Therefore Data reported to be linked is 15 FPs (10 + 5)
E.g. Functions= 100 (16) UFPs, Data = 25 (15) UFPs Total = 125 (31) UFPs.

However if you ONLY want to report the DATA NODES that are actually physically Flagged, not all those actually linked, then go to the User Options under the Status Bar Option in the dialogue box and check the box titled :"*Only Flagged Data Nodes used for FP Calculations*"

When this option is checked, then for the case where only one of the above linked Data Nodes (10fps) is Flagged then the reported Flagged count displayed in the Status Bar will be:

E.g. Functions= 100 (16) UFPs, Data = 25 (10) UFPs Total = 125 (26) UFPs.

SCOPE Reports of Functional Size

SCOPE reports the functional size in 4 different ways which can be selected at the time of reporting:

1. **Release Baseline Functional Size**
2. **Release Impacted Functional Size**
3. **Release Reworked Functional Size**
4. **Count Session Impacted Functional Size**

For more information refer **SCOPE Types of Functional Size Reporting**

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6.3.2 Types of Functional Size Reporting

SCOPE reports the functional size in 4 different ways Each Type of report is used for a different purpose and has a different **SCOPE** of functions included in the Size. The types of **SCOPE** reports are as follows:

1. **Release Baseline Functional Size**
2. **Release Impacted Functional Size**
3. **Release Reworked Functional Size**
4. **Count Session Impacted Functional Size**

The type of report can be selected at the time of reporting.

6.3.2.1 Release Baseline Functional Size

Reports the 'Net' size of the Release after all the impacts from the Count Sessions have been applied. Although the functions marked as deleted are displayed on the screen, these deleted functions will be excluded from the reports and the calculated net reported size.

The Baseline Release Functional Size for a Work in Progress Release will be the same as the size that will be reported in the Production Release after it is used to update the Production Release.

This size measures the total amount of functionality that is delivered to the User by the application and will be supported.

Note: In IFPUG CPM terminology this report would be equivalent to the Application Baseline Size (Production Release) or the Development Project Size (WIP Release).

6.3.2.2 <u>Release Impacted Functional Size</u>

Reports the aggregated size of the Count Sessions listed under the selected Release. It is the total size of this Work in Progress Release and is the aggregated size of the *unique* functions impacted by the Count Sessions listed for the Release. This is different from a Release Reworked Report in that if more than one Count Session impacts a Process or Data Group then the impacted function is only included *once* in the total size. E.g.: if the WIP Release had two Change Requests (i.e. separate Count Sessions) that changed a process of 4 function points, then the impacted process would only contribute 4 function points to the Release Impacted Functional Size. However the impacted process would contribute 4 function points to the size of *each* Count Session within the Release.

This size measures the total amount of *unique* functionality that is worked on during the Release and ignores any rework. It is the net size of the Release irrespective of how many times a function was impacted by Change Requests.

Note: In IFPUG CPM terminology this report would be equivalent to the sum of the Enhancement Project Counts for a particular Release of an Application except that it excludes duplicate counting of Enhancement Projects that impact the same function.

6.3.2.3 <u>Release Reworked Functional Size</u>

Reports the *cumulative* size of the Count Sessions listed under the selected Release. It is the total size of all the work done in this Work in Progress Release . This is different from a Release Impacted Report in that if more than one Count Session impacts a Process or Data Group then the impacted function is only included *each time it is impacted* in the total size. E.g. if the WIP Release had two Change Requests (i.e. separate Count Sessions) that changed a process of 4 function points, then the impacted process would contribute 8 (i.e. 4 + 4) function points to the Release Reworked Functional Size.

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This size measures the total amount of functionality that is worked on during the Release and includes any rework. It is the total aggregated size of the Release and takes into account for the size if a function was impacted by more than one Change Request. Many suppliers use this report for billing purposes as it actually reflects the work they were asked to do.

Note: In IFPUG CPM terminology this report would be equivalent to the actual sum of the Enhancement Project Counts for a particular Release of an Application.

6.3.2.4 Count Session Impacted Functional Size

Reports the size of each Change Request (Enhancement Project) as a Count Session within a Release. It is the total size of all impacted (added, changed, and deleted) processes and data groups for the selected Count Session listed within the Work in Progress Release.

This size measures the total amount of functionality that is worked on during by the Change Request for the Count Session.

Note: In IFPUG CPM terminology this report would be equivalent to the size of an Enhancement Project Count for a particular Release of an Application.

See also *Report Selection*

6.3.3 Flags and Filters

Profiling and Filtering Counts-Filters and Flags

Flagging Nodes on the trees allows SCOPE to selectively report, only on those nodes currently Flagged by using the "Select Flagged Nodes" option when reporting . This gives tremendous capability to the User to customize the reports to only list those nodes that are required. Nodes can be manually Flagged (Highlight the Node and select - Flag-Toggle or ALT +F, or select the Flag Icon on the menu.

However the most common way of assigning Flags is to have SCOPE report on a particular selection criteria and SCOPE will "Flag" the nodes that satisfy the filters requirements. **Using Flags, SCOPE** allows you to filter your function point count to selectively report the size. This filtering is performed by selecting **Filter Mode** from the buttons on the top of the screen. The **Filter button** is located next **Link Mode** button. **SCOPE** is either in **Link Mode** OR **Filter Mode**. If the small square boxes next to each node are not visible in the RHS, then you are in **Filter Mode**.

In **Filter Mode** you can use the Boolean options (**&** AND, OR or NOT) icons to select nodes on the opposite tree that satisfy the **Link** criteria you have selected, i.e. if you selected the Boolean Option **&**, to be tagged to some nodes on the RH tree, then SCOPE will select all the nodes that are linked to all the tagged Nodes on the LH tree. Collections within a tree can be Flagged and the result set of selected nodes can then be saved as a **Flag Set** for later display and use for that **Release**. Alternatively, you can assign Flags using a **Filter** to highlight the existence of **Links** between nodes in different trees. A particular selection of nodes and the conditions of selection are stored in a **Filter Set**.

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The **Filter Set** is equivalent to the 'question' being asked whilst the **Flag Set** is the 'answer' to that question. **SCOPE** enables you to save the question (Filter Set) and then re-apply at a later date to display either the same Flagged answer (Flagged Nodes) or different answers if you have made changes to the trees. Alternatively you can store the answer, i.e. the Flagged set of nodes (**Flag Set**) and re-display it when required.

Flag Sets and **Filter Sets** are managed from the dialog box, displayed when you choose Trees–Flag **Set List** or **Trees–Filter Sets** or the **Flag** icon or **Filter** icon from the top menu.

Flag Sets and **Filter Sets** are saved for the specific tree highlighted at the time of saving. **To re-apply them you need to be located on the tree for which the set was saved before selecting to view the dialogue box to retrieve them.**

You can save many **Flag Sets** and apply them cumulatively so that the display represents the net total of the selection Filters applied. You can also manually allocate **Flags** to any node in addition to those **Flags** currently displayed. Manually allocate and de-allocate flags by pressing **Alt+F** or selecting the **Flag** icon at the top of the screen whilst located on a node. When you save the displayed **Flag Set** you can include the new Flags or alternatively save as another set using the **'save as'** option.

Filters allow you to highlight nodes (i.e. **SCOPE** attaches a Flag to the node to highlight it) on the LH tree that are **Linked** to the node currently selected on the RH tree. The conditions for the **Filter** are set on the right hand side and the **Flags** are displayed on the LH tree.

To create a Filter:
- Display two trees by clicking the appropriate tabs (they must be different trees, you cannot filter Links within the same tree).

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- Choose Filter mode from the menu (**Trees–Filter**) or by selecting the **Filter Mode Icon** from the top of the screen, and then selecting the Boolean conditions (Yes, Or and No).
- Set the criteria in the right hand tree by setting selection conditions (using either the **Node** menu, or the toolbar buttons):

 & (**Yes) Exclusive 'AND' Filter** Sets a **Flag** for nodes on LH Tree that are **Linked** to this node on RH tree. When additional nodes on RH tree are selected then any ⌉ set Flags are only retained on the LH tree if they are **also Linked** to the new selected nodes.

or **(Or) Inclusive 'OR' Filter** Sets a **Flag** for nodes on LH Tree that are **Linked** to this node on RH tree. When additional nodes are selected using ∧ then the previously set Flags are retained on the LH tree **and** any additional **Linked** nodes are also **Flagged**.

🚫 **(No) Exclusive 'NOT' Filter** Sets a **Flag** for nodes on LH Tree that are **NOT Linked** to this node on RH tree. When additional nodes on RH tree are selected then any previously set Flags are only retained on the LH tree if they are **also Linked** to the new selected nodes.

▼ **(Clear)** Clears all currently set **Flags** for this node.

▼ **(Clear All)** Clears all currently set **Flags** for nodes under this parent.

Nodes that match the filter criteria on the left hand tree are **Flagged** 🚩 . You can save the **Flagged** nodes as a **Flag set** 📑 for future reference and cumulatively apply them to gain their aggregated impact.

For example if your question is display all the Process nodes **Linked** to three selected Notes, then display the **Function** Tree on the left side and the **Note** tree on the right side. Click on the 'YES (And)' **Filter** condition icon as you highlight each of

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the Notes. The **Flagged set** of Processes **Linked** to all three Notes will be highlighted with a **Flag** icon. These nodes selected with the Flag can then be reported using the "select Flag nodes" option.

Flags can be assigned manually by highlighting the node you want to Flag then selecting the Flag Icon. Additional Flags may be overlaid over those derived from the Filter on the main menu or pressing Alt+F.

Flags can be assigned automatically using the **Search and Replace** function under the Edit Menu. The results of the search will be flagged. This facilitates selective reporting of all processes and data groups that satisfy specific search criteria.
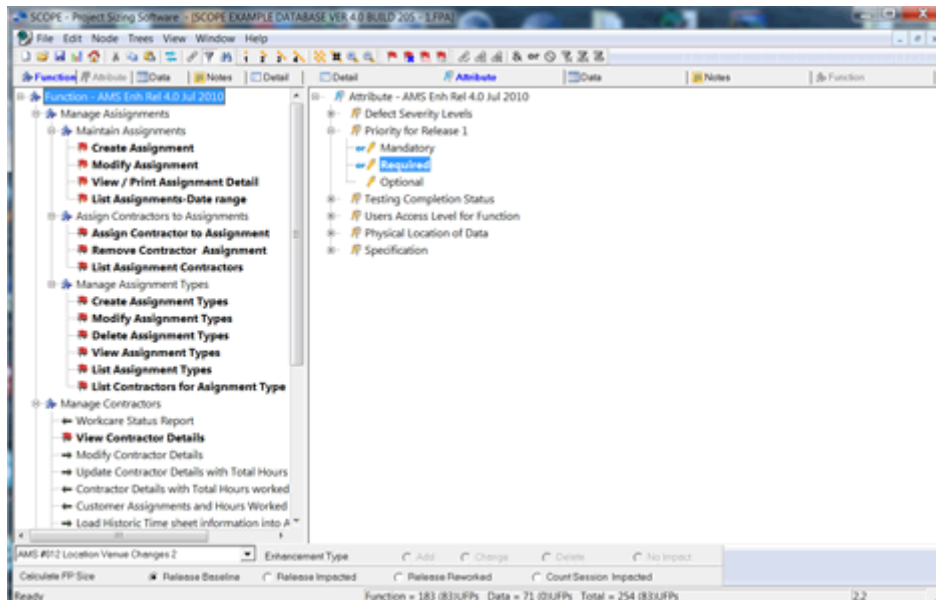
6.4 Project Management Reporting

6.4.1 FP Based Project Governance

Setting up Numerical Attributes

6.4.1.1 Uses for Numerical Attributes

Numerical Attributes allow you to create and assign 'quantifying variables' to your functional size measures so you can report a result using Function Points as the other quantifying variable for Project Management Reporting.

For example you can create Numerical attributes to report the:

- **Estimated effort hours** to deliver project functionality based on your expected delivery rate in hours / fp.

- **NESMA function points** of enhanced functionality for your project based on the NESMA impact factors for transactions and data

- **Earned Value status reporting** i.e. the number of function points that have been completed for your project compared to the total number of function points planned for the project

- Package implementation costing - apply different pricing to package implementations for different delivery mechanisms i.e. configuring tables, building new functions

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- **Leveraging Reuse** i.e. number of function points built 'new' compared to the total number of function points delivered based on the extent of 're-use' that could be leveraged for the functions etc.

Since Numerical Attributes are completely customisable you can create them to report what ever you want.

SCOPE includes a template set of Numerical Attributes which have preset values that can be automatically loaded. Once loaded you can change the presets to suit your own requirements. Once you have customised your Numerical attributes for your own needs, copy and paste them to the Attribute Tree of other Releases.

If you have already set up links for non-numerical attributes and you want to 'make them numerical', then set up your Numerical Category and its attributes. Use the "Copy Links" option to copy the links from your original attribute to the relevant new numerical attribute.

You can create your own Templates for Numerical Attributes and save them in the database for use on future counts.

6.4.2 Estimating Project Effort

6.4.2.1 Using the Count for Project Estimation

 Steps

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- Collect your own organisations project delivery rates (PDR=project effort hours to deliver a function point) or use the ISBSGs published PDRs for each environment.

- Set up a **Numerical Attribute Category** and name it '*Estimate Effort to Deliver*'. (you can also use the Insert Category Template option)

- Edit the Category Details so it has the **Variable** set to *PDR (hours/fp)* and the **Units** set as *Hours* as the output units for the report.

- Insert some **attributes**, under the Category; one for each different development technology you use (i.e. .NET, JAVA, C++). Then set a **Value** for the PDR for that technology (i.e. 13.0, 9.0,10.2). Link each Attribute to the functionality in the Process Tree and Data Tree that is delivered via that technology for the project.

- **SCOPE** will multiply the function points to be delivered by the PDR (hours/fp) to calculate a report of the *Estimated Effort* in *Hours* for each technology.

- View the calculated Effort for both Processes and Data on the screen or run the *Numerical Attribute - FP Size Report* (Select - then Attribute FP Size Profiles)

You can create your own Templates for Numerical Attributes and save them in the database for use on future counts.

You can export your function point counting data for your Project or Release to SEER SEM® software for more sophisticated estimation of resources.
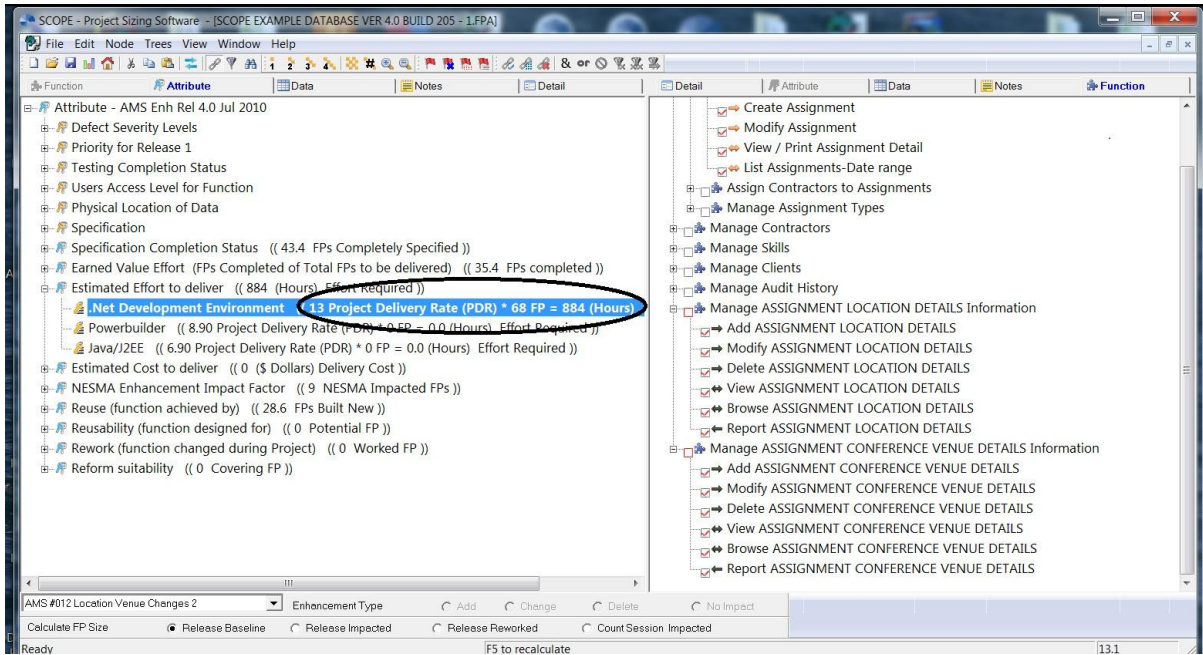
Online report of Hours to develop the Process functionality (68 function points at 13.0 hours per function point = 884 hours). The estimated hours to develop the Data Files is reported when the Data Tree Screen is open. (21 function points at 13.0 hours per function point = 273 hours) Total = 1,157 hours for the Project.

6.4.3 Earned Value Project Monitoring

Using the Count for Earned Value Reporting

6.4.3.1 Earned Value Overview

Earned value management (EVM) is a project management technique for measuring project performance and progress in an objective manner. EVM has the ability to combine measurements of SCOPE, schedule, and cost in a single integrated system. Earned Value Management is notable for its ability to provide accurate forecasts of project performance problems. Early EVM research showed that the areas of planning and control are significantly impacted by its use; and similarly, using the methodology improves both SCOPE definition as well as the analysis of overall

project performance. More recent research studies have shown that the principles of EVM are positive predictors of project success.

6.4.3.2 <u>Project tracking with EVM</u>

The project can use Function Points as means of quantifying the work completed. Industry figures, (ISBSG) indicate the % of total project budgeted effort that would be consumed to get a function point to a particular project stage. E.g. in order to complete the build phase for a function 78% of the budgeted project effort is typically consumed. I.e. 78% of the function point total should have been completed.

ISBSG publishes this data and SCOPE has set up a Template Numerical attributes for Earned value using these Percentages.

Worked example:

Total budgeted effort = 1000 hours (from your project plan)

Total project size = 100 fps (measured in SCOPE)

Project delivery rate = 10 hours / fp (calculated)

Current Project Status

- 50 fps in the project have finished Design phase = 35% *50 = 17.5 fps completed

- 50 fps in the project have finished Build phase = 78% *50 = 39 fps completed

- Total FPs completed = 57 of the planned 100 only 57% completed

- Actual effort consumed to date is 900 hours or 90% of the budgeted effort

Effort consumed indicates that the project is 90% complete but the FP completed figure indicates 57% complete.

57 function points should have only consumed 570 hours.

Actual effort of 900 hours would predict 90 fps completed . Slippage = (900 - 570)= 330 hours. Project is 330 hours behind schedule or 36% slippage.

 SCOPE reports the *Function Points completed* and the % completed of the total number of function points to be delivered. To determine the % slippage, use the **SCOPE** reported completed function points, project team effort consumed recorded in your time sheets, and the planned Project PDR .

 SCOPE enables you to regularly report your project status using the Earned Value method. Set up the "*Earned Value Effort (FPs Completed of Total FPs to be delivered)*   " Numerical Attribute category and follow instructions below for assigning the relevant status attributes and reporting Earned Value project status.

Customising Earned Value Attributes

NOTE: If you want to customise the Earned Value Category and names and values for the Attributes, then make your changes and **SCOPE** Reporting will dynamically accept all changes. To transfer your 'customised' Earned Value Numerical Category to other counts either:

- 'cut and paste' the branch

- under Options - set up a standard Numerical Attribute Template which can be reused for all your counts and will become part of the standard available template set.

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6.4.3.3 Assigning Earned Value Status

- Select the Count Session you want to report. If you want to report for the whole Release and all its count Sessions. Select "No Session" in the Count Session drop down list at the bottom of the screen. Click the Calculate FP Size online reporting to "Release Reworked"

- Position your cursor at the top of the ⚡Attribute Tree on the LHS screen. Right click and select "Insert Template Category". From the Select Template drop down list select "*Earned Value Effort (FPs Completed of Total FPs to be delivered)* "

- **SCOPE** will load this ⚡**Numerical Attribute Category** with a list of 📝**Attributes** representing project stage and the budgeted effort (Not Started, Planning, Analysis, Design, Build , Test, Implemented) and the % budgeted effort **Value= 0% to 100%** for that Stage. E.g. Testing Completed :Value =94%)

- Position your cursor at the top of the 🧩Function Tree on the RHS screen. Right click and select "Flag" - "Session Impacted" to highlight (🚩flag) all processes that are impacted by this Release for all Counts.

- Link the relevant Stage Completed Attribute to each impacted process based on its current status. E.g. link the Build Completed Attribute to all processes that have completed coding and unit testing. Continue until all processes and data impacted for the Release have a link to a Stage completed.

- Repeat steps 4 and 5 for the Data Tree.

- **SCOPE** will multiply the function points for the Processes and the Data by Budgeted Effort to calculate and report the *number of actually completed Function Points*. The number of function points that should have been delivered at this point in time is the Effort actually consumed divided by the Productivity rate (hours/fp)

- Locate your cursor on the top of the Function Tree/Data Tree to View the *number of actually completed Function Points* for both Processes and Data separately on the screen or run the *Numerical Attribute - FP Size Report* (Select ▮▮- then Attribute FP Size Profiles) to combine both transaction and data results.

- Example report below: Check the report has "100%" linked FPs (circled value below). This is indicating that 100% of all the impacted process and data groups within the Release have Status completed attribute assigned to them. The linked processes and data groups have 89 IFPUG function points attributed to them and of these 62 fps have been completed or 70% of functionality is completed. The project is on track if 70% or less of the planned effort for the project has been consumed.

ⓘ **PRESS F5 to recalculate Numerical Attribute Results**

Numerical Attribute - FP Size - Release Reworked

Application Name AMS - View Example Counts

Release Name AMS Enh Rel 4.0 Jul 2010

Project Details   **Count Session Details**

Report Selection Filter	FPs linked to the selected Attributes - Impacted by the Release - Reworked
	From Current Node position -

Selected for Release
AMS Enh Rel 4.0 Jul 2010

Earned Value Effort (FPs Completed of Total FPs to be delivered)

	FPs Budgeted	Linked (Fps)			TOTAL FPs completed		
		Process	Data Group	TOTAL	Process	Data Group	TOTAL
Analysis Completed	20.00%	14	0	14	3	0	3
Design Completed	35.00%	18	0	18	6	0	6
Build Completed	78.00%	12	0	12	9	0	9
Testing Completed	94.00%	24	0	24	23	0	23
Implementation Completed	100.00%	0	21	21	0	21	21
FPs Budgeted Linked (Fps)		68	21	89	41	21	62

FPs completed / FPs Budgeted 70%

TOTAL Reworked Fps 89   FPs completed / TOTAL Reworked Fps 70%

% TOTAL Reworked Fps 100%

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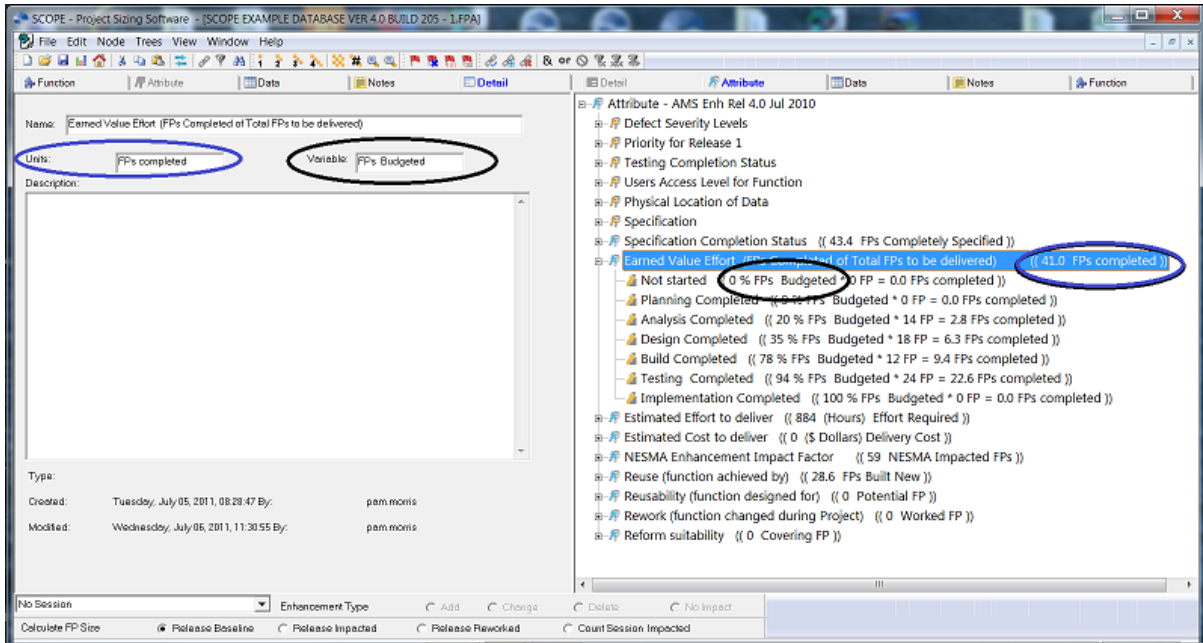
The text used in reporting the Earned Value is fully customisable in the Details Screen of the Category.

6.4.4 NESMA Impacted Enhancement Function Points

NESMA Enhancement Counts

The Netherlands Software Metrics Association (NESMA) has published guidelines on counting enhancement projects that supplement the IFPUG guidelines. Full details of the NESMA Method can be found in FUNCTION POINT ANALYSIS FOR SOFTWARE ENHANCEMENT GUIDELINES Version 2.2.1. The NESMA Method considers the application of FPA to software enhancement from the perspective of the standard function point analysis method. The result of this work, embodied in these guidelines, is a method applicable to software enhancement and testing that is strongly related to the standard FPA method. The term Enhancement Function Point Analysis (EFPA) is used to differentiate the method from the standard function point analysis method.

SCOPE enables you to report your Enhancement Function Point Counts using the NESMA method. Assign the Add, Change, Delete Enhancement Types to the Transactions and Data Groups in your functional model as you would normally for an IFPUG function point count. But in addition set up the "*NESMA Enhancement Impact Factor* " Numerical Attribute category and follow instructions below for assigning the relevant impact factors and reporting the results in NESMA Function Points.

Customising NESMA Attributes

NOTE: If you want to customise the NESMA Category and names and values for the Attributes, then make your changes and SCOPE Reporting will dynamically accept all

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changes. To transfer your 'customised' NESMA Numerical Category to other counts either:

- 'cut and paste' the branch

- under Options - set up a standard Numerical Attribute Template which can be reused for all your counts and will become part of the standard available template set.

6.4.4.1 Assigning NESMA Impact Factors

- Select the Count Session you want to report. If you want to report for the whole Release and all its count Sessions. Select "No Session" in the Count Session drop down list at the bottom of the screen. Click the Calculate FP Size online reporting to "Release Reworked"

- Position your cursor at the top of the ⚡Attribute Tree on the LHS screen. Right click and select "Insert Template Category". From the Select Template drop down list select "*NESMA Enhancement Impact Factor* "

- **SCOPE** will load this ⚡**Numerical Attribute Category** with a list of ✎**Attributes** representing each type of Impact on Transactions and Data (Add, Change, Delete) and the Impact **Value= 0.25 to 1.50** for that Type of Function and Type of Impact. E.g. Added Transactions - Value =1.0, Deleted Transactions - Value = 0.4 NESMA Impact Factor)

- Position your cursor at the top of the 🧩Function Tree on the RHS screen. Right click and select "Flag" - "Session Impacted" to highlight (🚩flag) all processes that are impacted by this Release for all Counts.

- Link the relevant NESMA Impact Factor Attribute to each impacted process. I.e. link the Deleted Attribute to all processes that have been deleted by the Enhancement Requirements. Continue until all processes and data impacted for the Release have a link to an Enhancement Factor.

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- Repeat steps 4 and 5 for the Data Tree.

- **SCOPE** will multiply the function points for the Processes and the Data by Enhancement Impact Factor to calculate an report the *NESMA Impacted Function Points* for each type of Impact.

- Locate your cursor on the top of the Function Tree/Data Tree to View the calculated NESMA Impacted FPs for both Processes and Data separately on the screen or run the *Numerical Attribute - FP Size Report* (Select 📊- then Attribute FP Size Profiles) to combine both transaction and data results.

- Example report below : Check the report has "100%" linked FPs (circled value below). This is indicating that 100% of all the impacted process and data groups have had a NESMA impact factor assigned to them. The linked processes and data groups have 89 IFPUG function points attributed to them and 75 NESMA Impact function points.

PRESS F5 to recalculate Numerical Attribute Results
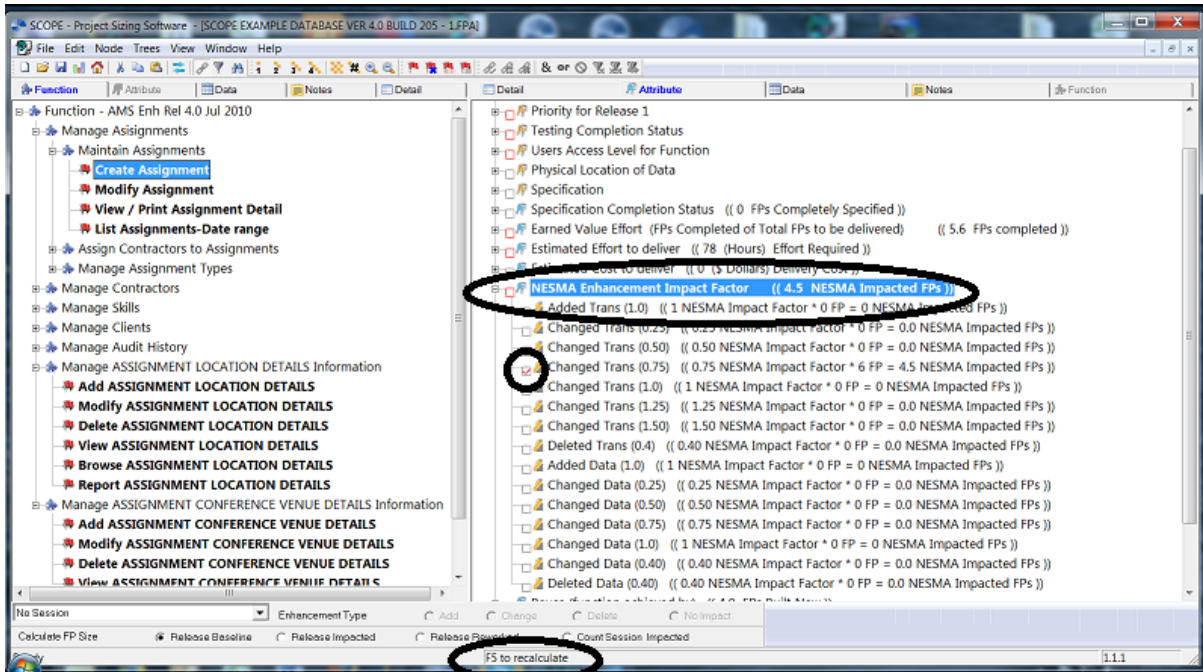
Numerical Attribute - FP Size - Release Reworked

Application Name   AMS - View Example Counts

Release Name   AMS Enh Rel 4.0 Jul 2010

**Project Details**   **Count Session Details**

Report Selection Filter	FPs linked to the selected Attributes - Impacted by the Release - Reworked
	From Current Node position -

Selected for Release
AMS Enh Rel 4.0 Jul 2010

NESMA Enhancement Impact Factor

	NESMA Impact Factor	Linked (Fps)			TOTAL NESMA Impacted FPs		
		Process	Data Group	TOTAL	Process	Data Group	TOTAL
Added Trans (1.0)	1.00	50	0	50	50	0	50
Changed Trans (0.25)	0.25	6	0	6	2	0	2
Changed Trans (0.50)	0.50	6	0	6	3	0	3
Changed Trans (0.75)	0.75	6	0	6	5	0	5
Added Data (1.0)	1.00	0	14	14	0	14	14
Changed Data (0.25)	0.25	0	7	7	0	2	2
NESMA Impact Factor Linked (Fps)		68	21	89	59	16	75

NESMA Impacted FPs

TOTAL Reworked Fps   89

% TOTAL Reworked Fps   100%

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6.4.5 Package Implementation Costing

6.4.5.1 <u>Package (COTS) Implementation Overview</u>

The project estimates for a package solution need to be refined for each implementation depending on the percentage of the project functionality which is:

- native to the package and implemented without change (vanilla)

- functionality within the package which needs to be customised for this installation

- functionality contained with the organisations existing applications which needs to be converted to adapt to the constraints of the package

- to be built as new functions in addition to the package functions

- to be built as new functions to enable interfacing to other in-house applications

- not to be delivered in this release

The productivity rates and cost per function point to deliver for each of these different development mechanisms (to implement, customise, enhance or build) are usually different. This complexity of assigning an appropriate productivity factor can be compounded when the package provides utilities which enable quick delivery based on changes to rule tables. Change requests, which can be implemented by changing values in rule-based tables, can be implemented very efficiently compared to a similar user change request, that requires source code modification. It is recommended that these different types of activities are identified and effort collected against them accordingly so that productivity rates and the cost effectiveness for the different activity types can by determined.

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The functions can be flagged for their development mechanism and their relative contributions to the functional size calculated. This will enable fine-tuning of the project estimates.

6.4.5.2 Reporting Package Implementation Cost Estimates

To Report Earned Value:

- Collect your own organisations costs for delivering the different development mechanisms (Dollar cost to deliver a function point)

- Set up a Numerical Attribute Category and name it '*Estimate Cost to Deliver*'. (you can also use the Insert Category Template option)

- Edit the Category Details so it has the Variable set to *(dollars /fp)* and the Units set as *Dollars* as the output units for the report.

- Insert some attributes, under the Category; one for each different development mechanisms you use (i.e. Vanilla, Configure, Customise). Then set a Value for the Dollar cost per fp for that development mechanism (i.e. $100, $500, $1000). Link each Attribute to the functionality in the Process Tree and Data Tree that is delivered via that technology for the project.

- **SCOPE** will multiply the function points to be delivered by the cost ($/fp) to calculate and report the *Estimated Cost* in *Dollars* for each mechanism.

- View the calculated Cost for both Processes and Data on the screen or run the *Numerical Attribute - FP Size Report* (Select - then Attribute FP Size Profiles)

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NOTE: If you want to customise the Package Cost Estimates Category and names and values for the Attributes, then make your changes and SCOPE Reporting will dynamically accept all changes. To transfer your 'customised' Package Cost Estimates Category to other counts either:

- 'cut and paste' the branch

- under Options - set up a standard Numerical Attribute Template which can be reused for all your counts and will become part of the standard available template set.

6.5 Benchmark Metrics Reporting

6.5.1 Benchmark Reports - Overview

SCOPE has 3 types of Metrics Benchmark Reports all of which are available for online preview, printing,saving and sending.

- You can select *which* Benchmark Data you want to report by highlighting one or more nodes on the Benchmark Metrics Tree. You can use CTRL and SHIFT to optionally select multiple nodes. SCOPE will report all the information located below the selected Nodes as :

- **Tables - Standard Reports**

- **Charts / Graphs - MS Excel Pivot Charts**

- **Charts / Graphs - Web Portal -** Interactive Drill Down and comparative ISBSG Industry Benchmarking (Available to SCOPE Connect subscribers only)

 See Customise and save your new reports as a Master Template

6.5.2 Benchmarking Reports - Tables

The Benchmark Tabular Reports work the same way as the other Function Point Reports in SCOPE. I.e. they have online preview in Snapshot Viewer and can be exported to MS WORD, MS EXCEL and HTML.

You can select *which* Benchmark Data you want to report by highlighting one or more nodes on the Benchmark Metrics Tree. You can use CTRL and SHIFT to optionally select multiple nodes.

Select ▊ icon at the top of the screen. Benchmark data will be reported in a *table* format grouped *by Benchmarking Period* for the following reports:

- **Applications Details** - reports all the M&S Metrics Data for the selected Applications.

- **Release Details** - reports all the D&E Metrics Data for the selected Releases.

- **Project Details** - reports all the D&E Metrics Data for the selected Projects.

- **Count Session** Details (Project) - reports all the D&E Metrics Data for the selected Sessions by Project

- **Count Session** Details (Release) - reports all the D&E Metrics Data for the selected Sessions by Release

 The M&S Reports - Size Usage, Maintenance and Support Effort , Defects and Environment.

All D&E Reports output all the Size, Effort, Defect, Cost, Environment Data with a summary on Project Delivery Rate (PDR Hours/FP), Cost Effectiveness ($/FP), Defect Density (defects delivered/1000 fps). Below is an example of the Report

output from the **Project Details Report**

Project Details

Benchmarking Details - Project Details

SIZE

Jan 2009 - Dec 2010 New Dev Projects Only	Functional Size (UFPs) (Manual)
AMS New Dev Proj	157
TRS New Dev Proj	132
CCASS New Dev Proj	215
Benchmark Period - Total Size (UFPs)	504

PROJECT EFFORT

	Plan	Specify	Design	Build	Test	Implement	Total Effort (hours)
Jan 2009 - Dec 2010 New Dev Projects Only							
AMS New Dev Proj	70	139	174	871	436	52	1,742
TRS New Dev Proj	31	78	187	1,012	234	16	1,558
CCASS New Dev Proj	45	181	226	1,016	722	68	2,258
Benchmark Period - Total Effort (hours)							5,558

DEFECTS

Stage Found:	Plan	Specify	Design	Build	Test	Implement	1st Month In Production	TOTAL (Defects)
Jan 2009 - Dec 2010 New Dev Projects Only								
AMS New Dev Proj								
Minor	-	1	2	3	7	2	4	19
Major	-	1	1	3	8	2	3	18
Extreme	-	0	1	0	1	0	1	3
TOTAL	-	2	4	6	16	4	8	40
CCASS New Dev Proj								
Minor	-	2	5	3	9	3	1	23
Major	-	0	2	2	9	1	3	17
Extreme	-	0	0	2	3	1	1	7
TOTAL	-	2	7	7	21	5	5	47

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(Report #20) Release 4, 0 2.05
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SCOPE Project Sizing Software™
Friday, July 01, 2011
4:45:41 PM

6.6 Benchmarking Charts - SCOPE Connect™
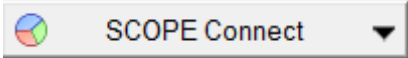
SCOPE CONNECT™ uses **semantic web technology** WWW portal for sophisticated management reporting and dynamic **ISBSG benchmarking capability**. It allows users to identify, integrate, query and visualise their metrics data with drill down reporting and dynamic filtering of the ISBSG database. Slice and dice' your own metrics data to **benchmark against relevant Industry projects.**

If you have a **SCOPE** Connect™ subscription then **SCOPE** will enable you to do Analytic reporting via their **SCOPE** Connect™ web portal.

SCOPE Connect™ enables you to Chart your data and benchmark against similar projects from the ISBSG Benchmarking data set.

You can select *which* Benchmark Data you want to report by highlighting one or more nodes on the Benchmark Metrics Tree. You can use CTRL and SHIFT to optionally select multiple nodes.

Select ![SCOPE Connect button] button at the top of the top right hand side of the Benchmark Metrics Screen. Benchmark data will be reported in a *Chart* format grouped *by Benchmarking Period .*

6.7 Benchmarking Reports - Graphs - Excel Charts

Excel Benchmarking Metrics Charts

SCOPE provides over 30 different Charts to enable you to compare your Benchmark Metrics by Period.

The Charts graphically report across Work Packages , Projects, Releases and by Period.

- Size

- Effort

- Defects

- Cost

- Effort Distribution by Phase

- Project delivery rate (PDR)

- Cost-effectiveness ($/FP)

- Defect Density (defects/1000fp)

SCOPE creates an XML extract of your selected data which is automatically loaded into an Excel Workbook and populates the pre-formatted Pivot Charts. **SCOPE** then opens the Excel Workbook for viewing and editing. For more advance instructions on how to edit the Graph see Tutorials

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The Benchmark Graphical Reports allow you to select *which* Benchmark Data you want to report by highlighting one or more nodes on the Benchmark Metrics Tree. You can use CTRL and SHIFT to optionally select multiple nodes.

6.7.1 Creating Benchmark Graphs

1. Select **Metrics Charts** button at the top of the screen. The drop down list gives the option of reporting Benchmark data as either:

   - **Maintenance and Support (M&S) Data** - reports all the M&S Metrics Data for the selected Applications at Application and Period level.

   - **Development and Enhancement (D&E) _Release_ Data** - reports all the D&E Metrics Data for the selected Releases at the Count Session/Work Package, Release and Period level.

   - **Development and Enhancement (D&E) _Project_ Data** - reports all the D&E Metrics Data for the selected Projects at the Count Session/Work Package, Project and Period level.

2. Select the Report option from the list displayed: Note: if the report option is 'greyed out' then it means that your are not located on a node that has that type of metrics data under it.

3. Select a Folder from the "Browse for Folder"dialogue box , then press the "Make New Folder" button on the left hand bottom screen. **SCOPE** will save the exported XML data extract and new Excel Workbook with the Pivot charts in the folder , then automatically open the Workbook.

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4. Since the Workbook contains Macros to enable the XML to load and display, in order to refresh the data you need to Enable the Macros you need to change the security settings for the file. This can be done by pressing the Options / Enable Content button on the Security warning ribbon at the top of the screen. You can also select "Info" under file and follow instructions on how to change the Trust settings for the file. Once you have changed the enabled macro settings you will be able to Open and view all the charts.

5. **SCOPE** utilises the MS Excel Pivot Chart report functionality. Pivot charts provide interactive analysis of data, like a Pivot Table report. You can change views of data, see different levels of detail, or reorganize the chart layout by dragging fields and by showing or hiding items in fields. For more information on how to edit Pivot Charts see Customising Excel Charts or to set up your own Template Benchmark Report so you can reuse it for all its reporting see Saving a New Excel Chart Template.

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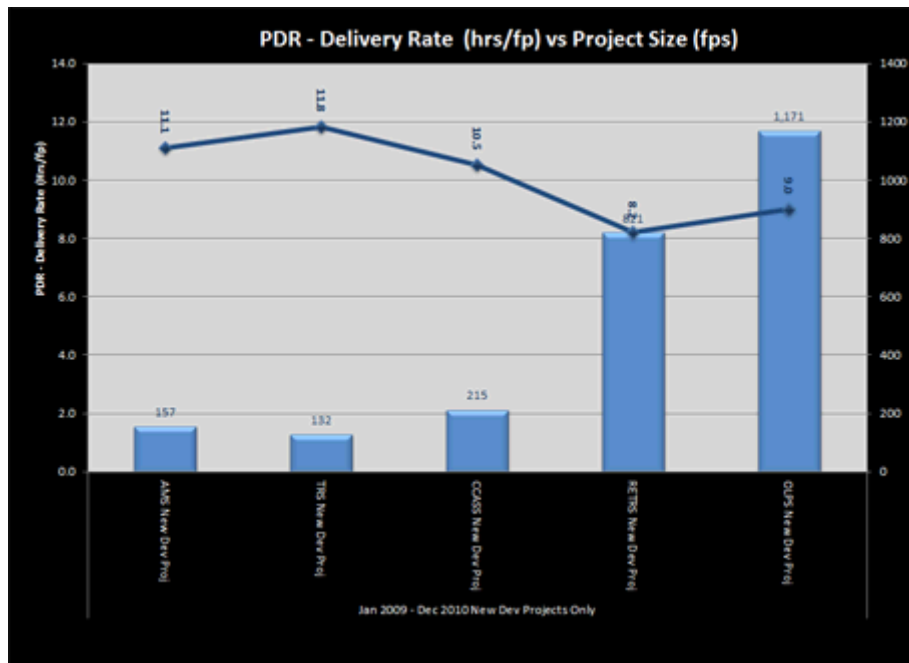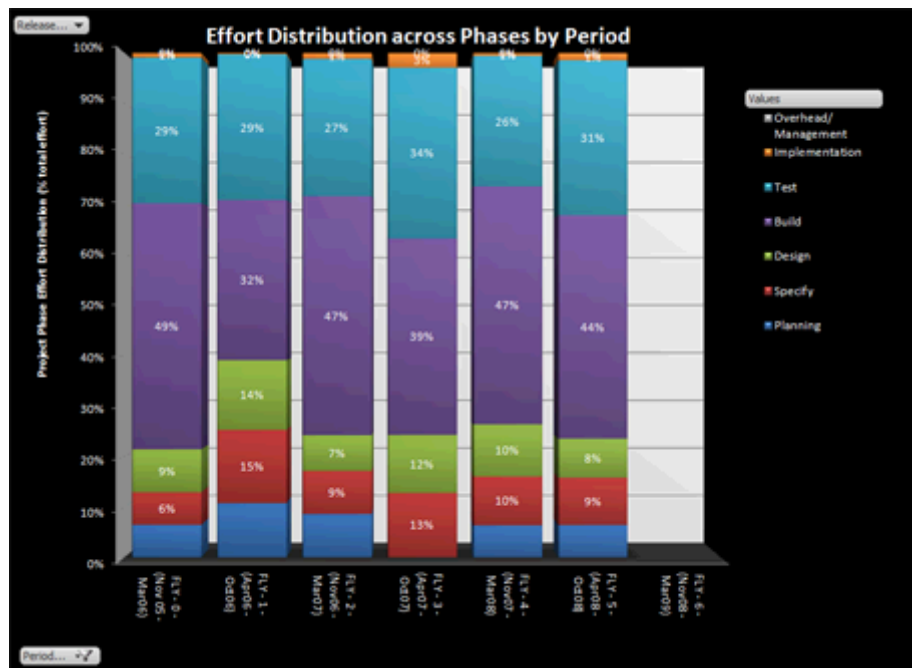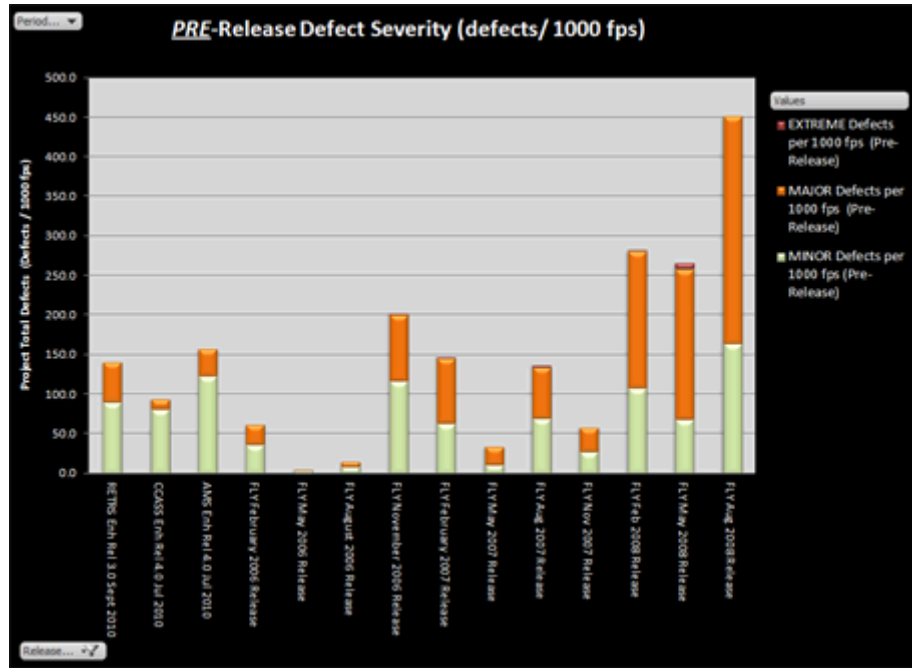
6.7.2 Customising Excel Metrics Charts

Pivot charts and Pivot Tables provide interactive analysis of data . You can change views of data, see different levels of detail, or reorganize the chart layout by dragging fields and by showing or hiding items in fields. For more information on how to edit Pivot Charts see MS Office 2007 Pivot Table Tutorial

6.7.2.1 Add and remove displayed Fields

1. Open the Data table associated with the Chart.
2. Click on the Table to display the Pivot Table Field List on the RHS of the screen.
3. Select fields from the check list to be added to the table to be displayed on the Chart.
4. Un-select fields from the check list to be removed to the table and the Chart display.

6.7.2.2 Remove "Blank" rows or other data from Displayed Chart data

1. Click on the Table row header drop down list. It displays a list of the current rows that are displayed on the Chart.
2. Un-select the "blank" row and other data row you want to remove it from the display

6.7.2.3 Change Format of Chart Display

- Change Chart Type - Right click on Chart and select "Change Chart Type"
- Change Colours - Right click on Chart column and select "Change Data Series"
- Change Titles - Click on Title and Change text

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Any changes you make will be for the current Workbook ONLY and will not be reflected next time you extract the data. If you want to keep your changes permanently then see Saving a New Excel Chart Template and Saving a New Excel Chart Template.

6.7.2.4 Saving a New Excel Chart Template

Saving an New Excel Chart Template to report Metrics

Background SCOPE Excel Chart Templates

SCOPE provides template Pivot Charts for Metrics data which can be generated by selecting the **Metrics Charts** button top right hand side of the screen. You will be prompted to save the extracted data in a new folder and name the directory folder.

SCOPE extracts the currently highlighted data and exports it to an XML file and saves it under the directory folder that you just created. It also saves an Excel workbook in the same directory. Both these files are saved with the same name as the directory folder. E.g. if you elected to save your Release Benchmark extract files in the folder called "Benchmark Metrics 2011" then under that directory folder will be two files:

- Benchmark Metrics 2011.XML (XML extract file with all your data)
- Benchmark Metrics 2011.XLSM (Macro enabled Excel workbook linked to the XML file)

There are 3 types of XML and XLSM files saved by **SCOPE** depending on the type of report you select.

- **Maintenance and Support (M&S) Data** :

  This XML extract uses the:

    - XSD Schema (c:\ProgramFiles\Total Metrics**MaintenanceAndSupport.xsd**)

    - Excel Master Template (....My Documents\Total Metrics**ApplicationReport.xlsm**)

- **Development and Enhancement (D&E) _Release_ Data** :

  This extract uses the:

    - XSD Schema (c:\ProgramFiles\Total Metrics**DevelopmentAndEnhancementReleases.xsd**

    - IExcel Master Template (....My Documents\Total Metrics\ (**ReleaseReport.xlsm**)

- **Development and Enhancement (D&E) _Project_ Data :**

  This extract uses the:

    - XSD Schema (c:\ProgramFiles\Total Metrics**DevelopmentAndEnhancementProjects.xsd**)
    - Excel Master Template (....My Documents\Total Metrics**ProjectReport.xlsm**)

SCOPE opens your new Excel file which has been created using one of the above template files and you can view and edit the template Pivot Charts displayed to suit your own organisation's needs. i.e. change the existing Charts, Add New Charts and delete/hide

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existing Charts.   If you just 'SAVE'' your Excel workbook the changes just made will only be for that workbook and do not update the original Master Excel Templates.

6.7.2.5 Setting up your own Master Template Files

This can be done two ways:

1. Storing Many Template Files to be Selectively used

If you want to keep many different versions of the Benchmark Templates, e.g.. different report formats for different clients, different User Areas etc, then when you have customised the Excel Benchmark Charts to look as you want them to report in the future save them in a specific directory named accordingly.

 eg. *C:\My Reports \Benchmark Reports \Annual Benchmark Reports for ACME client***ProjectReport.xlsm**

 When you save your customised XCEL Report Template file to the directory you will need to rename it using the **SCOPE** reserved name for the *.xlsm file. i.e. the file name is dependent on the type of data reported and can only be one of the following names.

- **ApplicationReport.xlsm**

- **ReleaseReport.xlsm**

- **ProjectReport.xlsm**

You can store all three of the above xlsm files in this directory. **SCOPE** recognises them by their name and will load the correct data according to that specific name . The reports will display in your saved customised format. This directory will now be the Template directory where **SCOPE** will use the xslm files as the templates to

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create all your new report files. SCOPE will not overwrite these files. If you want to 'fix' them you will need to either overwrite them with a newer version or fix them manually.

To ensure that SCOPE uses your customised templates rather than its own master templates you need to let SCOPE know where they are stored.

- Go to Main Menu <User Options>
- Select the " Microsoft EXCEL Report Template box " option
- Click the button next to it called "Manual" so it now has a green tick
- Paste in the name of the full directory path for where the templates are stored. Last character in the path must be a backslash \

eg. *C:\My Reports \Benchmark Reports \Annual Benchmark Reports for ACME client*

Remember to put the last back slash "\\" at the end of the directory path name or SCOPE cannot find the template files.

SCOPE will then automatically use these new customised templates in your selected path every time it runs its benchmark reports.   If you want to revert back to using the original inbuilt SCOPE Master Templates then just :

- click the "Manual" button again in the User Options window.
- SCOPE will automatically reload the original path name.
  C:\Users\pam.morris\Documents\Total Metrics\

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To get **SCOPE** to use another set of templates in a different directory just update the path with the new directory name in the User Options as described above.

2.**Overwriting the SCOPE Master Template Files with Your Template**

We would recommend that you first create a Directory called "**SCOPE** Master Templates" under c:\...My Documents\Total Metrics\. Then move the original Master Template Excel files to this new directory.

Once they have moved then the original workbook files can be replaced with the new edited versions keeping the same name as the ORIGINAL MASTER TEMPLATE.

E.g. if you want to replace the Master Template file for **Release** Metrics data with your new workbook which you have named "*Benchmark Metrics 2011.XLSM*" then you would copy the "*Benchmark Metrics 2011.XLSM*" workbook to the c:\...My Documents\Total Metrics\ folder. Rename it, **ReleaseReport.xlsm.**

To return to the original Master Template files, then just copy them back from your backup c:\...My Documents\Total Metrics**SCOPE** Master Templates folder.

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7 Moving from FPW to SCOPE

7.1 Mapping FPW Functions to SCOPE

7.1.1 Moving from FPW to SCOPE - Transaction Complexity

The following Commands in Function Point Workbench™ are mapped to the similar commands in SCOPE.

7.1.1.1 <u>Assess Complexity of Elementary Processes</u>

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS - SCOPE Features
Using Ranges of DETs and FTRs	Complexity Rating Method - Rapid	Result Source - Range	SCOPE Default is Average Input
Input values of FTRs and RETs	Complexity Rating Method - Record DETs/FTRs	Result Source - Enter Value, Range	
Derive from number of DETs and FTRs linked to the process	Not available	Result Source - Derive - Complexity and type automatically derived from RETs and DETs linked and access type	SCOPE automatically derives BOTH the number of FTRs and the DETs from the links. This provides the most accurate counting capability of any tool currently on the market. Ensures traceability and auditability of your counts.
Guess Low /Average /High	Only available using range selections	Result Source - Assessment and select Low/Ave/High	SCOPE - select low, average or high

7.1.1.2 Moving from FPW to SCOPE - File Complexity

The following Commands in FPW are mapped to the similar commands in SCOPE.

Assessing Complexity of Logical Data Groups

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS - SCOPE Features
Using Ranges of RETS and DETs	Complexity Rating Method - Rapid	Result Source- Range	SCOPE Default is Low - Type undefined
Input numbers of DETs and RETs	Complexity Rating Method - Record DETs/FTRs ; can be derived from the numbers entered	Result Source - Enter Value	
Derive from names of DETs and RETs listed for Data Group	Not Available	Result Source - Derived	SCOPE automatically derives BOTH the number of RETs and the DETs recorded for the Data Group in the Data Tree structure. This provides the most accurate counting capability of any tool currently on the market. Ensures traceability and auditability of your counts. Note: DETs and RETs can be imported from any list recorded in a column in a spreadsheet using the EXCEL Import option
Guess Low/ Average/High	Only available using range selections	Result Source- Assessment	SCOPE allows you just to select low average or high, default is LOW

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7.1.1.3 Moving from FPW to SCOPE - Types of Counts

The following Commands in FPW are mapped to the similar commands in SCOPE.

Application Baseline / Project Function Point Counts

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS SCOPE Features
Production Application Baseline Count	File > Browse for Counts and select count (Double-click) or Open in the Count List. Type is App for Application	File - Project and Applications List- Explode tree - Select Application, Production Release (Open, Release with Gold Padlock)	SCOPE highlights the latest Production Release with a Gold Padlock ICON. If that count is the latest i.e. There are no current Count Sessions then it has an Opened padlock Icon.
Development Project Count	File > Browse for Counts and select count (Double-click) or Open from the Count List. Type is Dev for Development Project.	File - Project and Applications List- Explode tree - Select Application- Work in Progress Release (Open Green Padlock), Open the Count Session	SCOPE highlights the latest release being counted for a project with an open green padlock. Counts measured at different stages of the life cycle are recorded as Count Sessions but are individually tracked on the same Release model to retain configuration control. Record Project Details for each Count Session in the Project List
Enhancement Project Count	File > Browse for Counts and select count (Double-click) or Open from the Count List. Type is Enh for Enhancement Project.	See above. Highlight a Count Session and select Open. Link the count session to the Enhancement Project in the Project List Screen	If your make changes to the Release when a Count Session is open then all changes for the Enhancement Project can be tracked by assigning an impact type to the elementary processes and data groups (impact type = add, change, delete) . This is similar to using Tracking in Microsoft WORD. Record Project Details in the Project List. SCOPE allows you to record

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			multiple counts for a Project across many different Applications or within the same application and aggregate the counts to a Project Total
Recording Rework during a Project	Not available to record rework (a/c/d) on the same process in the same Release count. A work around is to use Labels	Use a Count Session to record your new changes. Impacts across the life cycle can be tracked cumulatively	Report the total functionality impacted using the Release Rework Functional Size Report Option
Updating the Baseline Application count	File > Maintain Application Baseline or use File > Browse for Counts, select count and press [Maintain Application Baseline]	File Project and Applications List Select a work in progress Release with the Open Padlock (has update rights), select Update to Baseline.	The Baseline Application Count is protected from being mistakenly updated by an earlier count that overwrites later changes. You are given the option to' hold over' a count if it is not to be applied to this baseline or to exclude a count in which case it is not used to update the baseline (useful for conversion counts).

7.1.1.4 Moving from FPW to SCOPE - Enhancement Counts

The following Commands in FPW are mapped to the similar commands in SCOPE.

Enhancement Counts - Recording and Reporting

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS - SCOPE Features
Identify which Processes or data groups are impacted by a change request to the software	Create an Enhancement Project Count - the command to set the value of the Enhancement Type depends on whether a Transaction or File is selected	Highlight Work in Progress Release - open Count Session - To assign change type select Enhancement Type (see above status bar) The Icon next to the Data Groups and Processes, immediately change colour Green = add, Orange = change Grey = Delete Black = No Impact	SCOPE records work in a Count Session by awarding an impact type to the new, changed or deleted Processes or data groups. In the Details screen, view cumulative session impacts recorded in multiple sessions across the Release Project Cycle. The size of the current Enhancement Count Session is automatically displayed above the status bar in FP Size and Count Session Impacted
Reporting a selected Function Point Counting Session	Function Summary with Files	Reports -Count Session Impacted Functional Size OR view result online at the just above the status bar OR view result online in Project and Applications List	SCOPE allows you to report the impact recorded just for this selected count session for the Release. All reports are viewable online or a summary value is dynamically calculated on the screen and in the Project and Applications List. All reports can be exported to MS WORD, MS EXCEL or HTML
Reporting All Function Point	Not available	Reports - Release Impacted Functional	SCOPE Reports the impacted functions for all

Counting Sessions for a Release		Size OR view result online at the just above the status bar OR view result online in Project and Applications List	count sessions for this release
Reporting the Net Result of the Enhancement Counts	Only available in printed or published reports	Reports - Release Baseline Functional Size OR view interactively online (Release Baseline) as you make changes (see above)	Reports the net effect of the Adds and Changes, removes the Deleted functions

7.1.1.5 Moving from FPW to SCOPE - Profiling Results using Labels

The following Commands in FPW are mapped to the similar commands in SCOPE.

Profiling the Functionality for Analysis and Reporting using Labels

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS - SCOPE Features
Create Labels	(Create Labels) Select Tables - Global Tables - Global List - System Use, Add	(Create Categories of Attributes) Select - Attribute Tree TAB - ALT/INS to create CATEGORY. Highlight Category - INS and Attribute	SCOPE has Categories instead of Labels and Attributes instead of Label Options. SCOPE allows you to Label Data as well as processes. SCOPEs attributes are non-exclusive so it allows you to link more than one option of an attribute to a single process.
Linking Labels	Select Link Labels whilst in a Transaction. Only links to Transactions and links to related Label Options are not allowed.	Select Link Mode and view Attribute tree. Link to Data or Processes or Notes.	SCOPE allows you to create new Categories and Attributes whilst still viewing the Process, Data or Notes Tree. You can link related Attributes to the same Process or Data Node. They are not mutually exclusive.
View Combinations of Labelled Processes	View Options, Search and Highlight, Complex Labels etc.	Select Filter Mode Icon, Highlight the attribute and click the Boolean Icons (And/Or/Not) on Main Menu	SCOPE allows you to view the flagged result of your filter selection immediately on the screen. Allows you to save the question selection criteria (Filter) or the results (Flags)

Save a selection Filter	Save / Load Complex Label	Filter Set Icon, Save	**SCOPE** allows you to use a selection filter for any of the Trees (Process, Data , Notes and Attributes) and save this filter. It is not restricted to just the Attributes Tree
Load a selection filter	Load Complex Label	Filter Set Icon, Apply	If you want to see the cumulative result of selecting, using a Data Group plus selected Notes, plus selected Attributes, then save each Flag Set result and then apply them cumulatively
Save the results of your selection Filter	-	Highlight the root node for the Flagged Tree, Flag Set Icon, Save	**SCOPE** allows you to save the results of a selection, and then re-apply them cumulatively.
Cumulatively Load the results of many selections	Load Complex Label, Add to Complex Label	Flag Set Icon, Apply Flags Cumulatively, Apply	

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7.1.1.6 <u>Moving from FPW to SCOPE - Adding Transactions and Data</u>

The following Commands in FPW are mapped to the similar commands in SCOPE.

Record Processes and Data Groups on Functional Model

FUNCTION	Function Point WORKBENCH™	SCOPE Project Sizing Software™	COMMENTS - SCOPE Features
Modify Data Group Details	File > Count Files or directly using Count File List from the context menu in Transaction Hierarchy workspace. Modify File Details directly in this list or Open File Details dialog.	Double click Data Group. Or Select Detail TAB opposite window to Data Tree	**SCOPE** displays all Data details on the same screen, dynamically as you move around the data tree
Create a new Data Group	Tables > System Tables > System Files and [Add] There is no way to model, 'group' Data Groups in FPW	Select Data Tree TAB (ALT/INS) for Data Group or set up Folders for Related Data Groups (Right Click and select to Insert a Data Group Folder)	**SCOPE** allows you to create Data Groups on the same screen as you view your hierarchy. If you need add a new file press ALT/INS. Data can be modelled for easy sorting, searching and grouped from a User perspective. Related Data Groups can be catalogued and stored under a Data Folder for ease of use.
Create a RET for a Data Group	Not available	ALT/INS/Shift,	**SCOPE** allows you to record details of the RETs and link them to Processes that Read or Update them
Create a DET for a	Not available	INS	**SCOPE** allows you to record details of the DETs and link them to Processes that Read

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Data Group			or Update them
Insert a higher level Function Node	INS /OK Component	Select Function Tree TAB - ALT/INS	**SCOPE** uses all the Windows standard commands for copying, moving , shifting nodes.
Insert an Elementary Process	INS- Transaction - OK	INS	**SCOPE** uses Windows Explorer format and by not having boxes around functions and processes it allows over 40 to be displayed in a single screen.
View Process Details	Highlight for Flyover or Double Click Mouse	Select Detail TAB on the opposite window to the Function Tree	**SCOPE** displays all Process details on the same screen, as you move around the tree. You can view all its links, Data, Notes and Attributes, how it was counted, defaults used and the Change Request (Count Sessions) that impacted it.

7.2 Overview Comparison of SCOPE and FPW

SCOPE Project Sizing Software ™ is recognised by the metrics industry as the most advanced function point counting tool available on the market today and was designed by industry functional size measurement expert Pam Morris (CFPS), who specified and project managed the original development of Charismateks Function Point Workbench™ software (FPW) from 1991 to 1994.

SCOPE was built specifically to address all the limitations that the Total Metrics team of CFPS function point specialists, had experienced when using FPW; particularly with respect to ongoing management of counts in a corporate environment and tracking software changes in outsourcing Contracts.

SCOPE has extended all the great functions and features, originally designed into FPW, to take them to a new level of sophistication. Since the last Release of FPW 7 a number of years ago, SCOPE has Released three more updates 3.0 , 4.0 and 4.1 to include a host of new functions. In bringing function point counting up to date with the latest software technology and methods of development, it has also added many new features to take your function point counting into the future.

Function point counting is now:
- *Easier*
- *More reliable*
- *More accurate*
- *More cost effective*
- *More accessible*
- *Less exposed to risk of losing data*
- *Less exposed to risk of data corruption*
- *Integrated with your other IT metrics for performance measurement*

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SCOPE imports all the detailed count data from all current versions of FPW so you can upgrade to using SCOPE in minutes and continue counting without any loss of historical data.

SCOPE has been implemented in major corporations in over 17 countries, to become today's function point counting tool of choice for people who are serious

about counting.

Join all the other previous FPW users and upgrade to SCOPE today.

Ask us about our discounts for previous FPW Licensed users.

Total Metrics will be pleased to assist you in building your business case to upgrade to SCOPE.

Please contact us at: admin@totalmetrics.com

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7.2.1 Summary Gap Analysis - SCOPE 4.1 and FPW7

SCOPE'S FEATURE	SCOPE	BENEFITS OF SCOPE
Interface designed for **Windows 7 ®** by Microsoft Partner to work like MS Explorer®	YES	**Modern familiar interface and Windows Icons means minimal training required** to learn all SCOPE features.
Selectable **multilingual interface** (includes all screens, messages and reports)	YES	**SCOPE is available in 10 Languages**: English - Japanese - German - Chinese - Korean - Portuguese - Dutch - Spanish - Italian - French.
ISBSG compliant **Metrics Repository** allowing user to record all Effort, Defect, Environment Attributes for trends analysis and benchmarking	YES	**SCOPE integrates all Project and Maintenance and support metrics** into a central repository for centralised reporting.
SCOPE CONNECT™ uses **semantic web technology** WWW portal for sophisticated management reporting and dynamic **ISBSG benchmarking capability**.	YES	**SCOPE CONNECT™** allows users to identify, integrate, query and visualise their metrics data with drill down reporting and dynamic filtering of the ISBSG database . Slice and dice' your own metrics data to **benchmark against relevant Industry**

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		projects.
Provides **Automatic Comparison** allowing user to quickly compare reports from different databases or different counts to see where changes have been made.	**YES**	**SCOPE supports your Metrics Manager** to verify what has been changed between two different versions of a count. The Compare function highlights which nodes (process, data, notes or attributes) were changed, removed or added new, when and by which User.
SCOPE extracts ISBSG compliant Metrics data and **email ISBSG with your submitted Project Data** or export to MS EXCEL customisable pivot charts for graphical reporting.	**YES**	SCOPE can export an XML file of selected Metrics data and email it to ISBSG as a submision for their ISBSG Development and Enhancement Repository or the ISBSG Maintenance and Support Repository.
Customisable 'numeric multipliers' - allows users to use templates or create their own numeric multipliers to report metrics based on size.	**YES**	SCOPE provides inbuilt Numerical Categories (NESMA Impact factors, Earned Value Reporting, Project Delivery Rates) or you can create and customise your own for quantitative reporting.
Synchronisation capability - allows users to count off-site and later merge the changes they have made into the baseline count without	**YES**	**SCOPE allows counts to be done remotely** without the worry of overwriting changes made by others when the count results are merged back into the same or an updated baseline.

overwriting changes made in the meantime, by other counters.		
Single SCOPE database file to simplify data storage and transmission of counts	**YES**	**Makes transferring** data from different storage media simple and easy
Enables Project Managers to quantitatively track and **interactively display the size of project rework** displaying the history of changes online. Tracks when a process or data group is changed multiple times for the same project or removed from the project SCOPE.	**YES**	**Enables suppliers to easily charge back** for project SCOPE-creep and changes to User requirements
Imports **historical count data** from other industry FP counting software e.g. FPW	**YES**	**Easy to upgrade** from other tools without losing historical count data
Allows Projects to be mapped to multiple applications so that counts are **automatically aggregated** at Project level as well as at Application Release level to display online interactively	**YES**	Maps the structure of your counts to the real-world structure of your applications development and maintenance environment **for easy reporting and communication**

Allows **multiple separate counts** to be applied concurrently to the same baseline that can add, change and delete processes and data groups without overwriting other counts changes.	**YES**	Allows multiple counts to be done for multiple change requests that impact the same Release of an application – **avoids separate counts corrupting the master baseline** with counts overwriting each other
Inbuilt **expert assistance in IFPUG counting rules** enhances ability to record and report accurate and detailed count information	**YES**	**Reduces risk** of giving incorrect sizing for decision making by ensuring more accurate and consistent counting
All data entry and linking can be done **on a single split screen** without trekking through layers of stacked windows	**YES**	**Saves significant time** (therefore dollar costs) for a counter to record count results. Also assists in reviewing counts as all information is available on a single split screen and names are fully readable
Field lengths are virtually unrestricted to allow actual specification names to be used in documenting the count and display without truncation	**YES**	
Data groups can be hierarchically structured to individually document names of RETs and DETs which can be linked to Elementary Processes	**YES**	

Allows easy hierarchical cataloguing of Notes and Attributes with **long field length or no field length restriction for complete count documentation**	**YES**	**Saves significant time** (therefore dollar costs) for an auditor to review a count and for another counter to maintain a count since count decisions are easy to record, view and maintain
Online expert system to provide expert assistance in IFPUG counting rules	**YES**	**Saves time and costs of audits** and recounts by providing an online mentor on counting queries
Full Audit capability of all changes to counts	**YES**	**Tracks Author and date when all count details were modified** including comments. Fully searchable so you know what changed and when and who made the change.

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7.2.2 Detailed Comparison SCOPE 4.1 and FPW7

7.2.2.1 SCOPE maintains the Integrity of the Count Repository

SCOPE's unique configuration control capability enables it to manage the individual functional sizing of concurrent Change Request Projects (Enhancement Counts) ensuring other counts are not overwritten when updating the master Application counts (Production Releases). This feature enables a project manager to 'size' multiple change requests on the work in progress release and track the impact of each individual CR's count on the overall release baseline. The aggregated collection of counts can then be automatically combined to update the Production Baseline Release. This reflects 'real life' where many different business initiatives make changes to an Application within the same time frame.

SCOPE also allows flexibility with *how* and *when* you apply your counts to the baseline e.g.:

> • **'Cancelled Projects'** - If a change request is already counted on the baseline but the project was not approved then the cancelled Count Session can be deleted in a key stroke. All impacts from the count session are removed and the integrity of the Release is retained.   All other counts recorded on the same baseline will not be affected, even if they made changes to the same elementary processes or data groups.

> • **'Postponed Projects'** - If a change request needs to be counted but will not be implemented in the current Release, then it can be counted on the current Release baseline and selectively 'held over' and not incorporated into to the Production baseline when it is updated. However, it is automatically retained in the baseline count used for counting and kept up to date until a decision is made to re-instate it or get rid of it. This saves having to recount at a later date and the count in the meantime has been maintained such that it will reflect the 'latest'

complexity status and the links between processes or data groups in its **SCOPE**.

• **'Conversion Projects'** If a change request is not to be recorded in the Production count. This would occur for changes to the functionality required to be recorded at Project level but not to be implemented into the production version of an application (e.g. conversion functionality). The size of the CR can be retained in the Release project count and automatically 'not applied' to the Production baseline count. This saves having to selectively 'trim' your count prior to update.

Automatic Synchronization of the Baseline - The 'impacts' from a Change Request can also be imported and exported from a baseline. The need for this would occur when someone had updated the baseline on a copy of the database, but in the meantime the original baseline had been revised. The counter can then synchronize their 'count' with the latest revised version of the Baseline by selecting to 'import' a count. **SCOPE** applies its intelligence to apply the impacts of the count on the revised baseline. I.e. if a process in the count is deleted it will find the process on the revised baseline count and mark it as deleted. If the process has been changed then it will be updated and marked as 'changed'. If a new process is *added* then **SCOPE** will find the correct parent in the revised baseline count and insert the process under its correct parent.

If you have multiple counters counting on the same baseline at the same time, they can do their counts on their own version of the database, then export them and import them into a master **SCOPE** database and **SCOPE** will manage them so the integrity of the master version is maintained.

Comparison to FPW

• *FPW does not enable concurrent counts to be recorded (overlaid) on the same Release functional model. If concurrent counts are recorded on separate copies of the baselines functional model then each count has the potential to overwrite the previous one when updating the baseline resulting in a incorrect baseline count*

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• FPW does not allow a 'count' impact to be imported and merged with other counts, it only allows branches to be copied between counts or whole counts imported. Many clients report significant overhead in managing their counts to ensure that the Master Baseline is not overwritten by counts applied in the wrong sequence

• FPW does not provide functionality for multiple counters to be working on the same baseline count at the same time such that their work can be merged without the risk of overwriting

• FPW does not allow the capability of counting remotely then merging the completed count back into the 'current' functional model. It does not enable all the new modifications to be incorporated into the current model which may have changed content and structure since the original copy was made.

7.2.2.2 SCOPE maintains ISBSG Compliant Metrics Repository for online Benchmarking and Trends Reporting

SCOPE's developers have worked with the International Software Benchmarking Standards Group (ISBSG) to develop an XML file format the ISBSG can accept for submission of projects into their database. **SCOPE** enables you to record all Project Effort, Defect and Environment attributes required by ISBSG for Industry benchmarking.

> • create your **own Benchmarking Data sets** of project or maintenance and support data grouped how you want them to be reported
> • select the Projects and Applications you want to **send to ISBSG**. **SCOPE** removes any identifying information and allows you to view the extracted data prior to sending via email
> • **dynamic benchmarking against ISBSG datasets** – **SCOPE** Connect enables you to dynamically benchmark against ISBSG data that has been filtered to be aligned with data in your dataset.

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Comparison to FPW –

• FPW does not support a Metrics Repository of Project and Maintenance and Support performance and quality metrics data for dynamic benchmarking and trends analysis

7.2.2.3 SCOPE maintains the Security and Confidentiality of the Data

SCOPE's unique capability to synchronise and extract counts allows the Metrics Manager to select to 'Snapshot' the Release Model to a separate database enabling counts to be:

- **Validated** _before_ they are merged into the current baseline so as to avoid corrupting the master data repository
- **Private** – counts are only provided to other counters on a 'needs to know' basis. I.e. it allows the repository manager to keep the project size data of other business areas private and only accessible to the Repository Manager in the master database
- **Secure** - Commercially sensitive projects can be counted 'offline' and only if and when they are approved for public knowledge, then they can be merged back into the current baseline

Comparison to FPW –

• FPW has no ability to automatically synchronise and then merge counts done 'offline',as a result counts have to be manually re-applied once approved

• FPW can only apply security at the database access level and does not allow for segregation of the database and later synchronisation

7.2.2.4 SCOPE reduces risk of database corruption

SCOPE databases are easily identified and saved as a single *.FPA file that is Microsoft ACCESS® compatible. Users can use Microsoft ACCESS® to customise and create their own **SCOPE** reports.

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Comparison to FPW –

- FPW saves to a Paradox database of >40 individual files. All of these files need to be copied and transferred whenever a count database is transferred to another medium or directory using MS Explorer. This creates an issue if for some reason the transfer of just one of the tables fails, then the whole database is corrupted and irretrievable.

7.2.2.5 SCOPE provides the evidence for Project Managers to charge for Rework

SCOPE enables multiple counts to be performed on the same functional model throughout the development lifecycle. Projects often impact the same functions multiple times in project lifecycle. I.e. new functions or data groups may be added by the project then changed several times or even deleted at the users' request. **SCOPE** has the unique capability to track this *rework*. It is able to report cumulative size of the rework in addition to the net functionality delivered (the net result of the delivered software). **SCOPE** also records the counters name, date and time of the creation and modification of all the count processes and data groups and allows changes to be searched on name, or date of change.

Comparison to FPW –

• Whilst FPW does report rework, it does not enable concurrent counts for the same release and it is not able to record or display online, for each process and data group, the extent of rework. FPW does not record and interactively display situations where the same process or data group is changed several times within a release by different counts or subsequently deleted in a de-scoping exercise.

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7.2.2.6 SCOPE makes it easy to upgrade from other tools

SCOPE can be downloaded from the Total Metrics WWW site and installed in minutes. You can import your historical count data into the SCOPE structure from:

- EXCEL spreadsheets
- Function Point WORKBENCH™ (all count details [transactions, data groups, links, notes and labels] as well as project and application details) - imports ALL versions of FPW

Comparison to FPW

• FPW only imports VAF, process and data group data from its own template Excel spreadsheets but any descriptions for the processes or Notes documenting the count are not able to be imported from the Excel template spreadsheet, without manual copy and pasting of text.

• FPW is not able to import any data from SCOPE

7.2.2.7 SCOPE can be used by Novices

SCOPE has a modern Windows 7 standard intuitive interface which optimises the use of Windows 'shortcuts' and function keys. All the key components of a count (Processes, Data, Notes and Attributes) have been modelled to behave identically so that once the User learns to maintain, link and report one component (which is similar to the way MS Explorer® works), they can effectively use all SCOPE functionality.

SCOPE Viewer™ has proven that Users who have no function point knowledge or FP tool experience can effectively review counts and run reports in SCOPE.

Comparison to FPW

• FPW uses different structures, concepts, rules, and function keys for each of the count components (transactions, files, notes and labels) and

requires the user to learn each set of unique commands to maintain each type of count component.

7.2.2.8 SCOPE is more cost effective when recording counts

SCOPE was *designed* by function point counters *for* function point counters, to make counting fast, effective, auditable and well documented. The key component to this objective was to have all features in SCOPE performed on the single main screen avoiding the time wasting tasks of navigating through overlapping multiple windows.

SCOPE displays all four count components (Processes, Data, Notes and Attributes) as Hierarchy trees such that the majority of any tree's nodes are visible AND readable on a single screen, thus avoiding time wasted in scrolling vertically and horizontally to understand a functional breakdown.

The split screen display allows linking of *all* count components to be completed with a single mouse click without changing windows.

Data, Notes and Attributes can *all* be hierarchically modelled and catalogued into folders to facilitate locating them and understanding their relationships when linking to a Logical Data Group or Note to a Process. All branches within any tree can be automatically sorted in a sequence of the user's choice.

SCOPE has an MS Windows standard 'search and replace' function enabling quick up and down searches to find any text in the name or description of any count component (Process, Data, Note or Attribute)

SCOPE allows the counter freedom to use meaningful names and descriptions that best describes any of the count components and always displays the full name without truncation.

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SCOPE provides further flexibility for ease of searching and linking by allowing the user to flip the dominant components from the left hand or right hand tree. I.e. unlike FPW it is not driven from a fixed single directional left to right 'transaction tree' view. You can put the focus of the main window on any one of the Process, Data, Notes or Attribute Trees and then drive the count and the links from that view for ease of linking, filtering and reporting.

Comparison to FPW

• FPW's earlier style user interface requires the counter to navigate through multiple overlaying windows in order to complete a simple function such as linking a process to a new data group, over the course of a large count this can add considerable more effort and cost for a count

• FPW limits all exposed key fields to 8 and name fields to 32 characters. Longer names are truncated when displayed in boxes . In order to see the names without having to highlight the box or increase display size, counters waste valuable time compacting and truncating the specification names used by the business to 'fit' them within space constrained by FPW's pre-sized boxes

• FPW displays all count components other than processes as a flat list. The displayed lists can be sorted alphabetically but the order , hierarchical level and sequence cannot be customised, nor can the components be hierarchically grouped and catalogued for ease of review and maintenance of the counts

• FPW drives everything from the Transaction hierarchy and does not cater for decomposing Data into RETs and DETs thus making the auditing, maintenance, and managing of the Files much more complex and time consuming

• FPW does not allow the user to put the name and description for processes, thus limiting the capability to describe and document it for ease of maintenance.

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7.2.2.9 <u>SCOPE is more cost effective when Maintaining and Auditing Counts</u>

SCOPE was designed with the concept of making it quick and easy to maintain counts of each new change request and making it easy to document and report count decisions to assist in auditing.

SCOPE does this by providing the capability to:

o **Provide an audit trail** of who changed which tree node when that if fully searchable. Changes are highlighted using the Compare function in **SCOPE**

o **Quickly record project changes** (new functions, changed functions and deleted functions) with a single mouse click on pre-existing counts

o **Detailed Count Reports** that list exactly how a process was counted, not just its type and complexity (i.e. Ranges selected, numbers entered by the user or just defaulted)

o **Detailed Documentation in Reports** that list for each process which Data Groups, RETs and DETs it accesses and the type of access. (**SCOPE** will actually automatically derive process and data group complexity from these links to significantly reduce counting time and increase accuracy)

o **Hierarchal modelling** of Data, Notes and Attributes in addition to Functions and Elementary processes

- **Data** - **SCOPE** enables you to group your related data into Folders, then within a folder sort them in any order you choose and decompose them and name them at Data Group (ICF/EIF), RET and DET level and to link Processes, Notes or Attributes at any level. **SCOPE** models the Data hierarchically into its RETs and DETs. Processes can be optionally linked to DETs, RETs and Logical Data Groups for greater accuracy of recording and easy auditing

- **Notes** – **SCOPE** allows any comments or Notes to be grouped into SETS which can in turn be decomposed in a

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similar way to a Table of Contents. Notes can be of any length and arranged and re-arranged and sorted in any order. For importing your specification just copy the list and import directly from an EXCEL spreadsheet

- **Attributes** – SCOPE also models Attributes (key words / labels) into Categories as hierarchical trees. Attributes are not mutually exclusive i.e. Processes can be assigned more than one Attribute within a Category. Data can also be linked to Attributes.

o **One step (one mouse click) linking** of any Process, Data Group, Note or Attribute (label) without swapping windows.

Comparison to FPW –

o *FPW does not record who changed count components and when*

o *FPW requires opening up excessive windows just to link to a new File, Note or Label. For example it takes 6 mouse clicks just to link an existing file and 5 windows to add a new file and link it to the process.*

o *FPW requires the user to sift through 'layers' of windows to create links of any kind*

o *FPW displays both Files and Notes in a flat list of which the order and grouping can only be sorted alphabetically, their order or sequence cannot be customised. Does not display which Transactions are linked to a particular Note or File without selecting the Note or File and running a specific query.*

o *Without referring to the individual details reports FPW does not report how individual Processes or Data Groups were counted. FPW transaction and File list Reports only show High, Ave, or Low complexity.*

o *Labels in FPW can only be assigned to Transactions and not Data which provides very limited capability in profiling counts*

7.2.2.10 SCOPE facilitates more Accurate and Consistent Counting

SCOPE has an inbuilt expert system (FP Decision Maker™), designed by authors and reviewers of the IFPUG Counting Practices Manual, that steps counters through the IFPUG CPM decision logic when trying to determine the type or complexity of a function. This ensures that counters are reminded of the IFPUG guidelines and make count decisions via a consistent and auditable process.

SCOPE has a fully indexed ROBOHELP Help system for all functionality. This help accesses the Total Metrics www site to give the user the very latest HELP for all functionality and embedded Flash Tutorials on most counting activities. Both HELP and the Tutorials are updated every **SCOPE** Release and because it is online is updated dynamically whenever we identify another area where it can provide assistance.

SCOPE allows individual users to customise **SCOPE** to operate with their own user counting and display options and defaults. This flexibility in customisation includes being able to dynamically switch between 10 languages (e.g. French, Italian, German, Japanese, Portuguese, Dutch, Chinese etc.) which dynamically changes the language in which the screens and messages will display.

> ***Comparison to FPW***
> *• FPW does not provide any automated counting assistance*
> *• FPW does not enable users in to operate the software in their language of choice or dynamically switch between languages*

7.2.2.11 <u>SCOPE counts are more understandable by the Business Users</u>

SCOPE 's way of recording functional size takes into account the way we develop software today i.e. It recognises the way it structures its Applications, Release, Projects and Counts such that :

- A users business initiative (Project) may have many change requests that impact one or many different software applications and sometimes have more than one CR that impacts a single Release of one of the applications
- Software tends to be developed on a Release based approach rather than an approach where each Change Request resulting in a new production version of the software
- Each Release may have one or more Change Requests belonging to either same or different projects. These Change Requests need to be individually sized since they contribute to different projects and are often run by different teams and approved independently

SCOPE enables a Project to record multiple Impacts across multiple Applications and aggregate Function Point size, at Change Request, Application Level, Release Level and at Project Level.

SCOPE can record multiple Impacts from multiple projects on an Application concurrently and be able to maintain and report the different Project Impacts independently.

SCOPE's flexibility allows it to respond to changing project implementation decisions by being able to record the Project Impact on an Application AND be able to decide to not apply it, or to remove it or to hold it over to be applied again at a later date when the project is approved or restarted.

Comparison to FPW

*FPW has a linear relationship between software activities and **does not provide**:*

• a graphical hierarchical display that describes the Relationship of all the Counts to the Releases to the Applications

• a graphical display that describes the multi-dimensional relationship between Applications, Projects and Counts

• a means to record, measure and interactively display a project that impacts more than one application

• a method to 'hold over' a count and reapply it to the updated baseline when a projects implementation is postponed

• a means by which to automatically select to exclude functionality from the baseline update

7.2.2.12   SCOPE makes Count Results freely accessible

SCOPE has advanced cross-referencing and reporting functionality to enable you to easily do online 'what-if' analysis and produce up to 40 different reports instantly.

SCOPE central repository of counts is able to be accessed concurrently by multiple **SCOPE** users. Previewed reports, if accepted, can be printed or saved to a file or emailed.

SCOPE allows you to select to export the report to MSWORD or MSEXCEL or HTML, print or preview.

SCOPE reports, Baseline Size, Reworked Size and Current Count Size dynamically at the bottom of the screen as you move through the functional model.

Full Detailed Management Reports are generated online within seconds in print preview mode. The Count Detail Reports actually report the level of detail that a process or data group was counted. E.g. displays the ranges, or actual number of RETs or DETS. This is useful for auditing count results.

SCOPE allows you to extract your count using the SnapShot option to send the full count details to a client. The client can then download **SCOPE** Viewer ™ free from the Total Metrics WWW site and install it so they can investigate all aspects of the count, print all reports or provide comments and send it back in softcopy to the counter.

Comparison to FPW

• FPW has only one summary function point count report that can be selected to be displayed. The other Detailed Function Point Counting reports need to be printed as hard copy or 'published' by saving to a file. To view the 'published' information online requires the output report to be first named and saved to an XML file, then opened. This sequence takes several steps to complete in order to view the information. If the report indicates an error or omission in the count, the count needs to be fixed, and then all the steps in the publishing process repeated.

Download your evaluation copy of **SCOPE** today and start counting and see the differences for yourself!

8 Background and Articles on Functional Size

8.1 Why Use Functional Size

8.1.1 Why Measure Software Size

8.1.1.1 <u>Background</u>

Software is the output product from the software development and/or enhancement activity that is delivered and/or supported by IT. It makes sense to be able to objectively 'quantify' this product in order to establish its relative size with respect to other software products in our portfolio.

Traditionally the 'amount of product' produced from a software development project was perceived as being the amount of programming source code written. I.e. Source lines of Code (SLOC or KLOC).   In early homogeneous software development environments the amount of SLOC and the perceived relative size of software had a fairly direct relationship. However, as technology progressed, and software was built using hybrid languages, re-usable modules, COTs components, utilities, code generators and high level languages, the relationship between the SLOC and the relative size of the software became less predictable.

Developers need to be able to accurately estimate the effort and cost to deliver a software product and to compare different solutions, technology and tools for their efficiency and cost effectiveness. But in order to do this they needed to be able to quantify 'what' they are building i.e. how 'much' software, since the resources required are related to 'how much' software is built or maintained.

In the late 1970s Allan Albrecht from IBM established that there was a fairly predictable relationship between the resources required to build and/or support a software product and the number, type and complexity of the functions in that software product. I.e. The effort to build an 'amount of software' to satisfy the functional requirements of the User was proportional to the 'size of the functional requirements'.   He developed a method to size the functional requirements, called Function Point Analysis. This concept of sizing the functional user requirements to establish relative size of software has advanced over the past three decades so that now the concept has been transformed into an ISO standard called "Functional Size Measurement".

 There are four ISO Methods for Functional Sizing, that fall into two main groups, those derived from Albrecht's original methodology (IFPUG Function Point Analysis, and NESMA Function Point Analysis) and those that derive from extensions of his method (MK II and COSMIC Functional Sizing Methods).

8.1.1.2 2 Why use Functional Size Measurement (FSM)?

Functional Size Measurement (FSM) is the only internationally recognised and ISO standardised technique to measure the size of the Users Functional Requirements. Since Functional Requirements are independent of any constraints of how the software is built (i.e. Independent of the non-functional technical and quality requirements), then it enables software to be measured accurately and repeatedly over time, as developers utilise different tools, techniques and technologies to build software.

FSM also enables comparisons of IT efficiency and cost effectiveness using different development environments and strategies.

The recognition of the value of Functional Size Measurement is such that it is the only measurement unit for software development and support processes that has been formalised to be the level of an ISO standard. All other common measures

such as effort, duration, defects or speed of delivery do not have an internationally agreed method of collection, validation, and comparison.

8.1.1.3 <u>Why isn't Everyone Using Functional Size</u>

Many critics of the technique claim that FSM:

1. Is no longer relevant to current development technology environments

2. Is no longer relevant to the type of software built today

3. Does not adequately 'measure' highly algorithmic complex functionality

4. Is too time intensive

5. Does not provide any value if you do not know how much effort it takes to build a unit of software

6. Requires too much detailed information, much of which is often not available

7. Is outdated and other newer methods such as 'Use Case' Points are better

8. Does not take into account the constraints on the users requirements such as stringent quality requirements and highly complex architectural solutions.

9. Has four ISO approved methods and it is too hard to choose which one to use

10. Needs highly skilled trained measurement experts to measure accurately

11. The resulting software project and application sizes are difficult to maintain over time

Some of these comments are valid criticisms and others are excuses for avoiding the hard work of measurement. We have addressed each of these points in turn below.

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8.1.1.4 <u>The Value of FSM as a Size Measurement</u>

FSM has become the method of choice for organisations worldwide to measure their software development product. It has been unequivocally proven to be the most reliable and effective method to estimate software and to compare productivity. Whilst its exponents admit it is still not perfect, there continues to be teams of experts around the world, working daily on improving and certifying FSM related methods, tools, training, and standards. Its usage has grown from just the USA, Netherlands, UK and Australia in the late 1980s to being used in nearly every software development country in the world today, including China, South Korea, Brazil, India and most of Western Europe.

8.1.1.5 <u>Is FSM relevant to current development environments?</u>

Since the Functional User Requirements are independent of the development environment, then the measurement of these requirements is not influenced by 'how' the software is built. However the effort and cost to build and support is influenced by the environment; therefore for estimation and comparison purposes, different productivity factors are applied for the different environments. Just as in the building industry, where the size of the house is independent of the technology and tools used to build it, but the dollar cost per square metre is adjusted accordingly. The size of the house is independent of the technology, just as the size of the functional requirements of the software is independent of its build environment, so FSM is as valid today as it was in the past.

8.1.1.6 <u>Is FSM relevant to the Type of Software being built today?</u>

Since FSM measures the Functional User Requirements, then as long as there are requirements, they can then be measured. However different software can have

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different types of requirements and this is why we have different Functional Size Measurement Methods. Different methods are attuned to measuring different types of requirements. Identify the functional domain of the software you are building and select the appropriate FSM method.

8.1.1.7 How does FSM deal with Algorithmic complexity of Software?

All the current ISO Standard FSM Methods, measure the relative size of software functions based on the amount of different data types processed (enter, leave, read and written to storage) by the function. The intermediate algorithmic transformations, translations and conversions of those data types are not included in the measurement. Only the actual individual data movements from one form to another are considered. The reason for not considering algorithms is because there is no internationally accepted way of defining or quantifying their complexity. In reality for most applications, complex algorithms only exist in a very small proportion of the software. One commonly accepted way to address the impact of the algorithms on effort and cost is to isolate the functional area and apply a different cost factor to those requirements that have algorithmic complexity.

8.1.1.8 How much time will it take to functionally size my software?

The act of measuring requires the dissection of the Functional Requirements into their elementary processes, which are in turn catalogued and assessed for size. The effort to do this will be directly proportional to the magnitude of the Functional Requirements, but will be also be strongly influenced by the quality (completeness, ambiguity, consistency) of the specification of those requirements.   Actually doing the measurement, highlights any gaps in the requirements and is often the only fully documented list of functions for an implemented system. Time consumed in the measurement is in most cases compensated by the time saved by identifying requirements defects early in the life cycle of a project.

Typically an experienced functional size measurement expert can measure, document and report between 200 and 300 function points per day. This is equivalent to a project that would consume 12 to 18 person months of effort. I.e. Measurement is < 0.5% of project effort.

However in our experience, the cost of measurement is far outweighed by the benefits the measurement provides the project manager in optimising the success of the project and minimising risk of project failure .

8.1.1.9 How can I use the Functional Size if I do not have any other measures?

This is a 'chicken and egg' problem, where a project manager needs to estimate a high risk project but even if they measure the functional size, it will be of little benefit if they have no idea of how many hours or dollars it take to build a functional software unit.

We recommend to start measuring now and with time you will build your own metrics repository. This will enable you to know, for each development environment, your organisations number of effort hours to build or change a functional unit and the relative cost per unit. However, until you can collect enough data, there is always industry data available to assist in project estimations and productivity comparisons. For example the International Software Benchmarking Standards Group (ISBSG) has freely available productivity data on over 4,000 projects and all the latest development environments.

8.1.1.10   How can I use FSM if I do not have detailed functional specifications?

Whilst accurate Functional Sizing does require detailed functional specifications to identify each data group used by a functional process, there are ways to do less accurate sizing with less detailed specifications. Since the accuracy of the measured size is directly related to the accuracy and completeness of the specification, then these less accurate 'approximation' methods will result in a size

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that is anywhere between 15% to 30% different from true value. However, at early cost benefit analysis of a project, a ball-park size provides valuable information when assessing the viability of a project budget or schedule.

8.1.1.11 <u>Has FSM been superseded by alternative methods for sizing software?</u>

The use of FSM world wide is increasing daily, from India, China, and Brazil to the United Kingdom and the USA. In terms of methods to size software it is estimated to have >99% of market share. All Functional Sizing methods work on the same principle i.e. to measure the functionality delivered by the software. Whether they do this by measuring Use Cases or by identifying elementary processes, the principle is the same. The advantage of using the ISO standard Functional Size Methods is that the functional process measured by these methods is clearly defined such that requirements can be accurately and repeatedly decomposed to the elementary process level, no matter how they are specified. This is also true for implemented software, it can be analysed and decomposed to this same elementary process level. The methodology to measure Use Cases and assign points, has the limitation that there is no internationally accepted standardised level of granularity for defining Use Cases and as such there tends to be no external consistency in the measured size, making it difficult to compare externally or utilise industry data.

8.1.1.12 <u>How can I estimate the impact of stringent Quality and Technical Requirements?</u>

FSM only measures the functional requirements; it does not take into account variations in quality and technical requirements. Just as in the building industry the size of a house is based on the functionality defined in the plans, but the house does not increase in square metre size because it is built in brick on the side of a cliff compared to timber on flat ground; software size however, is based only on functionality delivered. When estimating the cost of the house to be built with different quality and technical constraints the builder changes the dollar charge rate

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to build a square metre, likewise in software development the productivity rate is adjusted relative to the impact of the quality and technical constraints. The degree of adjustment can be determined from similar projects available in Industry Data.

8.1.2 Guide to Choosing a Functional Size Method

There are currently four FSM Methods approved by the International Organisation for Standardisation (ISO). SCOPE currently records IFPUG Functional Size, but it planned to incorporate COSMIC FSM in future versions:

- COSMIC - ISO/IEC 19761 SOFTWARE ENGINEERING – COSMIC-FFP – A FUNCTIONAL SIZE MEASUREMENT METHOD
- IFPUG - ISO/IEC 20926 SOFTWARE ENGINEERING - FUNCTION POINT COUNTING PRACTICES MANUAL.
- MKII - ISO/IEC 20968 INFORMATION TECHNOLOGY - SOFTWARE ENGINEERING - Mk II FUNCTION PONT ANALYSIS - COUNTING PRACTICES MANUAL:2002
- NESMA - ISO/IEC 24570 INFORMATION TECHNOLOGY – DEFINITIONS AND COUNTING GUIDELINES FOR THE APPLICATION OF FUNCTON POINT ANALYSIS

ISO has recently published a guide to choosing the method most appropriate for your needs (ISO/IEC 14143: Part 6) . Key points needed to be considered are the following:

- Applicability to the domain of software that you need to measure. As a guide most organisations that develop or support 'data rich' software (i.e. Management Information Systems, Banking, financial, CRM, Asset Management, Work flow systems etc) use the IFPUG method. Organisations that develop or support 'process rich' or real time software tend to use the COSMIC method.

- Availability of equivalent Industry data. If you need to use Industry data for comparison of productivity or as input into estimates then this may be a deciding factor. The ISBSG repository has >90% of projects measured with the IFPUG method, but the proportion of COSMIC projects is increasing rapidly as the COSMIC method becomes more widely used.
- Availability of training and FSM tools. Most of the Industry leading tools e.g. **SCOPE** Project Sizing Software™ have been written to measure using the IFPUG method, but will also offer a version in the future that uses the COSMIC method, as its use increases.
- Availability of trained experienced certified Metrics experts. Currently most people are trained and certified in the IFPUG method which is offered in most countries, but COSMIC training and certification is now being offered in Europe, North America and Australia.

8.1.3 How hard is it to measure Functional Size?

Functional Size measurement requires specialised training of 2 to 3 days duration. After training, it typically takes several months of using the technique, measuring in a variety of situations to become proficient. International accreditation usually requires the measurer to have a skill level of at least 2 years experience in using the technique. Most organisations train a select group of software developers for the measurement role. It is similar to other specialist activities e.g. Database Design, it takes a person skilled in business analysis and attention to detail to make a good Functional Size Measurement Specialist.

8.1.4 How do we effectively manage the Functional Size Results?

Whilst Functional sizing can be performed by recording the results in a spreadsheet, experience shows that this approach has proved to be very high risk which are mitigated by using a specialist FSM tool such as **SCOPE Project Sizing Software™**. Problems we have experienced with clients using spreadsheets are as follows:

- **Results are hard to check for correctness or completeness:** There is no capability to 'model' the functional requirements, and long lists of functional processes (often thousands) are very hard to track. It is very difficult for the applications expert to determine if the measurer has missed any of the requirements from the measured project size. Omissions will result in under estimating the effort and cost of the project.

- **Size Calculation formulas are prone to Corruption**: Formulas totalling the components of the measurement are prone to have their ranges corrupted as inexperienced users insert rows outside the calculations specified range. In a recent survey of an organisations FP Spreadsheets 100% of those in the sample set were not calculating as originally designed. Errors in their reported size results ranged from 10% to 300%. These erroneous results had been previously extracted into the organisations estimation database and used in estimating other projects. Until the issue was identified the organisation was unaware that they were relying on incorrect results.

- **Significant time is wasted every measurement as there is little opportunity for re-use of previous measurements**: Each time a new enhancement project is started a new spreadsheet is started. There is rarely a library or cross-reverencing capability to determine if a previous project measurement could be leveraged and re-used. A lot of duplicate measurement is done and often not in a consistent way to previous measures of the same functions. There is no cross-referencing to decisions made in the original baseline to ensure functions are counted consistently.

- **Baseline Sizes are quickly out of date**: If a baseline measurement was completed for an application or project, change requests are rarely retrospectively applied to keep the baseline size current; since on a spreadsheet this involves two different acts of measurement recording (Baseline updates are performed automatically using FSM tools such as **SCOPE**).

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- **Configuration control of multiple concurrent projects is very difficult**. If multiple Projects are applied to the same application and several people develop concurrent measures of the impact of their projects, then it is a significant cross-referencing activity to determine if the same function is impacted by several projects and to determine the final impact on the baseline measurement

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8.2 Levels of Function Point Counting

8.2.1 Introduction

A function point count can be conducted at a number of 'levels', each of which provides a count which has its:

- Decisions documented to different levels of detail
- Results within different bounds of accuracy.

The level of detail for a particular count will depend on the purpose for which the count will be used. Different purposes will require different degrees of accuracy and detail in the documentation and consequently different counting rates.   The most optimal level of counting may not always be able to be achieved in a particular situation since the level actually selected may be constrained by:

- the quality of project or application documentation available,
- the time in which the count must be completed,

This document defines a number of levels of function point counting that are available from Total Metrics. We will normally recommend a particular level to you based on how the results will be used and your description of the quality of the information available to provide background on the count. However the final decision will rest with the client and the quality of the information available.

 A particular application count may be conducted at one of the following levels detail:

Level Name

1. Detailed Linked and Flagged Count
2. Detailed Linked Count
3. Detailed Count
4. Default Complexity Count
5. Rough Count
6. Size Approximation

8.2.1.1 Level 1: Detailed Linked and Flagged Count

Level 1 Count Description

A Detailed Linked and Flagged Count includes the following:
- application boundary is defined
- full functional decomposition to transaction level (transaction level is considered the lowest level function available to the business user)
- all files and transactions within SCOPE are uniquely identified
- all files and transactions are classified according to type
- all files and transactions are accurately categorised according to complexity (actual numbers of DETs and FTRs are identified where possible and provided the necessary source information is available)
- all related files and transactions are linked (aids in assessing impact of change requests)
- explanatory notes are attached to files and transactions as necessary (aids in future maintenance of the counts)
- where possible a cross-reference between the physical files and the logical files is documented
- explanatory notes also link files and transactions to relevant documentation
- all agreed attributes are attached to relevant transactions (aids in selective count reporting for management purposes)
- count is recorded and reported using the SCOPE Project Sizing Software™ software repository tool

Level 1 Count Attributes

Detailed Linked and Flagged Count are:
- very detailed
- easily auditable
- accurate (within the limits of the FPA technique +/- 10%)
- very well documented
- easily maintained

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Best suited for following count purposes:

- benchmarking projects (new development and enhancement)
- detailed estimates
- project tracking
- as detailed baseline model for future detailed enhancement project counting
- input into Metrics reporting for Strategic and Tactical Level reporting

Issues:

- very time intensive – counting rates up to 200 fps per day
- requires very skilled counters
- rarely cost effective for large, legacy application baseline counts

Pre-requisites:

- good to high quality system documentation
- data model
- full access to system experts

SCOPE and Level 1 Counts

Use the Enter Values Option and enter the number of DETs and FTR and RETs when determining the complexity of Processes and Data Groups in **SCOPE** and link Processes and Data Groups. More accurate Level 1 counting can be done by actually listing all the DETs used by a process on the data tree and linking to them. The complexity of the Data Group can be derived from these values.

8.2.1.2 Level 2: Detailed Linked Count

Level 2 Detailed Linked Count Description

A detailed linked count includes the following:
- application boundary is defined
- full functional decomposition to transaction level
- all files and transactions within SCOPE are uniquely identified
- all files and transactions are classified according to type
- all files and transactions are accurately categorised according to complexity (DETs and FTRs are identified within IFPUG ranges where possible)
- all related files and transactions are linked (aids in assessing impact of change requests)
- explanatory notes are attached to files and transactions where necessary
- count is recorded and reported using the SCOPE Project Sizing Software™ software repository tool

Level 2 Count Attributes

Detailed Linked Counts are:
- very detailed
- easily auditable
- accurate (within the limits of the FPA technique +/- 10%)
- very well documented
- easily maintained

Best suited for the following count purposes:
- benchmarking projects (new development and enhancement)
- detailed estimates
- project tracking
- as detailed baseline model for future detailed enhancement project counting

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Issues:

- time intensive – counting rates up to 250 fps per day
- rarely cost effective for large, legacy application baseline counts

Pre-requisites:

- good to high quality system documentation
- data model
- full access to system experts

SCOPE and Level 2 Counts

Use the Range option when selecting the complexity of Processes and Data Groups in **SCOPE** and link Processes and Data Groups.

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8.2.1.3 Level 3: Detailed Count

Level 3 Detailed Count Description

A detailed count includes the following:

- application boundary is defined
- full functional decomposition to transaction level
- all files and transactions within **SCOPE** are identified
- all files and transactions are classified according to type
- all files and transactions are accurately categorised according to complexity (DETs and FTRs are identified within IFPUG ranges where possible)
- explanatory notes are attached to files and transactions where necessary
- count is recorded and reported using the **SCOPE** Project Sizing Software™ software repository tool

Level 3 Detailed Count Attributes

Detailed Counts are:

- detailed
- auditable
- accurate (with limits of the FPA technique +/- 10%)
- well documented
- very maintainable

Best suited for following count purposes:

- benchmarking projects (new development and enhancement)
- detailed estimates
- baseline application counts for portfolio sizing
- as detailed baseline model for future detailed enhancement project counting

SCOPE and Level 3 Counts

Use the Range option when selecting the complexity of Processes and Data Groups in **SCOPE**

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8.2.1.4 Level 4: Default Complexity Count

Level 4 Default Complexity Count Description

A default complexity count includes the following:
- application boundary is defined
- full functional decomposition to transaction level
- all files and transactions within SCOPE are identified
- all files and transactions are classified according to type
- all files are defaulted to low complexity
- all transactions are defaulted to average complexity
- count is recorded and reported using the SCOPE Project Sizing Software™ software repository tool

Level 4 Default Complexity Count Attributes

Default Complexity Counts are:
- less detailed
- auditable
- reasonably accurate (within the limits of the FPA technique +/- 15%)
- documented
- maintainable

Best suited for the following count purposes:
- portfolio baseline assessment
- benchmarking development or support ratios
- quality metrics
- high level estimates
- as a baseline model for future enhancement project counting
- can be cost effective for large, legacy application baseline counts

Issues:
- efficient – counting rates up to 400 fps per day

- cost effective for large, legacy application baseline counts

Pre-requisites:

- average system documentation

- data model if possible

- access to system experts

SCOPE and Level 4 Counts

Use the Industry Default option when selecting the complexity of Processes and Data Groups in SCOPE

8.2.1.5 Level 5: Rough Count

A rough count includes the following:

- application boundary is defined
- functional decomposition (3-4 levels only)
- transactions and data functions 'tallied' from menus, menu access paths, file lists, screen lists, report lists, application boundary
- diagrams, system interface documentation
- assumptions documented in count report
- count is recorded and reported using the SCOPE Project Sizing Software™ software repository tool

Level 5 Rough Count Attributes

Counts are:

- low detail
- less accurate (+/- 20 - 25%)
- documented (issues and assumptions)
- 'Skeleton' on which enhancement counts can be built
- needs to be refined over time

Best suited for following count purposes:

- portfolio baseline assessment
- benchmarking support ratios
- as a baseline model for future enhancement project counting
- cost effective for large, legacy application baseline counts

Issues:

- very efficient – counting rates can exceed 750 fps per day
- cost effective for large, legacy application baseline counts which have very little enhancement

Pre-requisites:

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- summarised system documentation
- full-time access to system experts (for the duration of count)

SCOPE and Level 5 Counts

Level 5 counts are done in **SCOPE** using the Multiplier in the Process Details and Data Group Details screen.

8.2.1.6 Level 6: Size Approximation

There are various methods of approximating the functional size without counting all files and transactions. Such methods are often used for portfolio estimation, or as a basis for scheduling more detailed counts. They are based on characteristics of the application, which have been proven to have a strong correlation to size. E.g. numbers of reports, number of 3rd normal form tables, number of support staff etc. The size is estimated based on the answers to about 30 questions in a questionnaire.

Level 6 Size Approximation Description

A size Approximation includes the following:
- size estimate reported in unadjusted and / or adjusted function points
- assumptions documented in report

Level 6 Size Approximation Attributes

Size Approximation provides a result that:
- has very little detail –size results only
- accuracy historically has been demonstrated to be within (+/- 20%)
- is **not** documented other than the completed questionnaire and a very brief report on the result
- is **not** maintainable, they are snapshot of size only. They need to be redone if anything changes

Best suited for following count purposes:
- portfolio baseline assessment
- software asset valuation
- project scoping
- estimating count durations

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- benchmarking support ratios
- most cost effective for large, legacy applications, which do not need their counts maintained

Issues:
- very efficient – most applications can have their size estimated within half a day
- very cost effective for large, legacy application baseline counts which have very little enhancement

Pre-requisites:
- accurate completion of a questionnaire (usually takes 2 hrs, but may take up to 2 days if the software is poorly documented or applications knowledge is limited)
- access to system experts (1 – 2 hour interview)

SCOPE and Level 6 Counts

Level 6 counts are available online using **FP Outline™** (see

http://www.totalmetrics.com/function-point-software/software-size-estimation)

8.3 Uses and Benefits of Sizing

8.3.1 Introduction

Industry experience has shown that an emphasis on project management and control offsets much of the risk associated with software projects. One of the major components of better management and control of both in-house development and a package implementation is **measurement**.

This includes measurement of:
- The SCOPE of the project e.g.
    - *software units to be delivered*
- -performance indicators of efficiency and cost effectiveness e.g.:
    - *cost per unit of software delivered*
    - s*taff resources per unit of software delivered*
    - *elapsed time to deliver a unit of software*
- quality indicators e.g.:
    - *number of defects found per unit of software delivered*

The outcome of a Function Point count provides the metric 'unit of software delivered' and can be used to assist in the management and control of software development, customisation or major enhancements from early project planning phases through to the ongoing support of the application.

Knowing the software size facilitates the creation of more accurate estimates of project resources and delivery dates and facilitates project tracking to monitor any unforeseen increases in SCOPE. The measurement of the performance indicators enables benchmarking against other development teams and facilitates better estimating of future projects. These are only some of the ways in which Function Point Analysis (FPA) can assist IT management. These and other lesser known

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ways in which FPA can assist IT to move towards 'best practice' in the management of their software products and Processes, are discussed in the following sections.

The benefits of using measurement to support management decision-making, can only be achieved if the information supporting these decisions is relevant, accurate and timely. In order to ensure the quality of their measurement data, organisations need to implement a 'measurement Process'. The cost of implementing the activities, procedures and standards to support the function point counting Process will depend on the size and structure of the organisation and their measurement needs. These considerations are discussed in the last section **Costs of Implementing Function Point Analysis.**

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8.3.2 Managing Project Development

8.3.2.1 <u>FPA Uses and Benefits in Project Planning</u>

8.3.2.2 <u>Project Scoping</u>

A recommended approach for developing function point counts is to first functionally decompose the software into its elementary functional components (base functional components). This decomposition may be illustrated graphically on a **Functional Hierarchy**. The hierarchy provides a pictorial 'table of contents' or 'map' of the functionality of the application to be delivered. This approach has the advantage of being able to easily convey the SCOPE of the application to the user, not only by illustrating the number of functions delivered by each functional area, but also a comparative size of each functional area measured in function points.

8.3.2.3 <u>Assessing Replacement Impact</u>

If the software to be developed is planned to replace existing production applications it is useful to asses if the business is going to be delivered more, less or the same functionality. The replacement system's functionality can be mapped against the functionality in the existing system. A quantitative assessment of the difference can be measured in function points. Note, this comparison can only be done if the existing applications have already been sized in Function Points.

8.3.2.4 <u>Assessing Replacement Cost</u>

Multiplying the size of the application to be replaced by an estimate of the $ dollar cost per function point to develop, enables project sponsors to develop quick estimates of replacement costs. Industry derived costs are available and provide a ballpark figure for the likely cost. Industry figures are a particularly useful reference if

the re-development is for a new software or hardware platform not previously experienced by the organisation. Ideally organisations should establish their own 'cost per function point' metrics for their own particular environment based on project history.

If you are considering implementing a 'customised off the shelf' package solution then this provides a quick comparison of the estimated package implementation costs to compare with an in-house build. Package costs typically need to include the cost of re-engineering the business to adapt the current business Processes to those delivered by the package. These costs are usually not a consideration for in-house developed software.

8.3.2.5 Negotiating SCOPE

Initial project estimates often exceed the sponsors planned delivery date and budgeted cost. A reduction in the SCOPE of the functionality to be delivered is often needed so that it is delivered within a predetermined time or budget constraints. The functional hierarchy provides the 'sketch-pad' to do SCOPE negotiation. I.e. it enables the project manager and the user to work together to identify and Flag (label) those functions which are:

- mandatory for the first release of the application
- essential but not mandatory
- optional and could be held over to a subsequent release

The SCOPE of the different scenarios can then be quickly determined by measuring the Functional Size of the different scenarios. E.g., the project size can be objectively measured to determine what the size (and cost and duration) would be if:

- all functions are implemented
- only Mandatory functions are implemented
- only Mandatory and Essential functions are implemented

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This allows the user to make more informed decisions on which functions will be included in each release of the application based on their relative priority compared to what is possible given the time, cost and resource constraints of the project.

8.3.2.6 <u>Evaluating Requirements</u>

Functionally sizing the requirements for the application quantifies the different types of functionality delivered by an application. The function point count assigns function points to each of the function types, **External Inputs**, **Outputs** and **Inquiries** and **Internal** and **External Files.**

Industry figures available from ISBSG Repository for projects measured with IFPUG function points indicates that 'complete' applications tend to have consistent and predictable ratios of each of the function types. The profile of functionality delivered by each of the function types in a planned application can be compared to that of the typical profile from implemented applications, to highlight areas where the specifications may be incomplete or there may be anomalies.

The following pie chart illustrates the function point count profile for a planned Accounts Receivable application compared to that from the ISBGS data. The reporting functions (outputs) are lower than predicted by industry comparisons. Incomplete specification of reporting functions is a common phenomena early in a project's lifecycle and highlights the potential for substantial growth creep later in the project as the user identifies all their reporting needs.

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Checking completeness of project requirements Industry Figures
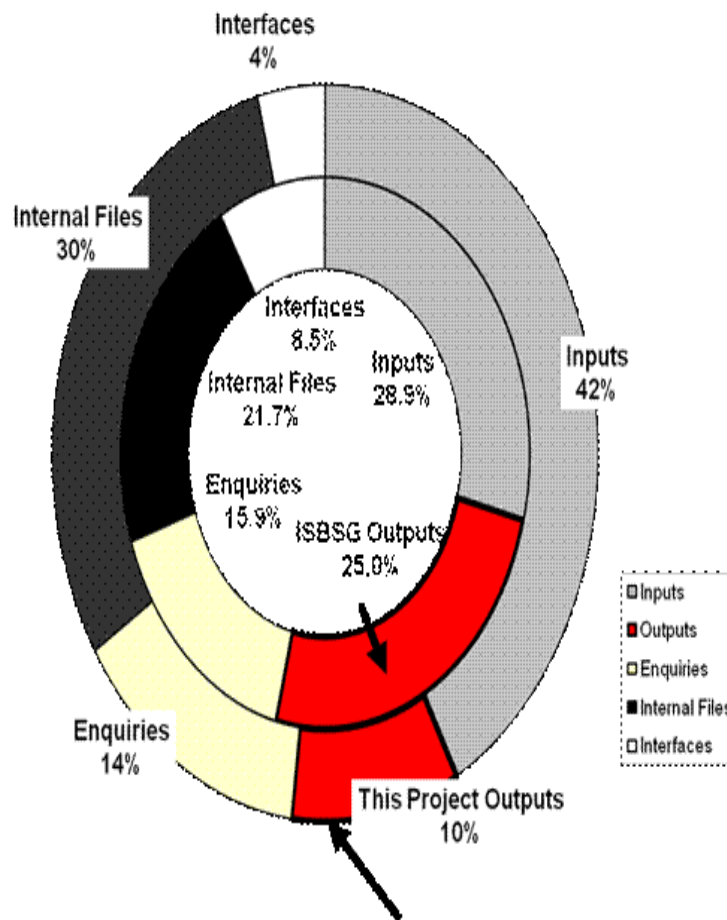
The quantitative comparison below shows that the reporting requirements were lower than expected by about half (14% compared to the expected 23% of the total function points). The project manager in this case verified with the user that the first release of the software would require all reporting requirements and the user indicated that more reports were likely to be specified. The project manager increased the original count to allow for the extra 9% and based his early project estimates on the higher figure that was more likely to reflect the size of the delivered product. The function point measurement activity enabled the project manager to quantify the potential missing functionality and justify his higher, more realistic estimate.

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8.3.2.7 Estimating Project Resource Requirements

Once the SCOPE of the project is agreed the estimates for effort, staff resources, costs and schedules need to be developed. If productivity rates (hours per function point, $cost per function point) from previous projects are known, then the project manager can use the function point count to develop the appropriate estimates. If your organisation has only just begun collecting these metrics and does not have sufficient data to establish its own productivity rates then the ISBGS industry data can be used in the interim.

8.3.2.8 Allocating Testing Resources

The functional hierarchy developed as part of the function point count during project development can assist the testing manager to identify high complexity functional areas which may need extra attention during the testing phase. Dividing the total function points for each functional area by the total number of functions allocated to that group of functions, enables the assessment of the relative complexity of each of the functional areas.

The effort to perform acceptance testing and the number of test cases required is related to the number and complexity of the user functions within a functional area. Quantifying the relative size of each functional area will enable the project manager to allocate appropriate testing staff and check relative number of test cases assigned.

8.3.2.9 Risk Assessment

Many organisations have large legacy software applications, that due to their age, are unable to be quickly enhanced to respond to the needs of their rapidly changing

business environments. Over time these applications have been patched and expanded until they have grown to monstrous proportions. Frustrated by long delays in implementing changes, lack of support for their technical platform and expensive support costs, management will often decide to redevelop the entire application. For many organisations this strategy of rebuilding their super-large applications has proved to be a disaster resulting in cancellation of the project mid-development. Industry figures show that the risk of project failure rapidly increases with project size. Projects less than 6500 function points have a risk of failure of less than 20% in comparison with projects over 5000 function points which have a probability of cancellation close to 40%7. This level of risk8 is unacceptable for most organisations.

Assessing planned projects for their delivered size in function points enables management to make informed decisions about the risk involved in developing large highly integrated applications or adopting a lower risk phased approach described below.

8.3.2.10   Phasing Development

If the project manager decides on a phased approach to the project development then related modules may be relegated to different releases. This strategy may require temporary interfacing functionality to be built in the first release to be later decommissioned when the next module is integrated. The function point count allows project managers to develop 'what if scenarios' and quantify the project SCOPE of each phase as a means of making objective decisions. Questions to which quantitative answers can be provided are:

- How much of the interfacing functionality can be avoided by implementing all of the related modules in release one?
- What is the best combination of potential modules to group within a release to minimise the development of temporary interfacing functions?

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If it is decided to implement the application as a phased development then the size of each release can be optimised to that which is known to be manageable9. This can be easily done by labelling functions with the appropriate **Release** and performing 'what-if' scenarios by including and excluding functions from the SCOPE of the count for the release.

8.3.3 FPA Uses and Benefits in Project Construction

8.3.3.1 <u>Monitoring Functional Creep</u>

Function point analysis provides project management with an objective tool by which project size can be monitored for change, over the project's lifecycle.
As new functions are identified, functions are removed or changed during the project the function point count is updated and the impacted functions appropriately Flagged. The 10project SCOPE can be easily tracked and reported at each of the major milestones.

If the project size exceeds the limits allowed in the initial estimates then this will provide an early warning that new estimates may be necessary or alternatively highlight a need to review the functionality to be delivered by this release.

8.3.3.2 <u>Assessing and Prioritizing Rework</u>

Function Point Analysis allows the project manager to objectively and quantitatively measure the SCOPE of impact of a change request and estimate the resulting impact on project schedule and costs. This immediate feedback to the user on the impact of the rework allows them to evaluate and prioritise change requests.

The cost of rework is often hidden in the overall project costs and users and developers have no means to quantify its impact on the overall project productivity rates. Function point analysis enables the project manager to measure the functions that have been reworked due to user-initiated change requests. The results provide valuable feedback to the business on the potential cost savings of committing user resources early in the project to establish an agreed set of requirements and minimising change during the project lifecycle.

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8.3.4 Customising Packaged Software

8.3.4.1 **Background**

For selected MIS applications, implementing a packaged 'off the shelf' solution is the most cost effective and time efficient strategy to deliver necessary functionality to the business.

All of the benefits and uses of Function Point Analysis which applied to in-house development projects as described in the previous section can also apply to projects which tailor a vendor supplied package to an organisations specific business needs.

Experience shows that Function Point Counting of packages is not always as straightforward as sizing software developed in-house, for the following reasons:

- Only the physical and technical functions are visible to the counter. The logical user view is often masked by the physical implementation of the original logical user requirements.
- In most cases the functional requirements, functional specifications, and logical design documentation are not delivered with the software. The counter may have to rely on the User Manual or on-line help to assist in interpreting the user view.

 The modelling of the logical business transactions often requires the function point counter to work with the client to identify the logical transactions. They do this by investigating the users functional requirements and interpreting the logical transactions from the package's physical implementation.

• In most cases the names of the logical files accessed by the application's transactions are not supplied by the package vendor.

> *The function point counter will need to develop the data model by analysing the data items Processed by the application.*

However, with sufficient care a reasonably accurate function point count of packaged applications can usually be obtained.

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8.3.4.2 <u>Estimating Package Implementations</u>

The project estimates for a package solution need to be refined for each implementation depending on the percentage of the project functionality which is:

- native to the package and implemented without change
- functionality within the package which needs to be customised for this installation
- functionality contained with the organisations existing applications which needs to be converted to adapt to the constraints of the package
- to be built as new functions in addition to the package functions
- to be built to as new functions to enable interfacing to other in-house applications
- not to be delivered in this release

The productivity rates for each of these different development activities (to implement, customise, enhance or build) are usually different. This complexity of assigning an appropriate productivity factor can be compounded when the package provides utilities which enable quick delivery based on changes to rule tables.
 Change Requests, which can be implemented by changing values in rule-based tables, can be implemented very efficiently compared to a similar user change request that requires source code modification. It is recommended that these different types of activities are identified and effort collected against them accordingly so that productivity rates for the different activity types can be determined.

The functions can be Flagged for their development activity type and their relative contributions to the Functional Size calculated. This will enable fine-tuning of the project estimates.

Another area of concern when developing estimates for package integration is the need to determine the extent that the application module needs to interface with existing functionality. The function point count measures the External Files accessed

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by transactions within this application. A high percentage of interface files (>10%) suggests a high degree of coupling between this application and existing applications. A high degree of interfacing tends to have a significant negative impact on productivity rates and needs to be considered when developing estimates.

8.3.5 FPA Uses and Benefits after Software Implementation

8.3.5.1 Planning Support Resources and Budgets

The number of personnel required to maintain and support an application is strongly related to the application's size. Knowing the Functional Size of the application's portfolio allows management to confidently budget for the deployment of support resources. The following figure demonstrates this relationship as demonstrated within an Australian financial organisation. The average maintenance assignment SCOPE (number of function points supported per person) for this organisation is 833 function points per person. The assignment SCOPE has been found to be negatively influenced by the age of the application and the number of users, i.e. as both these parameters increase the assignment SCOPE decreases. 12Capers Jones figures show similar assignment SCOPEs where for ageing, unstructured applications with high complexity an assignment SCOPE of 500 function points per person is not unusual whereas newer, structured applications, skilled staff can support around 1500 – 2000 function
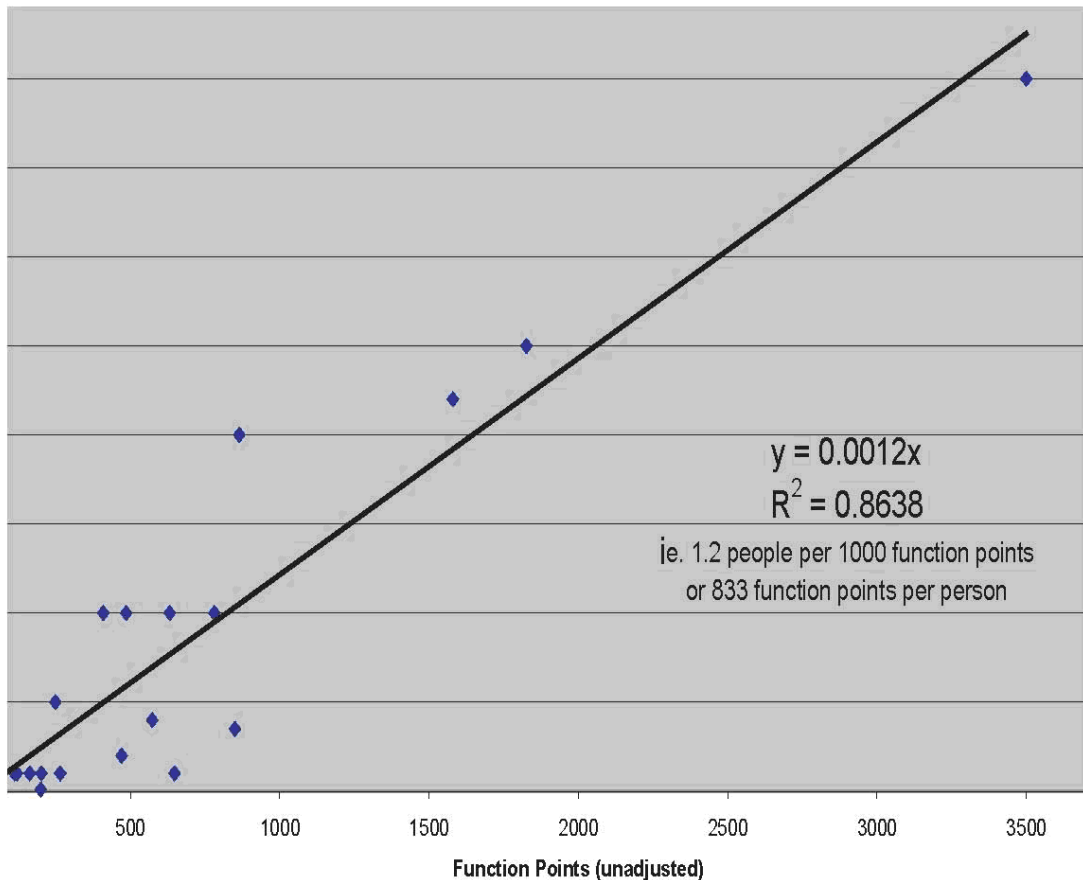
Figure 8-2 Relationship between the Size of an Application and the Number of Support staff (Source - Total Metrics 1999)

Once implemented, applications typically need constant enhancement in order to respond to changes in direction of an organisation's business activities. Function points can be used to estimate the impact of these enhancements. The baseline function point count of the existing application will facilitate these estimates. As the application size grows with time the increasing assignment SCOPE will provide the justification to assign more support staff.

8.3.5.2 Benchmarking

The function point count of delivered functionality provides input into productivity and quality performance indicators. These can then be compared to those of other in-house development teams and implementation environments. Benchmarking internally and externally with industry data enables identification of best practice. External benchmarking data is readily available in the ISBSG Repository (International Software Benchmarking Standards Group).

8.3.5.3 <u>Identifying Best Practice</u>

Project managers seeking 'best practice' in their software development and support areas recognise the need to adopt new tools, techniques and technologies to improve the productivity of the Process and quality of the products they produce. Baselining current practice enables management to establish current status and set realistic targets for improvement. Ongoing measurement of productivity and quality key performance indicators enable management to assess the impact of their implemented changes and identify where further improvements can be made. Function points are the most universally accepted method to measure the output from the software Process. They are a key metric within any Process improvement program because of their ability to normalise data from various software development environments combined with their ability to measure output from a business perspective as compared to a technical perspective.

8.3.5.4 <u>Planning New Releases</u>

The functional hierarchy of the functionality delivered by an application can also assist the support manager in planning and grouping change requests for each new release of the application. The hierarchy illustrates closely related functions and their relative size. If the impact of change is focused on a group of related functions then development effort will be reduced particularly in the design, testing and documentation stages of the project. This strategy of evaluating the SCOPE of impact of a change request also reduces project risk by restricting projects to a

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manageable size and focusing change on a restricted set of related business functions.

8.3.5.5 <u>Software Asset Valuation</u>

Function Point Analysis is being used increasingly by organisations to support the 'valuation of their software assets'. In the past, software has been considered an expense rather than a capital asset and as such was not included in an organisations asset register. The most commonly used software valuation method is based on the 'deprival method'. This method values the software based on what it would cost to replace in today's technical environment rather than what it cost originally to build. The industry build rate (dollar cost per function point) is determined and the total replacement value is calculated based on the current Functional Size of the application.

Since FPA provides a means of reliably measuring software, some organisations have implemented accrual budgeting and accounting in their business units. Under this directive, all assets must be valued based on deprival value and brought to account, thus ensuring better accountability of the organisations financial spending. Funding via budget allocation is based on assets listed in their financial accounts and their depreciation. In the past, the purchase price of the software recorded as an expense within an accounting year. These more recent accounting practices mean that it can now be valued as an asset and depreciated.

Publicly listed organisations have found that by using this accrual accounting method of measuring software as an asset rather than an expense they can amortise the depreciation over five years rather than artificially decrease the current year's profit by the total cost of the software. This strategy has a dramatic effect on their share price since once their software is listed as a capital asset it contributes to the overall worth of the company and the total cost of that asset has a reduced impact on the current year's reported profit.

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8.3.5.6 <u>Outsourcing Software Production and Support</u>

The benefits of Functional size measurement in outsourcing contracts, is that Functional Size enables suppliers to measure the cost of a unit of output from the IT Process to the business and enables them to negotiate on agreed outcomes with their client.

Specifically these output based metrics based on function point analysis has enabled suppliers to:

- Quantitatively and objectively differentiate themselves from their competitors.
- Quantify extent of annual improvement and achievement of contractual targets.
- Negotiate price variations with clients based on an agreed metric.
- measure financial performance of the contract based on unit cost of output.
- At contract renewal be in a stronger bargaining position supported by an established set of metrics.

Conversely these output based metrics based on function point analysis has enabled clients to:

- Objectively assess supplier performance based on performance outputs delivered rather than concentrating on inputs consumed.
- Establish quantitative performance targets and implement supplier penalties and bonuses based on achievement of these targets.
- Measure the difference between internal IT costs compared to the cost of outsourcing based on similar output.
- Quantitatively compare competing suppliers at contract tender evaluation stage.

Most of the international outsourcing companies use function point based metrics as part of their client service level agreements. Whilst this method of contract management is relatively new its proponents are strong supporters of the usefulness of the technique. In our experience once an outsourcing contract has been based on Function Point metrics subsequent contract renewals expand on their use.

Metrics initiatives have a high cost and need substantial investment, which is often overlooked at contract price negotiation. Both the supplier and the client typically incur costs. However, given the size of the penalties and bonuses associated with these contracts it soon becomes obvious that this investment is necessary.

8.3.6 Summary

Function Point Analysis is a technique that until now has been restricted within many organisations to only be used for better estimating or input into benchmarking productivity rates. The above examples illustrate a wider range of uses where it can contribute to the better management and control of the whole software production environment.

- International Software Benchmarking Standards Group (ISBSG) is an international group of representatives from international metrics organizations who collect project data from countries including Australia, Austria, Canada, Denmark, Germany, Hong Kong, India, Japan, New Zealand, Norway, Poland, United Kingdom and the United States.

- Data within the ISBSG Repository Release 11 supports the premise that smaller projects are successful. Over 65% of the projects in the repository are less than 500 function points and 93% of the projects are less than 2000 function points. The repository is populated by industry projects, voluntarily submitted by organizations that want to benchmark their project's performance against industry projects with a similar profile. Consequently organizations tend to submit successfully completed projects which have better than average performance i.e. the ones which did not 'fail'.

- Software Productivity Research

- At a median industry cost of $716/fp delivered, a 5000 function point project is risking $3.5 million dollars.

- Industry experience suggests that the best managed projects which deliver quality software on time and within budget tend to less than 700 function points and up to 1500 function points.

- The Victorian State Government in Australia has adopted a recommended policy for Government departments to manage and control government out-sourced development projects using Function Points. Suppliers tender for the development based on a fixed price in dollars per function point. SCOPE changes are automatically charged by the supplier at a pre-determined contracted charge-rate based on the number of function points impacted and the stage at the life cycle when the change was introduced. The government policy underpinning this approach is called 'Southern SCOPE'. More information is available at:
  http://www.egov.vic.gov.au/victorian-government-resources/e-government-strategies-victoria/southernSCOPE/southernSCOPE-avoiding-software-budget-blowouts.html

- Where maintenance and support includes defect repairs and very minor enhancements.

- Capers Jones – Applied Software Measurement – Assuring Productivity and Quality – McGraw Hill – Software Engineering series 1991 – Chapter 3 Page180.

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8.4 Introduction to Function Point Analysis

8.4.1 Background

Function Point Analysis (FPA) is a technique used to size the software work product. This work product is the output of software new development and enhancement projects. It is the software which is migrated to the production application at project implementation.

Function Point Analysis (FPA) has been used since the late 1970s to assess the functionality delivered to the user based on the user's external business view of the functional requirements. It measures the logical view of an application as compared to measuring the physically implemented view or the internal technical view.

FPA measures these functional requirements in terms of the:

- Business transactions (e.g., Enquire on Fault Record) that the user can perform using the software,
- Business data (e.g., FAULT File) that the software can store and access.

The process of performing Function Point Analysis is called a 'Function Point Count' and it involves the identification, classification and weighting of each of these transactions and data components. The weightings are combined to give the functional size as an Unadjusted Function Point Count. Older versions of IFPUG CPM methodology required an additional step of assessing the technical and quality features embedded in the software product and adjusting the functional size accordingly. The result was referred to as the Adjusted Function Point Count.

NOTE: The latest IFPUG CPM 4.3 Methodology records Functional Size WITHOUT adjustment. SCOPE reports Functional Size results in function points as per the new IFPUG 4.3 recommendations which are <u>unadjusted</u>. However if your organisation still requires an <u>Adjusted</u> function point count then record the details required under the Value Adjustment Factor, General System Characteristics and see the SCOPE summary function point count reports for the adjusted values.

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The Function Point Analysis technique is used to assess the functionality delivered by software (often called a 'function point count') and a 'function point' is the unit of measurement for the software functional size.

The Function Point Analysis technique is used to assess the functionality delivered by software and an 'unadjusted function point' (UFP) is the unit of measurement

Once you have a Function Point count, you can use the resultant measure of the software product, either on its own or combine it with other measures to develop the following project performance indicators:

- The **SCOPE** of the software development product (e.g. software units to be delivered or worked on).
- Quality indicators (e.g. the number of defects per software unit).
- Productivity (e.g. the cost per software unit).
- Performance (e.g. staff resources per software unit).

SCOPE facilitates a better understanding of a software application by displaying each functional area to be sized in a hierarchical tree display, thus providing an easy to interpret map of the application itself.

8.4.2 Identification of Functional Components

The technique of functional modelling (functional analysis/ functional decomposition) is used to model the relationship between the transactions and the application as a whole. The transactions are mapped onto a functional hierarchy of the application under the business activity to which they contribute.

The following criteria is used, where possible, to check each task to determine if it is a unique elementary process (logical business transaction). It is counted as a unique logical transaction when:

- it has processing logic (editing, validation etc) different from other similar transactions,
- it accesses a unique combination of fields and files,
- on completion, it leaves the business in a consistent, predictable state,
- it is user recognisable and definable,
- it is created by business requirements and not the technical requirements of the chosen solution,
- it is logically independent of other transactions (although it may in some cases be triggered by another transaction),
- it is logically triggered by an external event,
- it achieves a business objective, not a technical objective.

The technique of data modelling (information engineering, entity relationship diagramming) is used to identify the data and the relationship between the data. The data files are then mapped to the transactions on the hierarchy which access them.

Data files are logical master groups of data from a business user perspective. They are a group of data that tends to be created as a 'set' although parts of the data may be modified independently. They may be a business reference file e.g. Currency Details which are referenced by transactions or business entities maintained by the business transactions.

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Data Files do NOT include files created for quality, technical, performance, security, navigation reasons. Data Files are permanent groups of data, they are not stores for temporary data.

8.4.3 Classification of Functional Components

Once all the functional components have been identified they are classified into types depending on the type of activity they perform for the user.

Transactions can be classified into three types:
- **Inputs**: enable the user to input data into the software to be stored,
- e.g. *Create Fault Record = Input*
- **Outputs**: enable the user to extract derived information from the software,
- e.g. *Aged Faults Report = Output*
- **Enquiries**: enable the user to query stored data
- e.g. *Display Fault Details = Inquiry*

Data Groups can be classified into two types:
- **Internal Files** store data input by the user transactions
  - e.g. *Fault File = Internal File*
- **External Files** store data accessed by the user transactions but not maintained by the users' transactions
  - *e.g. Account File = External File (where this file is maintained by another system)*

8.4.4 Weighting of Functional Components

Once the functional components have been identified and classified they are evaluated for their functional complexity using a set of prescribed attributes. The functions are categorised into low, average or high complexity.

Functional components are awarded Function Points according to their classification of type and categorisation of complexity.

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E.g.:

Create Fault record

= External Input = High Complexity = 6 Function Points

Currency Conversion File

= Internal Logical File = Low Complexity = 7 Function Points

Once all functional components are identified, classified into type, assessed for complexity and awarded 'points' these points are accumulated into a total Function Point Count. *NOTE: IFPUG 4.3 records this size as the Functional Size. Any further adjustment is not recommended.*

Previous versions of the IFPUG Methodology had a final step is to adjust this count for quality and technical characteristics by using the value adjustment factor (range 0.65 – 1.35) for the Adjusted Function Point Count. This step is now an optional add-on for IFPUG and not recommended.

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8.4.5 What is Functional Size Measurement?

Functional Size Measurement (FSM) is a technique for measuring software in terms of the functionality it delivers. The ISO/IEC standard for Functional Size Measurement 14143-1:2006 defines FSM as a means of quantifying the Functional User Requirements i.e. functions that the user has required to be delivered. (For more information on the IFPUG Method for counting function points see - Introduction to Function Point Analysis.)

Functional Size can be used for many purposes (See - Uses & Benefits of Sizing) however; it is primarily used at the planning stage for input into project resource estimation calculations for cost, effort and schedule. At the completion of a project it is used to compare performance in terms of the cost effectiveness and efficiency of the development and support teams.

FSM measures the functional requirements of the software. This means that it can be applied before development commences, rather than retrospectively as is the case with other forms of software measurement, such as counting lines of code and/or other physical objects. This capability to measure early enables accurate estimates to be made, risks to be evaluated, and project SCOPE to be negotiated, before final commitments are made.

FSM also enables comparison of applications and projects based on their size. Productivity rates for applications of a similar attribute profile can be compared for benchmarking support ratios and improvement purposes. Productivity rates from past projects can also be used to predict effort, once a project's Functional Size has been determined.

SCOPE supports the rules of the Functional Size Measurement method, ISO/IEC 20926:2008 standard IFPUG Unadjusted and the IFPUG Function Point Analysis Method CPM 4.3. This technique is often referred to as IFPUG Function Point Analysis or "FPA".

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8.5 What is FP Outline?

8.5.1 Background

Many organizations have a need for quick easy software sizing and have neither the time nor the skills to do a detailed Function Point Count.

FP Outline™ provides the expertise to quickly determine the approximate size of a project or an application in minutes rather than the days, weeks or months consumed using traditional IFPUG counting methods. Learn how you could use **FP Outline™** to save significant time and money in implementing functional sizing in your organization.

To gain access to **FP Outline™** online see: http://www.totalmetrics.com/function-point-software/software-size-estimation

8.5.2 When could you use quick sizing methods?

- *Early project estimation* - quickly determine the project's functional size, even before specifications are completed, then apply the productivity coefficients to estimate effort, cost and duration.

- *Outsourcing Contract Negotiation* - establish the functional size of the client organisations software to be maintained by the supplier at due diligence stage

- *Valuing your software assets* -establish the functional size of an organisation' s software to determine its replacement cost for asset valuation and accounting purposes

- *Budget approvals -* use the functional size and projected productivity rates to verify your estimates for management budget approvals.

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- ***Benchmarking –***establish the functional size of an organisations projects and applications for quick determination of product quality and development and support efficiency and effectiveness.

- ***Release Management -*** establish the functional size of a change request to determine if it is possible to include in the planned release.

8.5.3 How does FP Outline™ work?

FP Outline™ uses a series of algorithms derived from thousands of projects and applications counted over the last 14 years by IFPUG certified counters. The algorithms are based on over 40 relationships derived between known project and application attributes and the measured functional size. Many of these relationships are between the physical aspects of the project that are easily measured, and the logical functional size.

All you have to be able to provide is data on the 'physical measures' which in most cases are easy to collect, and then FP Outline™ does the rest.

For example, there is a very predictive relationship between the number of pages of a functional specification and the function point count for a project. This makes sense when you consider the more functionality delivered by the project the more pages of specification. Just count the pages of specification!

This is just one relationship that forms the basis for the 20 questions asked by FP Outline™ to 'predict' the size of your project or application.

FP Outline™ reports the approximate size in function points with an appraisal of the level of confidence that FP Outline™ had in determining the answer. The accuracy of the predicted size will depend on which questions you answer, and the accuracy to which you answer them. Our users are amazed at its predictive ability when they

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compare the size calculated by FP Outline™ the actual measured size using the IFPUG methodology.

8.5.4 How accurate are the size predictions?

Total Metrics has been using the methodology underpinning FP Outline™ for over 14 years and has been able to demonstrate its accuracy, in both project (new development and enhancement) and application baseline counts for over 2000 applications and projects worldwide.

8.5.5 Client Case Study

A large Telecommunications company planning to outsource the maintenance of a set of 45 applications needed to urgently provide the functional size of their portfolio to the prospective supplier. Total Metrics took 6 effort days using the FP Outline™ methodology to establish the applications portfolio size at 30,710 UFPs. The predicted size was later verified using the IFPUG methodology and consumed 122 effort days to count. The actual measured size (25,326 ufps) was only -17.53% different to the predicted size. FP Outline™ predictions tend to typically lie within a +/- 20% range.

Comparisons of Actual Portfolio Size Versus Estimated Size using TM Methodology

Organisation Identifier	1	2	3	4
Number applications	16	29	46	56
Estimated Size	3,920	26,265	29,410	45,780
Actual Size	3,753	27,392	24,608	49,185
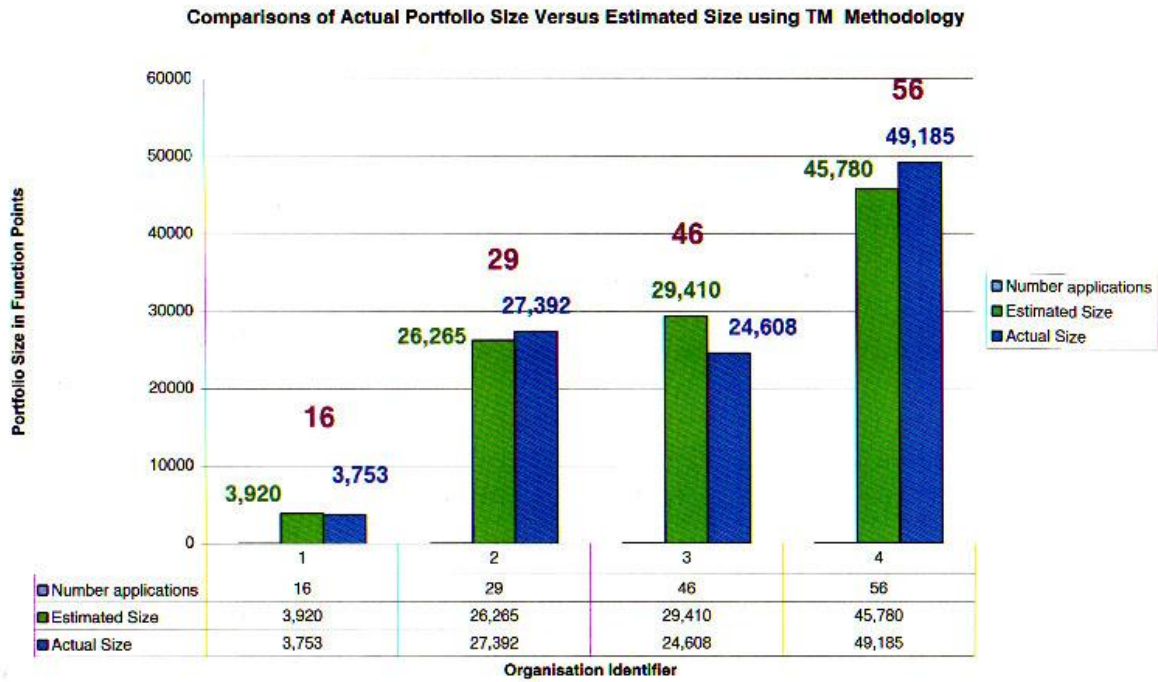
Comparison of Estimated Size Using FP Outline™ to actual detailed counting results using IFPUG 4.3 Rules 20 times faster and only 17.5% different

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8.6 Function Point Counting Expert System

FP Decision Maker™ is a free online tool within **SCOPE** that helps you answer your function point counting problems by prompting you with the IFPUG Rules and asking you to confirm if it is applicable to the current case. This tool was developed by Pam Morris who was an IFPUG CPC member for 7 years and co-author and reviewer of IFPUG 4.0 to 4.3.

We recommend that you use the FP Decision Maker™ any time that you are unsure how to count a process or data group or if it should be counted or not.

For the www link to FP Decision Maker™ see http://www.totalmetrics.com/function-points/**SCOPE**-Counting-59.swf

8.7 Metrics for Project Governance

8.7.1 Background

Our experience as Software Measurement consultants has taught us that knowledge gained in the act of measurement can be as valuable to project managers, as their use of our measurement results.

For example, as part of our measurement role we are often asked to functionally size a project early in its lifecycle for input into estimation models. In order to perform the functional size measurement we need to dissect the functional requirements for the project, model them and individually catalogue and quantify each base functional component. In doing so we make observations about the status of the project and the quality of both the requirements and the specifications and based on our experience with similar projects, we are able to make predictions on the likelihood of the project's success.

With time, as our predictions have become reality, we have begun to recognise that our observations, if reported, could have provided valuable input into the overall management of the project and if heeded could have prevented numerous project failures. The act of measuring provides quantitative assessments of the quality and status of a project that is rarely seen by others and the measures we take give insights that can provide real benefits to the project team beyond just monitoring their productivity.

This realisation has caused us to change our approach and to focus on using the role of measuring to provide ongoing advice to the project whilst it is progressing. We use the measurements to quantify our observations so our recommendations are now a critical part of the project decision making. Metrics experts observe and measure without any vested interest and as such provide unbiased and independent assessment of the project risk, quality and status. The measurement results support these observations.

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As metrics consultants we had been confusing the measure with the goal. Key objectives should not be the measurement results but successful software development projects. Delivery on time and on budget with the right functionality is the true measure of the worth of 'metrics' to a project. To make measurement an integral part of the software development process we first have to make it relevant to the project's success.

This change of emphasis has meant that we are now perceived by our clients as providing project governance through the act of measurement and called "SCOPE Managers" not "Metrics Consultants". We have shifted the perception of the project team from seeing us as just another project overheard, to being someone that can assist project teams to better manage and control their risk and optimise their chances of success.

To download the full paper please go to : http://www.totalmetrics.com/function-point-resources/downloads/Software-Measurement-Project-Governance.pdf

8.7.2 The Role of the SCOPE Manager in Project Governance

The role of Project Governance is to balance the risk of the organisation's investment against the opportunities and benefits that the outcomes will provide the business. It addresses the risks to ensure that the software provides value to the organisation and that the risks are properly mitigated.

For IT projects it is about providing the client with the capability to monitor the project status and control the risk of the project not delivering the business value they require within the time and budget available. Project governance is about understanding the business opportunities that the project can deliver, but also appreciating the consequences of failure and putting in place strategies to minimise the risk and optimise the investment so that business goals are achieved.

Governance

Corporate Governance	Board of Directors		
IT Governance	CFO	CEO	CIO
Project Governance	Project Board	Project Sponsor	
"Scope Manager"	IT Project Director		
	Business Project Manager	Development Project Manager	
	Project Team		
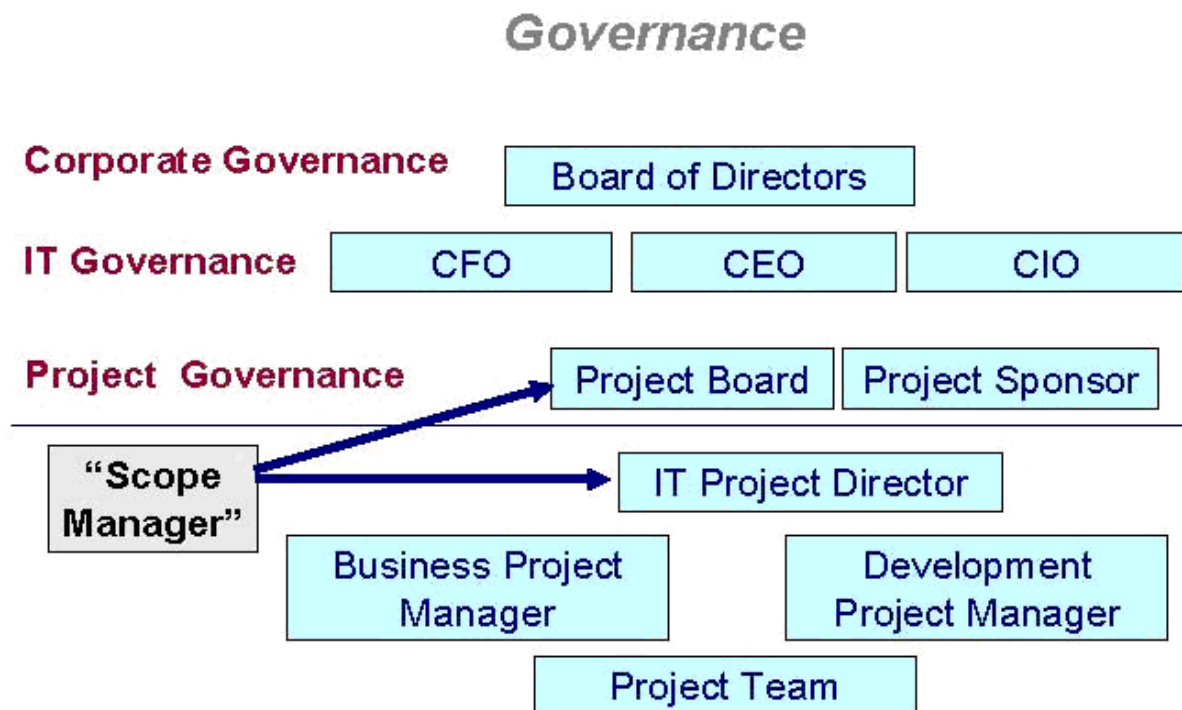
The SCOPE Manager provides metrics based project governance. We have found this approach to be very successful in objectively quantifying key project attributes to enable informed decision making with respect to project estimates and project risk. The SCOPE Manager is typically a metrics specialist who has excellent skills in

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business analysis, project estimation and functional size measurement. They need to be independent of the project team and not be connected to either the IT developers or the business client. They have to be able to report the status of the project objectively without bias, to a management level that has the authority to proceed, change direction or cancel the project.

The **SCOPE** Manager provides a key role in that their reports can provide early warning of project failure. In the past it was often not until major project milestones were missed that senior management had an indication that their investment was at risk. The following sections describe the role of the **SCOPE** Manager over the life cycle of the project and how they use metrics as a basis for their recommendations.

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8.7.3 Role of SCOPE Manager During Project Life Cycle

8.7.3.1 Business Planning / Feasibility

The SCOPE manager can be involved in the project as early as the business case stage where they assess the high-level business requirements to provide an estimated functional size of the proposed project. The functional size combined with a productivity rate for the planned development environment can be used to establish a ballpark range of predicted project effort, cost and likely duration.

If the organisation has its own internal productivity data then this can be used for the estimates. Alternatively, industry data for productivity rates are available from the International Software Benchmarking Standards Group (ISBSG) [1]. The ISBSG's data provides industry productivity data for a wide range of development platforms, languages and environments.

The project estimates can be used as a 'reality check' against the planned budget and required delivery dates. If delivery time is constrained, then the SCOPE Manager can use ISBSG's regression equations to demonstrate the trade-offs between compressing the schedule and the cost of adding more people on the project. For example, doubling the speed of project delivery requires up to four times the number of people [5]. Large teams have a significant negative impact on an individual's productivity rate and consequently an overall increased cost of the project to deliver the same product.

If the estimated cost and duration exceeds the planned budget or schedule then the functionality may need to be reduced. Other governance processes need to be in

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place to ensure that the reduced functionality still delivers the planned business benefits.

Project risk of failure increases exponentially with project size. Early quantification of the size of the proposed software product enables evaluation of potential risk. The **SCOPE** Manager provides quantitative input for the business to make objective decisions as to the development strategy to minimise risk, whether to proceed to the next step of building a requirements specification or to cancel the project.
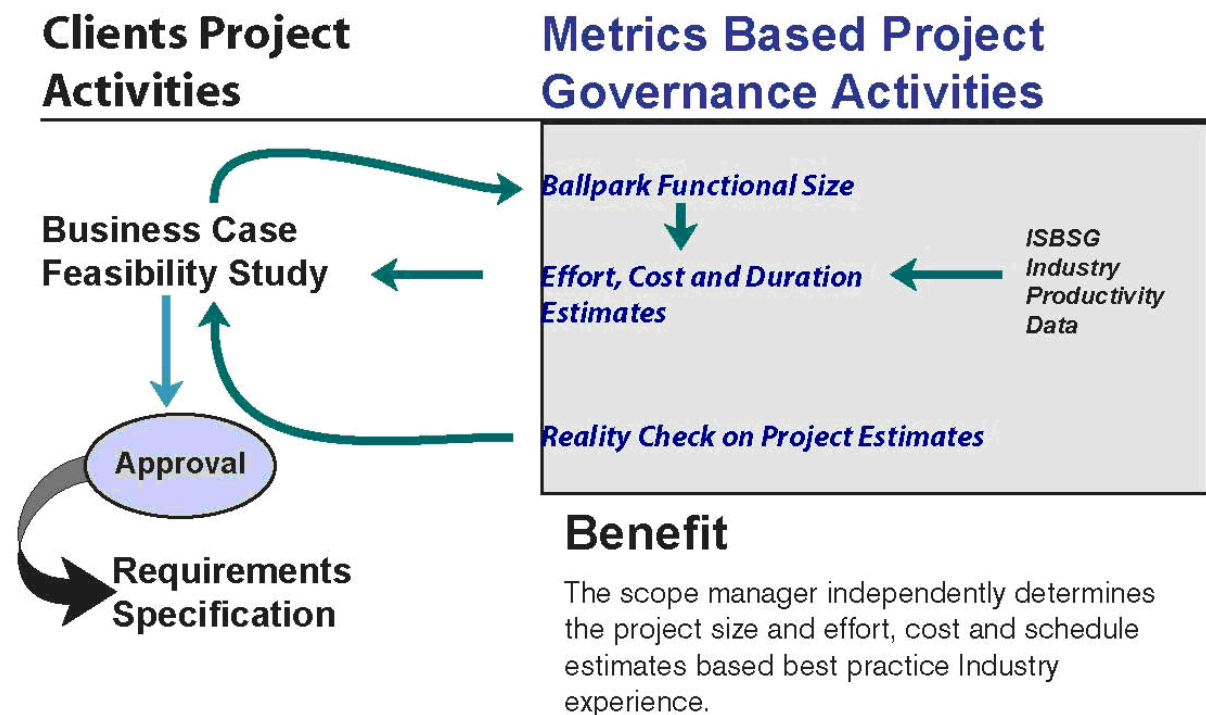
8.7.3.2 Requirements Specification Stage

As part of the functional sizing process, the User's Requirements need to be decomposed into individual functions within a functional model. Each function (process and data group) is identified, catalogued and sized. The cataloguing and modelling process often highlights gaps in the Requirements Specification i.e., where functions have failed to be specified, or have been specified inadequately, inconsistently or ambiguously. The **SCOPE** Manager is in a unique independent

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position to view the project how the external developers may see it. The **SCOPE** Manager's experience with sizing functional specifications enables them to identify areas that may have been overlooked by the project team and provide objective feedback on the quality of the specification. For example, they can mark up the functional model for functionality that has been explicitly specified or only implicitly specified and quantify the percentage of each. The functional size is still only an estimated 'range' as the complexity of many functions can often not be evaluated at this stage; it is usually anticipated that the project will grow further. The Users may also prioritise their Requirements as those that they consider to be Core functionality and mandatory to be delivered versus those that they consider to be extended or for future consideration. The **SCOPE** Manager can determine the size and estimate of each alternative.

High-level project resource estimates are revised based on the selected platform and the predicted size range. Once the project team have updated the specification to fix ambiguities, inconsistencies and missing functionality, the refined Requirements Specification is ready to be used as the basis for input into the Functional Specification. In an outsourcing situation the Requirements Specification would be provided as part of the Request for Tender (RFT). The functional sizing model along with its list of individual identified quantified functions and their associated priority for delivery is distributed as part of the RFT. This becomes the baseline Requirements document with which the business can evaluate whether the completed project has delivered their required functionality.

If the method of quotation by the suppliers is to be via a 'fixed $ price per function point' as identified within the Southern**SCOPE** [5] methodology, then the tendering suppliers need a clear indication of which of the Users Requirements would be considered to be included or excluded from the fixed price.
The **SCOPE** Manager identifies which of the User's Requirements will consume effort (and therefore costs) that are proportional to the overall functional size and which will not, and thus be excluded from the fixed price. For example, documentation of Project Deliverables is proportional to functional size and would be included within

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the fixed price per function point. In comparison, research and acquisition of hardware is not, and should be quoted separately.
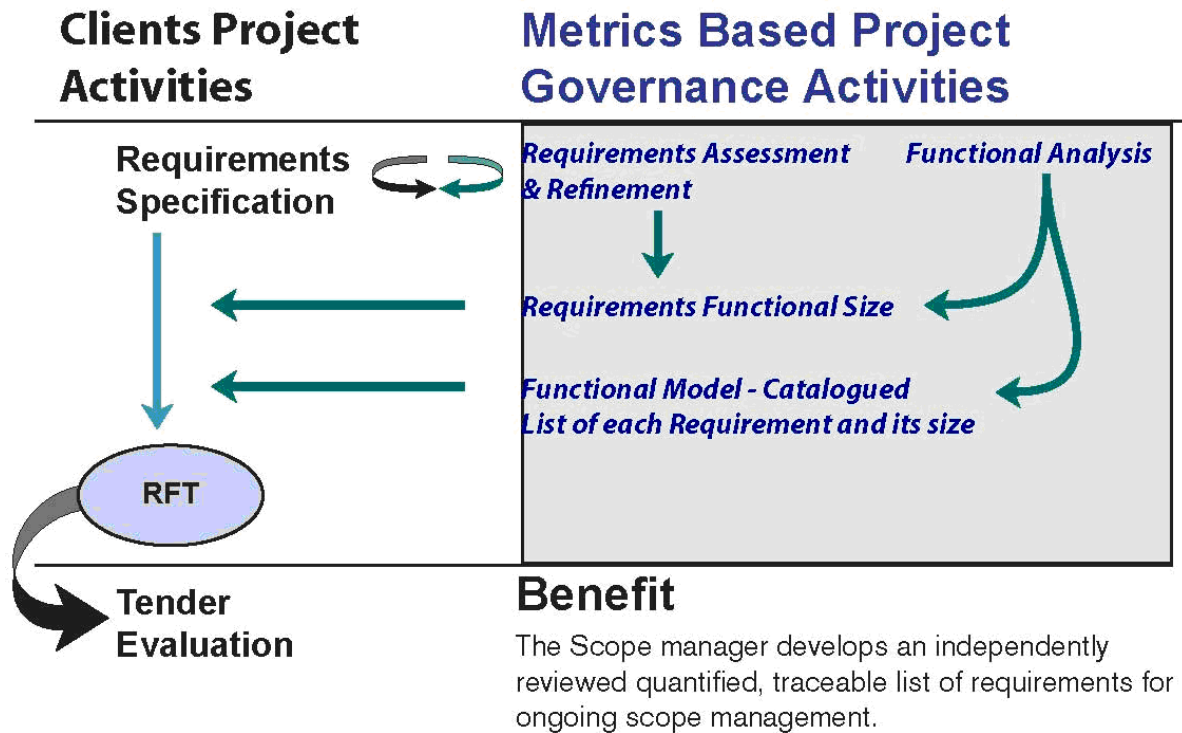
8.7.3.3 Supplier Selection Stage

The early ballpark estimates of projected effort, duration and cost based on functional size enable the client to objectively evaluate the 'reasonableness' of the supplier's proposed quotation and solution. This mitigates the risk of selecting the supplier based on the lowest price and promised fastest delivery who would potentially have the greatest risk of failing to deliver the project

The SCOPE Manager uses the functional size model to quantify the 'fit' of each supplier's proposed solution to the original requirements enabling full objective evaluation of the supplier's solution by the quantification of the proportion of extra functionality, functionality omitted, functionality delivered by a package or functionality that needs to be customised or built.

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Stage

package of functionality that needs to be customised or built.

Clients Project Activities

Tender Evaluation

Select Supplier

Functional Specification

Metrics Based Project Governance Activities

Suppliers Functional Solution → Price → Schedule

Match Suppliers Solution against RFT Requirements

Reality check Suppliers bid against initial Cost and Schedule Estimates

Benefit

The Scope manager provides an independent evaluation of suppliers' price and schedule estimates. Quantitative match and evaluation of supplier functional proposal .

The SCOPE Manager revises the functional size based on the Functional Specification and quantitatively maps the functional requirements to the original RFT Requirement's Specification to provide a percentage match of the RFT to the proposed solution. Any omissions, ambiguities or inconsistencies in the Functional Specification are highlighted for revision before proceeding with the build. If at this stage the functional size indicates that the project will cost more, or be delivered later than planned, then non-core functionality is selectively removed from the project until the project size indicates that it can be delivered within the allocated budget and delivery dates.\

If the project-charging model is based on dollars per function point delivered, the SCOPE Manager will work with the client and supplier to finalise the price variation model for changes that are approved during the remaining development. Ie, typically penalties are paid for any function points added, modified or deleted from this stage forwards. The dollar amount charged is usually scaled to increase as the project progresses. The outcome from the functional sizing and mapping exercise is a

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traceable, auditable, quantified list of agreed functional requirements to act as a baseline for ongoing **SCOPE** management.
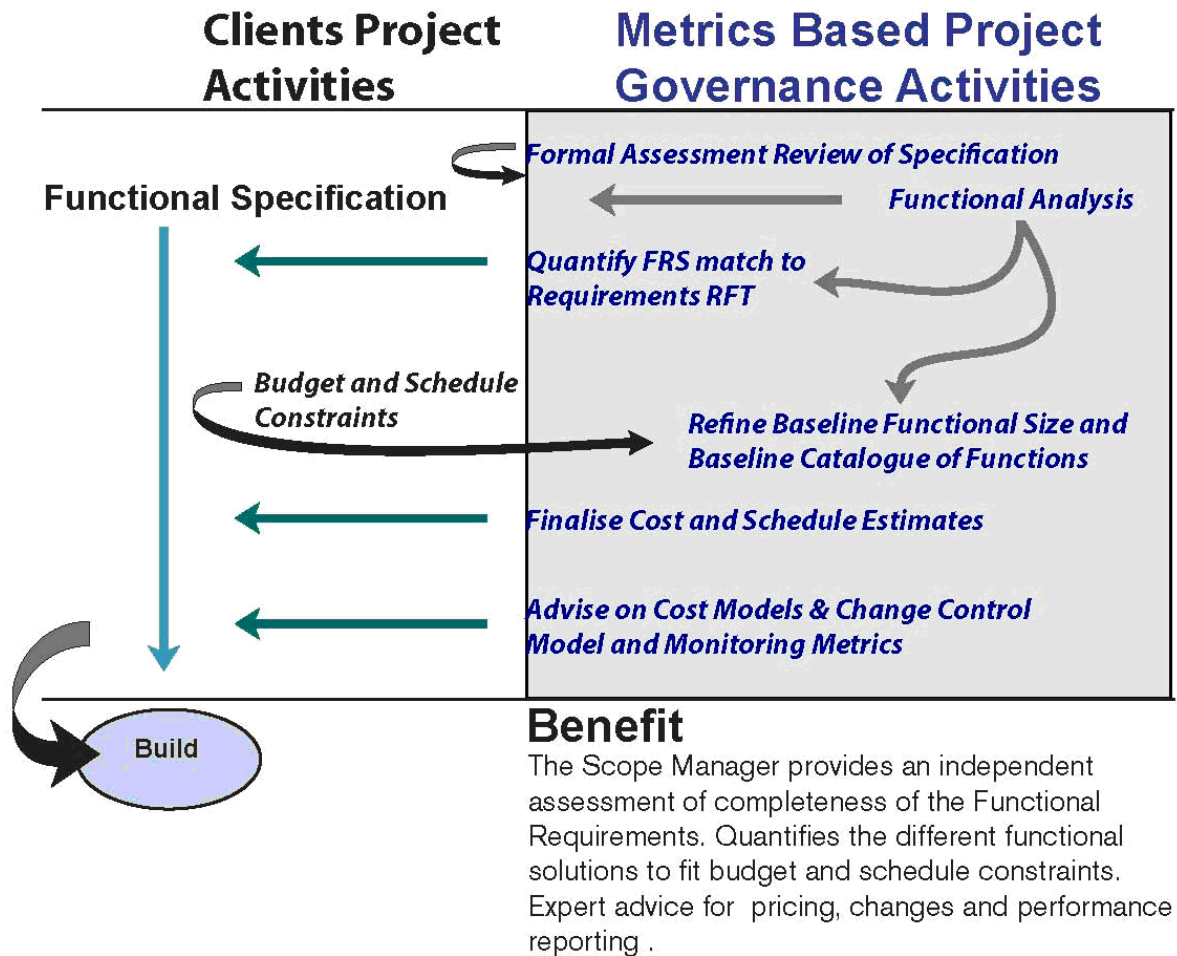
8.7.3.4 Changes introduced during the Project Build to Implementation

The **SCOPE** Manager is tasked with the quantification of Client Change Requests based on functional size of impact. This is used as a basis for pricing negotiations, enabling the client to assess the price of Change Requests prior to submission to the supplier and know they are being fairly charged for their required changes.

The **SCOPE** Manager uses the size of the change to establish the revised project **SCOPE** as a means of evaluating the supplier's revised project delivery date.

Clients Project Activities

Build

User Requirements Change

Implement Change

Metrics Based Project Governance Activities

Requirements, Assessment & Refinement

Functional Analysis

Budget and Schedule Constraints

Quantify size of change for Pricing

Revised Cost and Schedule Estimates

Update Baseline Functional Size

Benefit
The Scope manager provides an independent objective assessment of the size of the change and assistance with size based price negotiations. We assess impact on planned schedules and budgets.

8.7.3.5 Ongoing Project Monitoring

The Functional Size Model provides input into the quantitative monitoring of project status using an 'earned' value type of reporting [2], [3]. I.e., the SCOPE Manager provides independent project status reports based on the amount of functionality delivered, versus functionality planned to be delivered, within each reporting period. This is an 'output based' metric for project reporting that is more meaningful to the business client rather than an input based metrics of budget or effort consumed. I.e., status reporting is based on the amount of product delivered (function points) to each stage of completeness. This contrasts with traditional approaches of monitoring status based on resources and schedule consumed.

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The status report provides the client with detailed objective independent assessment about which functions of their software have been developed to what stage. The increased visibility of project status gives early warning of project slippage.
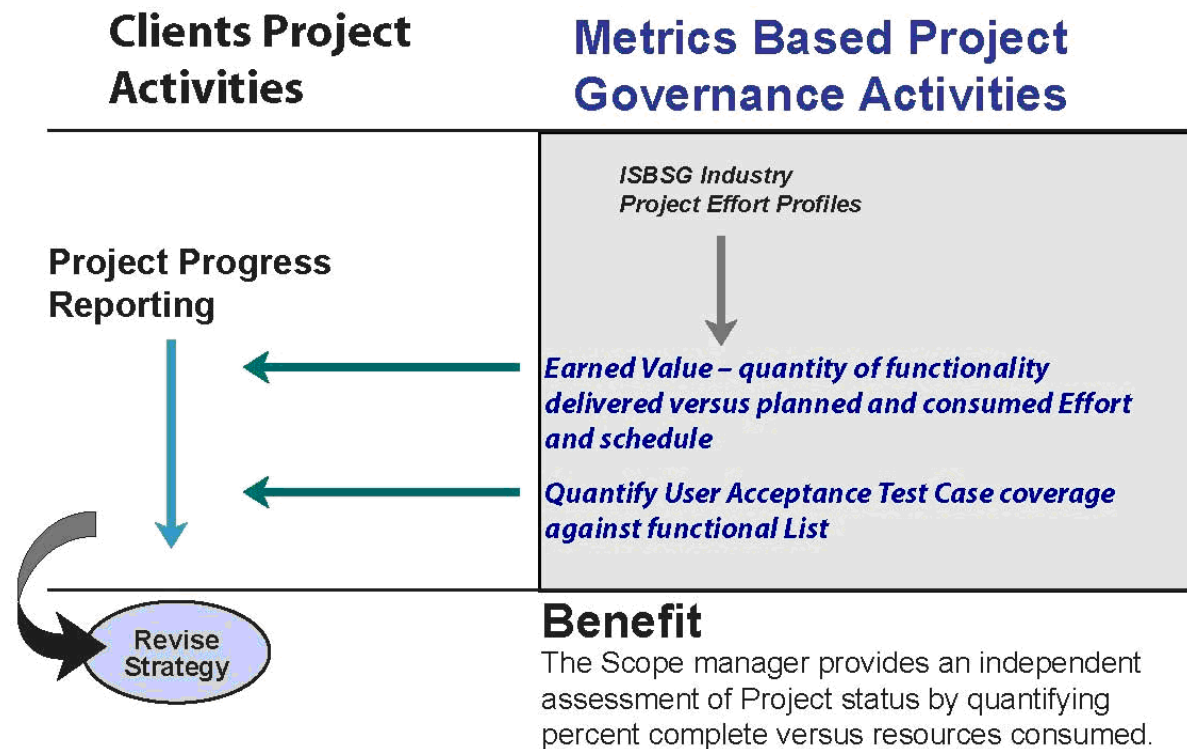
Project Implementation

On project completion the **SCOPE** Manager quantifies and maps the functionality implemented versus functionality contracted to be delivered, for input into final payment negotiations. This enables the client to verify, against the traceable list of requirements, which functions have been satisfactorily delivered. The quantification of the delivered functionality enables objective discussions on payments due.

The **SCOPE** Manager provides advice on the project metrics to collect, analyse and report, and ensures that they are consistent with the organisations internal standards or those of ISBSGs. The **SCOPE** Manager can assist with the submission of the project data to the ISBSG repository and provide an independent assessment of the developer's productivity and product quality.

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Clients Project Activities

Metrics Based Project Governance Activities

- Revise Strategy
- Project Implementation
- Contract Sign-Off

ISBSG Industry Project Data Repository

Validation, collation, analysis and submission of Metrics Data

Supplier Productivity and Product Quality Assessment compared to Industry values

Benefit

The Scope manager provides an independent assessment of the supplier's performance and the development process. Assistance in submission of the project data to the ISBSG Repository.

Conclusion

The SCOPE Manager focuses on the effective management and control of the project and uses their metrics skills to provide objective evidence of their observations, shifting the focus from measurement to project governance.

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8.7.4 References and Recommended Reading

1. ISBSG data Benchmark Industry Reports - http://www.isbsg.org/

2. Morris P. M - Case Study of a Successful Measurement Program 2007 - http://www.totalmetrics.com/total-metrics-articles/Software-Measurement-Case-Study.pdf

3. Morris P.M - Metrics for Project Governance 2004 - http://www.totalmetrics.com/function-point-resources/downloads/Software-Measurement-Project-Governance.pdf

4. Software Productivity Research (Capers Jones) - Softwares Chronic Crisis W. Gibbs Scientific American September 1994

5. Southern**SCOPE** Project Management Methodology developed by the Australian Government (State of Victoria). - http://www.mmv.vic.gov.au/

6. American Programmer, Cutter Information Corp, vol. 8, no. 7, July 1995, 37 pp.

7. DeMarco, T., and Lister, T., Peopleware, Dorset House Press, New York, 1987, 189 pp.

8. Garmus, D., and Herron, D., Measuring the Software Process: A Practical Guide to Functional Measurements, Prentice Hall PTR, 1996.

9. Garmus, D., and Herron, D., Function Point Analysis: Measurement Practices for Successful Software Projects, http://www.aw.com/cseng/

10. Goodman, P., Practical Implementation of Software Metrics (International Software Quality Assurance Series) McGraw Hill, London, 1992.

11. Humphrey, Watts, Measuring the Software Process, Addison-Wesley, Reading, Mass, 1989, 489 pp.

12. IEEE Recommended Practice for Software Requirements Specifications, IEEE Computer Society, Institute of Electrical and Electronics Engineers, Inc., New York, April 1994, 26 pp.

13. International Function Point Users Group, IT Measurement, Pearson Education Corporate Sales Division, ISBN 0-201-74158-x (pbk.)

14. Jones, Capers, Applied Software Measurement - Assuring Productivity and Quality, Software Productivity Research, Inc., Burlington, Mass, 1991, ISBN 0-07032813-7.

15. Jones, Capers, Programming Productivity, McGraw-Hill, New York, 1968, 280 pp.

16. Jones, Capers, "Measuring Software Productivity," CASE Trends, vol. 2, no. 1, Jan/Feb 1990, pp. 17-24.

17. Jones, Capers, Table of Programming Languages and Levels, Software Productivity Research, Inc., Burlington, Mass, 1988, 35 pp.

18. Jones, Capers, A Short History of Function Points and Feature Points, Software Productivity Research, Inc., Burlington, Mass, 1988, 45 pp.

19. Symons, Charles, Software, Sizing and Estimating, Mk II FPA, John Wiley, New York.

20. System Development, Function Points Applied Computer Research, Inc., Phoenix, August 1989, 20 pp.

21. 'American Programmer' – vol.10, no. 11: Adapting Function Points to Real-time Software:

22. Stephen Treble & Neil Douglas, Sizing and Estimating Software in Practice: Making Mk11 Function Points Work, McGraw-Hill Book Company, 1995, IBSN: 0-07-707620-

23. Morris, P M Forgotten Aspects of Function Point Analysis: Digest Magazine "Project and Profits" April 2003 Issue

24. Morris, P. M Using Function Points to get Projects Back on Track: Proceedings of the International Function Point Users Group Conference, April 1994.

25. Morris, P.M, IFPUG's Involvement in ISO Function Point Standards: Proceedings of the International Function Point Users Group Conference, April 1995.

26. Morris, P.M, Desharnais, Jean-Marc, Validating Function Points: Proceedings of the International Function Point Users Group Conference, April 1996.

27. Desharnais, Jean-Marc, Morris, P.M., Validation Process in Software Engineering: An example with Function Point. Software Metrics: Research and practice is Software Measurement 3-8244-6518-3 (1997).

28. Desharnais J.-M., Morris P., Post Measurement Validation Procedure for Function Point Counts, Position Paper Forum on Software Engineering Standards Issues, October, 1996.

29. Wittig GE Morris PM Finnie GR Rudolph EE Formal Methodology to Establish Function Point Coefficients: Proceedings of the International Function Point Users Group Conference, September 1998.

30. Oligny, Serge, Abran, Alain, Desharnais, Jean-Marc, Morris, PM, Functional Size of Real Time Software: Overview of Field Tests 13th International Forum on COCOMO and Software Cost Modeling – Los Angeles, October 1998.

31. E.E. Rudolph, G.E. Wittig, G.R. Finnie, P.M. Morris Verifying Function Point Values IFPUG International Function Point Users Group Conference - Arizona USA, September, 1997.

32. Desharnais J.M., Morris P, Measuring ALL the Software not just what the Business UKSMA Software Measurement in Practice Conference - London October 1998.

33. IT Measurement: Practical Advice from the Experts (Pam Morris contributed a Chapter on Benefits and Uses of Function Point Analysis and the infrastructure required to implement Function Point Analysis within an organisation. (International Function Point Users Group) Addison Wesley 2002 ISBN: 020174158X

34. Morris, P.M : The IFPUG Guide to IT and Software Measurement - Effective Applications Development and Maintenance and Support Benchmarking; *Pam Morris* - Auerbach Publications - ISBN 9781439869307 April 2012

9 Trouble Shooting

9.1 SCOPE Performance Optimising

Slow Performance of SCOPE may be for a number of technical reasons:

1. **Database needs compacting**
   - To speed up performance select the option to Compact the Database from the top Menu - File.
2. **Slow Network**
   - If you are accessing the SCOPE database over a slow Network connection you need to either increase download speed or
   - Work on a copy of the Count ie. Snapshot the Application / Release / Count Session from the central Repository database and save it locally (not on network).
     - Open the snapshot database and work on it.
     - When the count is finished export the Release / Count Session
     - Import Release / Count Session back into the Central SCOPE Repository database

3. **Extremely large Database**

   SCOPE has good performance for databases that contain hundreds of applications and thousands of Count Sessions and millions of Fps, however as the size of the database increases the time to save takes longer. We would therefore recommend:

   - Archiving Applications, Releases etc that are no longer required (use Export capability in SCOPE to import to an Archive database or just copy the database)

   - Increasing the time intervals of the Automatic Save.

- Exporting out the Release/count you are working on and importing it back in when completed.

Remember to contact **SCOPE** Support to assist you in your operation of **SCOPE**..

9.2 Enabling EXCEL Template Macros

SCOPE MS Excel Templates are 'Macro enabled' and as such some security settings on your computer may prevent them operating as expected.

1. Ensure that you have "Clicked" the yellow button "Enable Editing"at the top of the screen."

2. If you still have problems with the worksheet then go to:

   - EXCEL Options under File on the Main Menu of the MS Excel Template.

   - Select the Option "Trust Center" then the Button "Trust Center Settings" .

   - The Trust Center Screen will display select "Macro Settings" and choose the option "Enable all Macros".

SCOPE Excel Templates have been developed for MS EXCEL® **2007 and 2010**. We do not expect them to work as expected if you use older versions of MS Excel.

Remember to contact SCOPE Support to assist you in your operation of SCOPE..

9.3 SCOPE Not Responding - saving your Data

If for some reason you find that **SCOPE** is "Not Responding" and you have not saved your work ie. you have Disabled **SCOPE**'s automatic save or have completed work in the interval between saving.

Do not select, via the Task Manager, to end the **SCOPE** Application until you have completed the following.

1. Using Explorer, go to the directory where your current **SCOPE** *.FPA file is stored.(eg. *mycount.fpa*)

2. You will notice there is a second file in the directory with the same name as your *.FPA file but it has a 'tmp' extension ie. *mycount.TMP*

3. Copy (CTRL C) the *mycount.TMP* file and paste it, then rename the copy with a new name and an FPA extension. eg. *mycount v2.fpa*

Now you use Task Manager to end the task for **SCOPE**.

In **SCOPE** ,open the *mycount v2.fpa* file to see all your latest changes.

Open your original *mycount.fpa* file. **SCOPE** will inform you it has saved a recovered version. Compare the Recovered version with your *mycount v2.fpa* file to determine which one you want to keep.

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Remember to enable Autosave Option in **SCOPE** (User Options / Autosave) . Autosave time interval can be set from 5 minutes to every 30 minutes. We would recommend to save every 5 minutes. We would not recommend that you select "Disable" as this turns off Autosave and if your session is interrupted your data will not be saved.

Remember to contact **SCOPE** Support to assist you in your operation of **SCOPE**..

9.4 Trial Version can Only be Installed Twice

Error Message " *Trial Version of* **SCOPE** *can only be installed twice. Please contact Total Metrics if you require a Trial extension* "

The free downloadable versions of **SCOPE** (Evaluation / Trial Versions) can only be installed twice on a Users Computer.

ie. . Any user is only able to have 2 evaluation copies of **SCOPE** on one computer for each new version of **SCOPE**.

If you have not previously installed 2 Evaluation Versions of **SCOPE** or if you would like to continue evaluating **SCOPE** please contact Total Metrics support.

9.5 SCOPE Reports Stop Working

This is usually as a result of a change in a security setting on your network or computer for your User Profile.

SCOPE Reports use MS ACCESS Reporting Utility that requires the actual Network name of the drive into which to write its reports. If for any reason you have changed the name of the drive to its IP address then MS Access will not be able to identify the drive. It gives a message that it cannot open the Output file.

Ask your network Technical Support to change permissions on the network DRIVE to enable access via the Name for all programs.

You can also :

- set your output Drive to be a trusted location via the security settings for your computer.

- right click on your *.fpa file and under Properties set to "unblock" it.

In some instances when MS Office is re-installed on a computer, the Microsoft install process overwrites the link between SCOPE and Snapshot Viewer®, so the reports will no longer display. Fix by un-installing and re-installing SCOPE.

Your **SCOPE** data will not be impacted in any way by the uninstall and reinstall providing you have not stored your data in the Example database which is installed with **SCOPE**.

Remember to contact **SCOPE** Support to assist you in your operation of **SCOPE**..

9.6 SCOPE Installed - Needs Activation

SCOPE installs under your USER ID and windows User Profile Name but you MUST have Administrator rights to the computer for your User Profile.

SCOPE registration details only apply for current windows user, hence if registration details are entered for windows user (e.g. John Smith) then Windows User user logs out and another user logs in (e.g. Ann Jones) SCOPE will ask for the registration details again.

SCOPE installs all of its operational files under *MyDocuments* for the User Profile for which it was installed.

If you find that you have installed SCOPE on your computer but when you login it asks for you to Register SCOPE again, then you need to have the person who installed SCOPE to login and deactivate their Registration so you can Activate your Registration for your Windows User Name.

Remember to contact SCOPE Support to assist you in your operation of SCOPE..

9.7 Activation / Deactivation Issues

9.7.1 Activation / Deactivation Error Message

" System.Reflection.Target Invocation Exception An exception occurred during the operation"

The error you are reporting is due to a restriction imposed by your network security. Ie. It is preventing access from your installed version of **SCOPE** to the Total Metrics web server. This access is required to activate **SCOPE**.

This restriction is due to a security setting in your fire wall on your network or WWW filtering system, blocking access to to the Total Metrics web server WWW site from inside **SCOPE**. This can occur even if you are able to access our server directly via your browser. The block is invoked when you try and access it via a software program (in this case **SCOPE**).

 We recommend that your IT Network administrator change the settings to unblock the fire wall or change settings in the WWW filtering software, to enable access to the following URLs.:

1. *.totalmetrics.com

2. **SCOPE**connect.totalmetrics.com

Note: Once you have entered the serial number and **SCOPE** is activated and operating the IT Administrator can undo steps 1 & 2 . However this is not recommended to utilise the full capabilities of **SCOPE**.

SCOPE only needs to be activated once, the first time you use it. If you are using a notebook computer that can access the WWW without going out through your companies network, then you can activate SCOPE via that means and then once it is activated it can be used from that point onwards without needing to contact our server.

If you are unable to solve your connection issues please contact SCOPE support

9.7.2 Maximum Number of Available Seats Exceeded

If you have already installed and activated your maximum number of seats and for your purchased license key and you try and Activate another copy of SCOPE you will receive an error message that the maximum available number of seats has been exceeded.

This may have occurred due to the following reasons:

- You have installed all your available licenses. To activate another license first Deactivate another installed copy and receive confirmation that the deactivation was successful.

- You attempted to De-activate a copy of SCOPE but there was a network outage before the confirmation was received by your computer. - Ensure a better network connection and try to deactivate again.

- You did not install SCOPE on your PC with your User ID but had an Administrator install SCOPE on your PC and activate it with their Administrator User ID. SCOPE will have activated using the Administrators USER ID and put information in their "MY Documents' not yours. It will not be

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activated for your User ID. You need to have the Administrator deactivate **SCOPE** and then re- activate **SCOPE** with your User Id so it writes to the Register and *MyDocuments* under your User ID.

If you are unable to solve your activation / deactivation or connection issues please contact **SCOPE** support to reset your Activation / Deactivation and available seats at the WWW server.

10 Glossary

A

Application: Is used synonymously for 'software system', e.g, AMS System. Each set of activities that impacts the application is called a project. Application Counts measure the size of the implemented software product.

Attributes: Attributes are used to Flag functions within the SCOPE of the Function Point Count so that these functions may be selectively reported as a group. They enable different size profiles of the software to be measured.

B

Boundary: The application boundary is the conceptual interface between the software under study and its users. A user is any person or anything that communicates or interacts with the software.

D

Data Element Type: A Data Element Type (DET) is a unique user recognisable field, from a business perspective, that participates in a transaction and/or is stored on a logical data file.

Development Project: Set of activities that build one or more software applications. These activities primarily 'add' new functionality.

E

Enhancement Project: Set of activities that change one or more existing software applications. These activities change or delete existing functionality or add new functionality to existing applications.

F

Files: Represent the 'Data Business Functions' or 'Data Groups' described in the IFPUG documentation. They are logical groups of data from an external

business perspective. They are closely related to, but do not exactly correspond to, entities on a normalised data model that is the logical view of the data from an information technology perspective.

Function Point: A unit of measurement of software product and project functional size.

Function Point Analysis: A technique used to measure the Functional Size of software products and projects.

Function Point Count (Noun): The result of applying the Function Point Analysis technique to software. It is a measure of the Functional Size of the software.

Function Point Count (Verb):: An activity that applies the Function Point Analysis technique to size software projects or applications.

Functional Hierarchy: A diagrammatic representation of the functional decomposition of the business functionality of an application. This representation assists a function point counter in conducting, and validating the completeness of, a Function Point Count.

G

General Systems Characteristics: Fourteen quality and technical features identified to be delivered with the functions of the software. The 14 characteristics (GSCs) or features are assessed for their degree of influence on the software application as a whole and for their impact on the development and maintenance activities for the software. Albrecht's algorithm (VAF = 0.65 + [0.01 * Sum GSCs]) is used to calculate the Value Adjustment Factor for the software.

I

IFPUG: International Function Point Users Group - a US based organisation, with international affiliates, which maintains standards and guidelines for the use of the Function Point Analysis technique.

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R

Record Element Type: A Record Element Type (RET) is a user recognisable sub-group of a logical data file. It usually corresponds to the relational tables on the data model, which were grouped together to make up the logical group of data from a business view.

S

System: Is used synonymously for 'application', (see 'application').

T

Transactions: These correspond to 'elementary Processes' in IFPUG terminology. They are the lowest level on a functional hierarchy and represent a discrete event in the users' business Processes. They complete a unit of work and leave the business in a consistent state. E.g. Update Property Details.

V

Value Adjustment Factor: This represents the quality and technical features of the application delivered to the user. Where as 'functions' on the hierarchy represent 'what' the user can do with the software the 'features' represent 'how' these functions are implemented and 'how well' they operate. The Value Adjustment Factor (VAF) is calculated from the General Systems Characteristics.

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