

# PSM Insight: Power and Flexibility for Issue-Driven Measurement

Scott Lucero, US Army Software Metrics Office  
Dave Morris, Independent Engineering, Inc.

## Abstract

*PSM Insight is a powerful desktop tool that allows the user to tailor and manage the data needed for an effective, issue-driven measurement program. The Army Software Metrics Office developed PSM Insight to support the Practical Software and Systems Measurement (PSM) process. The tool supports a user in implementing the systematic but flexible PSM process. PSM Insight is a Windows-based application that allows a high level of flexibility in data management, including modifying, browsing, and sophisticated graphing capabilities. PSM Insight provides the capability to tailor software measurement to unique project issues and allows the use of data already available from an existing software development process.*

## 1. Introduction

### 1.1 PSM Insight: A Software and Systems Measurement Tool

PSM Insight is a powerful desktop tool that allows you to tailor and control the data needed for an effective, issue-driven measurement program. The power behind PSM Insight lies in its flexibility. For example, you can:

- Make use of pre-defined issues, measures, and indicators; tailor them to unique project issues; or define new ones
- Use data available from an existing software development process or enter data directly into the program
- Automatically access different databases with dissimilar data formats
- Manage data efficiently and flexibly, including modifying, browsing, calculating, and graphing
- Query data for specific information and generate tailored graphics and reports

The Army Software Metrics Office developed PSM Insight to support the Practical Software and Systems Measurement (PSM) process. PSM Insight, therefore,

reflects the philosophy, terminology, and best practices of the PSM approach. It serves as an excellent companion to the PSM guide, *Practical Software and Systems Measurement: A Foundation for Objective Project Management*.

PSM Insight was first released to the public in 1998. It has been developed in a spiral process, and major releases have been issued every six months. New and enhanced functions in each incremental release are selected from informal recommendations submitted by the worldwide community of users and formal recommendations derived from the annual PSM Users' Conference. Table 1, at the end of this paper, identifies some new and pending capabilities.

### 1.2 Practical Software and Systems Measurement (PSM)

The PSM project was initiated by the Department of Defense in 1994 to help program managers obtain the objective data they need to successfully manage software-intensive projects. PSM was developed through the collaboration of measurement professionals from the Department of Defense, industry, and academia. These volunteers have identified and documented the best measurement practices used within the software and systems acquisition and engineering communities.

As a result, PSM is a systematic but flexible measurement process. It is not a pre-defined list of measures, graphs, or reports; instead, PSM is driven by each program's management issues and is uniquely adapted to meet each program's specific information needs. PSM is also integrated with existing risk and financial management processes to provide a basis for objective decision making.

PSM Insight supports the concepts and methods of the PSM process, as reflected in a set of nine best practices, called measurement principles (see Figure 1). PSM Insight allows you to import, store, and graph the sample data items, issues, categories, and measures included in the PSM guide. However, it also provides a flexible database that allows you to fully define and control the elements of your own project-specific measurement program.

Principles of the PSM Approach to Issue-Driven Measurement
1. Use program issues and objectives to drive the measurement requirements.
2. Use the developer's process to define how the software is actually measured.
3. Collect and analyze elementary data.
4. Implement an independent analysis capability.
5. Use a structured analysis process to trace the measures to the decisions.
6. Interpret the measurement results in the context of other program information.
7. Integrate measurement into the program management process throughout the software life cycle.
8. Use the measurement process as a basis for objective communication.
9. Focus initially on single-program analysis.

**Figure 1. PSM Insight supports the nine principles of the PSM process.**

## 2. Features of PSM Insight

PSM Insight offers many features to support tailoring and implementing an issue-driven measurement program. This section highlights several of the most important features. Table 1, at the end of this paper, provides a more detailed listing.

### 2.1 Defining and Tailoring Capabilities

Following the PSM approach, PSM Insight links program issues to the categories, measures, and data items that address them. When you begin defining a measurement program, PSM Insight presents seven common project issues. You may select from them or define your own. This type of option continues with each step. PSM Insight makes extensive use of default settings to guide those newer to the measurement process, but more experienced users can easily bypass the defaults to customize all aspects of the program. At any time, you can add, edit, or delete any elements of your measurement program, including issues, categories, measures, structures, attributes, and data items.

### 2.2 Data Management

PSM Insight is a Windows-based program that was developed using Borland's Delphi, Version 5. The Windows interface to the advanced Delphi design capabilities provides a powerful tool for information analysis and retrieval. It allows a high level of flexibility in data management, including data

modification, data browsing, sophisticated graphing capabilities, and the ability to use the data available from an existing system development process. The electronic import module handles ASCII files, Microsoft Access databases, Microsoft Excel spreadsheets, Paradox tables, and dBase files precisely, and it imports "comment" data when needed.

Another important feature of PSM Insight is the ability to calculate data items. This feature allows collected data items to be processed with a user-defined formula and displayed in report formats without entering permanent storage. For example, if Lines of Code is collected, PSM Insight can calculate Thousands of Lines of Code for executive-level reporting. Or, PSM Insight can calculate Labor Hours as Staff Months by dividing the hours by 160. Defining formulas and calculating data items are simple with PSM Insight's formula builder. Values for calculated data items will appear in the data entry grid and can be plotted on graphs.

PSM Insight also responds to missing or potentially corrupt data. If an edit could potentially corrupt existing data, PSM Insight will issue a warning and will recommend making a backup. Also, because missing values can lead to misinterpreting a graph, PSM Insight handles blank or missing values and reports them in indicator legends.

### 2.3 Graphs and Reports

PSM Insight offers sophisticated, flexible graphing capabilities. You can choose from ten output graphic indicators with multiple options to support your

analytical needs, and you can make use of the following additional features:

- Generate indicators in multiple formats, drawing on multiple data items and depicting data items by individual structure or attribute value. Graphing data in multiple displays and in multiple sub-categories will allow potential problems to be isolated and corrected in a timely manner.
- Display data as either cumulative or non-cumulative, regardless of how the data items were originally defined. PSM Insight does the calculations automatically, so that data can be viewed from different perspectives or in summary totals. Data item totals can be plotted.
- Set a “cap” on the data values that are plotted in snapshot graphs by selecting a cut-off date for data. This allows you to look at a project from any point in time and to illustrate project progress by changing the snapshot date and regenerating the graph.
- Create a reliability indicator. This indicator creates a data file that can be used as input for the SMERFS<sup>3</sup> reliability software package, developed by Dr. William Farr at the Naval

Surface Warfare Center in Dahlgren, Virginia. SMERFS<sup>3</sup> is included free with PSM Insight.

- Generate histograms and calculated series

Also, PSM Insight generates indicators quickly—typically in less than a second.

### 3. Sample Tasks

The main toolbar for PSM Insight is shown in Figure 2. It contains three icon groups: **Select**, **Tailor**, and **Apply**. **Select** allows you to define and open all of the projects tracked in PSM Insight. **Tailor** allows you to define the issues, categories, and measures that are needed for each project. **Apply** allows you to add, edit, and graph your collected data. Using this toolbar as a starting point, you can navigate most of the program functions from the basic to the complex. The only exception is the data import/export module, which is accessed through an external icon, described below.

Selected tasks are described in the following sections to demonstrate the operation of PSM Insight. The examples include defining project measures, importing external data, and creating an indicator. These examples are in no way an exhaustive illustration of PSM Insight’s full capabilities.

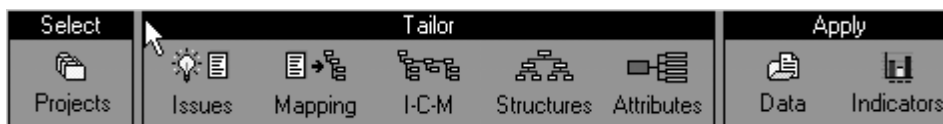


Figure 2. The main toolbar of PSM Insight allows you to define your project, select and tailor your measures, add data, graph indicators, and more.

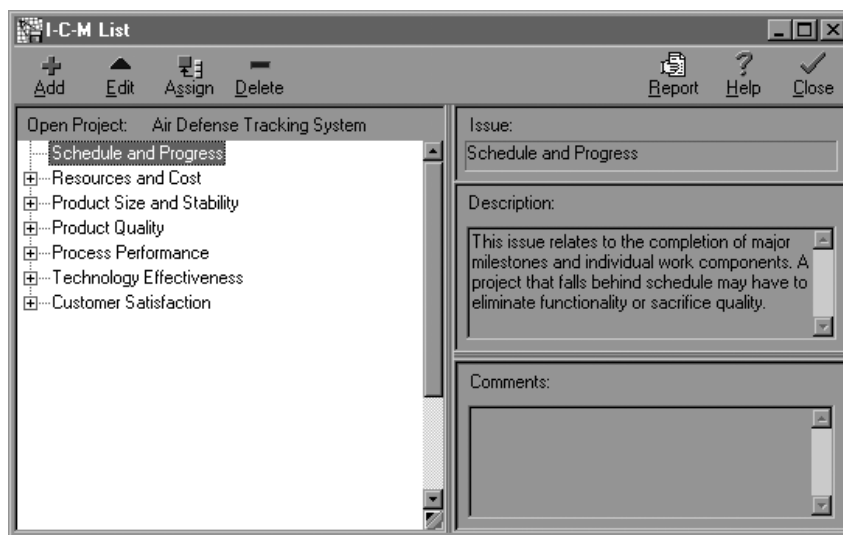


Figure 3. The I-C-M list initially displays seven suggested project issues. You can tailor the default list and or create an entirely new one.

### 3.1 Defining Project Measures

In the PSM approach, measures do not exist in isolation. They are driven by and tied to the critical information needs of the project. Therefore, those needs—called “issues” in PSM terminology—must be defined first. An issue is usually broken into categories, and each category may have one or more measures associated with it. A tree diagram that shows these relationships is called the Issues-Categories-Measures (I-C-M) list.

Constructing the I-C-M list is a key function in PSM Insight. In this example, we will create the list using default options. However, you can always add, edit, or remove any issue, category, or measure.

**Step 1:** Tailor the issue list. Click the I-C-M button on the main toolbar. The I-C-M window, shown in Figure 3, opens and reveals seven default issues. In this brief example, we will create a measure for Schedule and Progress. Therefore, we will delete the other issues.

**Step 2:** Define the categories for Schedule and Progress. With the Schedule and Progress issue highlighted, click on “Add” and select “Categories.” The category selection window (Figure 4) allows you to select default categories or create new ones. In this case, we will select the default Milestone Performance. Choose “Next” to further define the category, then select “Save.”

**Step 3:** Define the measures for Milestone

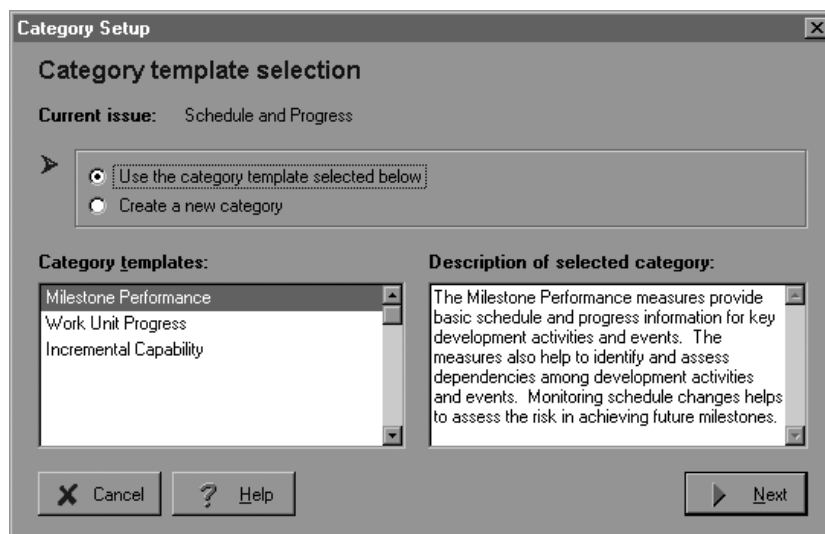


Figure 4. Select from default categories or create new ones.

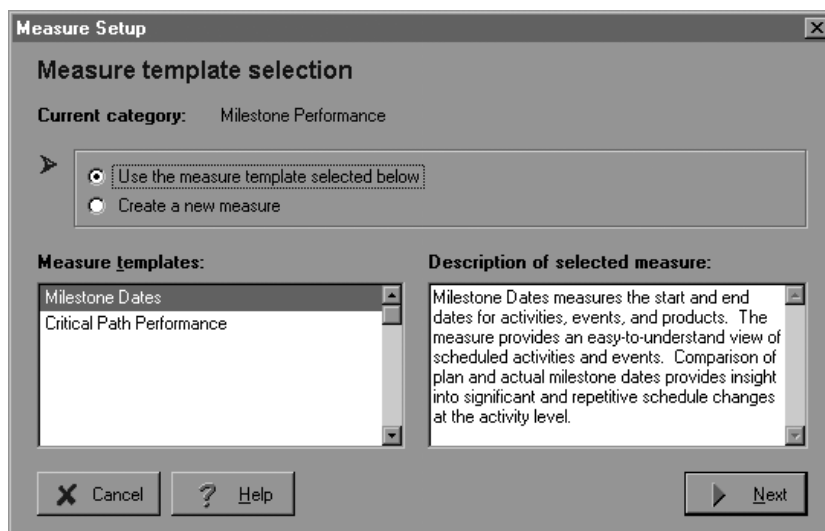


Figure 5. The measurement selection window allows you to choose from suggested measures or create new ones.

Performance. After saving the category, you are prompted to define the measures. The measure selection window is shown in Figure 5. In this example we will select the measure Milestone Dates.

**Step 4:** Refine the measure by assigning a structure level, attributes, and data items. The structure reflects the level at which the measure is collected, such as function, unit, or activity. Attributes break down the measure into more detail, such as the planned date and the actual date. Data items are the specific information you collect. A dialog window guides you through the process. In this example, we will select “Start Date” as one of the data items for the measure Milestone Dates. You can further refine the data item by using the window shown in Figure 6.

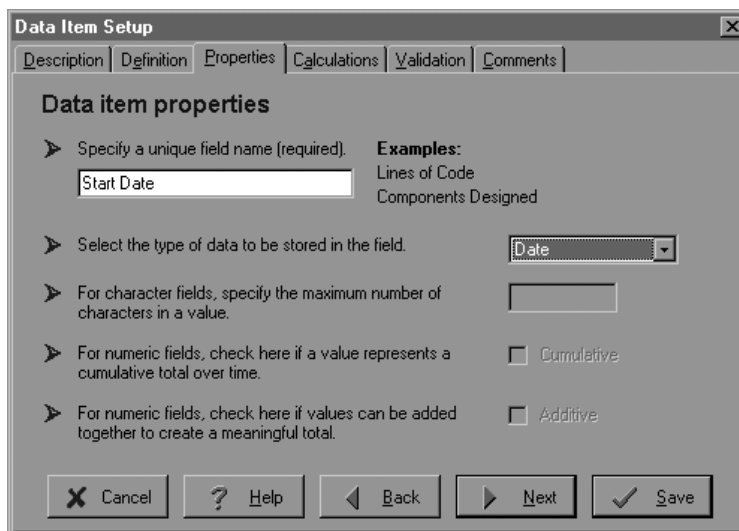
The measure, as well as its driving issue and category, are now fully defined and reflected in the master I-C-M list for the project (Figure 7.)

### 3.2 Importing Data into PSM Insight

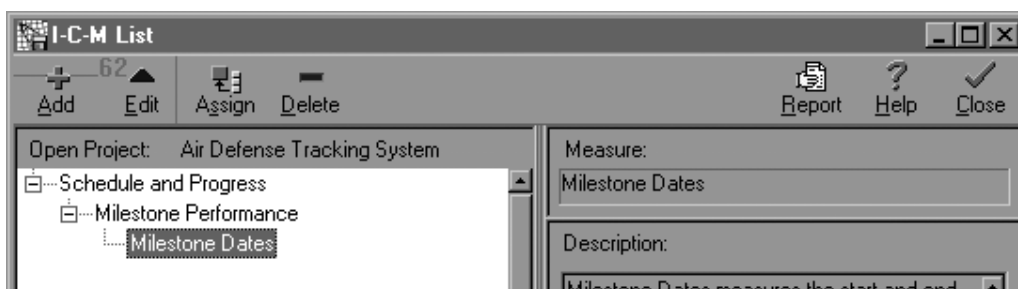
The PSM Insight import/export module is activated by a separate icon created on your desktop. Open the program, and select the project name the data will serve. Build the import setup using the following steps.

**Step 1:** Identify the source file and the destination file. The source file may be an ASCII text file, Paradox table, dBase table, MS Access table, or Excel spreadsheet. Set other options, such as transfer method and date range, using the window shown in Figure 8.

**Step 2:** *For non-ASCII source files*, map the relationship between fields in the source file to fields in the destination file. As shown in Figure 9, the field mapping window shows lists of both fields, with a workspace in the center that displays linked fields. *For ASCII source files*, you must define the incoming record format using the window shown in Figure 10.



**Figure 6. The data item setup window provides numerous options for defining, controlling, calculating, and validating your data items.**



**Figure 7. The tailored and expanded I-C-M list displays all issues, categories, and measures for the project.**

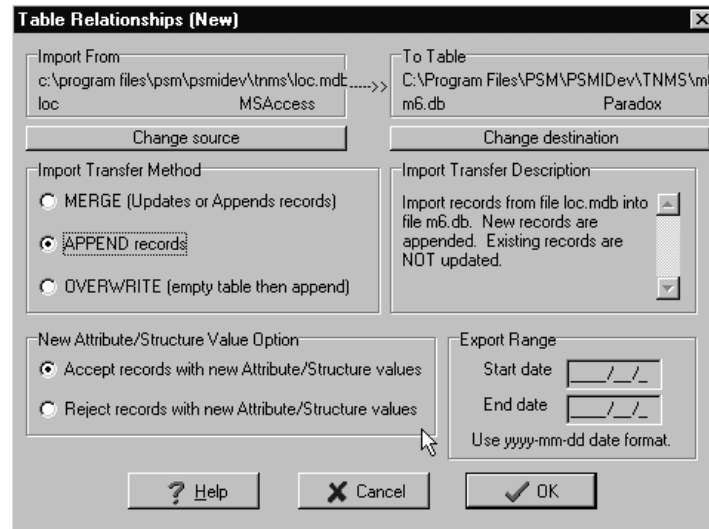


Figure 8. The table relationships window sets up the basic parameters for importing data to PSM Insight.

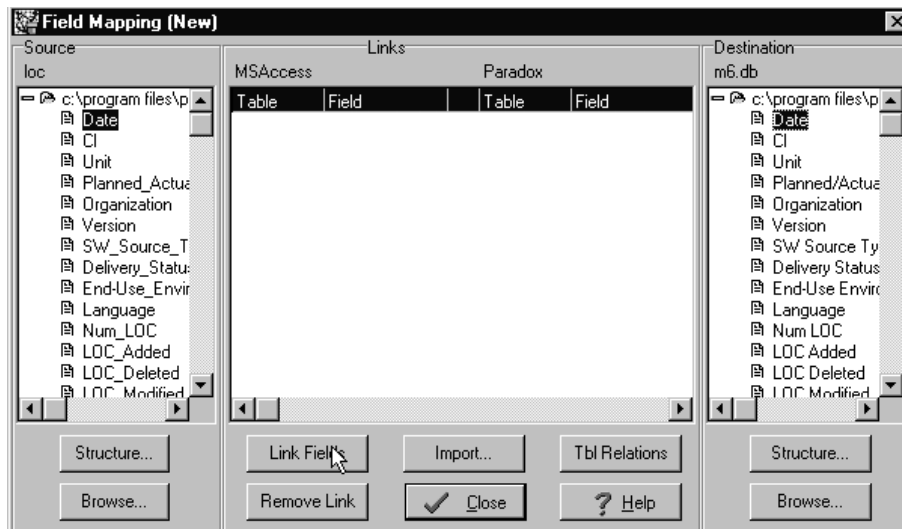


Figure 9. The field mapping window links related fields from the source file to the destination file.

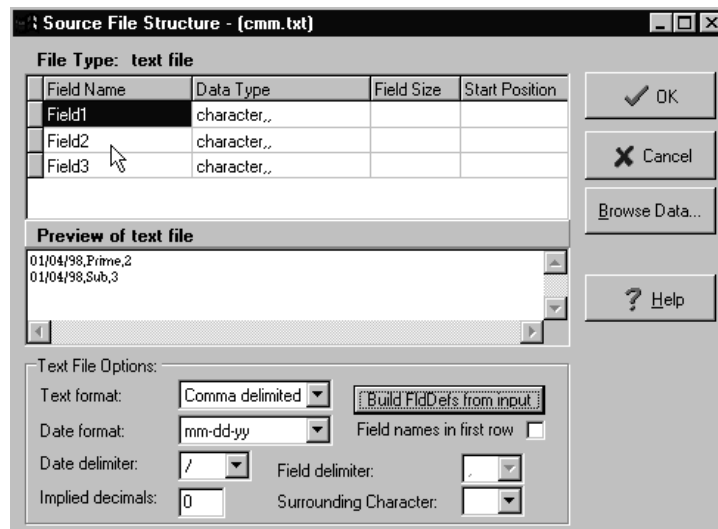


Figure 10. You must define the structure of an ASCII text file before importing it.

**Step 3:** When the import is complete, you can check for errors by viewing the import log or viewing the data directly in the PSM Insight data grid.

### 3.3 Creating an Indicator

In this example, we will create an indicator that graphs the status of problem reports.

**Step 1:** Click the indicators icon on the main toolbar. A window will display your project issues; select the one to work with. Then, select the indicator type by using the set up window shown in Figure 11. In this example, we will use a trend graph and work with multiple data items.

**Step 2:** Select the measure to use, as shown in Figure 12. In this case, we choose Problem Reports.

**Step 3:** Specify various indicator options. Use the window shown in Figure 13 to select the data items for

each axis and to control the legend, structure, titles, and other attributes.

Figure 14 displays the finished indicator. It can be saved, printed, and converted to graphic formats, such as JPEG for use on the Internet.

## 4. Availability, Training, and Support

PSM Insight is now available for Windows 95, 98, 2000, ME, and NT. A 16-bit version of PSM Insight with reduced functionality is also available for Windows 3.1. The program installs from an auto-run CD-ROM and menu system.

PSM Insight is accompanied by an extensive help system, including onscreen help, a printable user's manual in Adobe Acrobat PDF format, web-based assistance, and a help phone line. Most users take a one- or three-day class on the PSM methodology to

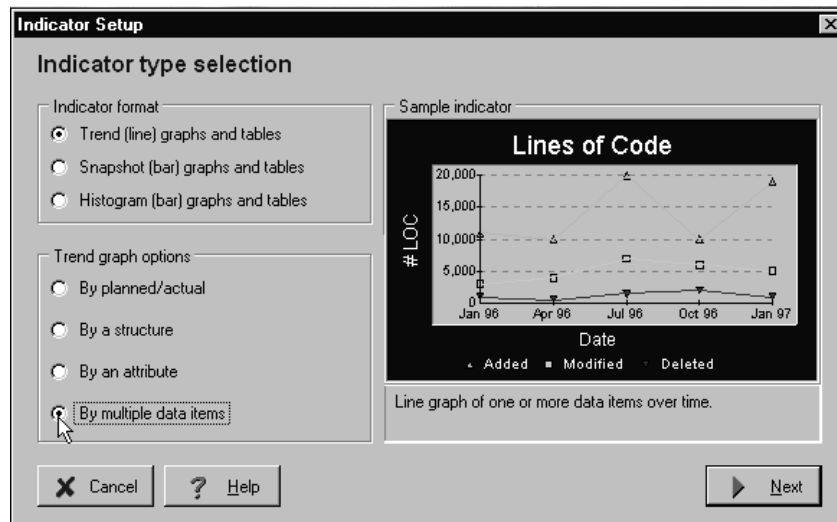


Figure 11. Select from trend, snapshot, and histogram graphs and tables.

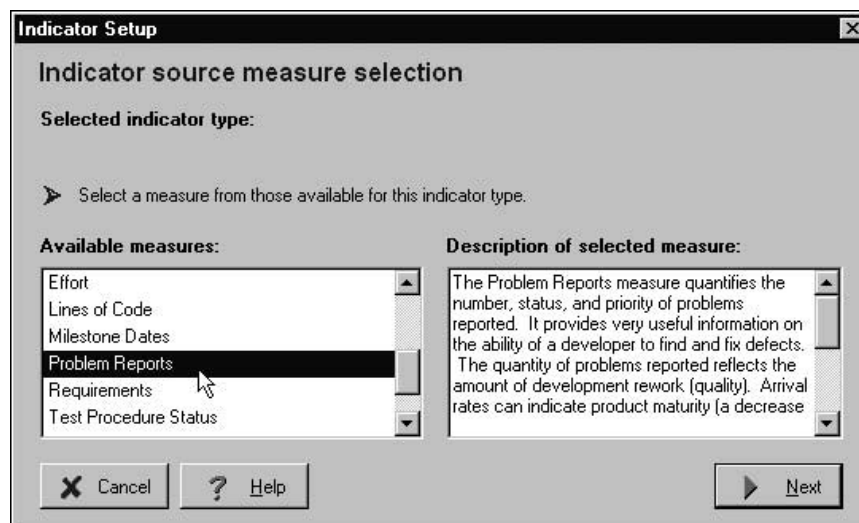
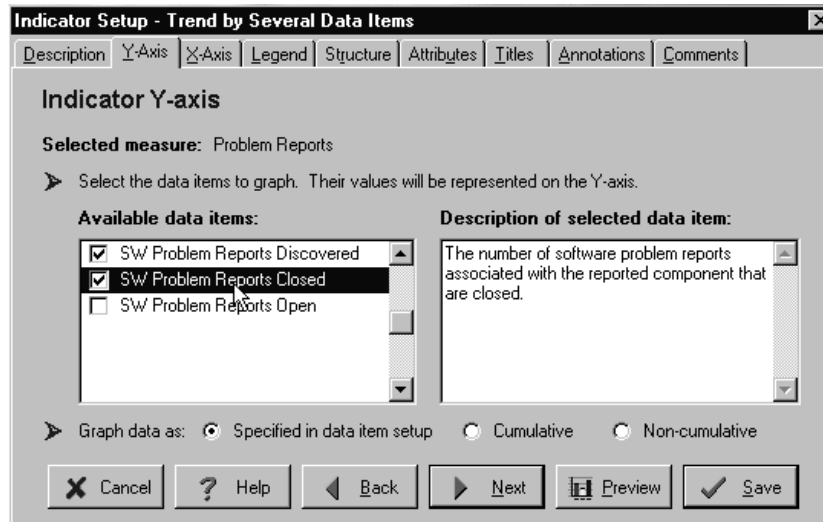
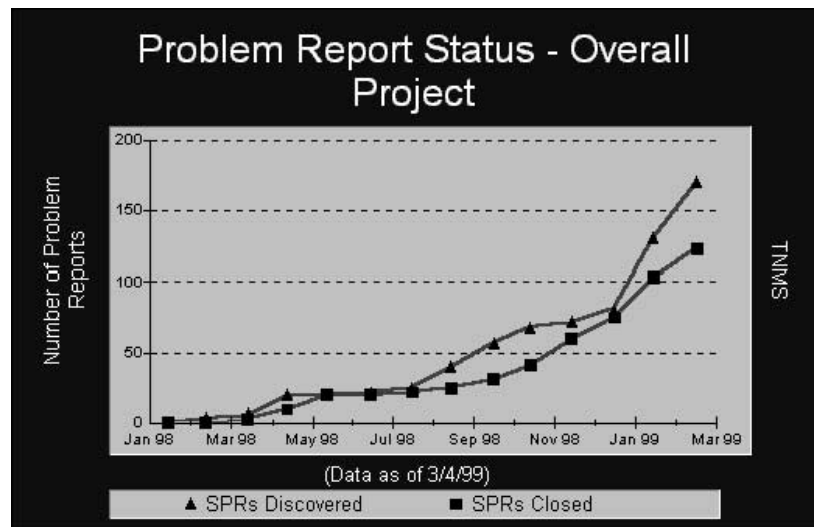


Figure 12. Select the measure to be used in the indicator.



**Figure 13. PSM Insight allows you to customize your indicator in many ways.**



**Figure 14. Finished indicators can be printed, saved, or converted to graphic formats for use in presentations or on the Internet.**

acquire a working knowledge of the terminology and principles behind the PSM process. On-site workshops are often the best choice, especially for larger organizations. A computer-based, multimedia tutorial is also available to provide continuous training at a user's workstation.

PSM Insight is free. You can download the full program from the PSM Support Center web site (<http://www.psmc.com>) or request that a CD-ROM be mailed to you by contacting the Army Software Metrics Office:

US Army Software Metrics Office  
 Attn: CSTE-AEC-MA  
 Park Center IV, 4501 Ford Avenue  
 Alexandria, VA 22302-1458  
 Phone: (703) 681-3823 / DSN: 761-3823  
 Fax: (703) 681-2840  
 E-mail: [loeschjonathan@atec.army.mil](mailto:loeschjonathan@atec.army.mil)  
 Web: <http://www.ArmySoftwareMetrics.org>



**Table 1. PSM Insight user recommendations define the new capabilities for each version of the program.**

<b>Data Management</b>
<ul style="list-style-type: none"> <li>• Importing of data directly from an Excel spreadsheet</li> <li>• Option to select a limited range of data to import from a large, external data set</li> <li>• Derivation of calculated data items and data series</li> </ul>
<b>Graphs and Indicators</b>
<ul style="list-style-type: none"> <li>• Capability to create an indicator or series of indicators from multiple measures</li> <li>• Capability to create a software reliability indicator and a data file for use with the SMERFS<sup>3</sup> reliability software package (SMERFS<sup>3</sup>, developed by Dr. William Farr, is automatically installed in a subdirectory under the PSM Insight directory.)</li> <li>• E-mail support for standard reports and indicators</li> </ul>
<b>Navigation</b>
<ul style="list-style-type: none"> <li>• New keyboard shortcuts</li> <li>• Right-click menus with button shortcuts and list management and sorting features</li> <li>• New browse functions for manual data entry</li> </ul>
<b>Support for the PSM Process</b>
<ul style="list-style-type: none"> <li>• Compatibility with the new issues, categories, measures, data items, and attributes <i>of the PSM Guide Version 4.0a</i></li> <li>• A File-Upgrade function to map current templates to the new <i>PSM Guide 4.0</i></li> <li>• A measurement-planning template to define detailed measurement plans</li> </ul>
<b>Future Insight Design Requirements</b>
<ul style="list-style-type: none"> <li>• Evolution to an enterprise- and organizational-level measurement tool</li> <li>• Indicator and analysis capabilities within a web browser</li> <li>• Terminology to match ISO STD 15939, Software Measurement Process</li> </ul>