User's Manual

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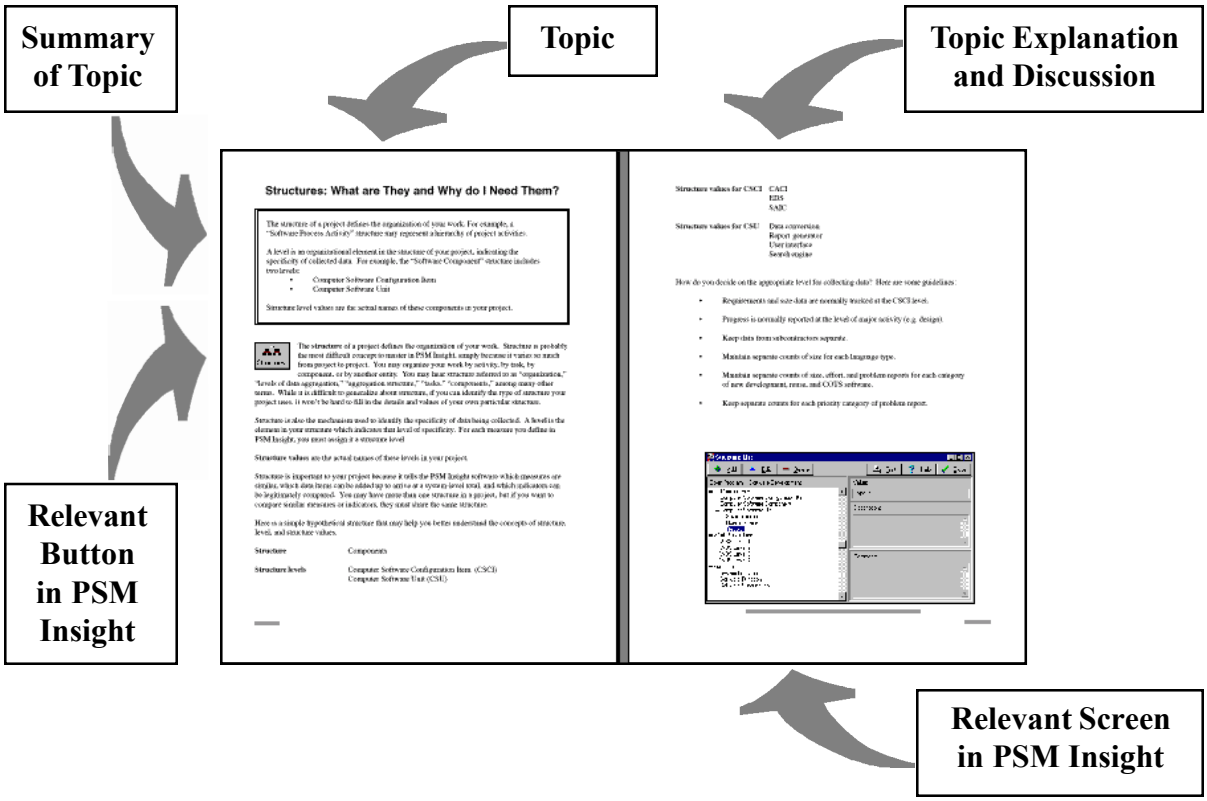
About This User's Manual

This **PSM Insight User's Manual** presents guidance in the preparation and use of the PSM Insight software. The **Manual** gives you an overview of topics, concepts, and questions about the PSM process and the integration of the PSM Insight software into that process. The information is intended as guidance, not specific step-by-step instructions for using the software (which is provided in the **Help** system). Each two-page spread of the **Manual** discusses a PSM Insight topic or task, presented in a standard layout:



For detailed step-by-step instructions on using PSM Insight functions, refer to the on-screen **Help** system. **Help** tells you how to use each function or component. Help information appears on the right-hand side of your screen, so that the PSM Insight screen you are working with is not obscured from view. The **Help** file also includes pop-up definitions of terms and phrases.

PSM Insight is easy to use if you are already familiar with the PSM (Practical Software and Systems Measurement) terminology. If you are unfamiliar with PSM methodology, consult the PSM Guide for a comprehensive discussion of terms and processes. This **Manual** also includes a Glossary (at the end of the manual) of PSM terminology.

If you need assistance with any aspect of PSM Insight, technical support information is available at the PSM Web site, http://www.psmsc.com.

If you have any questions about the PSM process, call the PSM Support Center at 973-724-5638.

Installing PSM Insight

Installing PSM Insight is very easy. If you are using the PSM Insight CD-ROM, the CD is an auto-run disc; the installation menu and routine will appear automatically. If you are installing from the PSM Web site, simply download the 16-bit or 32-bit version, unzip the file, and run **Setup.exe**, following the step-by-step instructions. Installation takes less than a minute.

Installation places several modules on your PC: **PSM Insight** software, the **Import/Export** routines, the **Product Tour**, and documentation.

For best results, you should have a Pentium PC with 16mb RAM and running Windows 95 or higher.

PSM installation is a simple procedure, and it takes less than a minute to put PSM Insight on a PC. Before you install the software, check to make sure you have the right system configuration for PSM Insight:

Component	Minimum	Recommended
PC	486	Pentium
Memory	16mb RAM	16+mb RAM
Disk space	30mb	40mb+ for project files
OS	Windows 95	Windows 95/98/2000/NT

Note: A special reduced-functionality version of PSM Insight for Windows 3.1 is available on the PSM Web site (http://www.psmsc.com).

You will also need to know a few things that installation will ask you for:

- What drive to you want to use for PSM Insight?
- What directory do you want to use for PSM Insight?
- Do you want to use the default program group for PSM Insight, or will you access the software from an existing program group?

Once you have this information, you can start the installation routine.

Installing from the PSM Source CD-ROM

1. Put the disc in your CD-ROM drive. The installation routine starts automatically.

2. Follow the on-screen instructions.

If the disc does not automatically run on your PC, follow these instructions:

1. Put the disc in your CD-ROM drive. Click **Start** on the **Taskbar**, and then **Run**.

2. Click **Browse**. Choose the **PSM_CD** (e.g., the **D:** drive, or whatever letter is designated as the CD-ROM drive on your PC). Double-click on **setup.exe**.

3. Select **Products and Services**. Then, select **PSM Insight**. Follow the on-screen instructions.

Installing from the PSM Web Site

Go to www.psmsc.com/insight.html. Choose either the **Windows 3.1x** version of PSM Insight or the **Windows 95/NT** version. Download the appropriate file to your hard drive and unzip it. Then, run **Setup.exe**. Follow the step-by-step instructions, accepting the defaults or making changes where needed.

Network Users

For network users, note that while the PSM Insight software program is designed to be used by one person at a time on a local drive, a team of individuals can share a project database on a network.

Getting Started

When installation is complete, you will see the PSM Insight program icon in your selected program folder. You are now ready to run the PSM Insight software.

Note that there are three icons that are created during installation:

PSM Insight - Click to run the PSM Insight software measurement application

PSM Import/Export - Click to transfer data electronically into and out of PSM Insight

Product Tour - Click to see an overview of the PSM Insight software and process

You can access both **Import/Export** and the **Product Tour** from within PSM Insight as well as from their own program icons. Be sure to take 15 minutes for the **Product Tour**. You'll learn the basics of PSM Insight procedures and terminology. You can also install a Tutorial that provides over 5 hours of demonstrations and practice exercises on every aspect of PSM Insight. You will find several documentation files about PSM Insight: **Readme.txt**, containing the latest news about the software; **Userdoc.pdf**, which is a printable version of this user's guide; and **Tool_com.rtf**, providing a problem reporting form.

Where Can I Get Help?

You can get assistance with PSM Insight from several sources:

Tutorial: computer-based lessons on PSM Insight
Product Tour: on-screen overview of the software
Help file: on-screen step-by-step instructions
PSM Insight Manual: discussions of PSM Insight tasks, issues, and concepts
PSM Guide: detail on the PSM process and terminology
PSM Web site: technical support for PSM Insight problems
http://www.psmsc.com

You never have to feel frustrated or lost with PSM Insight; there are several different types of assistance to help you learn and use the software.

Before you start using PSM Insight, you may want to see an overview of the product and terminology. Access the **Product Tour** for a general introduction to the software:

Product Tour program icon

Product Tour button in PSM Insight

You can also install the PSM Insight computer-based **Tutorial** from the CD-ROM. The **Tutorial** includes over 5 hours of demonstrations and practice exercises on every aspect of PSM Insight.

If you are not familiar with PSM terminology, or if you haven't taken a course in the PSM process, you'll want to review the PSM Guide. Call the PSM Support Center for a copy, or print the book from your PSM Source CD-ROM (see "Printing PSM and PSM Insight Materials" in this **Manual**). PSM Insight is based on the PSM Guide Version 4.0a.

If you have a problem using PSM Insight, or if you just want to discuss a task that you are trying to accomplish, contact **PSM Insight Technical Support**:

Contact	PSM Web site
Internet	http://www.psmsc.com
Email	dmorris_iei@email.msn.com

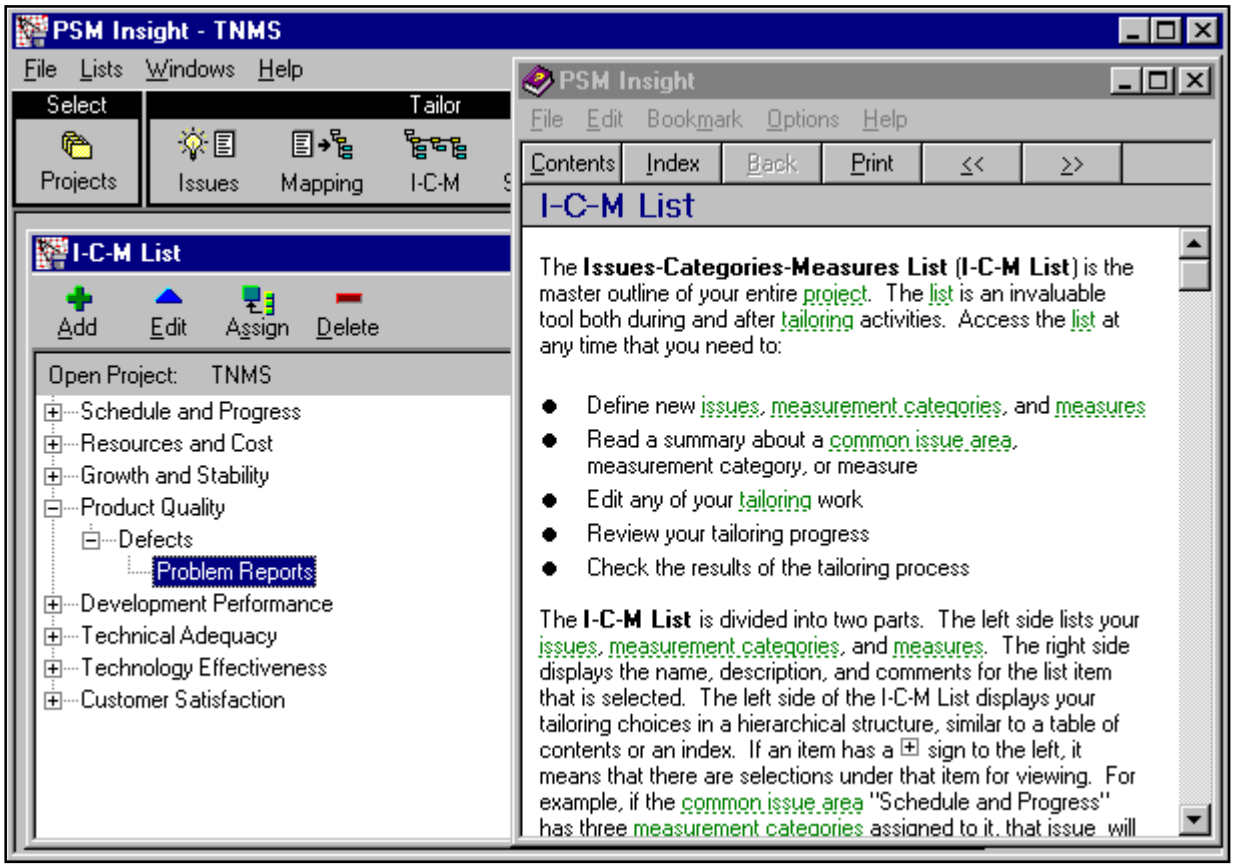
If you would like more information about the Practical Software and Systems Measurement methodology and programs, contact the **PSM Support Center**:

Contact	Cheryl Jones
Phone	973-724-5638
Fax	973-724-2382
Email	psm@pica.army.mil

PSM Insight includes a comprehensive **Help** system that delivers context-sensitive step-by-step instruction for the task at hand. You can get help anywhere in PSM Insight by clicking on the **Help** button.

When you access **Help**, the help screen opens up on the right-hand side of your screen so the function you are using in Insight is not obscured. You can work in Insight while the **Help** file is open to the instructions you need.

The **Help** file also includes a comprehensive glossary of terminology used in PSM Insight. You can go directly to the glossary to browse the full list of terms and phrases. Many terms in **Help** file instructions are also underlined and green to indicate that you can click on them to see pop-up definitions.



The Help File Opens Alongside Your Current Work

What is Practical Software and Systems Measurement?

Practical Software and Systems Measurement (PSM) is a systematic and objective process for analyzing software development project issues, risks, and financial management. **PSM** provides government and industry managers with objective information for making sound decisions and for meeting cost, schedule, and technical objectives. It is based on actual DoD, government, and industry experience, representing the best practices in the software and engineering communities. While the PSM process includes common issues and recommended measures, the process is completely flexible, to adapt to project-specific requirements and objectives.

Practical Software and Systems Measurement (PSM) is an objective process for analyzing project issues, risks, and financial management, focusing on software project management. PSM provides government and industry managers with objective information for making sound decisions and for meeting cost, schedule, and technical objectives. It is based on actual DoD, government, and industry experience, representing the best practices in the software and engineering communities. While the PSM process includes common issues and recommended measures, the process is completely flexible, so you can adapt it to your own project-specific requirements and objectives.

PSM provides a systematic method for obtaining quantitative data to help project managers:

- Identify and correct problems early
- Assess the impact of problems on cost, schedule, and performance objectives
- Make tradeoffs
- Track project objectives
- Justify project decisions
- Communicate information effectively and objectively

PSM can help you work smarter and meet all your performance objectives. PSM encourages a pro-active management style when integrated into the software development process. Your PSM activities are flexible and iterative, changing throughout the project life cycle along with the software under development. You can define and customize your own issues and measures to meet the specific needs of your project.

Nine software measurement principles define the PSM process:

- Project issues and objectives drive the measurement requirements
- The developer's process defines how the software is actually measured.
- Collect and analyze data at a level of detail sufficient to identify and isolate software problems.
- Implement an independent analysis capability.
- Use a structured analysis process to trace the measures to the decisions.
- Interpret the measurement results in the context of other project information.
- Integrate software measurement into project management throughout the software life cycle.
- Focus initially on single project analysis.
- Use the measurement process as a basis for objective communications.

When you integrate these nine principles into your project life cycle, the software development process runs more smoothly, you can monitor progress more accurately, and potential problems can be addressed early to assure greater success.

PSM Insight supports all nine principles, and is an invaluable tool to help you succeed at meeting all your project goals and objectives.

What is PSM Insight?

PSM Insight is a PC-based software tool that automates the Practical Software and Systems Measurement (PSM) process. The software is highly graphical, and includes many "wizards" to help you tailor your project and set up measures and indicators. PSM Insight includes three major modules:

- Tailoring
- Data entry
- Analysis

PSM Insight is user-friendly, and provides many PSM defaults. However, PSM Insight is also very flexible, helping you customize the software with project-specific issues and measures.

PSM Insight is a PC-based software tool that automates the Practical Software and Systems Measurement (PSM) process. PSM Insight includes tailoring, data entry, and analysis functions to help you develop a project-specific software measurement database and analyses. While PSM Insight provides templates of commonly-used issues and measures, it is also completely flexible for you to customize analysis to project-specific needs.

PSM Insight provides many benefits:

- Customization to project-specific needs
- Templates of commonly-used issues, measures, and indicators from best practices
- Insight into key software issues
- Objective data for informed decision making
- Identification of potential problems and solutions
- Assistance in meeting cost and schedule objectives
- Flexible data definitions and analysis tools
- Interface with the SMERFS^3 reliability modeling software package
- Presentation-quality graphs and reports
- Support for risk management of software projects
- Ease of use in tracking complex projects

PSM Insight was developed by a team of professionals, including experts in the Practical Software and Systems Measurement process, graphical software programmers, beta testers, and instructional designers. The software represents years of manpower to deliver the best, most thorough software measurement tool on the market. PSM Insight, unlike any other package, was created by people dedicated to the PSM methodology. It is a tool that will work for you and with you to meet your specific project needs.

PSM Insight includes many "wizards" that assist you in learning the software and in setting up your project. This user-assisted approach guides you through each function, makes recommendations on next steps, and points you to the **Help** file when needed. You should never feel lost in PSM Insight; the wizards always make it clear where you are and what type of information is needed.

The PSM Insight software is designed for use by someone who understands the basic Practical Software and Systems Measurement principles and processes. There are several sources of information about PSM if you are unfamiliar with its methodology; see "Where Can I Get Help?" in this **Manual** for detail. Use this **Manual** to help you understand basic PSM Insight concepts. You will also need to gather information and project materials before you sit down to use PSM Insight; see "What do I Need Before I use PSM Insight?" in this **Manual** for a list of preparatory items.

You can share PSM Insight project data with other programs. If you need to exchange information for a scheduling tool, a configuration management system, or a data spreadsheet you can import and export information to and from PSM Insight. Compatible file formats include ASCII, Paradox, Access, and DBase.

PSM Insight is continually being refined and upgraded. If you have a particular need that is not being met by PSM Insight, if you find an anomaly that you do not understand, or if you envision a feature that is not yet available, we encourage you to call the PSM Insight Help Desk to discuss your ideas with a team member. See "Where Can I Get Help?" in this **Manual** for further information.

PSM Insight Software Automates the Practical Software Measurement Process

What is Tailoring?

Tailoring is the first step in the Practical Software and Systems Measurement process, when you define your specific project tracking needs. Tailoring activities include:

- Identifying and prioritizing project issues
- Selecting and specifying software measures

The tailoring functions in PSM Insight help you create your own issues, categories, and measures, or select pre-defined items from templates provided by the PSM Insight Development Team.

The first major task you must undertake in PSM Insight is the tailoring process, to define your specific project tracking needs. Tailoring creates all the issues, categories, and measures which serve as the foundation for graphs and indicators. Tailoring also builds the framework of a database in which to store all your project data. Think of the tailoring process as a customization of PSM Insight to meet your specific project needs. No two PSM Insight projects will look exactly alike; each project manager will create a system unique to his/her program tracking requirements.

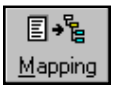
If you have ever created a spreadsheet in one of the popular PC software packages, if you've ever defined the schema of a database, or if you've ever drawn a pattern for a decorative wood cut-out, you have "tailored" a project. In other words, you set the groundwork, define boundaries, and model the data before you build a particular project. Or, like a tailor in the garment industry, you take a standard size and fit it to a specific person. While it may seem time-consuming, tailoring is well worth the effort in the long run, because you have a tool that fits your needs exactly.

You will use the following PSM Insight functions during the tailoring process:

Projects - Use this function to name your project and to specify its database directory.

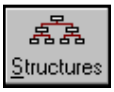
Issues - This optional module is used to name all the important points that you will have to keep track of during your project's life cyle. The Issues function provides a workspace where you can brainstorm different issues and ideas that will be important for tracking your project status.

If you would rather use common issues that represent the best industry practices, you can skip this step and work with the I-C-M function to use the PSM common issue areas that come with the PSM Insight software. By skipping the Issues function, you are not "stuck" with information categories that are not exactly relevant to your project; rather, you start in editing mode, working with suggested issues and deleting items rather than trying to think of all the project-specific issues by yourself.

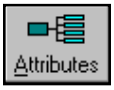


Mapping - Use this function to associate your project-specific issues with standard issues used in the PSM process. Here, you can add your project-specific issues to the list of PSM common issues, you can make a project-specific issue a sub-category of a PSM common issue, and you can delete common issue areas that are not relevant to your project. Take your time with the Mapping function; it provides the foundation for all project data and graphs.

I-C-M - This is the most important function in the tailoring process. You will use it several times to define, edit, and fine-tune the critical issues, measurement categories and data measures in your project. Use the I-C-M function to work with PSM common issue areas as well as your own project-specific issues. The function helps you think in a "top-down" manner, going from the general issues to the specific data items that you need in your project.



Structures - Every project has an organizational framework or structure. Use this function to define the organization of your project, using one of several standard structures supplied with PSM Insight, or creating your own structure from scratch. Structure levels are used throughout PSM Insight to group similar tasks across different work units for data calculation purposes.



Attributes - Think of attributes as distinguishing characteristics or properties of the data measures that you defined with the I-C-M function.. PSM Insight supplies the most commonly used attributes, such as "Planned/Actual," "Increment," and "Language." Chances are, you will not have to create any attributes from scratch, that you can find every attribute you need pre-defined in the PSM Insight software.

When you are done defining data items, attributes, and structures for your project measures, you can move on to data entry and indicator definition.

What do I Need Before I use PSM Insight?

Before you use PSM Insight, you need to gather project information. If you have all this information at hand, it will be easier to tailor your project. You should have the:

- Project name
- Project structures (organization)
- Important issues that you must track
- Names of data items that you know you will be collecting
- Indicators (graphs) that you want to generate

You will find this information in several sources, suggested below.

Before you use the PSM Insight software, you need to have project information ready to input. While PSM Insight can suggest common issue areas, measures, and indicators for your project, you will find it easier to walk through the tailoring screens if you have project information at hand. Here is a list of items you will need for your PSM Insight work:

Project name - The project name will display and print out on everything you do with PSM Insight. Make sure the name is recognizable to everyone who will be using PSM Insight.

Project structures - The structure of a project defines the organizational levels of your project. Structure also defines the way that measurement data is organized and aggregated. For example, a structure could be a "Software Process Activity" structure, representing a hierarchical tree of work elements that must be completed in the project. All entities in a structure are the same type (e.g. software modules), but vary in size (e.g., component, routine, unit). A structure contains all the project entities that you track with measures.

PSM Insight includes three pre-defined structures for your use: Software Component, Software Function, and Software Process Activity. You can use these structures and modify them for your project, or you can define your own.

Important issues that you must track - Every project has critical aspects that must be tracked on a regular basis. You may be concerned about schedules, cost, lines of code, etc. You do not need a lot of detail about your project issues, but you should know your highest priorities. If you have been through PSM training, you may have a list of your project issues that you can use with PSM Insight. Consult the managers to whom you will be reporting to determine their priorities, too.

Project categories (optional) - If you have taken a PSM training course, you probably defined measurement categories that you can use with PSM Insight. If you don't have categories already defined, PSM Insight will suggest categories under each issue.

Project measures (optional) - If you have been to a PSM training course, you may have defined specific measures for your project. Bring that list of measures to PSM Insight. If you don't even know what a measure is, you can use pre-defined measures in PSM Insight When you create your own measures, PSM Insight walks you through the definition of every measure and its data items.

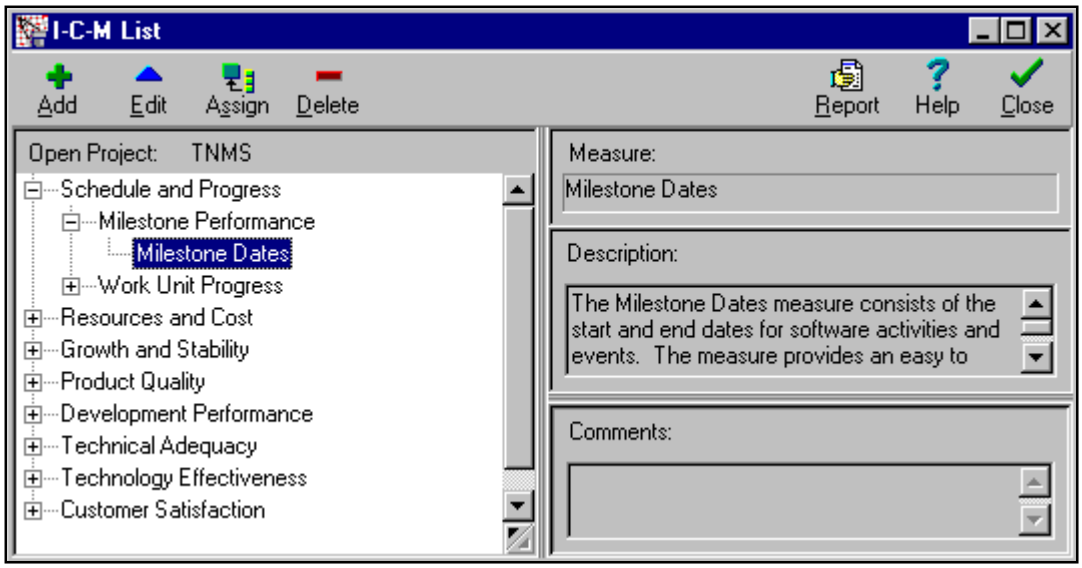
Data items that you will be collecting - This is very important information, and it might be difficult to gather. You may know that you need to generate a specific graph every month, but if you don't have the data items to plot on the graph, you'll never be able to develop the graph.

Where do you find the data that you will be collecting? Data items may be mandated by contract, contracting companies may have standard sets of data that they supply to you periodically, or you may be able to define and demand specific data items from each work group. Whatever your information source is, it will probably take time to gather a list of relevant data items.

Indicators (graphs) that you want to generate - If you have some experience with the PSM process, you probably already know what types of graphs, charts, and reports you want for your project. Check with the managers to whom you will be reporting to find out what types of graphs are important to them for tracking your project status. Indicators are the final result of your work in PSM Insight, and they dictate the data items and measures that you must collect. Consult the PSM Guide for more detail and explanation of each indicator.

Where do you find all this information? There are several sources you should use:

- Software Development Plan
- Cost and Schedule Estimating Data
- Test and Evaluation Master Plan
- The PSM Guide Version 3.1
- Schedules
- Work Breakdown Structures
- Project Management Plan



PSM Insight is Easier to use if you Have Project Information at Hand

Getting Started With PSM Insight

Start your PSM Insight work with the Product Tour. It takes about 15 minutes, showing you the basic PSM Insight screens, explaining PSM terminology, and presenting an overview of the PSM Insight process.

When you are ready to start your actual project work, you must first name the project and decide where the master files will reside. Then, you are ready to start the detailed process of tailoring. You can do that now, or return to your work at any time, at any point in the process. Your work is never lost in PSM Insight. Simply remember to open the correct project files to continue your work.

When you start PSM Insight for the first time, you see the main button bar and a **Welcome** screen. At this point, you can do one of several things:

View a brief overview of how to use PSM Insight

Before you start walking through the PSM Insight screens and functions, you should "take a tour" of the software. The Product Tour helps you:

- Learn PSM terminology
- Learn some basics of the Practical Software and Systems Measurement process
- Gain an overview of the PSM Insight software
- Understand the order in which PSM Insight functions are used

The Tour takes about 15 minutes, and is well-worth the extra time to get acclimated to the new software.

You can take the Tour now by clicking on the **Product Tour** button, or you can review it at any time within the PSM Insight software from the **Help** menu by choosing **Product Tour**.

You can view the Tour sequentially, or you can go to the **Tour Menu** to view only sections that are of particular interest.

For a more extensive learning tool, you can also install the PSM Insight computer-based **Tutorial** from the CD-ROM. The **Tutorial** includes over 5 hours of demonstrations and practice exercises on every aspect of PSM Insight.

Start tailoring your project

If you are already familiar with the concepts and basic screens of PSM Insight, you can skip the Product Tour and go directly into tailoring mode.

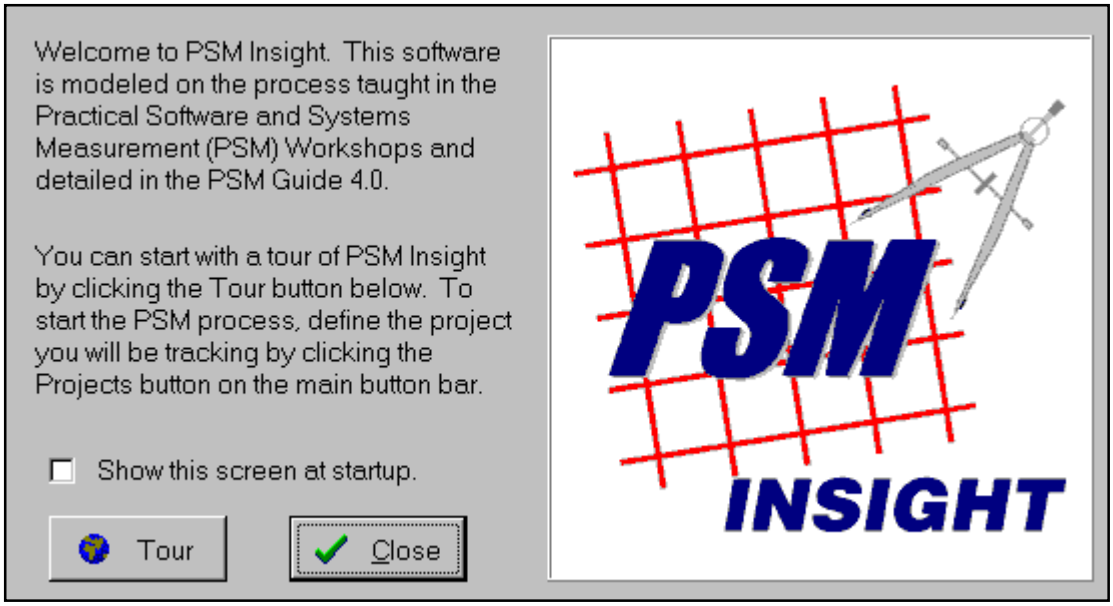
Close the Welcome screen, and start the tailoring process by choosing the Projects function off the main button bar.

Here, you start the tailoring process by defining your project at the highest level. Minimally, you must enter a project name. But you can also describe the project in more detail. This may be helpful if you are sharing the PSM Insight software with other people.

You must also enter a path and directory name where you will keep your project files. This is especially important if you are sharing files on a network. Make sure to pick a directory that is write-accessible by any team members who will be using PSM Insight. You probably want to store your project files under the PSM directory, created when you installed PSM Insight, so that your database is always associated with the software that it uses.

When you are done creating your project, you will see the message, "You can click the Issues button to begin the project tailoring process". You can now get into the substantive functions to tailor your project issues, categories, and measures. You can continue the tailoring process now, or return to it at another time. Don't ever worry about leaving tailoring unfinished; your work is always saved in PSM Insight, and you can return to tailoring at any time and at any point within the process.

Whenever you want to work with your new project, return to the **Project List** to select and open your project files.



The Welcome Screen is the First Thing you see in PSM Insight

Installing and Using the Sample Project

PSM Insight includes a sample project database that you can use while you are learning the software and tailoring procedures. This prevents any accidental loss of real project data, and helps you understand measures, data items, and indicators from a very practical perspective. The sample project represents typical practices for tailoring and defining measures. You can also view, add to, and modify data records.

The sample project file is automatically copied on your hard drive when you install the PSM Insight software with the **Typical** installation option. The default location is in the subdirectory C:\PROGRAM FILES\PSM\PSMInnn\SAMPLES (where C is your chosen drive, and nnn is the version number of the PSM Insight software).

You may want to use the PSM Insight software with a sample project at first. This helps you learn at your own pace while not worrying about accidentally changing your actual data. PSM Insight includes a sample project database specifically for this purpose. It includes fully-tailored issues, categories, and measures, as well as several hundred data records. You can work with the project, modify the data, specify indicators, and even use the data entry functions to add to the database. Background material about the sample project is in the online Help file under the topic, "Sample Project Storyline."

When you installed PSM Insight, if you accepted the **Typical** installation defaults, the sample project is copied into the subdirectory C:\PROGRAM FILES\PSM\PSMInnn\SAMPLES (where C is your chosen drive, and nnn is the PSM Insight software version number). If you change the installation defaults, put the sample database in a subdirectory of your PSM directory.

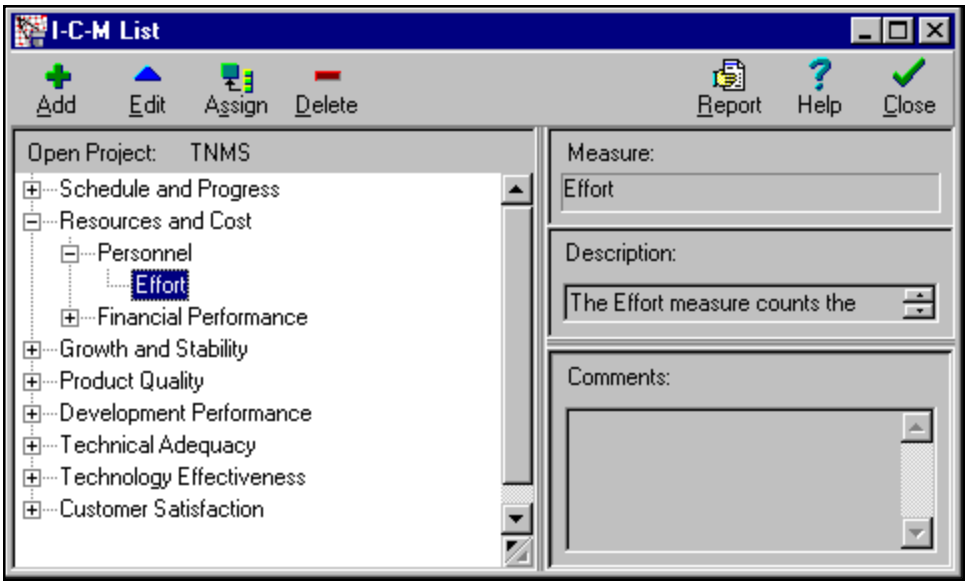
The sample project is a packed file (compressed). To use the sample project, restore the files with the PSM Insight **Project/Unpack** function. Unpack automatically creates a TNMS project with all its tailored issues, categories, measures, and indicators.

The sample project is called the Tucker Network Management System (TNMS). TNMS includes several measures which are commonly used in DoD projects, including:

- Capability Maturity Model Level
- Component Status
- Cost
- Effort
- Problem Reports
- Requirements
- Lines of Code
- Test Procedure Status

One of the most valuable features of the sample project is the extensive list of indicators that are pre-defined for your review. Open an indicator and go into edit mode to review each specification of the indicator. This will help you understand the types of analysis that are possible with PSM Insight, and the most important graphs that you should generate to analyze the progress of any software development project. Sample indicators include all types of graphs:

- SW Unit Progress
- Detail Design Progress
- Implementation Progress
- Implementation Progress by CI
- Cost Profile - Prime
- Cost Profile - Sub
- Effort Allocation - Prime
- Effort Allocation - Sub
- Effort Allocation Key Personnel (Prime)
- Requirement Status
- Requirement Stability
- Problem Report Status
- High Priority Open Problems by CI
- CMM Ratings



The Sample Project Database is Fully Tailored and Ready for Analysis

Basic Steps in Using PSM Insight

To conduct your PSM Insight work in a logical fashion, follow this functional order:

- Projects
- Issues
- Mapping
- I-C-M
- Structures
- Attributes
- Data
- Indicators

PSM Insight can seem confusing if you are new to the Practical Software and Systems Measurement process. Before attempting to tailor your project, make sure you are familiar with PSM terminology and concepts. Consult the PSM Guide for a thorough explanation of the process. For a brief refresher, the **Product Tour** is sufficient. See "Where Can I Get Help?" in this **Manual** for more detail.

There is a logical sequence to the PSM Insight functions. Your work will flow easily if you use the functions in this order:

Projects - Create a project name and directory. You must establish a project file before you use the tailoring functions.

Issues - Input critical project issues you must monitor. The Issues function helps you "brainstorm" about your project priorities and major concerns. Use this function to create your issue list from scratch, or skip this step and go directly to the I-C-M List and use the PSM common issue area templates.

Mapping - Add your project-specific issues to PSM common issues. After you have listed out all your major project concerns with the Issues function, PSM Insight helps you assign each issue to a common issue area, or to add it to the list as an original, project-specific issue.

I-C-M - Create issues, categories, and measures to track. The I-C-M function is the heart of tailoring activities. You will revisit this function frequently to:

- Define issues, measurement categories, and measures
- Edit or revise these items at any time in your project's life cycle
- Work with PSM defaults
- Check the progress of your tailoring work
- Define data that you will collect

- Refine the validation of data items
- Integrate your project structures into your tailoring framework

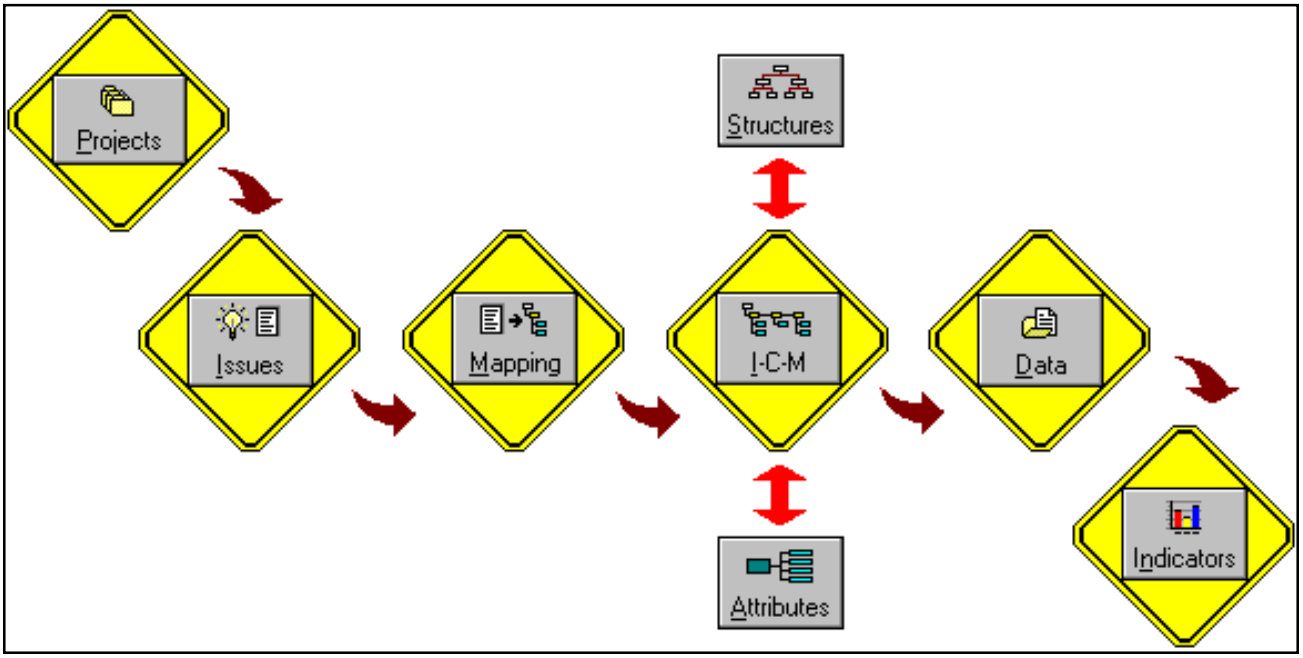
Structures - Define your project's organization. When you create measures with the ICM function, you assign a structure level to each measure, identifying the collectable level of your data. You may use the pre-defined PSM Insight structures and change them later, after you create a project-specific structure with the Structures function. You also use the Structures function to create names for project-specific levels and values.

Attributes - Define values for measure characteristics. You can also create project-specific attributes to supplement the PSM Insight pre-defined attributes. Whether you assign pre-defined or project-specific attributes to your measure, you need to create the actual values relevant to your site. You can do that with the Attributes function, or as you enter data in the Data Entry function.

Data - Input data manually or with the Import function. The Data Entry grid is customized for each measure you create, providing data fields and validation routines based upon your tailoring activities. Alternatively, if you have electronic data from another source, use the **Import/Export** function to convert your data into PSM Insight.

Indicators - Specify graphs for project monitoring. This is the function you will use to analyze and interpret the data you collect. PSM Insight walks you through graph creation step-by-step, building an indicator one piece at a time. Indicators are the heart of the analysis process; you will use this function regularly to generate status reports and to redefine graphs as your project changes.

The two most important functions in PSM Insight are **I-C-M** and **Indicators**. You will return to each function over and over again to refine your tailoring work and to make changes as your project develops and matures. Take enough time to become thoroughly familiar with these critical functions.



The Product Tour's Roadmap Depicts a Logical Order to Your Work

Creating a Project

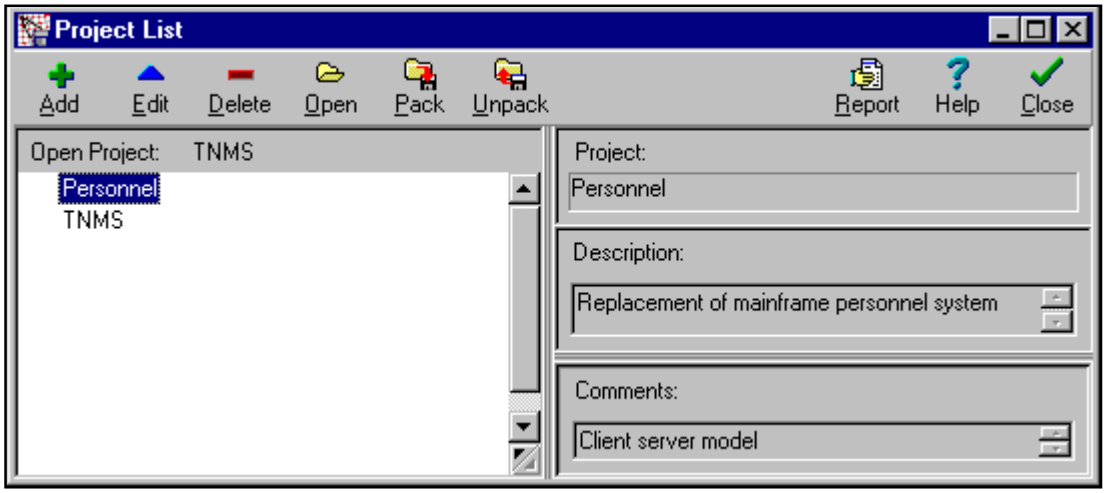
A project is the name of the development work you are undertaking. You must create a project name to start the tailoring process. The project name appears as the first item in your tailoring list, defining the highest level of your work. You can also add descriptive notes to your project for the benefit of anyone working with this copy of PSM Insight.

Make sure that all staff can access the PSM Insight project files. Choose a path and directory that is write-accessible by all team members. This is particularly important if you are working in a network environment.

Before you start your detailed tailoring work in PSM Insight, you must define the project that you are working on. You can use one copy of PSM Insight to track multiple projects, each with its own set of issues, categories, measures, and indicators. Every project has its own separate database, retaining its customized settings and unique data. If multiple teams are working with PSM Insight, it is important that your project information is distinct and readily understood.

Start your project work by clicking the **Projects** button. Choose a name for your project that is distinctive, clear, and accurate. The name can be any length, but it should be easily recognized by all project team members.

You can also enter full-text descriptive information and comments about your project. This is particularly



You can Track Multiple Projects in PSM Insight

important if other staff members will be accessing PSM Insight and need more detail about the project. These fields are optional.

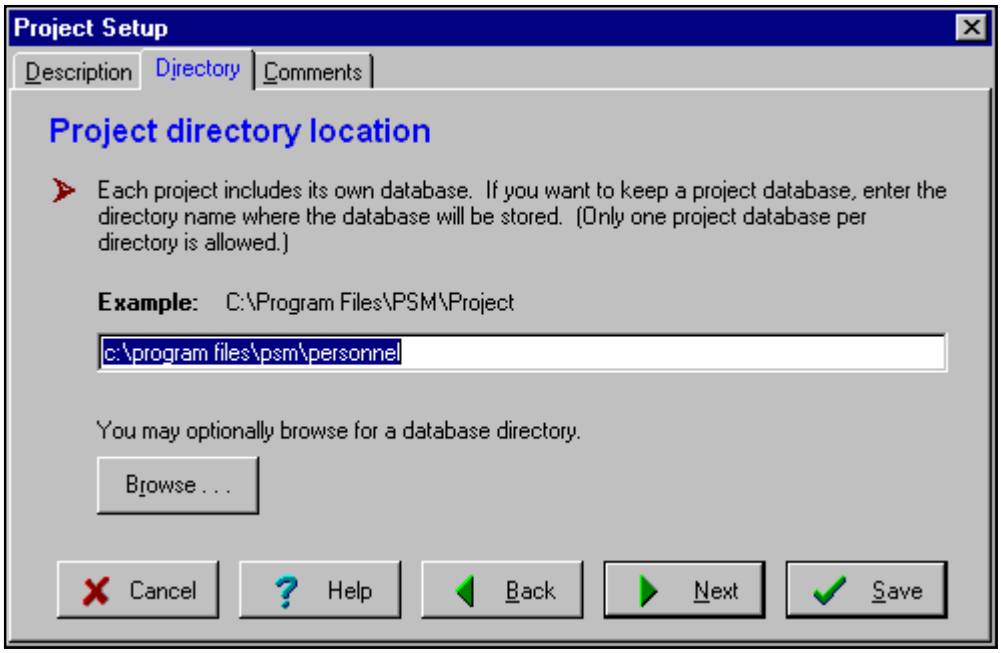
The critical step in defining your project is choosing a path and directory name for the location of the project database files. This is especially important if you are working in a network environment, where not all staff have the same access rights to system directories. To share a project database on a network, each PC must have full writable access to a network drive (or subdirectory) that is not password protected. Each PC must first have that network drive/subdirectory mapped to a local drive, but it needn't be the same drive letter on each local PC. This assures that everyone who is tailoring, entering data, or analyzing project information has full access to the PSM Insight project files. Users can still have separate copies of the PSM Insight software programs on their PCs; only the project data files must be centralized.

If you are running more than one project on this copy of PSM Insight, make sure each project has its own directory. Projects do not share tailoring information or files, and should be separate from each other to preserve data integrity.

You and your system administrator will recognize your PSM Insight project files more readily if you place them under the main directory that is used for the PSM Insight software.

When you finish defining your project files, PSM Insight tells you that you can now start to tailor your project issues. Click the **Issues** button to begin.

Whenever you start the PSM Insight software, be sure that the project you need to work with is **Open**. All of the major functions list the currently open project name on a status bar. To open another project, return to the **Projects** function, highlight the project you need to work with, and click the **Open** button. You can then proceed with any other function in PSM Insight.



Make Sure all Team Members Have Access to Your PSM Insight Project Database

Project-Specific Issues or PSM Common Issues?

PSM Insight comes with 7 common issue areas, used to track project status in most AIS or weapons systems projects:

- Schedule and Progress
- Resources and Cost
- Product Size and Stability
- Product Quality
- Process Performance
- Technology Effectiveness
- Customer Satisfaction

You can use these 7 common issues as a starting point for your tailoring work in the **I-C-M** function. Or, you can build your project-specific issue list from scratch with the **Issues** function. The end result is the same - a list of critical project aspects to monitor.

An issue is a critical aspect of your project that must be monitored on a regular basis. PSM Insight comes with the seven most common issue areas used by DoD and industry to speed your tailoring work. These issues are used frequently by AIS or weapons systems to monitor on-going project status, representing best practices in DoD today:

- Schedule and Progress
- Resources and Cost
- Product Size and Stability
- Product Quality
- Process Performance
- Technology Effectiveness
- Customer Satisfaction

These seven common issue areas are fully defined and refined into measurement categories and measures in the PSM Insight software. Common issues, categories, and measures are called “templates”, tools to use to speed your project tailoring work.

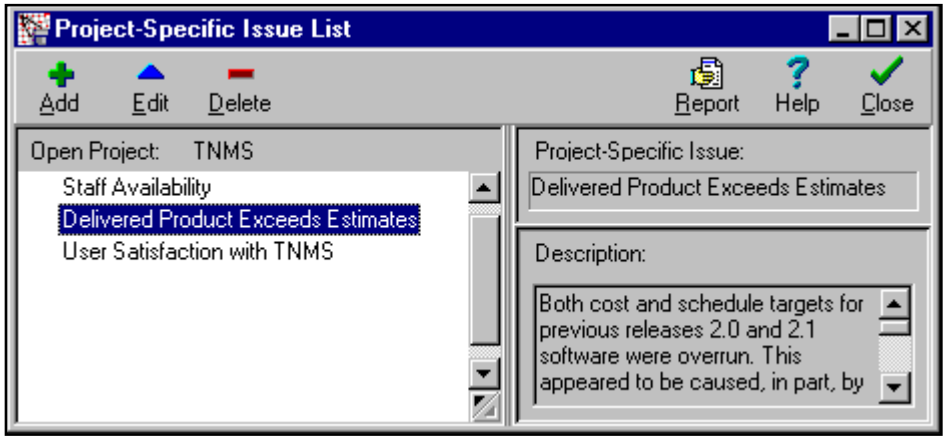
A project-specific issue is one that you define in addition to or in place of PSM common issue areas. A project-specific issue can be a risk, potential problem, constraint, concern, or objective, stated in either general or very detailed wording.

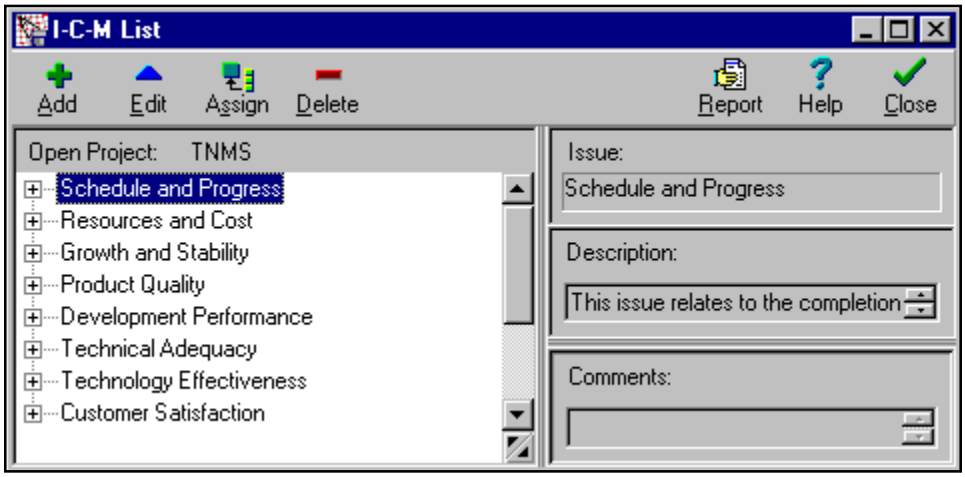
You can tailor a project by either starting with the PSM common issue areas, or by creating a list of project-specific issues from scratch. The choice depends on your preference, whether you want to see what others have done first to determine if their issues are relevant to your project, or you wish to “brainstorm” first about your own project needs. In the first scenario, you basically work in edit mode, picking and choosing from templates and modifying or deleting items as you go. In the second scenario, you work from your original ideas to model a project tracking system unique to your needs. Regardless of which method you choose, you will end up with a list of issues, categories, and measures that are critical to the success of your project.

To start working with the PSM common issue areas, use the **I-C-M** function. You will have all the PSM templates available to you for acceptance, omission, or modification.

To start with project-specific issues, use the **Issues** function. Here, you will "brainstorm" about the important aspects of your project, identifying items that you wish to monitor on a regular basis. Once you have a complete list of project issues, use the **Mapping** function to merge your project-specific issues with PSM common issue areas, creating a master list to use in PSM Insight. You can associate or subordinate a project-specific issue with a common issue, or you can add a project-specific issue to the master list. When you are done, you take your master list into the **I-C-M** function to define measurement categories and measures for your needs.

If you have ever been to a PSM workshop, the project-specific issues procedure is the method you used with the whole class to start thinking about a project before getting into the tailoring process. Think of the **Issues** function as a flipchart in a classroom, where you can think freely and explore many possibilities with other people.





Start Your PSM Insight Work by Defining Project-Specific Issues ... or ... by Using Common Issues

Working in Outline Mode

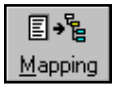
A list is a summary or outline of tailoring activities you have completed. Lists provide a fast and convenient way to review or edit your work. The **Issues-Categories-Measures List** (**I-C-M List**) is the master outline of your entire project. The list is an invaluable tool both during and after tailoring activities. Access the list at any time that you need to:

- Define new issues, measurement categories, and measures
- Read a summary about an issue, measurement category, or measure
- Edit any of your tailoring work
- Review your tailoring progress

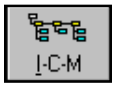
All of the tailoring work you do in PSM Insight is based on the list tool. A list is a summary or outline of tailoring activities you have completed. You can work quickly and conveniently with project data by using lists. Most PSM Insight functions are based on the list concept:

Projects - All the project names and descriptions defined in this copy of PSM Insight

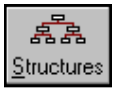
Issues - A framework for creating a list of project-specific issues



Mapping - A tool for mapping issues from your project-specific list to the master list of common issues



I-C-M - The Issues-Categories-Measures list is the heart of tailoring



Structures - A list of all the project structures in PSM Insight

Attributes - A list of commonly used measure characteristics for tailoring

Data - A list of all project measures for data entry

Indicators - A list of all the your graphs, grouped by issue

There are several reasons to use a PSM Insight list:

- To define new issues, measurement categories, measures, and indicators
- To read a summary about a tailoring item
- To edit or review your tailoring work
- To see the PSM Insight templates
- To evaluate your tailoring and analysis results

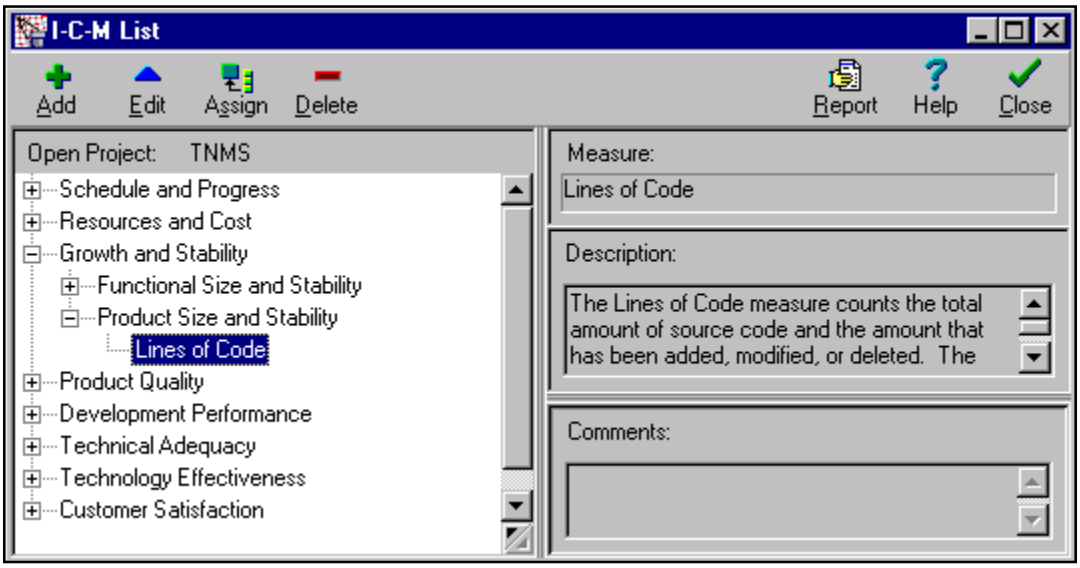
The list format is consistent from function to function. The list is on the left side of the screen. As you highlight an item in the list, its description and notes appear on the right side of the screen. So, you get both a summary or overview of your tailoring items as well as detailed information about one specific item. Right click on the list for a shortcut menu to button functions and list management options.

You can customize the order of the items on the list. By right-clicking on any item, you can access the **Sort** options to:

- Move the item to the top of the list
- Move the item up one line
- Move the item down one line
- Move the item to the bottom of the list
- Alphabetize the entire list

Sort options are particularly useful when you want to place high priority issues or measures at the top of your **I-C-M List**, to list the most frequently run graphs at the top of the **Indicators List**, or to alphabetize a long **Attributes List**.

As you work with lists, you may want to change the size of the windows on your screen. For example, if you usually enter **Descriptions** but not **Comments**, you can shrink the **Comments** window down and maximize the space for **Descriptions**. Simply place your cursor on a window edge. When the cursor changes to a double-arrow, click and hold down your left mouse button as you drag the edge to a new position. The window size is now changed. The newly-sized windows will remain this way both during your current PSM Insight session and future sessions, until you change them again.



The List Format is Consistent Across all Functions, Making it Easy to Use

Working With Measurement Categories

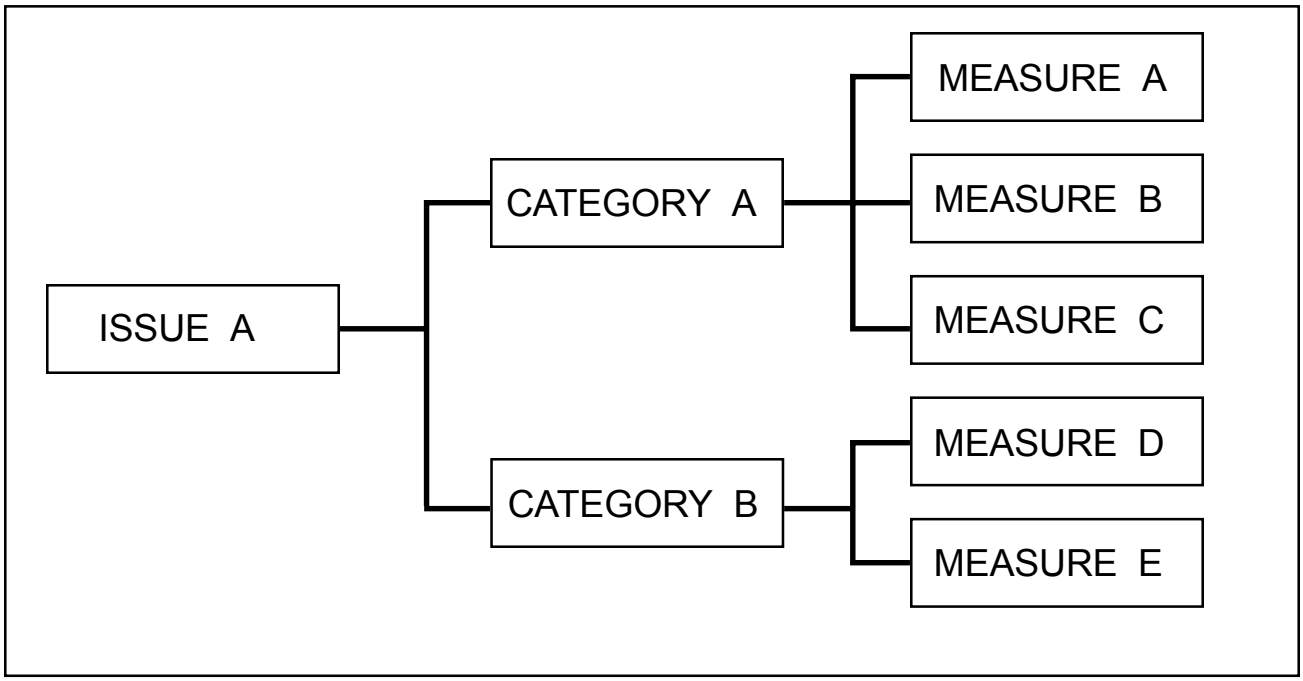
Each issue in PSM Insight includes one or more measurement categories, further clarifying the information that you monitor. A category is a set of related measures that can be tracked in your project, such as cost-related or schedule-specific measures. Each measurement category answers different types of software-related questions on one specific topic. Many commonly used categories are pre-defined for your use, or you can create your own project-specific measurement categories.

Each issue can have several different measurement categories. For example, the issue, "Resources and Cost," has three categories: "Personnel," "Financial Performance," and "Environment and Support Resources."

It helps to think of your tailoring work as top-down design. You work from general concepts to more specific detail. This systematic process helps you understand what data you need to collect for your project. PSM Insight walks you down the hierarchy of tailoring items one step at a time.

At the very top of the tailoring ladder are issues. These are the most important aspects of your project that need to be tracked. Next, come categories. Each issue in PSM Insight includes one or more measurement categories, further clarifying the information that you must monitor. A category is a set of related measures that are tracked in your project, such as cost-related or schedule-specific measures. Measurement categories break issues into more specific topics.

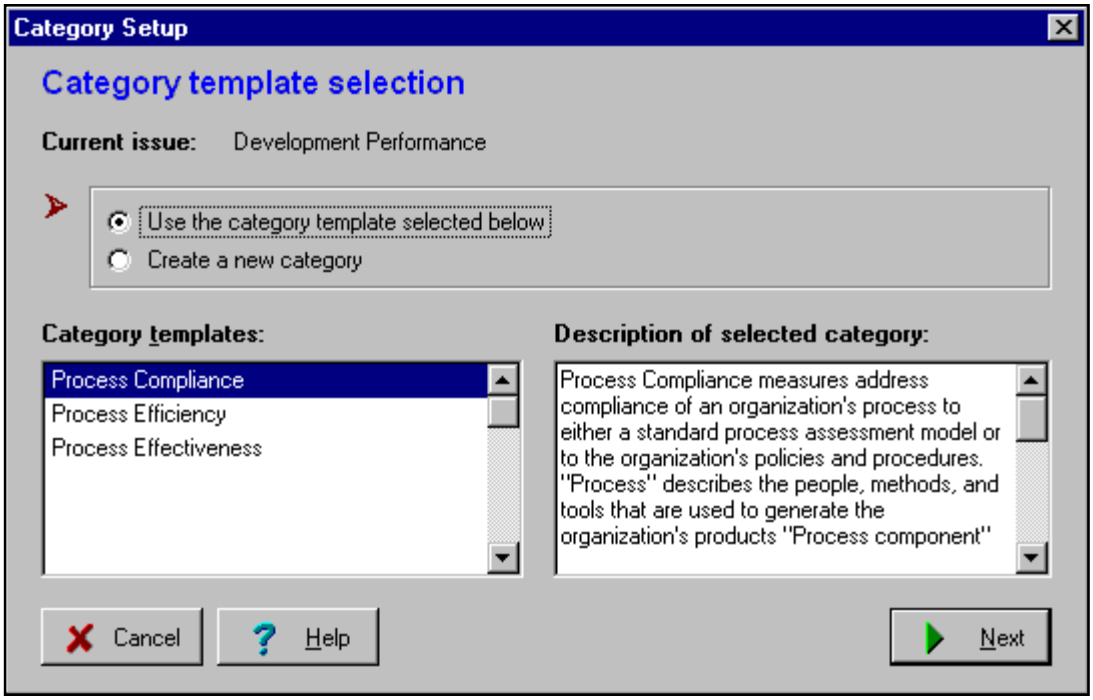
Measurement categories group similar measures and data. There may be many categories in one issue,



A Tailored Project can be Depicted as a Hierarchy

differentiated by the type of information that their measures address. You can add project-specific categories and measures to the common ones. Here are the PSM Insight measurement category templates:

Issue	Categories	
Schedule and Progress	Milestone Performance	
	Work Unit Progress	
	Incremental Capability	
Resources and Cost	Personnel	
	Financial Performance	
	Environment and Support Resources	
Product Size and Stability	Physical Size and Stability	
	Functional Size and Stability	
Product Quality	Functional Correctness	Portability
	Supportability - Maintainability	Usability
	Efficiency	Dependability - Reliability
Process Performance	Process Compliance	
	Process Efficiency	
	Process Effectiveness	
Technology Effectiveness	Technology Suitability	
	Impact	
	Technology Volatility	
Customer Satisfaction	Customer Feedback	
	Customer Support	

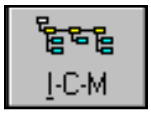


Categories Define Groups of Similar Measurement Types

Defining Measures

Measures are the third step in the tailoring process. Measures are ways of quantifying aspects of a software process or product. They are specific data types that you can monitor in your project. Measures are characterized by structures, attributes, and data items. Sample measures include: Milestone Dates, Requirement Status, Cost, and Lines of Code. Measures are the basis for data entry or import, and they are also used to create indicators for monitoring project status.

Not all measures are relevant to every development project. You may define your own project-specific measures, or you may use the most commonly tracked measures that are pre-defined in PSM Insight.



Measures are the third step in the tailoring process, and they represent data types that are monitored on a software process or product. You'll want to choose measures that specifically address your project issues, but that also are relatively easy to implement. It helps to have a general idea of what types of data you can collect from the various work units. Measures are the basis for data entry, and they are also used to create indicators for monitoring project status. Make sure you have sufficient time to devote to measures - their governing structures, characteristic attributes, and specific data items - when you tailor this aspect of your project.

Not all measures are relevant to every development project. You may define your own project-specific measures, or you may use the most commonly tracked measures that are pre-defined in PSM Insight. Be sure that you define enough measures to monitor all your project issues.

When you add a measure to your project in PSM Insight, you will be asked to define three different aspects (or fields) of a measure:

- Structures
- Attributes
- Data items

All three aspects are important. You may want to work through your measure definitions on paper before inputting the final information into PSM Insight. When you use pre-defined PSM measures, PSM Insight automatically copies recommended structures, attributes, and data items in your project files.

Structures - A structure represents the organization of your project. Typically, a structure is either component-based, activity-based, or function-based. You can have more than one structure per project. Structures are related to measures because each measure represents data collected at a particular level of your structure. (See this **Manual**'s topic on "Structures: What

are They and Why do I Need Them?" for more detail on defining structures.)

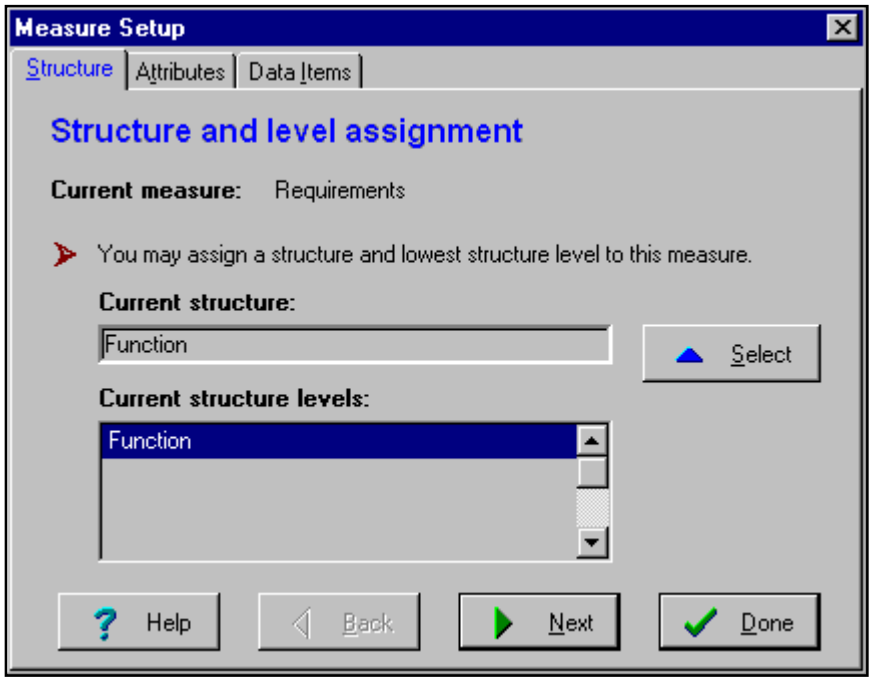
For example, if your structure is component-based, you may use the two default structure levels of "Configuration Item" and "Unit." You would then assign project-specific values to these levels. Or, you can create your own project-specific structure with the **Structures** function. Each measure must have a structure level assigned to it, representing the level at which data are collected for that measure. Usually, measures are assigned to the lowest level of agency organization (the unit).

Attributes - An attribute is a characteristic of a measure. It defines the nature of the measure and can be readily collected for data entry. Each measure typically have several attributes to describe it. For example, the measure, "Lines of Code" may be characterized by the attributes "Increment" number of the software, "Planned/Actual" lines coded, and "Language" of the compiler used. PSM Insight supplies the most commonly used attributes. If you need more attributes, you can readily create them. (See this **Manual**'s section on "Working With Attributes" for more information.)

Data items - A data item is a specific piece of information that you collect for a particular measure. Data items are quantitative and specific. For example, two data items you might collect for the "Lines of Code" measure are "Number of Lines of Code," and "Lines of Code Modified."

Creating data items takes some time because you must define every aspect of data validation, the numeric data type, a default value, a range of allowable values, and a list of valid entries. PSM Insight walks you through each specification individually, providing guidance with each aspect. When you use pre-defined PSM measure templates, the data items are fully defined for you; all you have to do is edit the data items with project-specific information.

Try to be as accurate and precise as possible. Once you start entering data, measures are very complicated to modify or delete.



Measure Setup Involves Three Different Types of Data

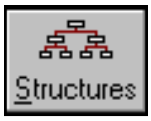
Structures: What are They and Why do I Need Them?

The structure of a project defines the organization of your work. For example, an "Activity" structure may represent a hierarchy of project activities.

A level is an organizational element in the structure of your project, indicating the specificity of collected data. For example, the "Component" structure includes two levels:

- Configuration Item
- Unit

Structure level values are the actual names of these components in your project.



The **structure** of a project defines the organization of your work. Structure is probably the most difficult concept to master in PSM Insight, simply because it varies so much from project to project. You may organize your work by activity, by task, by component, or by another entity. You may hear structure referred to as "organization," "levels of data aggregation," "aggregation structure," "collection levels," "tasks," "components," among many other terms. While it is difficult to generalize about structure, if you can identify the type of structure your project uses, it won't be hard to fill in the details and values of your own particular structure.

Structure is the mechanism used to identify the specificity of data being collected. A **level** is the element in your structure which indicates that level of specificity. For each measure you define in PSM Insight, you must assign it a structure level. **Structure values** are the actual names of these levels in your project.

Structure is important to your project because it tells the PSM Insight software which measures are similar, which data items can be added up to arrive at a system-level total, and which indicators can be legitimately compared. You may have more than one structure in a project, but if you want to compare similar measures or indicators, they must share the same structure.

PSM Insight comes with several commonly used structures, but you can create your own with the **Structures** function, not the Measure Setup function in **I-C-M**. This may seem confusing, but by defining a structure at the project level, you make it available for every measure you create. When you use a PSM-defined measure template in your project, you can keep the pre-assigned structure levels in your measures and change them later (by editing measures with the **I-C-M** function) after you create a project-specific structure. Define your project-specific structure values with the **Structures** function also.

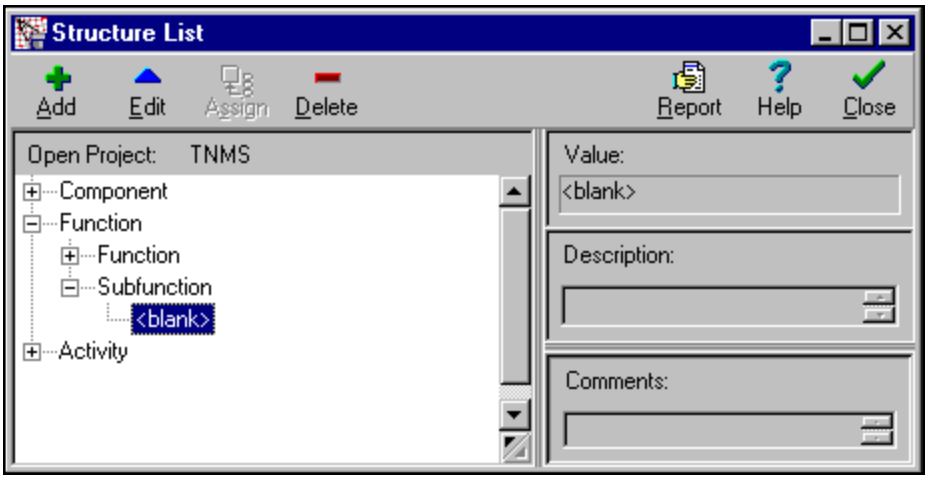
Here is a simple hypothetical structure that may help you better understand the concepts of structure, level, and structure values.

Structure	Components
Structure levels	Configuration Item (CI) Unit
Structure values for CI	CACI EDS SAIC
Structure values for Unit	Data conversion Report generator Search engine

How do you decide on the appropriate level for collecting data? Here are some guidelines:

- Requirements and size data are normally tracked at the CI level.
- Progress is normally reported at the level of major activity (e.g. design).
- Keep data from subcontractors separate.
- Maintain separate counts of size for each language type.
- Maintain separate counts of size, effort, and problem reports for each category of new development, reuse, and COTS software.

You may also want to examine the sample database that comes with the CD-ROM version of PSM Insight to learn more about how structures are integrated with your measures.



PSM Insight Includes Several Pre-Defined Structure Templates

Working With Attributes

An attribute is a characteristic of a measure, such as "Planned/Actual", "Increment," or "Language"; they distinguish one data item from another. Attributes are very important when you are defining indicators for your project; if you wish to compare two measures, they must share the appropriate attributes. Think of attributes as items that you graph by, or that you search by.

PSM Insight comes with the most commonly used attributes pre-defined for your use, but you can also create your own with the **Attributes** function.

For each attribute you use, you must create project-specific, collectable values.

The second step in setting up a measure is defining and assigning attributes. Simply put, an attribute is a characteristic or property of a measure. For example, the measure "Defects " may have attributes of "Product Name" or "Defect Priority."

Attributes are very important when you are defining indicators for your project; if you wish to compare two measures, they must share the appropriate attributes. Think of attributes as items that you graph by, or that you search by. For example, if you want to graph "Lines of Code," you may want to see the difference in productivity between the values of C++ and Visual Basic for the attribute, "Language."

PSM Insight comes with the most commonly used attributes, but you can also create your own attributes. When you use a pre-defined PSM template measure, PSM-recommended attributes are automatically added to your project and measure files. To create your own attributes, you must use the **Attributes** function, not the Measure Setup function in **I-C-M**. This may seem confusing, but by defining an attribute at the project level, you make it available for every measure you create, regardless of what issue or category a measure falls under. You can assign pre-defined attributes to your measures and change them later (by editing measures with the **I-C-M** function) after you create project-specific attributes.

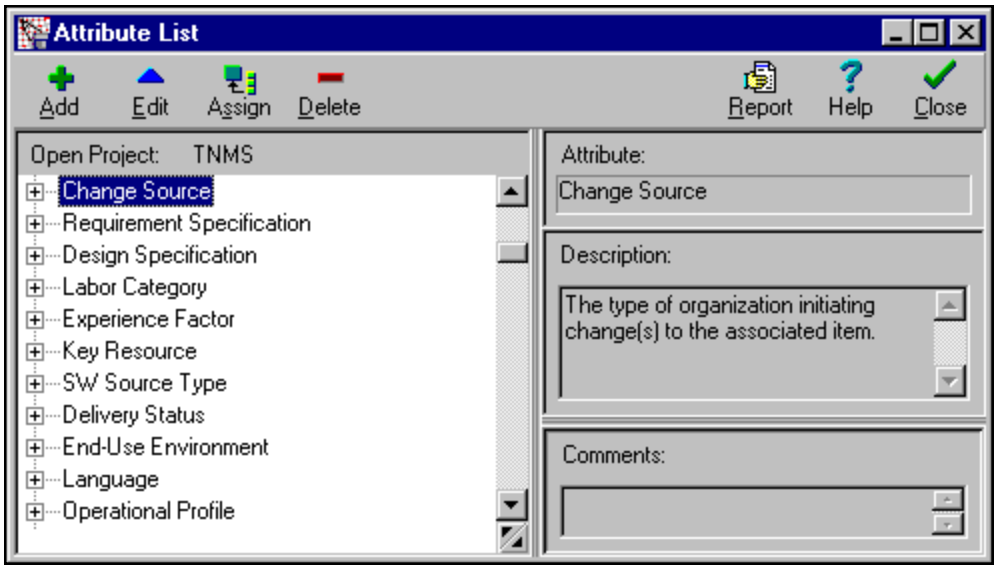
While PSM Insight provides pre-defined attributes, you will still have to create values for each attribute you use. For example, if you use the "Language" attribute, you will name all the programming languages that are relevant to your project, such as Delphi, C++, and Visual Basic. Values are very specific to your project, and must be defined by you.

Create attribute values with the **Attributes** function so that they are available project-wide. As a short-cut, you can leave your attribute values undefined until data entry time. Then, you can build an attribute values list simply by entering the values into the appropriate attribute fields in data entry. PSM Insight will record and store those values for you in a drop-down list, available every time you enter data manually.

Here are some of the commonly used pre-defined attributes available in PSM Insight:

Planned/Actual
Organization
Increment
Language
Increment
Labor Category
Test Sequence
Requirement Type
Test Environment
Discovering Activity
Defect Priority
Change Source
Failure Type
Failure Cause
Scope
Impact
Relative Cost
Impact on User Service
Test Sequence
Product Source Type
Delivery Status
Escape Type

Product Type
Model Number
Component Source
Evaluation Criteria
Evaluation Period
Support Request Priority
Type of Maintenance Required
Vendor
Satisfaction Ratings
Customer Activity When Problem Was Discovered



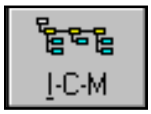
PSM Insight Supplies a Rich List of Attributes

What Data Items Should I Collect?

A data item is a specific piece of information that you collect to manage and monitor your project. Data items quantify what you are actually measuring. Each measure that you define in PSM Insight must have quantifiable data items to collect and analyze.

PSM Insight provides over 100 pre-defined data items that can be used in your project measures and indicators. When you use a PSM-defined measure template, PSM Insight automatically copies recommended data items to your project files. You can also create your own data items that you know you will be collecting.

There are several guidelines to help you decide what data to collect.



A data item is a specific piece of information that you collect to manage and monitor your project. Data items quantify what you are actually measuring. Every measure that you define must have data items assigned to it for collection. Without data items, you will have nothing to plot and analyze in your indicators.

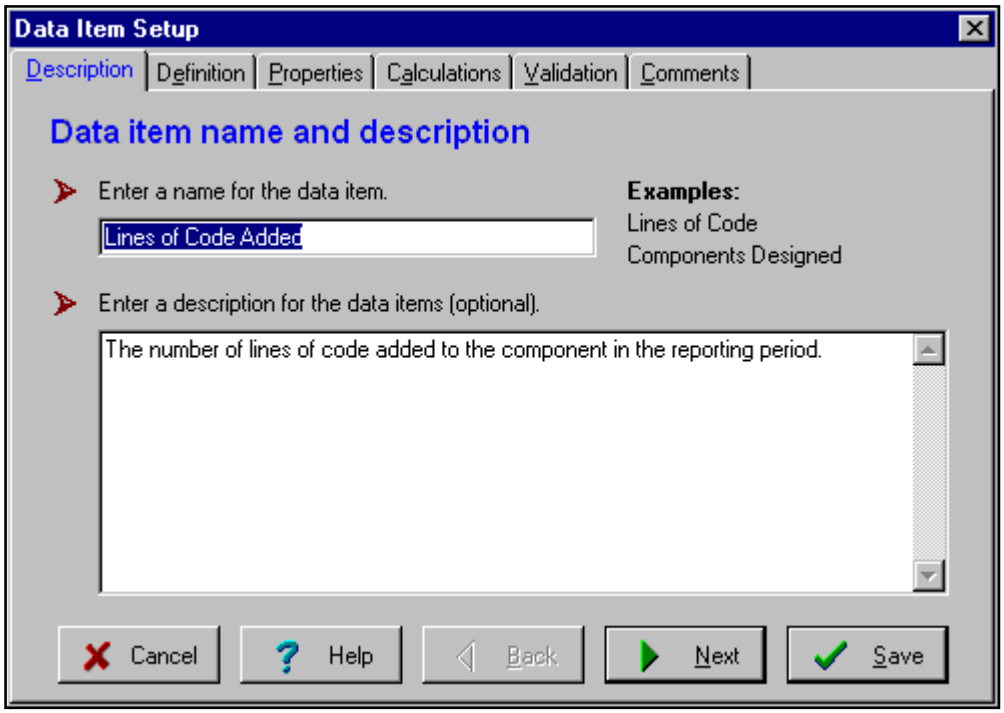
How do you know what kind of data to collect? Here are several guidelines to help you decide:

- Collect both planned and actual data values.
- Only collect data that is relevant to project events and objectives.
- Collect data at a level appropriate to localize problems.
- Collect data at least monthly.
- Develop clear, concise definitions to guide data collection for all project staff to use.
- Collect the same data across all project sources and organizations.
- Use the same codes and abbreviations consistently throughout project sources.
- Define data items that are relatively easy to collect.
- Be sure to cover cost, schedule, and technical issues in your data collection.
- Take advantage of electronically-collected data wherever possible.

PSM Insight provides over 100 pre-defined data items that can be used in your project measures and indicators. Use the templates of pre-defined data items to assist you in tailoring, or create your own data items for information you know you will be collecting. When you use a PSM-defined measure template,

PSM Insight automatically copies recommended data items to your project files. Here's a sampling of common data items:

- End Date
- Total Number of Requirements
- Number of Test Cases Passed
- Number of Problem Reports
- Number of Action Items Resolved
- Number of Reviews
- Number of Components
- Number of Labor Hours
- Cost
- Number of Lines of Code
- Weight
- Number of Database Records
- Number Function Points Added
- Number of Functional Change Requests
- Defects
- Labor Hours to Perform Maintenance Action
- Number of Users Impacted
- Reference Model Rating
- Number of Transactions
- Value Rating
- Performance Rating
- Number of Customer Support Requests Received
- Average Time to Resolve

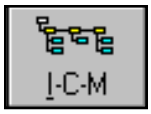


PSM Insight Walks you Through 6 Steps to Define a Data Item

Data Item Specifications

When you assign a data item to a measure, PSM Insight prompts you for several data item specifications. If you are using a pre-defined PSM template, the data items are already specified, and you merely have to edit them for project-specific information. Data item setup is a comprehensive definition of the data type, properties, and validation routines. Setup is easy to follow, and many specifications are self-explanatory; other specifications require more thought. You can always edit a data item later if you need to add or change information about it.

Setup is important because it controls the interaction between data entry specialists and PSM Insight, assuring valid and accurate data input. However, if you edit data item specifications, it is best to do this before you enter any data, to assure data integrity and consistency.



When you assign a data item to a measure, PSM Insight prompts you for a variety of specifications. If you are using a pre-defined PSM template, the data items are already specified, and you merely have to edit them for project-specific information. Data item setup is a comprehensive definition of the data type, properties, and validation routines governing data entry for accurate input. Many of the specifications are self-explanatory and easy to define; others require more thought. You can specify as much as you know, save the data item, and return to edit the item later if you need to. However, editing data item specifications is best done before you use data entry, to assure consistency in input and integrity of your project database. Here are the major specifications that you will define:

Unit of Measure - This is the type of measurement represented by this data item, such as “days,” “dates,” “dollars,” “thousands of dollars,” or “counts.”

Field Name - This is the name of the data item that appears in the data entry grid. The field name should be easy to recognize by data entry specialists. The field name must also be unique among all data items for this measure.

Data Type - This property is similar to the “format” or “numeric type” in a spreadsheet. Choices include “long integer,” “short integer,” “decimal number,” “currency,” “character,” “date,” “time,” “date/time,” or “true/false.” The on-screen **Help** file explains each type in detail.

Maximum Length - This represents the number of places that a data value can be.

Cumulative - This is a very important data item specification that impacts indicators and aggregation. A cumulative value represents a number that is continually retotaled over time. For example, if you spent $1,000 in October and $2,000 in November, a cumulative Cost would be entered as $3,000 in November, not $2,000. An example of a non-cumulative data item is Number of Components Added This Month. Data values must be cumulative if you wish to aggregate them (see the section of this Manual on “What is Aggregation?” for detailed information).

Additive - An additive value represents a number that can be added with previous values to arrive at a total. For example, if your additive data item is Monthly Cost, and you spent $3,000 in March and $4,000 in April, you can add those values to arrive at a total project cost to date of $7,000. Examples of non-additive data items include Averages and Indexes.

Calculated - This is a very helpful feature. You may be collecting a data item that is not in the exact format you need for reporting. For example, you may collect "Lines of Code," but you need to report "Thousands of Lines of Code." You can create a "calculated" data item by creating a formula, using other data items (common to one measure), mathematical operators, and numeric constants. Then, PSM Insight automatically calculates the data item values as you need them, for a data entry grid or an indicator. Examples of calculated data items and their formulae appear in the Help file.

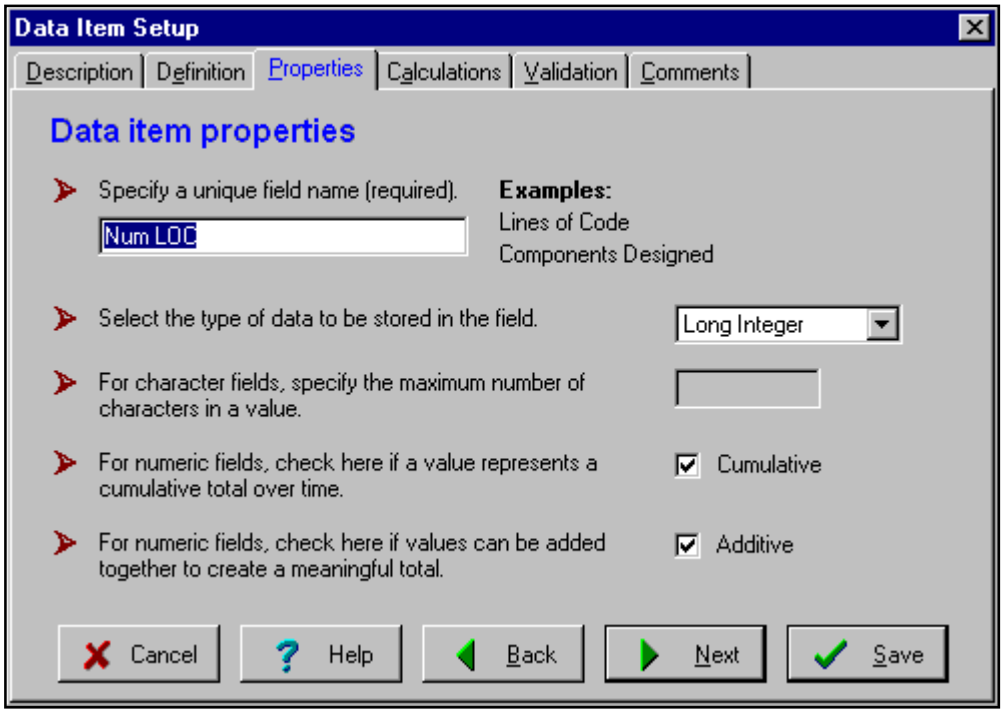
Required - Specify a data item as "required" if you want to make sure that the data entry specialists always enter a value for this data item.

Lower Limit - You can optionally define the lowest possible value for a data item, if there is one.

Upper Limit - You can optionally define the highest possible value for a data item, if there is one.

Picture Mask - You can define the exact format of data values, assuring that data entry specialists enter characters and numbers exactly as you specify them. This is especially useful for dates, or alphanumeric values. Masks are optional, and are detailed in the Help file.

Default Value - This is a handy feature for data entry. You can optionally define a default value that will appear in the data entry screen as the most frequently used value for this data item.



PSM Insight Walks you Through Data Item Specification one Factor at a Time

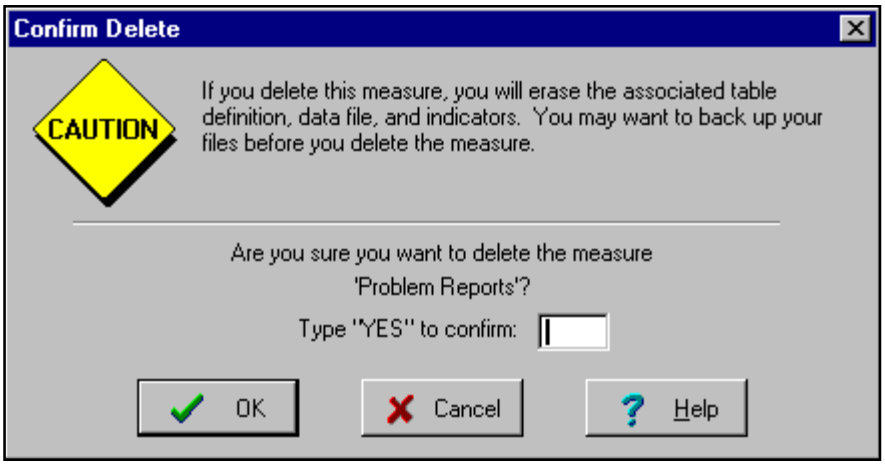
Deleting Items From Your Project

PSM Insight does not make it easy to delete an item from your project, and for good reason. Think twice before you try to delete something! When you delete an issue, measurement category, measure, data item, attribute, or structure, you are not just deleting a name on the screen, but you are erasing all the data and indicators associated with that item. A deletion can permanently alter your database structure as well.

Before you can delete an item, PSM Insight warns you about the consequences of deletion. Read it carefully and think twice before you decide to erase something from your project; you could be losing valuable hours of hard work entering data into your project database. If you do delete project data, make a backup copy before proceeding.

As you tailor your project, you will no doubt change your mind, edit and delete items. During the early stages of project definition, that is not a problem; you can change your project in any way. However, once you start to enter data and to specify indicators, making changes to your tailored project has major consequences.

When you delete an issue, measurement category, measure, data item, attribute, or structure, you are not just deleting a name on a list, but you actually erase all the files, data, and indicators associated with that item. You may also permanently alter your database structure, depending upon the type of deletion you make. Once you have used the data entry modules of PSM Insight, you should not make deletions casually.



PSM Insight Warns You of Deletion Consequences

Before you delete any item, PSM Insight warns you about the consequences of deletion. This is a built-in safety measure to protect data that may have taken hours to input. Read PSM Insight's warning carefully and think twice before you decide to erase something from your project.

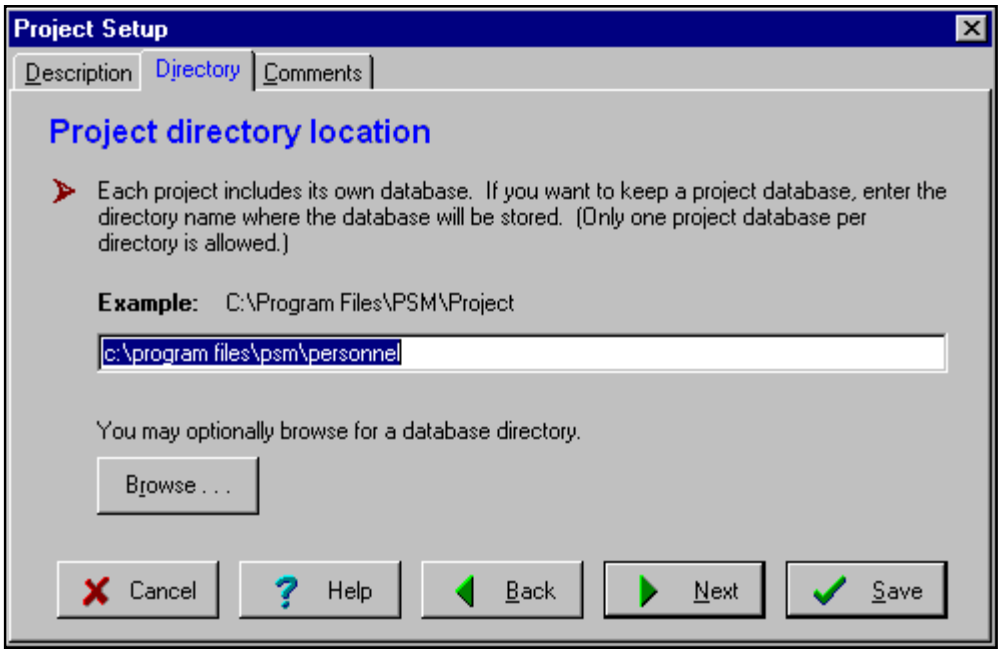
If you do wish to erase the item and all its related data and files, you should create a backup of your project directory for future reference. To do this, PSM Insight lets you cancel out of the deletion process.

To make a backup of your project, go to your project directory and copy all the files to another drive (with the Windows File Manager, Windows 95 Explorer, or with DOS commands).

If you are not sure where your data resides, go to the **Projects** function, highlight the project that you are working with, and click the **Edit** button. You will access the **Project Setup** screens. Click on the **Directory** tab. You will then see the full path and directory name where you store your project files. Exit PSM Insight and copy all the files from that directory before proceeding.

To make a project backup within PSM Insight, use the project **Pack** function to compress and save all the files for one project files in a single file. Use the **Unpack** function to restore the project files to PSM Insight format. (**Pack** and **Unpack** are also useful for sharing files between sites.)

If you wish to make a backup copy of just one measure instead of the entire project, you can do so with the **Import/Export** function. Go to the **Import/Export** function, click the **Copy** button, and select the measure that you want to back up. PSM Insight will prompt you for all the information it needs to copy your data.

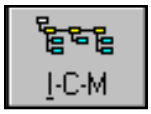


Locate Your Project Directory in the Project Setup Function

Working Exclusively with PSM Templates

A template is a pre-defined element in PSM Insight. When you tailor or define your development project, PSM Insight offers templates for the most common issue areas, together with their measurement categories and measures. Measure templates include all the PSM-recommended attributes, structures, and data items. Templates are developed by the PSM Team, reflecting the best practices of measurement professionals in the software acquisition and engineering communities. Templates are handy tools because they reduce the time it takes to tailor a project, and they provide guidance on the most important items to track in your project.

All PSM Insight templates are available for your use in the **I-C-M** function. PSM Insight now provides the PSM 4.0 templates when you create a new project..



When you tailor a project, you can create issues, categories, and measures from scratch; you can work from the PSM defaults; or you can mix PSM templates with your own project-specific items. When you use the PSM templates, you build a project monitoring system that reflects the best practices in DoD and industry. If you find the PSM Insight templates too detailed or comprehensive for your use, you can delete items from the list and edit out details as you work.

Here is a complete list of the PSM 4.0 common issue areas, measurement categories, and measures that are pre-defined in PSM Insight. These items are available on the PSM 4.0 **I-C-M** List. Note that measure templates also include all the PSM-recommended attributes, structures, and data items.

Issue	Category	Measure
Schedule and Progress	Milestone Performance	Milestone Dates
		Critical Path Performance
	Work Unit Progress	Requirements Status
		Problem Report Status
		Review Status
		Change Request Status
		Component Status
		Test Status
		Action Item Status
	Incremental Capability	Increment Content - Components
		Increment Content - Functions

Resources and Cost	Personnel	Effort
		Staff Experience
		Staff Turnover
	Financial Performance	Earned Value
		Cost
	Enviroment and Support Resources	Resource Availability
		Resource Utilization
Proudct Size and Stability	Physical Size and Stability	Database Size
		Components
		Interfaces
		Lines of Code
		Physical Dimensions
	Functional Size and Stability	Requirements
		Functional Change Workload
		Function Points
Product Quality	Functional Correctness	Defects
		Technical Performance
	Supportability - Maintainability	Time to Restore
		Cyclomatic Complexity
		Maintenance Actions
	Efficiency	Utilization
		Throughput
		Timing
	Portability	Standards Compliance
	Usability	Operator Errors
	Dependability - Reliability	Failures
		Fault Tolerance
Process Performance	Process Compliance	Reference Model Rating
		Process Audit Findings
	Process Efficiency	Productivity
		Cycle Time
	Process Effectiveness	Escapes
		Rework
		Defect Containment
Technology Effectiveness	Technology Suitability	Requirements Coverage
	Impact	Technology Impact
	Technology Volatility	Baseline Changes
Customer Satisfaction	Customer Feedback	Survey Results
		Performance Rating
	Customer Support	Requests for Support
		Support Time

Upgrading from PSM 3.1 to PSM 4.0

The PSM Guide Version 3.1a was recently upgraded and enhanced to Version 4.0a, with new issues, categories, measures, data items, and attributes. The PSM Insight **File - Upgrade Project Template** function associates your PSM Insight project tailoring items from PSM Guide 3.1a templates with PSM Guide 4.0 templates. No terminology or measurement specifications are changed by **Upgrade**; you can continue to work with familiar tailoring language and data items.

PSM Insight now uses PSM 4.0 as the standard template for new projects that you create.

The PSM Guide version 3.1a has been upgraded and enhanced to version 4.0a. The latest Guide includes new issues, categories, measures, data items, and attributes. It also changes the terminology of project structures and structure levels. For example, compare the lists of common issue areas:

PSM 3.1a	**PSM 4.0**
Schedule and Progress	Schedule and Progress
Resources and Cost	Resources and Cost
Growth and Stability	Product Size and Stability
Product Quality	Product Quality
Development Performance	Process Performance
Technical Adequacy	Technology Effectiveness
	Customer Satisfaction

The **File-Upgrade Project Template** function maps or associates your PSM Insight project tailoring items from PSM Guide 3.1a templates with PSM Guide 4.0 templates. **Upgrade** preserves the terminology of issues, categories, measures, data items, structures, and attributes that you have defined, but links them to the corresponding new items in PSM 4.0. For example, the PSM 3.1 issue-category-measure of:

Growth and Stability - Functional Size and Stability - Change Request Workload

is associated with the PSM 4.0 issue-category measure of:

Product Size and Stability - Functional Size and Stability - Functional Change Workload

but would appear in an Upgraded project as:

Growth and Stability - Functional Size and Stability - Change Request Workload

The association is made so that when you add new data items, attributes, or structures to the "Change Request Workload" measure, PSM Insight knows what list of possible data items, attributes, and structures to offer you (i.e., the ones associated with the PSM 4.0 measure, "Functional Change Workload"). If you want to fully adopt PSM 4.0 language, you should edit the PSM 3.1 measure of "Change Request Workload" to read "Functional Change Workload". The **Upgrade** function never changes any of your tailoring work; there is no disruption to your data collection and reporting activities. When you view your project's issue list, you see all the issue names that you previously defined, plus the new PSM 4.0 issues of "Technology Effectiveness" and "Customer Satisfaction".

Most PSM 3.1 measures map to new PSM 4.0 measures. However, a few 3.1 measures do not have equivalents in PSM 4.0. In such a case, PSM Insight links the PSM 3.1 measure to its corresponding PSM 4.0 category. For example, the 3.1 issue-category-measure of:

Product Quality - Defects - Defect Density

has no direct equivalent in PSM 4.0. In this case, your measure would appear as:

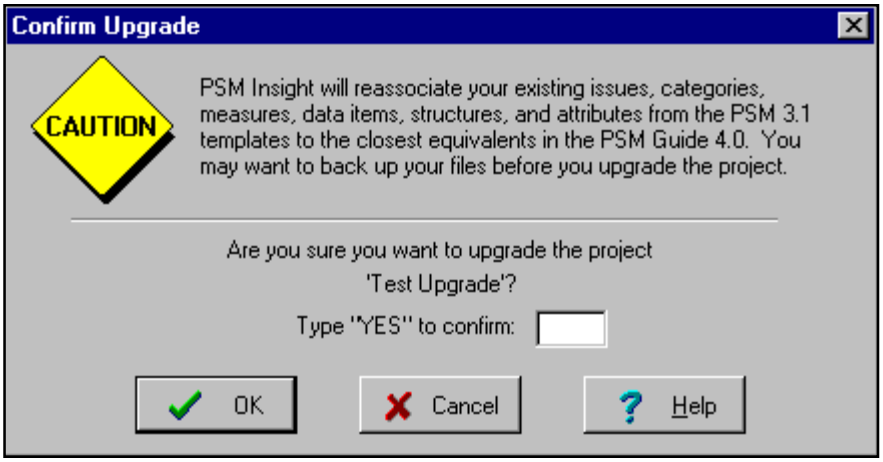
Product Quality - Defect - Defect Density

associated in the background with the PSM 4.0 issue and category of:

Product Quality - Functional Correctness

If you edit the "Defect Density" measure, since it is not associated with a PSM 4.0 measure, PSM Insight cannot selectively offer data items, attributes, or structures from a PSM 4.0 template; you see all the data items, attributes, and structures that are defined in the system.

The PSM 4.0 templates are too extensive to list here in their entirety. However, you can find a complete list of the PSM 4.0 issues, categories, and measures on the previous two pages. The Help file also links to several Excel spreadsheets that detail the mapping of issues, categories, measures, data items, attributes, and structures from PSM 3.1 to PSM 4.0. If you have Microsoft Excel on your PC, you can view these spreadsheets online. You can also consult the PSM Guide Version 4.0 for further information on the new tailoring items.



You Can Upgrade a Project to PSM 4.0 Terminology

Entering Data Manually

The data entry grid is the screen you use to enter project data in PSM Insight. You enter data one measure at a time. The screen resembles a table or grid of rows and columns, representing specific data items, fields, and values for the measure you have chosen.

If you have already defined values for your structure levels and attributes, those values are available in a list during data entry. Whenever you need to enter data in one of those fields, you simply point and click on the value that you want to enter.

If you defined validation routines for your data item, PSM Insight checks the validity of the value you entered into that specific field.

You can enter data two different ways in PSM Insight: manually or electronically. You do not have to choose one method exclusively; you can use either method when it is most convenient. Any project staff can use the data entry functions, as long as they have write access to your project directory.

As you define your measures, PSM Insight custom builds a data entry screen for each measure. The data entry screen resembles a grid or spreadsheet, with columns representing data fields and a row representing a single record. The columns are labeled with the names you assigned to data items, attributes, and structures during the tailoring process. You must tailor your measures, data items, structures, and attributes before you can use the data entry functions.

You can add, edit, or delete data at any time. You can start entering data, save it, and return later to continue. You can even leave a "marker" or "note" to help you locate the record you were working with in a previous session (read about the **Comments** field below). You can also search for specific records, or browse through the data.

PSM Insight adds two fields to each of your records: **Date**, and **Comments**.

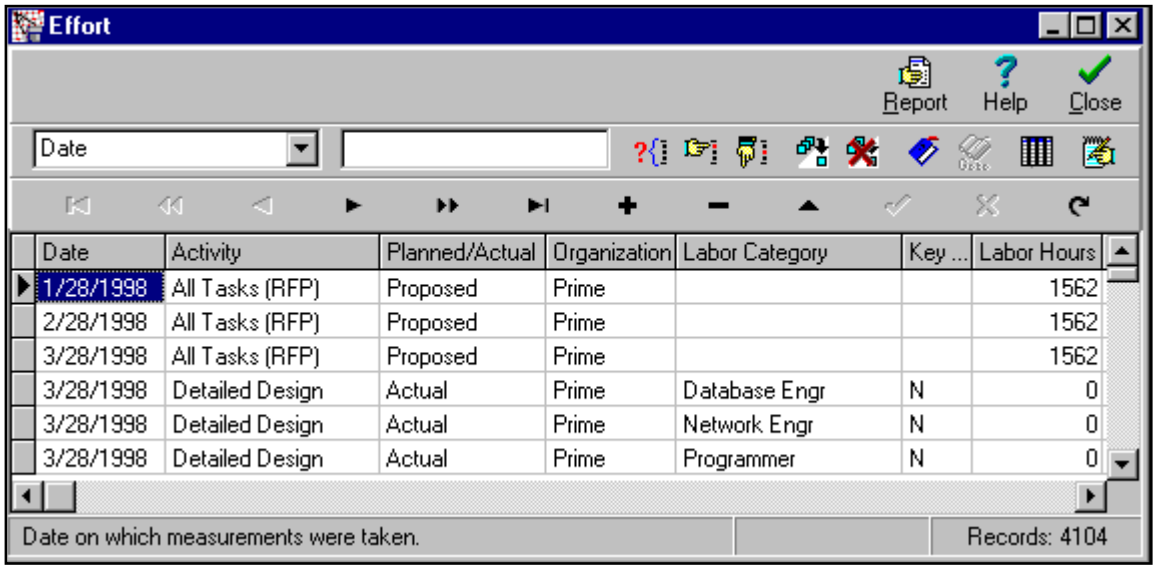
The **Date** field is the first field in a record. The field is meant to represent the date when that record's data entered your PSM Insight database. However, you can change the meaning of the field. For example, you may want to record an "as-of" date on which the record was current, or the date on which you received the data. PSM Insight uses the Windows date format.

Comments is the last field in a record, and you can enter anything you wish in this field. For example, you may want to record the initials of the person doing data entry, the name of the agency that supplied the data, or notes about anomalous data. One creative use of the **Comments** field is to use it as a "marker." Whenever you are working with data entry and must interrupt your work, enter a brief note into the **Comments** field of the record with which you are working. Then, when you return to your work, search the text of the **Comments** field to find the note in your previous record.

The data entry grid provides many options for moving around and editing data:

- Move to the first record
- Move back 10 records
- Move to the previous record
- Move to the last record
- Move forward 10 records
- Move to the next record
- Enter a record
- Delete a record
- Edit a record
- Save a record
- Cancel this edit
- Refresh the data
- Search for records
- Go to the first record matching your search
- Go to the next record matching your search
- Select a subset of records to work with
- Cancel the subset and work with all records
- Bookmark a record
- Move to a bookmarked record
- Re-arrange the columns
- Edit the Comments field

You can also browse through any PSM Insight data file, even if you are not editing the data. Simply go into the **Data** function, choose a measure, and the data appears on the grid for review. Use the navigational buttons listed above to move through the data file.



PSM Insight Builds a Customized Data Entry Grid for Each Measure

Handling Missing Values

A missing value is an empty or blank field. The field has no substantive data in it. Missing values should be avoided, but sometime a blank field cannot be avoided; the field may no longer be used, the value may be unknown, or the blank value may actually mean something. You should document the meaning of missing values for your specific project.

PSM Insight visually represents a missing value in attributes and structure levels as <blank>. Missing values can also occur in data items, appearing as an empty field in data entry. You can work with blank values just as you would any other value; you can select them on active value lists in data entry, describe them in setup, and specify them as graphing values in indicators.

A missing value is simply an empty field. The field has no substantive data value in it; it is blank, or null. Fields may be empty for a variety of reasons:

- The field is obsolete.
- At the time of data entry, the value for that field was unknown.
- The field is not relevant to the reported case or record.
- The field is temporarily empty until a data entry specialist can determine the appropriate value for the field.
- The field is a placeholder for future use but is not currently being used.
- The field was inadvertently skipped over; it is blank by accident.

You should document the specific meaning <blank> has in your project for all team members.

While blanks in your data should rare, sometimes they cannot be avoided. Missing values can occur in any field in a measure: attributes, structure levels, data items, or comments. PSM Insight has special handling rules for two classes of missing values: attributes or structure levels, and data items. PSM Insight has special rules for handling each of these two cases.

Attributes and Structure Levels

Automatic <blank> value - PSM Insight creates a blank value for every new attribute or structure level you create (also for all the pre-defined templates) and designates it visually as <blank>. The new <blank> value is active by default; it is available immediately for data entry. Blank values appear on active value lists, in indicator legends, on the Attribute and Structure Lists, and in Attribute Value and Structure Value Setup.

Attribute and Structure Value Setup - When you work with values in Attribute Value Setup or Structure Value Setup, you should add a <blank> value Description to document its use in your project. You can also add Comments to the value's setup just like any other value. You cannot delete

a <blank> value; you can only de-activate it on the Properties screen. You also cannot change the name of the <blank> value; it must always appear as <blank>.

Data Entry Active Values List - Whenever Insight displays a list of structure level or attribute values, <blank> is displayed just like any other value. It always appears as the first value in the active values list (as long as it is presently defined as active). If you select <blank> from the drop down list, or type "<blank>", Insight automatically clears the word "<blank>" from the field to display a true empty field.

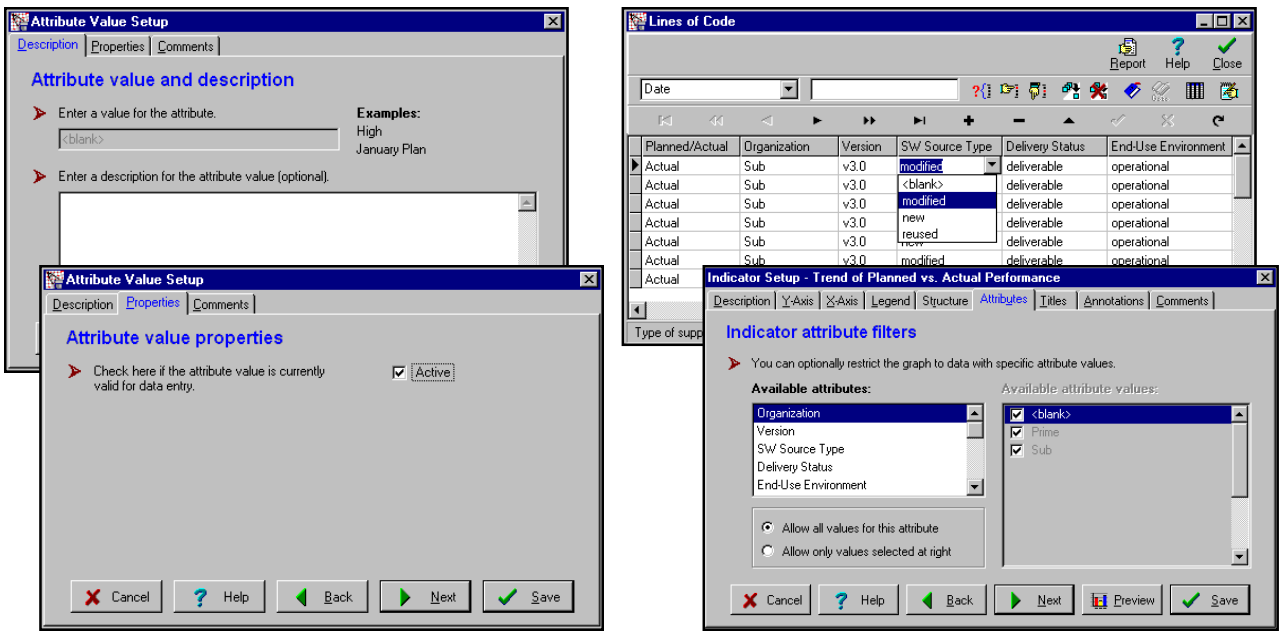
Activating and deactivating the <blank> value - On the data entry grid, if you defined the <blank> value as inactive, it will not appear on the active value lists as a valid choice. If you want to activate the <blank> value, you must go to Attribute Value Setup or Structure Value Setup and check the Active option box on the Properties screen; you cannot activate the <blank> value in the data entry function.

Indicators - In indicators, PSM Insight treats <blank> just like any other value. You can set a filter to include or exclude <blank>, you can specify <blank> in a legend, and you can specify <blank> as an x-axis value to be graphed.

Data Items

Data Entry and Import - Missing values occur in imported or data entry records when you skip over a field or leave it empty. PSM Insight does not display <blank>, it merely leaves the field empty. You can always edit a record to supply a value later if necessary.

Indicators - In indicators, PSM Insight treats missing values just like any other value. You can specify <blank> in a legend, and you can specify <blank> as a value to be graphed.



Blank Values Can be Set up and Activated ... and Selected for Data Entry and Indicators

Importing Data Electronically

PSM Insight can read several standard formats for importing data into PSM Insight from another software program or data source, saving you valuable hours in populating the PSM Insight databases and files. Insight presently recognizes the following import formats:

- Access
- ASCII
- DBase
- Excel
- Paradox

When you import ASCII data, you must also specify detailed file definitions to assure an accurate import.

PSM Insight provides two different data entry functions: one for manual data entry, another for importing data electronically. The **Import/Export** feature will save you valuable time getting project data into PSM Insight if you already have part or all of that data in another software application or file format. You can import data in several formats:

- Access (*.mdb)
- ASCII (*.txt, *.csv, *.tab, *.asc)
- DBase (*.dbf)
- Excel (*.xls)
- Paradox (*.db)

For other data files, use the "save as" function in the source software package to convert the data into one of these import formats.

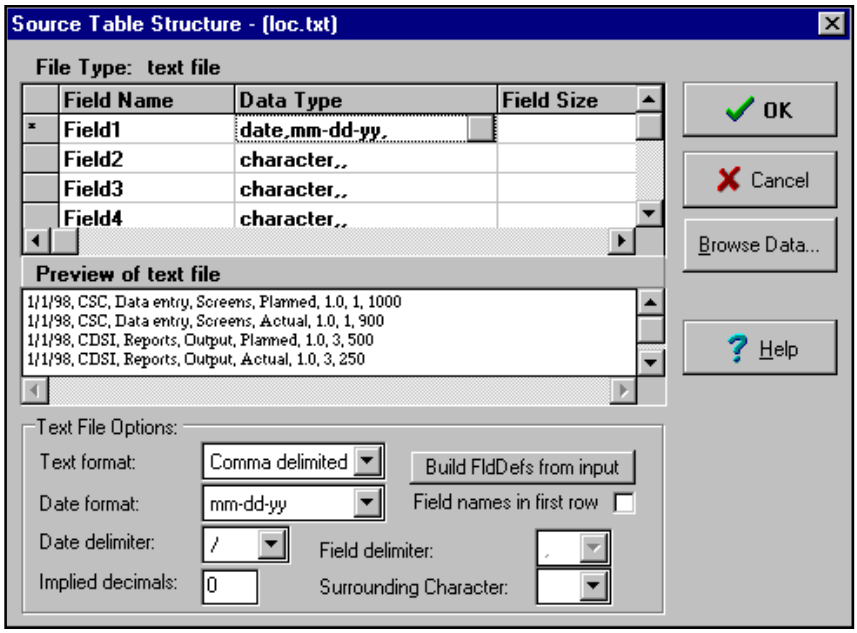
You import data for one measure at a time. For most import file formats, one import file corresponds to one PSM Insight measure. However, when you import data from a Microsoft Access file, one Access *table* corresponds to one measure; when you import data from an Excel spreadsheet, one Excel *sheet* corresponds to one measure. You must provide both the file name and the table or sheet name when importing from these formats.

To import data, you need to create a conversion definition file; PSM Insight calls this a **Setup** file. If this is the first time you have imported data for a particular measure from a specific software package, choose the **New Setup** command. When you finish your import, make sure to **Save** the setup for future use. If you are importing a file that matches the measure and format of a previous import that you defined, choose the **Open Setup** command.

When you import DBase files, Excel, Access, or Paradox tables, PSM Insight automatically recognizes the format and parses the records for your review. If Insight finds a problem with one of these data files, it will tell you what is wrong. When you import data in ASCII format, you must define the structure of the incoming data. PSM Insight prompts you for the information on the **Source Table Structure** screen:

Data Detail	Choices	
Text format	Fixed length Comma delimited Tab delimited	
Date format	yyyy-mm-dd yyyy-mmm-dd dd-mmm-yy mm-dd-yy	mmm-dd-yy mmm-dd-yyyy mm-dd-yyyy yy-mm-dd
Date delimiter	- _ / space none	
Implied decimals	Enter a number	
Field names in first row	Check if your file contains field names in the first record of your input file	
Build FldDefs from input	For tab or comma delimited files, if you checked Field names in first row, PSM Insight will create the Field Names for your records.	
Surrounding character	Enter the character that surrounds text fields	

Note! PSM Insight requires 4-digit years in dates, and will convert imported 2-digit years to 4 digits.



You can Define the ASCII Import Data Structure

Merging and Appending: What is a Duplicate Record?

The PSM Insight Import features lets you:

- Merge new records into an existing database
- Append records to an existing file
- Overwrite a current file with a new file

The PSM Insight duplicate record algorithm checks for date, attribute values, and structure level values when matching incoming records to existing records. Make sure you understand duplicate checking before choosing an import operation to prevent accidental loss of important project data.

When you import records into a PSM Insight project database, you must decide how to handle duplicates and update records. If you are populating a newly-tailored project which doesn't have any data files, you can import your records using the Append command without worrying about overwriting any data. But if you are working with a project that already has data files associated with it, you probably don't want to import records without checking for existing duplicate records. PSM Insight offers three types of import operations:

Merge: Use the Merge command to add new records, and to update existing records. The Merge command checks every incoming record to determine if it matches an existing record in your measure file. If a match is found, the imported record replaces the the record presently in your project. If an imported record does not match a PSM Insight record, the imported record is added into your measure file.

PSM Insight compares the Date, Structure Level Values, and Attribute Values in an incoming record to existing records. If all these fields match exactly, the current PSM Insight record is replaced with the new record. This duplicate check is standard across all measures and projects in PSM Insight.

Append: Use the Append command when you only want to add new records to your measure file and you don't want to update existing records. The Append command checks for duplicate records, but if a match is found, the imported record is ignored and is not included in your measure file. Only unique records are added into the measure file.

Append uses the same duplicate check that Merge uses; it compares the Date, Structure Level Values, and Attribute Values in an incoming record with an existing PSM Insight record. If all these field values match exactly, Import does nothing with the incoming record.

Overwrite: Use the Overwrite command with caution; it deletes your current PSM Insight measure file and replaces it with new data. Overwrite does not check for duplicates or updates. Before you use Overwrite, use Import/Export's Copy command to make a backup of your current measure file.

Checking for Duplicate Records

PSM Insight's duplicate check has been designed and tested by many measurement specialists to make sure you have the most accurate matching algorithm for your project database. At first glance, it may seem strange that records match if they include exact values for only the Date, Structure Level, and Attribute fields. Why aren't data items also checked? Take a look at a sample scenario to better understand the duplicate algorithm. The sample measure, Lines of Code, is defined with 6 fields, the first 5 of which are used for duplicate checking:

Field	Type
Date	Required Field
CI	Structure Level
Unit	Structure Level
Organization	Attribute
Language	Attribute
Number of Lines of Code	Data Item

Here are some records that were input during one month of the project:

Date	CI	Unit	Organization	Language	# of LOC
10/30/1997	DBMS	Database	ABC Software	Delphi	1000
10/30/1997	DBMS	Retrieval	XYZ Developers	Delphi	1200
10/30/1997	DBMS	Reports	PDQ Programs	ReportPPro	1150

Now consider the following records being imported into the LOC measure with the Merge command:

11/30/1997	DBMS	Database	ABC Software	Delphi	1075
10/30/1997	DBMS	Export	XYZ Developers	Delphi	1200
10/30/1997	DBMS	Reports	PDQ Programs	ReportPPro	1180

The first record doesn't match any existing record, so it is added into the measure as a new record. The second record almost matches an existing record, but since it describes work on the Export unit (as a Structure Level) and not the Retrieval unit, it fails the matching algorithm and is also added in as a new record. The third record, however, matches a current record on the first 5 fields, all of which are duplicate checking fields (Date, CI, Unit, Organization, Language); only the data item, Number of Lines of Code, has a different value of 1180. The duplicate check matches; the imported record is an update to a previous record that was incorrectly reported with just 1150 lines of code. Merge replaces the existing record (with the 1150 value) with the imported record (with the 1180 value) as an update. The measure data file now includes 5 records, not 3 or 6:

10/30/1997	DBMS	Database	ABC Software	Delphi	1000
10/30/1997	DBMS	Retrieval	XYZ Developers	Delphi	1200
10/30/1997	DBMS	Export	XYZ Developers	Delphi	1200
10/30/1997	DBMS	Reports	PDQ Programs	ReportPro	1180
11/30/1997	DBMS	Database	ABC Software	Delphi	1075

Exporting Data Electronically

PSM Insight can write out electronic data in ASCII, DBase, Paradox, or Access format so that you may export data from your PSM Insight project to another software package or system. You can specify detailed file definitions to assure that your data is exported accurately and completely.

PSM Insight lets you make a copy of any measure table that you have created in data entry, preserving all the fields that you have defined. The copy is created in Paradox format, for use by another software program or by someone else using PSM Insight.

You may want to use the **Copy** command to make backups of your PSM Insight database in case of a catastrophic loss.

Sometimes you will enter data into your PSM Insight project file and want to share it with other software applications. PSM Insight supplies an export function for this purpose. You can export your data (one measure at a time) in several different formats:

- ASCII (*.txt, *.csv, *.tab, *.asc)
- Paradox (*.db)
- DBase (*.dbf)
- Access (*.mdb)

To quickly export in **Paradox** format, use the **Import/Export** function and choose the **Copy** command. PSM Insight stores project data in Paradox format, so exporting it is easy. **Copy** preserves all your defined fields and measure data. Make sure you **Copy** a measure table to another directory and file. You can use Paradox copies of measure tables in a variety of ways:

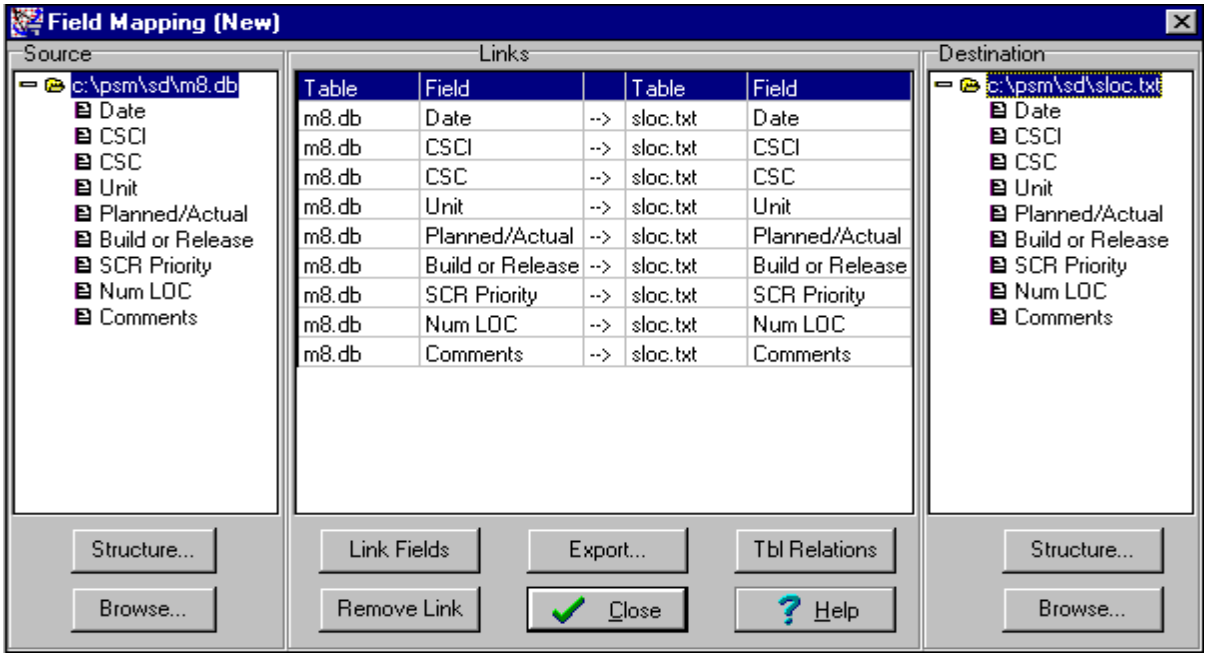
- In another software application
- Shared with another manager or site using PSM Insight
- As backup for your project files
- Imported back into PSM Insight after a catastrophic data loss

To export data, use the **Import/Export** function and choose a new or existing **Setup** to use. A setup is a conversion definition that defines the structure of the file used for exporting data. When you export data from a particular measure for the first time, choose the **New Setup** command. When you finish your export, make sure to **Save** the setup for future use. If you are exporting a file that matches the measure of a previous export that you defined, choose the **Open Setup** command.

For most export file formats (Paradox, DBase, and ASCII), one exported file corresponds to one PSM Insight measure. However, when you export data to a Microsoft Access file, one Access *table* corresponds to one measure; you must provide both the destination file and table name for exporting from PSM Insight to Microsoft Access.

When you export data in ASCII format, you must define the structure of the export file. You must supply the following information on the PSM Insight Export **Destination Table Structure** screen:

Data Detail	**Choices**
Text format	Fixed length Comma delimited Tab delimited
Date format	yyyy-mm-dd yyyy-mmm-dd dd-mmm-yy mm-dd-yy mmm-dd-yy mmm-dd-yyyy mm-dd-yyyy yy-mm-dd
Date delimiter	- _ / space none
Implied decimals	Enter a number
Field names in first row	Check if true
Surrounding character	Enter the character that surrounds text fields



You can Preview an Export File in PSM Insight

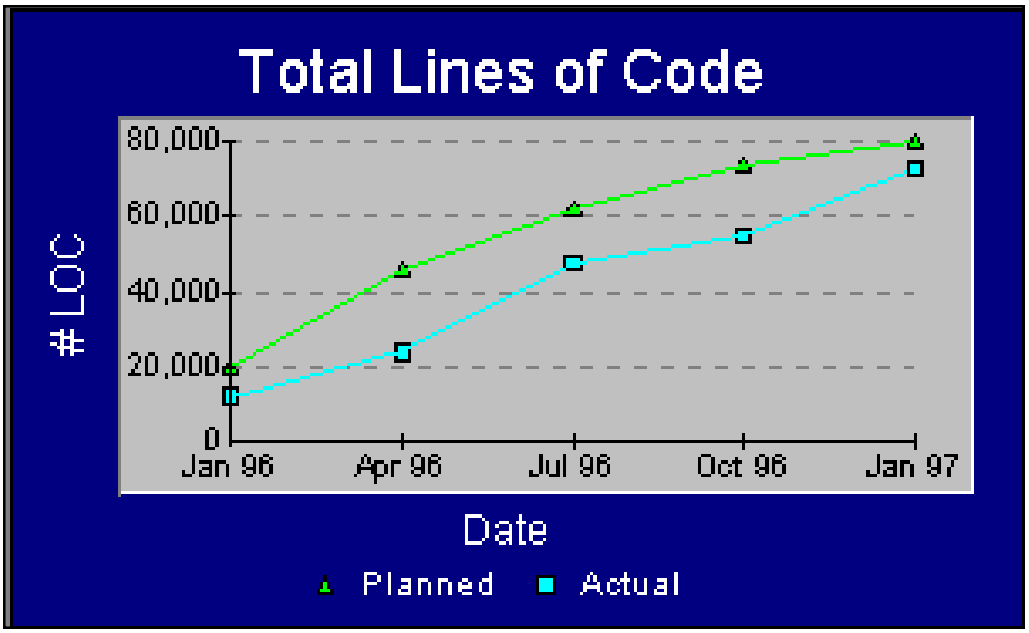
What are Indicators?

An indicator is a measure or a group of measures that provides insight into a project issue. An indicator may be called a metric in other software measurement tools. Indicators frequently make comparisons between two values, such as planned and actual values. An indicator is usually a graph or table. Graphs may depict comparative data, trends, or a snapshot of a project's current status, based on your specific tailoring data.

You can create indicators after you have defined your measures and input data for them. To create an indicator, PSM Insight walks you through several simple steps to specify all the aspects of your graph. When you are done, PSM Insight draws your graph on the screen, using the data that you entered previously.

An indicator is a graph or table that depicts data from one or more measures, providing insight into the status of your project. Indicators help you understand your project issues, and provide objective information for avoiding future problems. Indicators also help you communicate information effectively and unambiguously. Indicators promote a pro-active approach to project management.

Graphs depict such things as schedule variance, design progress, resource utilization, cost variances, software size in lines of code. Indicators can make comparisons between two values, such as planned and actual progress. Make sure your indicators are not complex; each graph should convey one message. You can generate several graphs for a comprehensive view of your project.



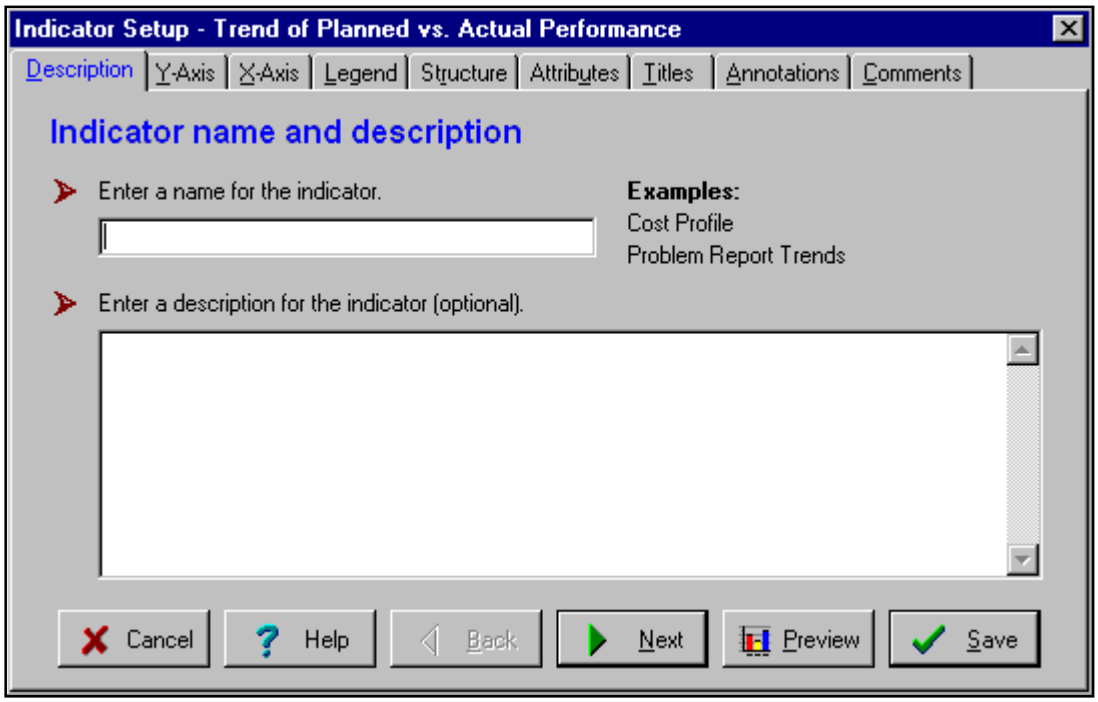
An Indicator is a Graph that Provides Insight into a Project Issue

In the **Indicators** function, PSM Insight walks you through several steps to specify your graph. Choose a graph type, select one or more measures, and review the tab topics to describe each aspect of your graph (such as the x-axis or the legend). PSM Insight presents one factor at a time, helping you build a graph logically and carefully. If you have ever created graphs in a spreadsheet program, the process is very similar, but with a "wizard" helping you. When you are done, PSM Insight draws the graph on your screen with data you entered previously.

Here are a few guidelines to help you define your indicators:

- Pick the right graph type for your data.
- Provide a descriptive and unique title.
- Date your graph to represent the reporting period depicted.
- Include the type of units and scale markers in axis labels.
- Include a key or legend for each line or bar.
- Use the same axes on both graphs when comparing two graphs.
- Be generous with annotations and explanations.

You can be sure that you meet all these guidelines by completing each screen in **Indicator Setup**. If you would like further guidance on indicators and graph types, consult the next several pages in this Manual, or read the PSM Guide, Part 5 - Indicator Examples.



Make Sure to Review all 9 Tabs in the Indicator Set-up Function

How do I Know What Type of Graph to Use?

PSM Insight offers a wide variety of graphs for your indicators, including:

- Trend (line) graphs
- Snapshot (bar) graphs
- Histogram (bar) graphs
- Reliability models (SMERFS^3 input data file)
- Tables

You can graph data in one or several measures, data grouped by an attribute or by structure, analysis of several data items, or a comparison of project plans and actual data gathered. With a few guidelines, you can choose the appropriate graph for every aspect of your project.

There are many options to choose from when defining an indicator. While it may seem like there are endless graph types to choose from, there is a short list of questions that you can ask yourself about your data to guide you to the correct indicator. You can also group indicators into a few simple categories to differentiate the graph types.

There are four basic types of PSM Insight indicators. **Trend graphs** are line graphs, depicting the project performance over a selected period of time. **Snapshot graphs** are bar charts, showing the performance of one or more data items for one particular point in time. **Histograms** are bar charts that count the frequency of data items in different classes for one point in time. **Reliability models** are data files prepared for input into the SMERFS^3 software package.

Ask yourself these first guideline questions to make a basic decision about the type of indicator you should use:

1. Do I want to show progress or performance of a data item over time?
   Choose a trend graph

2. Do I want to capture data from just one point in time?
   Choose a snapshot graph or histogram

3. Do I want to assess the reliability of my software, hardware, or system?
   Choose a reliability model to create a data file as input into the SMERFS^3 analytical software program

The next consideration is whether or not you want to filter data on structures:

4. Do you want to graph a data item for just one of its structure level values?
   A trend graph can depict data for a specific structure unit

5. Do you want to compare performance by different structure level values?
   A snapshot graph can include one bar for each structure value

Next, consider the influence of attributes on your graph:

6. Do you want to graph a data item for just one of its attributes?
   A trend graph depicts data for a specific attribute value

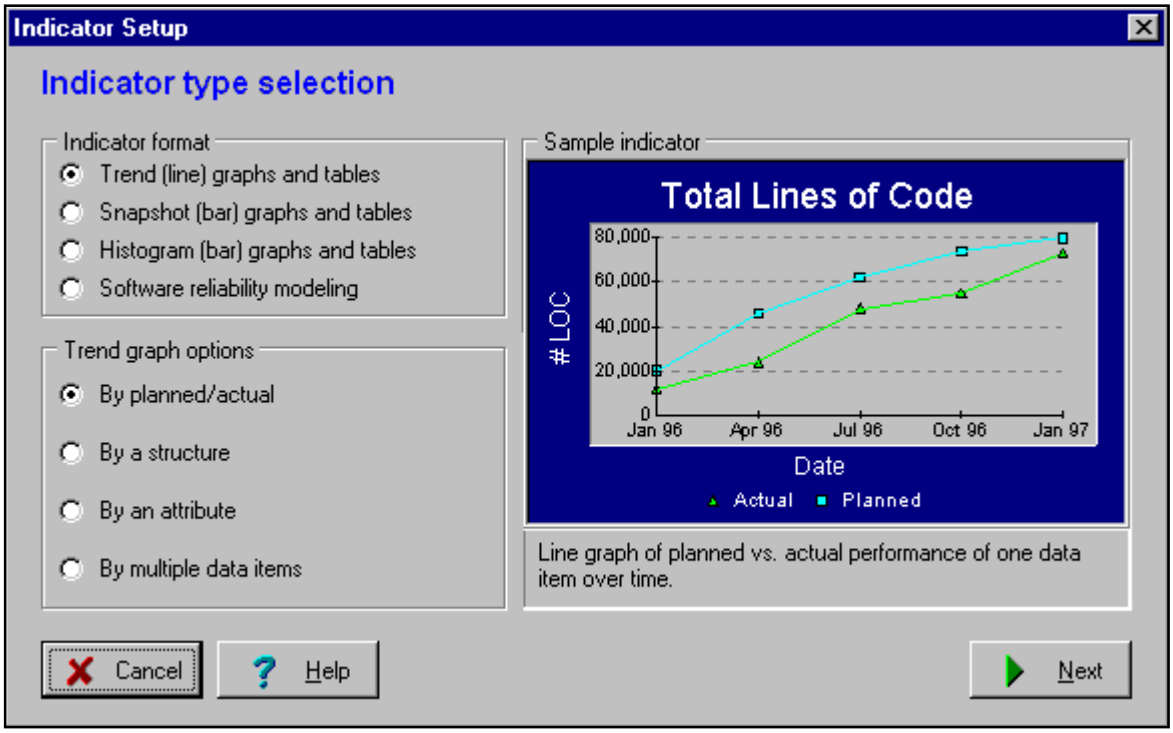
7. Do you want to compare performance by different attribute values?
   A snapshot graph can illustrate multiple attribute values with several bars

A very common type of indicator depicts project plans as well as actual performance. Either type of graph can be used in this case:

8. Do you want to compare planned and actual data?
   A trend graph uses multiple lines to compare planned and actual data
   A snapshot graph uses different bars to compare planned and actual performance

If you just wish to plot a frequency distribution, or the counts of data items in different groups (by structures or attributes), choose a histogram.

Finally, you may just wish to view your data in a table rather than in a graphical indicator. To generate an indicator table, use the same guidelines listed above, but after you define your indicator, choose **Table** instead of **Graph** when you generate the actual indicator.



PSM Insight has Examples of all Graph Types to Help you Decide Which one to Use

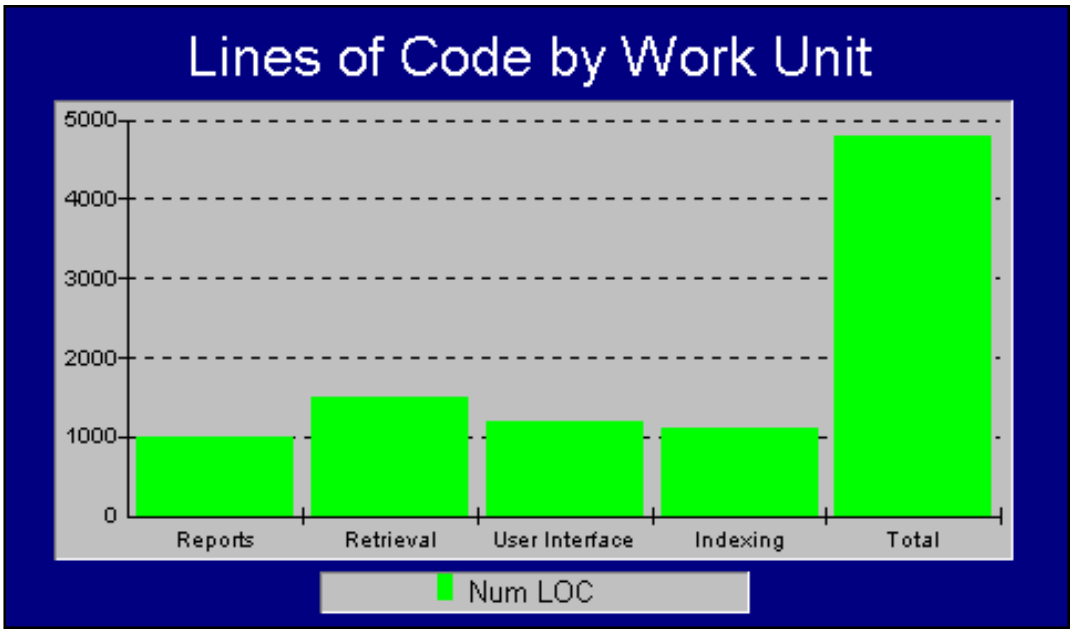
Using Snapshot Graphs

A snapshot graph captures project data in bar graph style. This type of graph illustrates project status at a single point in time. A snapshot graph is often used to report:

- Design progress by CI
- Effort allocation by activity
- Requirements stability by type of change
- Problem report status by priority
- Software complexity
- Software productivity

A snapshot graph captures project data for a single point in time as a bar chart. Bar charts are typically used to represent counts or frequencies of specific activities or events. By default, PSM Insight draws vertical bars, each one illustrating a class or group of data. Sets of bars can be used to compare the performance of two or more data items. Multiple bars can also be used to compare the planned value and the actual value of data items. Differences are indicated by the height of the bars.

For example, you might graph the monthly cost that each work unit spends. Each bar would represent the expenditures of one work group. For any given month, you could compare the monies spent by each group to make sure that funds are allocated equitably. Or, you might graph the same



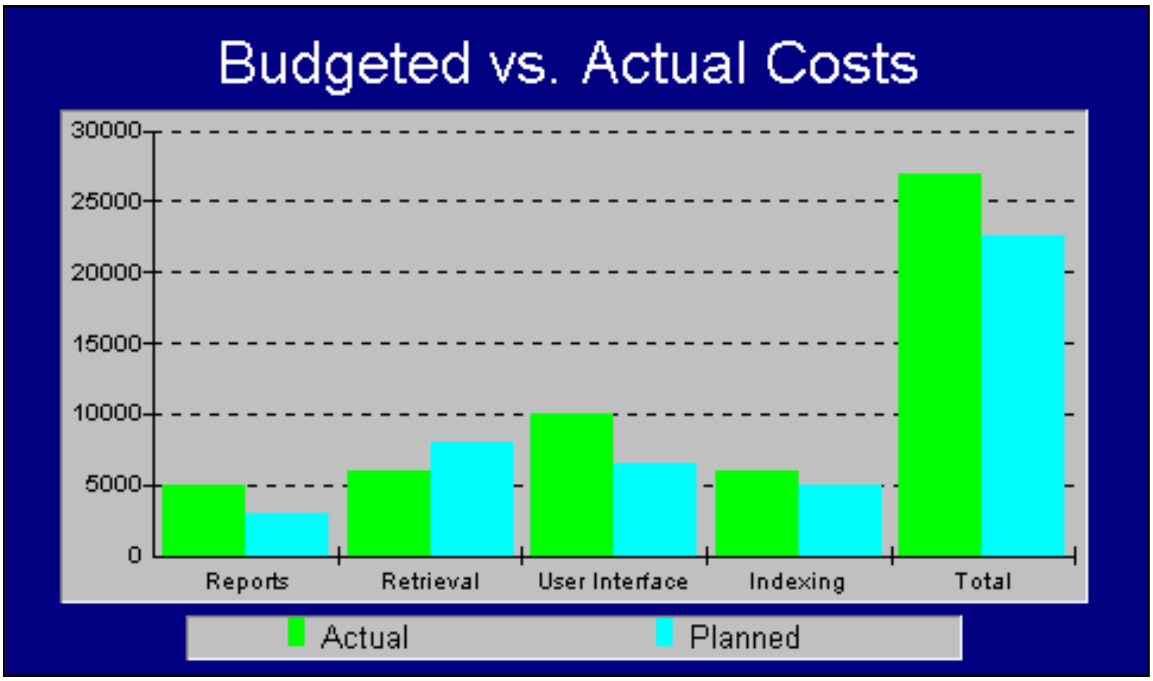
Snapshot Graphs Chart Data Values at one Point in Time

monthly costs against the planned amounts. In this case, PSM Insight would draw two bars for each work unit, one indicating the budgeted amount spent, the other depicting the actual monies spent. A clear comparison can be drawn when the bars are side by side. Each set of bars would represent the performance of one work unit compared to its expected expenditures.

Snapshot graphs are often used to report:

- Design progress by CI
- Incremental build content
- Effort allocation by activity
- Staff experience
- Software size by CI
- Requirements stability by type of change
- Response time by function
- Problem report status by priority
- Software complexity
- Software productivity by build or CI
- Rework effort by activity
- Planned and actual software origin in lines of code

The PSM Guide includes many pages of actual snapshot graphs created for case studies. Consult the PSM Guide for further guidance in using snapshot graphs and to see specific examples. See the topics, "Printing PSM and PSM Insight Materials" and "Where Can I Get Help?" in this **Manual** for assistance in acquiring a copy of the PSM Guide.



Snapshot Graphs Can Also Compare Planned and Actual Performance

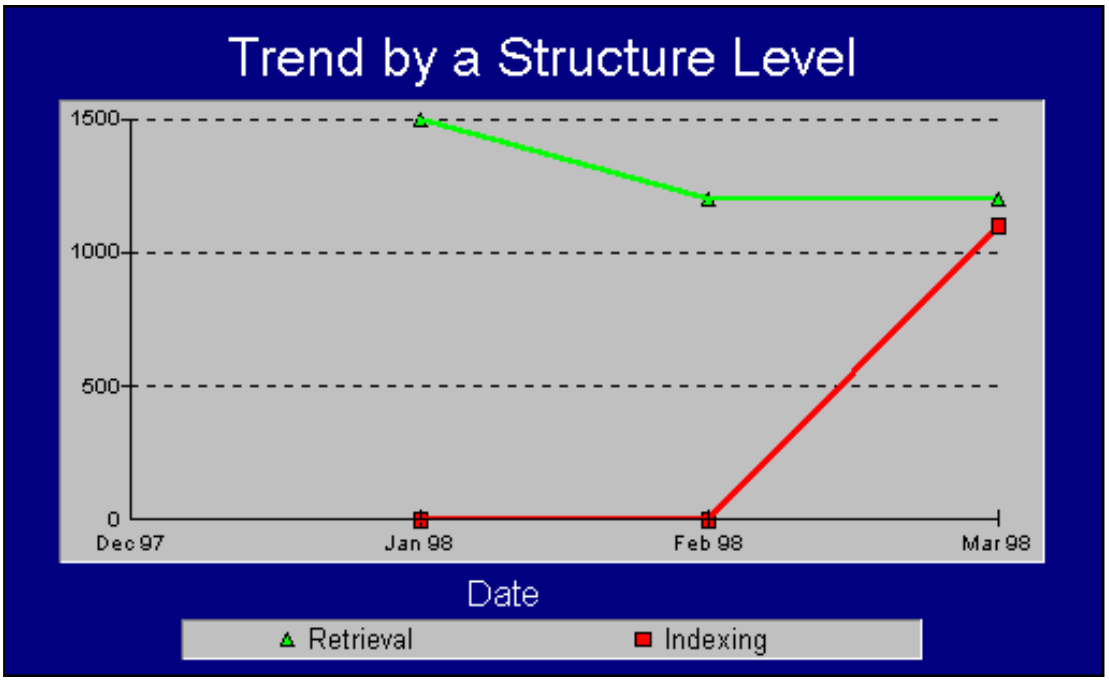
Using Trend Graphs

A trend graph depicts changes in one or more data items over time. A trend graph is typically drawn as a line graph. It is often used to report:

- Design progress by date
- Cost profile
- Resource utilization over time
- Software size over time
- Requirements stability over time
- Problem report status by date

Trend graphs are line graphs. They represent a series of data values collected over time. The values are plotted as points on the graph, and the points are connected with lines to show progress or a trend.

Project changes are easily illustrated by the slope and the direction of the line on a trend graph. As time goes on, you can re-generate the graph, adding to the value points and line each time. When your project is complete, the final trend graph depicts the historical performance of a particular data item over the lifetime of the project.



Trend Graphs Depict Change Over Time

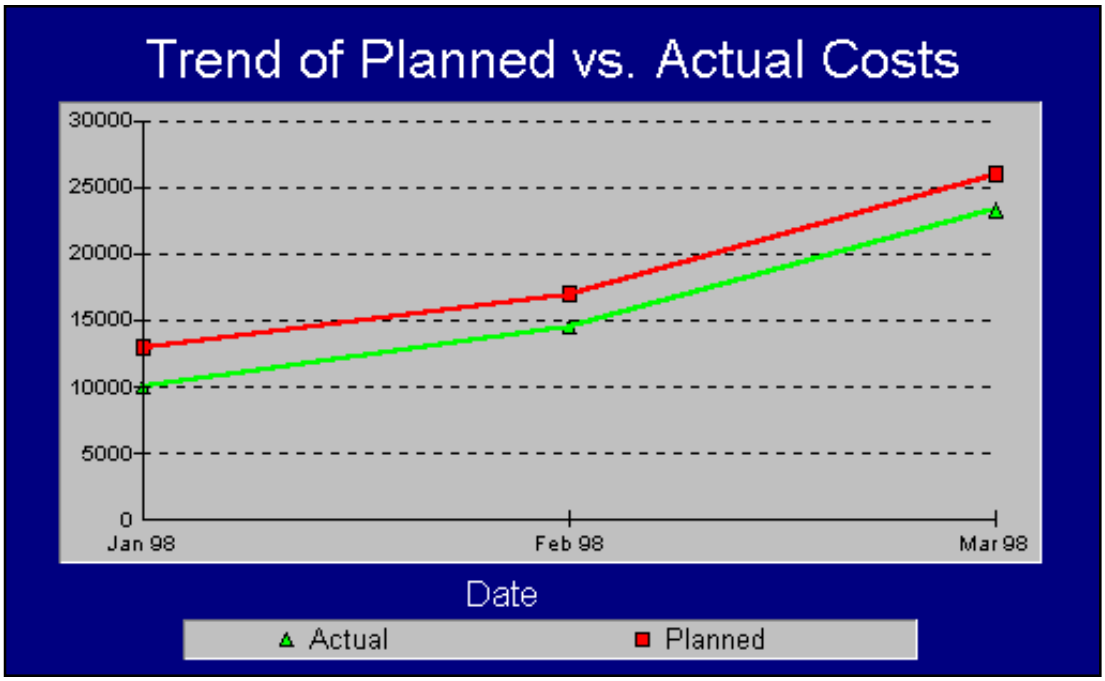
Trend graphs are often used to compare the expected performance of one data item to its actual performance. For example, you can compare the planned lines of code (predicted at the start of the project) to the actual number of lines that are written every month. This comparative trend graph helps you evaluate the productivity of each work unit. You must assign the Planned/Actual attribute to your measurement data item if you want to generate this type of comparative trend graph.

The x-axis of a trend graph represents time. Markers on the x-axis typically indicate months in a year. The y-axis depicts the range of the data values being tracked.

Trend graphs are often used to report:

- Design progress by date
- Schedule variance
- Effort allocation over time
- Cost profile
- Resource utilization over time
- Software size over time
- Requirements stability over time
- Problem report status by date

The PSM Guide includes many pages of actual trend graphs created for case studies. Consult the PSM Guide for further guidance in using trend graphs and to see specific examples. See the topics, "Printing PSM and PSM Insight Materials" and "Where Can I Get Help?" in this **Manual** for assistance in acquiring a copy of the PSM Guide.



Trend Graphs Can Compare Planned vs. Actual Performance

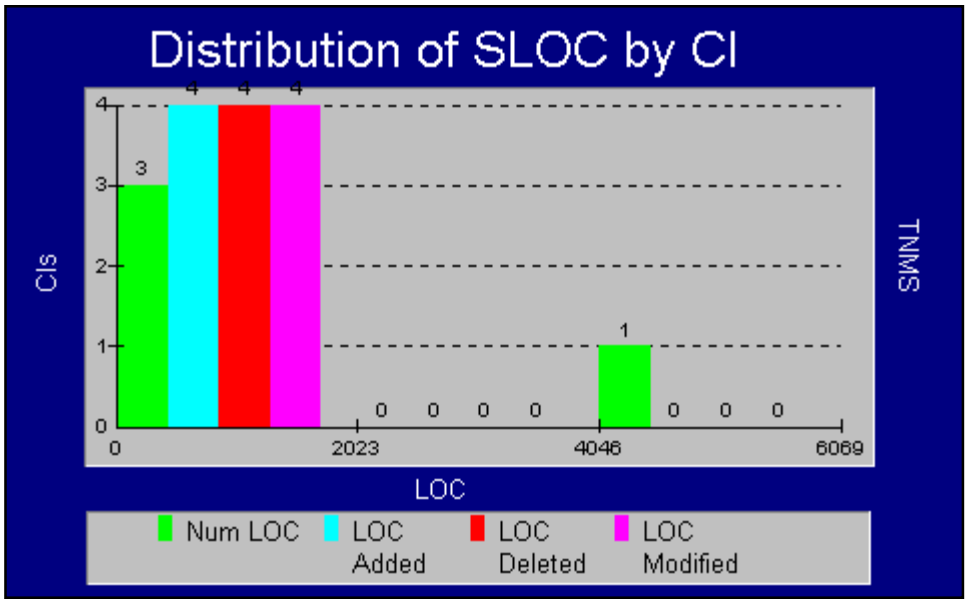
Using Histogram Graphs

A histogram graph is a special type of bar chart that counts data items in different classes, depicting a frequency distribution by structure or attribute. Histograms illustrate project status at a single point in time. A histogram is often used to report:

- Distribution of costs
- Count of software size (measured in lines of code) by CI, or by version
- Distribution of staff experience levels by software unit
- Distribution of requirements by CI
- Frequency of problem reports by software unit
- Count of problem reports by software version

A histogram graph is a special type of bar chart. Like a snapshot graph, it captures project data for a single point in time. A histogram plots the count (or frequency of distribution) of data items in different classes. The height of a bar in a histogram represents the count, plotted on the y-axis. The range of values for the data item is plotted on the x-axis in "intervals" or groups of data values. Sets of bars can be used to compare the performance of two or more data items. Multiple bars can also be used to compare the planned value and the actual value of data items. Differences in counts or frequencies are indicated by the height of the bars.

For example, you could graph a count of Lines of Code by CI to determine how many software units have achieved a certain size. The x-axis plots lines of code, grouped into intervals. For example, PSM Insight



Histograms Chart the Distribution of Data Items by Structures or an Attribute

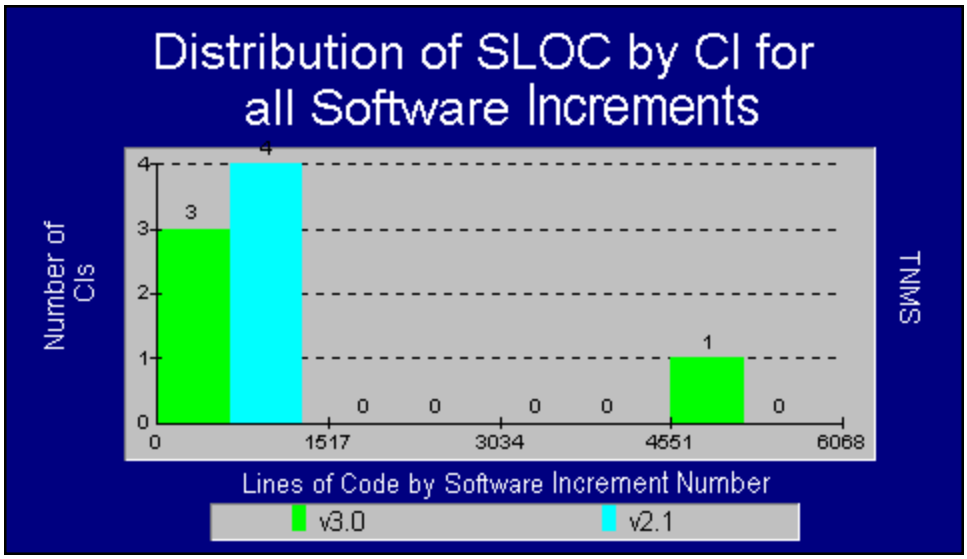
could divide the range of values for Lines of Code into five intervals, approximating tens of thousands of lines or thousands of lines of code (depending upon the actual values). The y-axis represents the count of structure level values (CIs) for each data item. The resulting histogram helps you determine how many software units are below the level of expected development, how many units have reached a maximum size, or if all units are progressing at a relatively equal level of development. (See the example histogram on the previous page.)

Histograms can also count data items by both structure level and an attribute. For example, you may need to know if the development costs for a project's units differ by software version number. In this case, the x-axis plots lines of code, with one bar for each software version. The y-axis represents counts by software unit. (See the example on this page.)

Histogram graphs are often used to report:

- Distribution of costs
- Count of software size (measured in lines of code) by CI
- Count of software size by version
- Distribution of requirements by CI
- Frequency of problem reports by software unit
- Count of problem reports by software version
- Distribution of staff experience levels by software unit

The PSM Guide includes examples of histograms created for case studies. Consult the PSM Guide for further guidance in using histogram graphs and to see specific examples. See the topics, "Printing PSM and PSM Insight Materials" and "Where Can I Get Help?" in this **Manual** for assistance in acquiring a copy of the PSM Guide.



Histograms Can Also Count a Data Item by both Structures and Attributes

Using Software Reliability Indicators (SMERFS)

PSM Insight provides a special type of indicator for reliability analysis. When you sepcify a software reliability indicator, PSM Insight creates an input file for SMERFS^3, or Statistical Modeling and Estimation of Reliability Functions for Systems. In SMERFS^3, you can use over a dozen reliability models to analyze error/problem data. Software reliability indicators answer such questions as:

- Is my software ready for widespread distribution?
- How good is my system?
- How much testing must be done before we can release our product?
- Does my software need extensive rework?

PSM Insight provides a special type of indicator for reliability analysis. When you specify a software reliability indicator, PSM Insight creates an input file for SMERFS^3. SMERFS^3, or Statistical Modeling and Estimation of Reliability Functions for Systems, is a software package developed by Dr. William Farr at the Naval Surface Warfare Center in Dahlgren, Virginia. SMERFS^3 analyzes software, hardware, and systems data with over a dozen reliability models, using either time-between-failures data (TBF) or interval counts of error/problem data.

Software reliability indicators are used to address such issues as:

- Is my software ready for widespread distribution?
- How good is my system?
- How much testing must be done before we can release our product?
- Does my software need extensive rework?

SMERFS^3 is provided free with this version of PSM Insight, installed automatically in a \SMERFS subdirectory under the PSM Insight software directions. PSM Insight requires non-cumulative date for the SMERFS^{3}data file; if you define your data as cumulative, PSM Insight will tranform it to non-cumulative. Like all other PSM Insight indicators, you can filter data in a software reliability indicator by structure level or attribute values. You can also limit a large data set to a specific date range, or aggregate selected measure data But since PSM Insight does not generate a graph of a software reliability indicator, you do not define X and Y axis parameters. Instead, you define data specifications needed by the SMERFS^3 software package. When you Save a SMERFS indicator, PSM Insight automatically launches the SMERFS^3 software, which plots the data and prepares it for reliability analysis.

No one reliability model can accurately predict software/system readiness, so SMERFS^3 provides the a set of reliability models that can be applied to different situations:

Time-between-failure models for software

- Littlewood and Verrall's Bayesian Model
- Moranda's Geometric Model
- John Musa's Basic Execution Time Model
- John Musa's Logarithmic Poisson Model
- The Jelinski-Moranda Model
- An adaptation of Goel's Non-Homogeneous Poisson Process (NHPP) Model

Error count models for software

- The Generalized Poisson Model
- Goel's NHPP Model
- Brooks and Motley's Model
- Yamada's S-shaped Growth Model
- Norma Schneidewind's Model

Hardware reliability analysis models

- Exponential
- Raleigh
- Weibull
- Reliability growth-projection models (discrete and continuous versions)
- A discrete reliability growth model
- A continuous reliability growth-tracking model

Systems reliability analysis models

- The hyper-exponential model
- A Markov model

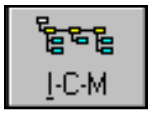
The SMERFS^3 software provides interactive step-by-step instructions for its use, and comprehensive documentation. For further information about SMERFS^3, or for assistance in its use, contact Dr. William Farr, B35, at the Naval Surface Warfare Center, Dahlgren, Virginia 22448; phone 540-653-8388; e-mail farrwh@nswc.navy.mil.

PSM Insight Creates a SMERFS^3 Input Data File for Reliability Analysis

Cumulative and Additive Data

When you define a data item, there are many different properties and characteristics you must specify. Some of those specifications may be confusing. For example, the properties of **Cumulative** and **Additive** may seem identical or so similar as to be indistinguishable. While these properties are closely related, they are different, and must be accurately specified to assure that your graphs are valid.

Additive data values can be added together arithmetically to arrive at a meaningful total. Cumulative data values represent totals to date. Data must be additive before it can be cumulative, and it must be additive to be used in indicators -- PSM Insight only graphs additive data at this time.



When you define data items for PSM Insight measures, you specify several different characteristics of data items. For numeric fields, you must indicate two special properties: whether or not a data item is cumulative and additive. Your decisions affect the type of indicators you generate and how PSM Insight manipulates your data. Take a few minutes to understand these important data item properties and how to specify them.

Cumulative Data Item

A cumulative value is a total value to date, at one point in time. For example, if you spent $1,000 in October and $2,000 in November, the cumulative Cost value for November is $3,000. Examples of data items that may be cumulative include Cost, Total Lines of Code, and Software Problem Reports.

Non-cumulative data values are collected periodically and represent counts or values that are not totals. For example, the Number of Components Added This Month may be 5 in March, and 4 in April. The total number of product components in April may be 15, but only the number added during the month is reported; the data item is non-cumulative.

Most data items will be cumulative, representing totals to date. When you specify a data item, PSM Insight defaults to cumulative; change the property option if your data is non-cumulative.

Additive Data Item

An additive value is a number that can be added with other values to arrive at a meaningful total. For example, if your Monthly Cost in June is $3,000 and $4,000 in July, you can add those values to arrive at a total project cost to date of $7,000. Some typical additive data items may include Lines of Code Added, Personnel Gained, and Requirements Deleted.

Data items such as averages and indexes are non-additive; adding their values does not result in a meaningful total.

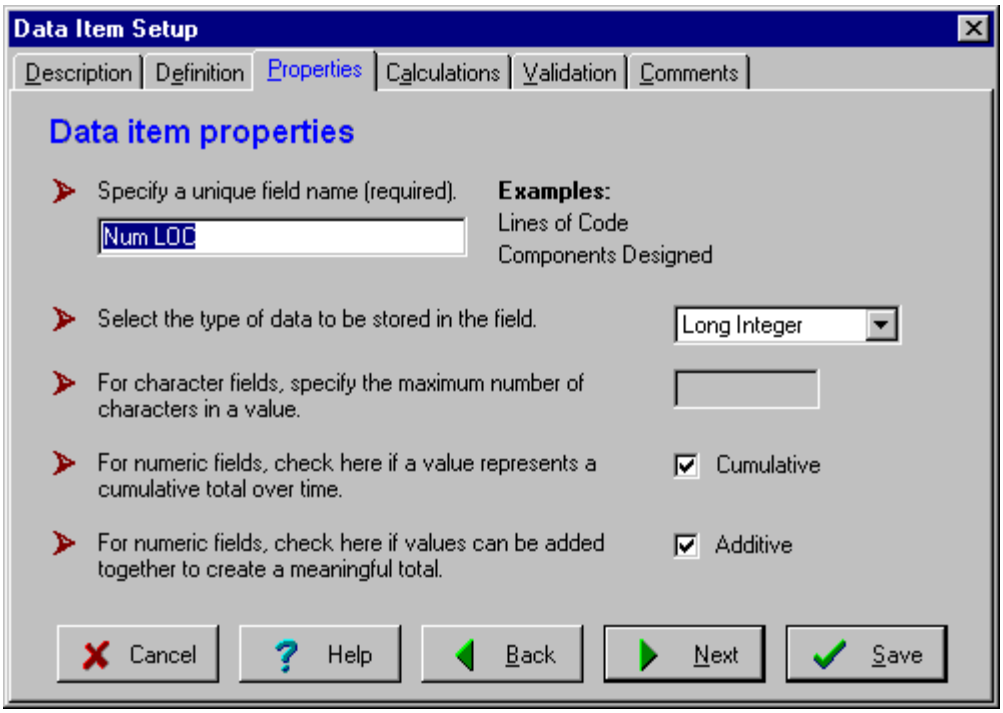
Data items cannot be defined as cumulative or non-cumulative until they are specified as additive. Also, data must be additive if you want to use it to generate PSM Insight graphs. When you specify a data item, be sure the additive property option is checked if your numeric data can be manipulated arithmetically.

What Kind of Data Do I Need for Indicators?

At present, data must be additive to be plotted in PSM Insight indicators. Data items can be either cumulative or non-cumulative in indicators. In fact, you can mix cumulative and non-cumulative data on one graph. For example, you may want to plot Total Lines of Code (cumulative) and Lines of Code Added (non-cumulative) on one trend graph to compare progress and growth.

PSM Insight does not remind you that a data item is cumulative or non-cumulative; you must remember that distinction when you interpret your graph. You may want to record notes about this data item property in your indicator annotations area.

When you specify an indicator, you can have PSM Insight re-interpret a data item as cumulative or non-cumulative regardless of how it was originally specified. You do not change the data item values that are permanently stored in your database; PSM Insight performs the necessary computations solely for generating one indicator. In other words, you can see your data plotted as cumulative or non-cumulative even though you didn't record your data that way. Use this option in Indicator Setup (when you define your Y-axis) if you don't recall how a data item was originally specified or if you want to view your data differently for a particular analysis.



Be Sure to Specify if Your Data Item is Cumulative or Additive

What is Aggregation?

Aggregation is the addition of similar lower level values to arrive at a higher level total on an indicator. It is the combination of raw, detailed information from lower level components into higher level totals.

Aggregation can occur across attributes or structure levels to arrive at a total for a particular data item as long as your data item is defined as additive. PSM Insight aggregates values for you automatically when creating indicators. This is very useful when you need to present project data to senior staff who only require an overview or top-level reporting of the data.

Aggregation is an important concept to understand, but it is not a calculation that you have to do manually. It is the addition of low level values from your raw data, resulting in sub-totals or a project-level total. PSM Insight can aggregate data several ways in your indicators. It is an important feature to use when you are reporting high-level project information to senior staff who require a project overview rather than work unit level detail.

Aggregation is best understood with hypothetical examples. Consider values for the "Lines of Code" measure. "Lines of Code" is defined at the Unit structure level. The project analyst is collecting the additive/cumulative data item, "Number of Lines of Code," and the attribute, "Organization" as the name of the company doing the programming. The data grid includes the following records:

Date	CI	Unit	Organization	Lines of Code
01/01/1998	Personnel database	Retrieval	Software Concepts	1500
01/01/1998	Personnel database	User interface	Techno-Designs	1000
02/01/1998	Personnel database	Retrieval	Software Concepts	2700
02/01/1998	Personnel database	Reports	Computers, Inc.	1050
03/01/1998	Personnel database	Indexing	Software Concepts	1100
03/01/1998	Personnel database	User interface	Techno-Designs	2350

The analyst usually charts the "Number of Lines of Code" by Unit in a snapshot graph to determine the comparative progress on each component. By checking off the "Include a total of the x-axis values" option in Indicator Setup, PSM Insight automatically calculates and plots a quarterly project total lines of code of 7200 for the analyst. The "Total" bar on the snapshot graph is the aggregated total (see first illustration).

Aggregation can also occur across an attribute to arrive at a total for a particular data item. Using the data in the previous example, consider aggregation by attribute. The analyst would like to have PSM Insight aggregate data across attribute values for "Organization" in a snapshot graph to compare the productivity of each company working on the project. During Indicator Setup, he selects the "Attribute" tab and all values for "Organization." He also checks off the option to include

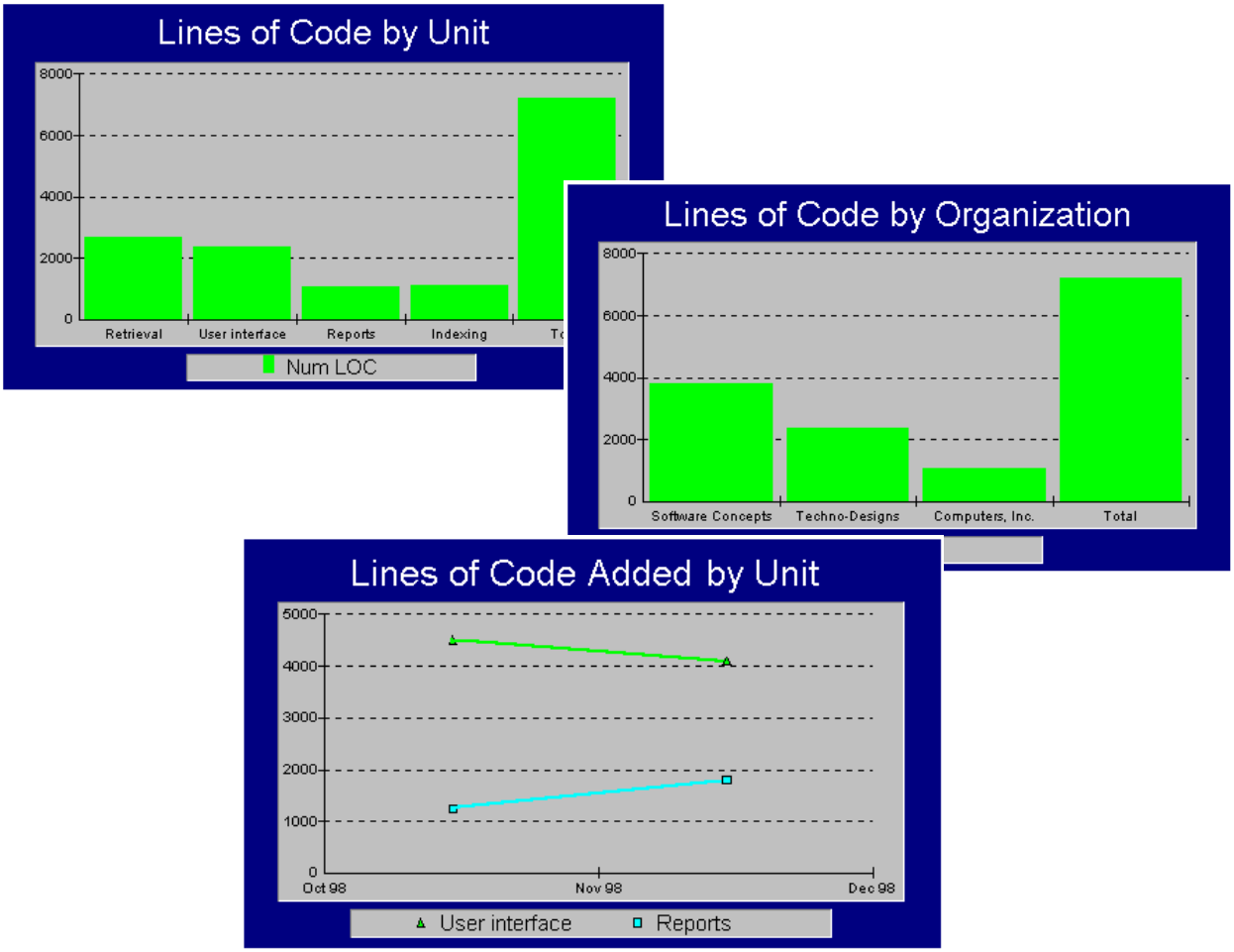
a total bar on the x-axis. PSM Insight aggregated the total automatically (see second illustration).

PSM Insight also aggregates non-cumulative data automatically. For example, given these records in a larger data set:

Date	Unit	Organization	Language	Lines of Code Added
10/15/1998	User interface	Bits, Inc.	Delphi	1500
10/15/1998	User interface	Bytes, Inc.	C++	2000
10/15/1998	User interface	Bits, Inc.	C++	1000
11/15/1998	User interface	Bits, Inc.	Delphi	2300
11/15/1998	User interface	Bits, Inc.	C++	1800

you may want to plot "Lines of Code Added" by Unit on a trend graph to analyze productivity. PSM Insight automatically adds up all the lines of code programmed by both Bits, Inc. and Bytes, Inc., in both Delphi and C++, to arrive at an October total of 4500 and a November total of 4100. Your graph includes one line for each Unit, with monthly totals as data points (see third illustration).

PSM Insight can save you valuable time by aggregating hundreds of values in any number of ways, as long as you define your data items as additive.



PSM Insight Aggregates Across Attributes or Structure Values

Interpreting Graphs

Indicators point to potential problems that you must recognize and handle. You should review your project indicators regularly, taking corrective actions when necessary.

Indicators support two types of analysis: feasibility analysis and performance analysis. Feasibility analysis occurs during project planning, to determine if objectives are realistic. Performance analysis is done regularly to determine if your project is meeting plans and objectives.

There are several guidelines and checklists available to help you examine your graphs in a systematic way.

Indicators are not answers to problems; they merely point to potential problems or unexpected situations that you must analyze and resolve. Analysis is dynamic; you must continually reexamine your data to respond to new problems or changing issues.

As you analyze your indicators, use the following points as guidance:

- Identify problems or new issues.
- Evaulate the impact of the problem on project objectives.
- Compare data across all project sources and organizations to isolate a problem's origin.
- Compare several graphs to determine the scope of the problem.
- Combine indicators with other project information for a more accurate assessment.
- Use previous personal experience to interpret your indicators.
- Evaluate your alternatives and choose an action plan.
- Revise your strategy and your PSM Insight project accordingly.

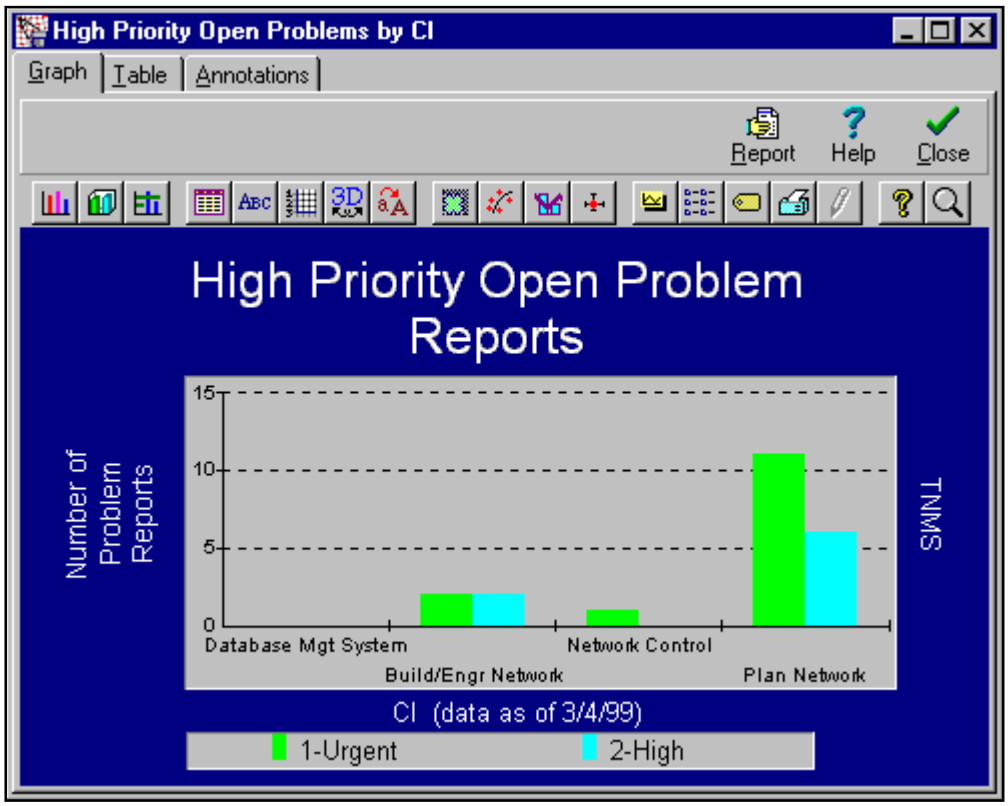
There are two types of analysis: feasibility analysis and performance analysis.

Feasibility analysis determines if project plans are realistic and achievable. It is conducted during the intial planning phase and during all subsequent re-planning periods. Here are some questions to ask yourself as you analyze indicators during the planning stages of your project:

1. Are important activities missing on schedules?
2. Is overlap between activities reasonable?
3. Are holidays and vacations considered in your plan?
4. Is the rate of progress reasonable?
5. Is planned performance consistent with past performance?
6. Are totals reasonable?
7. Are dates, milestones, and frameworks realistic?
8. Does the effort allocated match the workload?
9. Does the effort allocated match costs?
10. Does any other project information contradict plans?

Performance analysis determines if development is meeting the plans, assumptions, and objectives of your project. It should be conducted regularly throughout the project life cycle, since issues can change at any time. Here is a list of questions to ask yourself as you analyze project status indicators:

1. Do actual trends correspond to planned trends? If not, how big is the variance?
2. Is the variance growing gradually each month?
3. Are actual values exceeding planned limits?
4. Are outliers or anomalies affecting results?
5. Is the source of a problem evident?
6. Are growing problems in one area a leading indicator of other problems later in the project?
7. Do multiple indicators lead to similar conclusions?
8. Does other project information contradict performance results?



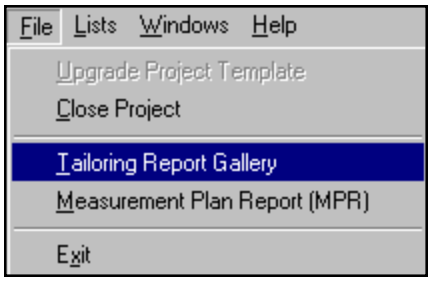
Graphs Indicate Problems but Don't Supply Answers

Reports

PSM Insight provides several reports to help you tailor and monitor your project:

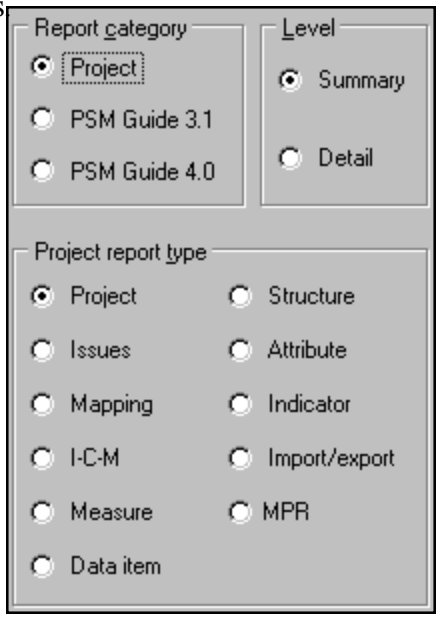
- Measurement Plan Report - PSM template for an initial project measurement plan that can also be used to track progress against plans
- Tailoring Reports - Project-specific reports and **PSM Guide** template reports that help you customize your project, accessible from **File/Tailoring Report Gallery**
- Data reports - Printouts of records you input with the **Data** and **Import** functions
- Indicators - Graphs to help you analyze your data

Most functions in PSM Insight provide a **Report** button to generate a hardcopy of the data on the screen. Reports can be saved as RTF or HTML files, and can be emailed as attachments.



While you tailor a project, you may need a comprehensive report. You may want to see a list of all the items in a PSM template, to print descriptions of your tailored items, or to share reports with team members. This is when the **Tailoring Report Gallery** is useful. The Gallery provides many project-specific reports, and several PSM Guide Template reports. Each report can be generated as a summary report or a detailed report with lengthy descriptions.

Access these reports from the **File** menu and then click **Tailoring Report Gallery**. Choose a report category (**Project**, **PSM Guide 3.1**, or **PSM Guide 4.0**), a detail level (**Summary** or **Detail**), and a report type (topic) that you need. You can choose from many different report topics, including: a complete listing of your issues, categories, and measures; detail on all your data items; a summary of all measure information; or a list of all indicators.



PSM Insight Provides Many Project-Specific and PSM Template-Based Tailoring Reports

The PSM methodology recommends that you write a measurement plan when you start a project, and that you update it throughout your project as analysis results necessitate tailoring changes and measurement changes. PSM Insight provides a comprehensive template for a Measurement Plan Report (MPR). The MPR template helps you plan a new project, justify a project to senior management, and track progress. The MPR template outlines and defines the basic organization of the report. It also includes guidance text to help you write the contents of a measurement plan.

Access the Measurement Plan Report from the **File** menu and then click **Measurement Plan Report (MPR)**. PSM Insight walks you through the creation of the MPR outline and report one section at a time. Use the recommended report structure and follow the PSM guide text to add project-specific data.

Most PSM Insight functions provide a **Report** button for generating a hardcopy of the data on the screen, for saving the information to an RTF or HTML file, and for saving a report as an email attachment.. There are several places where this function is useful:

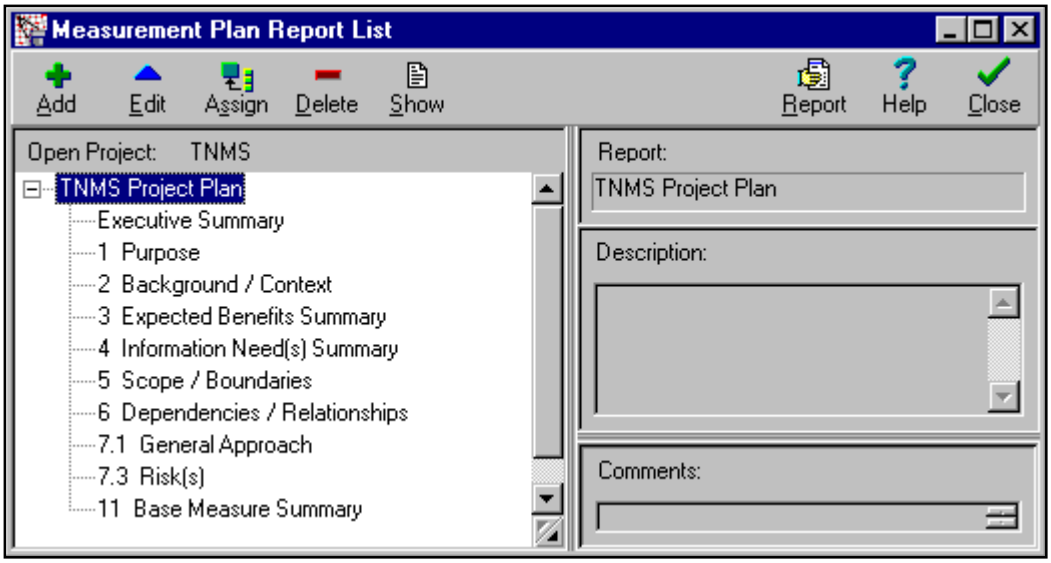
- **Planning** - During project planning, create a Measurement Plan Report for a comprehensive view of project plans and actual progress

- **I-C-M** tailoring progress printouts - While you are tailoring a project, you can print out the items that you have entered into the **I-C-M** list at any time.

- **Data** grid printouts - If you need a copy of the records you have input either through data entry or the **Import** routine, you can call up a measure on the **Data** grid and print the file.

- **Indicators** printouts - If you are generating a graph, chances are you will want to print a hard copy for reporting purposes.

Note: PSM Insight uses your default Windows printer. If you have not defined a default printer, exit PSM Insight and set up a printer with the Windows **Control Panel/Printers** command. Optionally, you can configure your printer with the PSM Insight **Report/Print/Setup** function.



PSM Insight Helps You Create Measurement Plan Report

Printing PSM and PSM Insight Materials

There are several different pieces of documentation on the PSM process and on the PSM Insight software that may help you work smarter. You can print any of them out from their PDF format. The most important files are:

- **Userdoc.pdf** This User's Manual, stored in your PSM Insight directory
- **Front.pdf, Part1.pdf**...**Part7.pdf, Dod_supp.pdf** PSM Guide on the CD-ROM

While there are many useful on-screen aids for PSM Insight, you may want to have printed documentation for occasional reference or for background reading. There are several sources to assist you:

1. You can print any topic in the **Help** file simply by using the print button while viewing the Help topic that interests you.

2. You can screen capture and print any screen in the **Product Tour** while you are viewing it. You will need screen capturing software to accomplish this task.

3. There are several documents about the PSM process and the PSM Insight software tool that you can easily print out from their PDF files. PDF files are special formats created for the Adobe® Acrobat® Reader so that anyone can view and print the files, regardless of what type of word processor you have. You can install the Adobe Acrobat Reader from the PSM Source CD-ROM.

Once you have the Acrobat reader installed, click on any PDF file in the **Windows Explorer** or the **File Manager** to view the file. Then, use the **File/Print** function to obtain a hard copy.

Here are the PDF files that are relevant to your work:

Usedoc.pdf

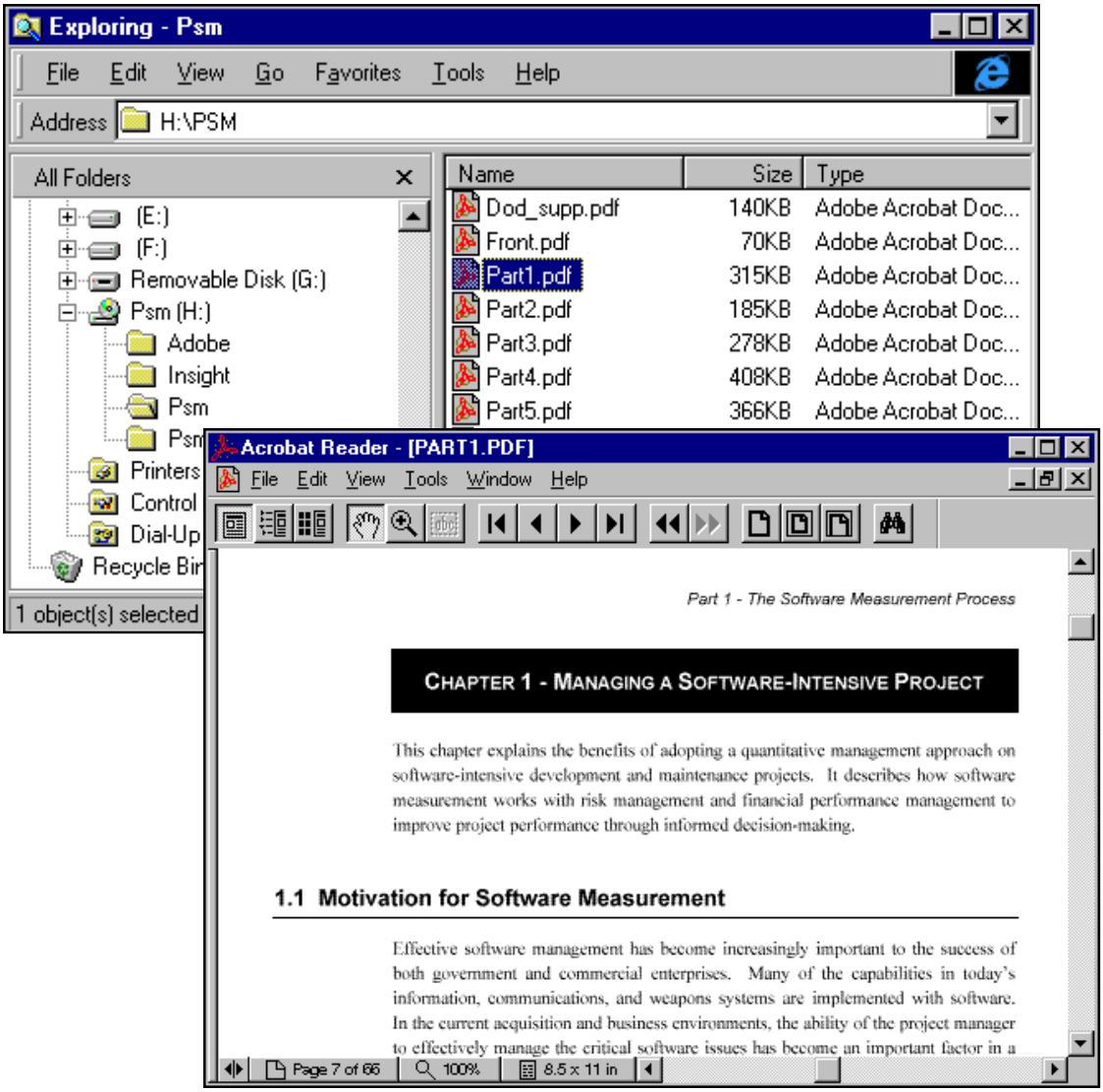
This is the file name of the user's guide that you are presently reading. This **Manual** provides discussions of major tasks that you can accomplish with PSM Insight. It also provides explanations of concepts and terms that are key to your work.

The Manual PDF file is stored on your hard drive in the PSM Insight directory. When you print the **Manual**, it is best to print on both sides of the paper, since each topic is discussed on a two-page spread.

Front.pdf
Part1.pdf...Part7.pdf
Dod_supp.pdf

These files together make up the PSM Guide. Version 4.0a of the **Guide** is the most comprehensive reference about the PSM process. The Guide is stored in sections, since it is such a large book. You may wish to print just a few chapters of interest.

These files are stored on the PSM CD-ROM. Consider printing these files on both sides of the paper, since the files are lengthy.



Click on any PDF File Name ... to View the Document

Glossary

Active values list
As you input new data with the Data Entry screen, many fields include a list of valid entries. This is the Active Values List, that pops up in fields representing structure values and attribute values. Incoming values are validated by PSM Insight against this list of valid values; if you enter a new value that is not on the list, PSM Insight offers to add the value to the list of active values. Values are assigned to the Active Values List on the Attribute Value Properties screen and the Structure Value Properties screen.

ACWP
ACWP stands for the Actual Cost of Work Performed. ACWP represents the actual amount of money spent on a project to date. ACWP is a data item that is frequently defined under the Resources and Cost issue.

Additive data
An additive value represents a number that can be added with previous values to arrive at a total. For example, with a data item of Monthly Cost, if you spent $3,000 in March and $4,000 in April, you can add those values to arrive at a total project cost to date of $7,000. Examples of non-additive data items include Averages and Indexes. Additive describes the property of a data item on the Data Item Properties screen, and is used by data entry to validate incoming data.

Aggregation
Aggregation is the addition of similar lower level values to arrive at a higher level total on an indicator. It is the combination of raw, detailed information from lower level components into higher level totals. Aggregation can occur across attributes or structure levels to arrive at a total for a particular data item as long as your data item is defined as additive. PSM Insight aggregates values for you automatically when creating indicators.

Analysis
Analysis is the dynamic and systematic examination of indicators to assess the status of a project, to identify potential problems, and to evaluate alternative plans. Analysis helps you identify potential problems early enough in your project to take corrective action in time to affect the outcome in a positive manner. Analysis typically involves generating graphs and tables to compare planned and actual progress, and to make informed management decisions.

Feasibility analysis is conducted during the planning stages of a project, to determine whether plans and milestones are realistic and achievable.

Performance analysis occurs regularly throughout the development life cycle to determine if plans and targets are being met, and to detect potential problems.

AIS
AIS stands for an Automated Information System. An AIS is a combination of hardware and software that performs specific functions other than real time weapons systems operations.

Assignment
PSM Insight uses the term "assignment" to mean the association of one entity with another one within your project. For example, you "assign" a category to an issue in the tailoring process, indicating to the software that a specific category (such as "Milestone Performance" assigned to "Schedule and Progress") will be used in your project setup. You can also "assign" a structure value to a measure, indicating that a particular data value can be used in data entry. In general, you assign a more detailed item to a hierarchically higher or more general item, such as assigning a measure to a category.

Attribute
An attribute is a characteristic or property of a measure, such as"Planned/Actual", "Increment," or "Language"; they distinguish one data item from another. Attributes are very important when you are defining indicators for your project; if you wish to compare two measures, they must share the appropriate attributes. Think of attributes as items that you graph by, or that you search by.

PSM Insight comes with the most commonly used attributes pre-defined for your use.

Attribute value
An attribute value names a specific trait of a measure.

For example, the measure "Paths Tested" has an attribute or characteristic of "Increment" (i.e. software version). Values for the "Increment" attribute may include numbers such as 2.1, 3.01, 4.3.

Some attribute values are provided with the PSM Insight templates, but many others are project-specific. You can define all attribute values with the Attribute List, or you can enter them directly into records input with the Data Entry and Import functions. The data entry functions use attribute values for validation purposes; when a data entry specialist enters data into an attribute field, PSM Insight will supply an authoritative list of only those values that you have already created.

Bar graph
A bar graph compares the values of several data items by representing each item with a horizontal or vertical bar of color.

BCWP
BCWP stands for Budgeted Cost of Work Performed. It represents the earned value of the products that have been delivered to date. The BCWP is based on the contracted cost of each product or item. BCWP is usually calculated when a product has been completely delievered.

BCWS
BCWS stands for Budgeted Cost of Work Scheduled. BCWS represents the contractor's spend plan to pay for software that is under development, or the "planned" cost. BCWS is a common data item used in the Resources and Cost issue.

Blank value
A blank value is an attribute value or structure level value field that is empty. There is no substantive data in the field; the value is missing or null. PSM Insight creates a blank value for every new attribute or structure level you create and designates it visually as <blank>. Blank values may appear on active value lists, in indicator legends, on the Attribute and Structure Lists, and in Attribute Value and Structure Value Setup.

A blank value in the database may mean different things to different projects. For example, it may mean that data were not currently available, but will be added in the future; or it may mean that the field is currently obsolete. You can create a description to document the exact meaning of a <blank> value in Attribute Value or Structure Value Setup.

Calculated data item
A data item is a specific type of information that you use to quantify, manage, and monitor your project. However, not all data items are collected, imported, and permanently stored; some are calculated from other data items. PSM Insight can automatically calculate a data item and its values by using a formula you create. You can use other data items (common to one measure), mathematical operators, and numeric constants in your calculated data item formula. Then, PSM Insight automatically calculates the data item values based on the incoming values of the parent data items. The values are dynamically calculated as you need them, either for a data entry grid or for an indicator. At present, calculated values cannot be exported into another software program. Some examples of calculated data items and their formulae include:

Cost variance	BCWP - ACWP
Schedule variance	BCWP - BCWS
Thousands of lines of code	SLOC / 1000
Staff months	Labor Hours / 160
Storage utilization %	(Storage Words Used / Storage Words Available) * 100
Test case success %	(Number of Test Cases Passed / Number of Test Cases) * 100

Calcuated series
A series is a set of related data points that are plotted on a graph. Typically, a series represents a data item or a calculated data item that you defined during project tailoring. However, there are times when you may need to create a variable from multiple data items that are not assigned to the same measure. To create such a variable, use the calculated series definition in indicator setup. You can use data items, mathematical operators, and numeric constants in your calculated series formula. The values are dynamically calculated as you need them for an indicator. At present, calculated values cannot be exported into another software program. Here are some examples of calculated series and their formulae:

Cost per Line of Code	Cost / LOC
Percent Lines of Code Added	Total LOC Added / Total LOC

Category
Each issue in PSM Insight includes one or more measurement categories, further clarifying the information that you monitor. A category is a set of related measures that can be tracked in your project, such as cost-related or schedule-specific measures. Each category answers different types of software-related questions. Many commonly used categories are pre-defined for your use.

Character
Character is a term used to describe the data field type of a data item as a string consisting of letters, numbers, special symbols (%, &, #, =), or other printable ASCII characters. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

CI
CI stands for Configuration Item, the highest level of the Component structure in PSM 4.0. A CI represents a software component in your project which satisfies an end-use function and is designated for separate configuration management. All CIs grouped together represent all the software under development in your project. A CI may represent newly developed software, COTS, or other non-developmental items.

Common issues
A common issue is a PSM issue that is tracked in most AIS or weapons systems projects. A common issue is also one of the most important or critical aspects of a development project. PSM Insight includes seven common issues that are pre-defined for your selection:

- Schedule and Progress
- Resources and Cost
- Product Size and Stability
- Product Quality
- Process Performance
- Technology Effectiveness
- Customer Satisfaction

Use these seven common issues as a starting point for your tailoring work.

COTS
COTS stands for Commercial Off The Shelf software. COTS require no government modifications or maintenance over the life cycle of the product to meet the needs of your project.

CSCI
CSCI stands for Component Software Configuration Item, the highest level of the Software Component structure in PSM 3.1. A CSCI represents a software component in your project which satisfies an end-use function and is designated for separate configuration management. All CSCIs grouped together represent all the software under development in your project. A CSCI may represent newly developed software, COTS, or other non-developmental items.

CSU
CSU stands for Computer Software Unit, the lowest level of the Software Component structure in PSM Insight. A CSU is a subcomponent of a CSCI. All CSUs associated with a CSCI comprise the entire software of that particular CSCI. A CSU is the most detailed module of code tracked in your project.

Cumulative data
A cumulative value represents a number that is continually retotaled over time. For example, with a data item of Cost, is you spent $1,000 in October and $2,000 in November, a cumulative Cost would be entered as $3,000 in November, not $2,000. An example of a non-cumulative data item might be Number of Components Added This Month. Cumulative describes the property of a data item on the Data Item Properties screen, and is used by data entry to validate incoming data.

Currency
Currency, used to describe the data field type of a data item, is a number formatted to display decimal places and your Windows-defined money symbol (e.g., a dollar sign). A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

Cyclomatic complexity
A measure of the logical complexity of a project module, based on the number of independent linear paths in the module. Cyclomatic complexity is used to evaluate code quality and to predict testing effort.

Data entry grid
The data entry grid is the screen with which you enter project data in PSM Insight. The screen resembles a table or grid of rows and columns, representing specific data items, attributes, and structure levels for a measure.

Data item
A data item is a specific type of information that you collect to manage and monitor your project. Data items quantify what you are actually measuring. Each measure that you define in PSM Insight must have quantifiable data items to collect and analyze. Common data items include “Start Date”, “End Date”, “Number of Test Cases”, “Cost”, “Requirements Added”, and “Defects”.

PSM Insight provides many pre-defined data items that can be used in your project measures and indicators. Use the templates of pre-defined data items to assist you in tailoring your project. You may also create your own data items that you will be collecting for your project.

Date
Date, as used to describe the data field type of a data item, is any valid date from 1/1/9999 BC to 12/31/9999. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data. PSM Insight uses the Windows date format (set in the Windows Control Panel, using the Regional Settings function to select a Short date style), and converts 2-digit years to 4 digits for display.

Date/Time
Date/Time is a term used to describe the data field type of a data item as both the time of day and the date value. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data. PSM Insight uses the Windows date format.

Decimal number
A decimal number, used to describe the data field type of a data item, is a positive or negative value, with decimals allowed, up to 15 significant digits. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

Destination file
In the Import function, the destination file is the electronic file in which you store data that has been imported into PSM Insight. You name a destination file in the Import function, on the Table Relationships screen. Imported data is converted from its original format into the PSM Insight database format with the mapping function in Import.

In the Export function, the destination file is the electronic file in which you store data that is being exported from PSM Insight into an ASCII file format for use in another software program.

Export
PSM Insight can write out electronic data in ASCII, DBase, Paradox, or Access format so that you may export data from your PSM Insight program to another software package or system.

Field mapping
Field mapping is a procedure in the PSM Insight Import/Export function that you use to associate each imported or exported data field with a PSM Insight data item, structure value, or attribute value. The Field Mapping screen helps you link each field with its equivalent PSM Insight field.

Filter
In Data Entry, a filter is a search criterion that you define to narrow down a large set of records into a smaller, specialized set of records. A filter helps you select records that you may need to edit, that you wish to review for project status, or that you wish to work with at the moment. You can "filter" or "select" records based on data in any field in the record set.

In Indicator Setup, a filter is an attribute value or a structure value that you have selected to limit the data points on your graph.

Histogram
A histogram is a special type of bar chart, plotting the count (or frequency of distribution) of data items in different classes. The height of a bar in a histogram represents the count, plotted on the y-axis. The range of values for the data item is plotted on the x-axis. A histogram captures the status of your project at one point in time. Use histograms to analyze the distribution of costs, software size, (measured in lines of code), requirements, or problems reports by software module or attribute.

Import
PSM Insight can read several standard formats for importing data into PSM Insight from another software program or data source, saving you valuable hours in populating the PSM Insight databases and files. Insight presently recognizes the following import formats:

- Acess
- ASCII
- DBase
- Excel
- Paradox

Indicator
An indicator is a measure or a group of measures that provides insight into a project issue. Indicators frequently make comparisons between two values, such as planned and actual values. An indicator may be called a metric in other software measurement tools.

An indicator is usually a graph or table. Graphs may depict comparative data, trends, or a snapshot of a project's current status, based on your specific tailoring data. All calculations are done by PSM Insight without user intervention.

Issue
An issue is a critical aspect of a project that should be tracked and monitored. An issue may be a risk, potential problem, constraint, concern, or objective of a project. Issues usually describe project resources, progress, quality, or performance.

PSM Insight comes with the seven most common issue areas used by DoD and industry to speed your tailoring work. You can also create your own project-specific issues which are not included in the common issues template.

Legend
The legend of a graph (or indicator) is the key to or explanation of data values plotted on the graph or chart. For example, the legend on a bar graph may explain that a red bar represents "Actual Lines of Code Tested," and a blue bar represents "Planned Lines of Code Tested."

Level
A level is an organizational element in the structure of your project. It is typically used to indicate the specificity of data items collected for measures. You can add levels to existing structures, you can change level names, and you can create your own levels in a new structure.

For example, the "Component" structure includes 2 levels:

- Configuration Item
- Unit

List
A list is a summary of tailoring activities you have completed. Lists provide a fast and convenient way to review your work and to check the completeness of the issues, categories, and measures that you have selected for your project. Lists also provide the quickest way to edit, delete, or create new issues, categories, measures, structures, attributes, etc. Use a list to edit an item rather than stepping through the entire tailoring process all over again.

Log file
The log file is a report that is stored electronically each time you use the Import or Export functions in PSM Insight. The log file tells you if your import/export procedure ran correctly, how many records were processed, which fields were mapped, and how many errors occurred. You can read the log file with the View Log button in Import/Export.

Long integer
A long integer, used to describe the data field type of a data item, is a positive or negative whole number from -2,147,483,648 to 2,147,483,647. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

Mapping
"Mapping" is the process of associating a project-specific issue with a common issue. A project-specific issue may be the same as a common issue, or it may be a "sub-issue" that falls under a common issue in content and meaning.

Measure
Measures are ways of quantifying aspects of a software process or product. They are specific data types that you can monitor in your project. Measures are characterized by structures, attributes, and data items. Sample measures include: Milestone Dates, Requirement Status, Cost, Lines of Code, and Failure Interval. Measures are the basis for data entry or import, and they are also used to create indicators for monitoring project status.

Not all measures are relevant to every development project. You may define your own project-specific measures, or you may use the most commonly tracked measures that are pre-defined in PSM Insight.

Measurement Plan Report
The PSM methodology recommends that you write a measurement plan when you start a project, and that you update it throughout your project as analysis results necessitate tailoring changes and measurement changes. PSM Insight provides a comprehensive template for a Measurement Plan Report (MPR). The MPR template helps you plan a new project, justify a project to senior management, and track progress. The MPR template outlines and defines the basic organization of the report. It also includes guidance text to help you write the contents of a measurement plan.

Milestone
A scheduled event for which a manager is held responsible. A milestone is often used to measure progress.

Origin
On a graph, the origin is the starting point for either the X or Y axis. The origin is frequently zero, but it can be any value or the lowest value in your data set.

Pie chart
A pie chart is a type of graph that typically illustrates one series or data set as percentages or parts of a whole. Each data value is depicted as a "slice of pie" or section of a circle.

Post
The term "post" means "save" in PSM Insight data entry. Use the post function in data entry to save a new record that you have input or to register changes that you have made to an existing record.

Practical Software and Systems Measurement (PSM)
Practical Software and Systems Measurement (PSM) is an objective process for analyzing project issues, risks, and financial management, focusing on software project management. PSM provides government and industry managers with objective information for making sound decisions and for meeting cost, schedule, and technical objectives. It is based on actual DoD, government, and industry experience, representing the best practices in the software and engineering communities. While the PSM process includes common issues and recommended measures, the process is completely flexible, to adapt to project-specific requirements and objectives.

Project
A project is the name of the development program you are undertaking. You must create a project name to start the tailoring process. The project name appears as the first item in your tailoring list, defining the highest level of your project.

Project-specific issue
A project-specific issue is a critical aspect of your project that must be monitored on a regular basis. A project-specific issue may be a risk, potential problem, constraint, concern, or objective, stated in either general or very detailed wording.

PSM Insight comes with the six most common issues used by DoD and industry to speed your tailoring work. A project-specific issue can be mapped to a common issue, or it can be added to the list of issues that you will track in your project.

PSM
PSM stands for Practical Software and Systems Measurement, which is an objective process for analyzing project issues, risks, and concerns, focusing on software project management. PSM provides government and industry managers with objective information for making sound decisions and for meeting cost, schedule, and technical objectives. It is based on actual DoD, government, and industry experience, representing the best practices in the software and engineering communities. While the PSM process includes common issues and recommended measures, the process is completely flexible, to adapt to project-specific requirements and objectives.

PSM Insight
PSM Insight is a PC-based software tool that automates the Practical Software and Systems Measurement (PSM) process. PSM Insight includes tailoring, data entry, and analysis functions to help you develop a project-specific software measurement tool. While PSM Insight provides templates of commonly-used issues and measures, it is also completely flexible for you to customize analysis to project-specific needs.

Reject file
The reject file is an electronic list of records and their data that failed either the Import or Export functions in PSM Insight. You can review the reject file and edit the records with the View Rejects button in Import/ Export.

Risk
Risk is the probability that a problem that may occur during the life cycle of your project that will affect a particular issue. By defining the risk level of an issue, you tell PSM Insight what the most critical issues and measures are for analysis and tracking. Risk is defined on the Issue Risk screen as either high, medium, or low.

Series
A series, represented by a single line on a graph, is a set of data points that are related. A graph may have one or more series plotted on it.

Setup
Setup is the process that you use in PSM Insight to select and define issues, categories, measures, structures, and attributes for your project. You can select pre-defined items or create your own project-specific items. Setup is the software equivalent of tailoring in the PSM process.

A setup file is a conversion definition that defines the structure of the file used for importing or exporting data.

Short integer
A short integer, used to describe the data field type of a data item, is a positive or negative whole number from from -32,767 to 32,767. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

SMERFS
SMERFS^3, or Statistical Modeling and Estimation of Reliability Functions for Systems, is a software package developed by Dr. William Farr at the Naval Surface Warfare Center in Dahlgren, Virginia. SMERFS^3 analyzes software, hardware, and systems data with over a dozen reliability models, using either time-between-failures data (TBF) or interval counts of error/problem data. SMERFS^3 is provided free with PSM Insight, installed automatically in a \SMERFS subdirectory under the PSM Insight software directions. Use the PSM Insight Indicators function to format your data into a SMERFS^3 input file. When you Save a SMERFS indicator, PSM Insight automatically launches the SMERFS^3 software, which plots the data and prepares it for reliability analysis.

Snapshot date
On any snapshot graph, you can limit the data values that you plot on your y-axis to values collected on or before a specific date. This snapshot date places a "cap" on data values in your graph. In general, PSM Insight plots all actual data values collected on or before the snapshot date, and all planned data values scheduled on or before the snapshot date. Snapshot date specifics vary, depending upon whether you are plotting cumulative or non-cumulative data:

Cumulative snapshot graphs: PSM Insight totals data values up to and including the snapshot date; it ignores data past the snapshot date in generating the graph. If you do not specify a snapshot date, PSM Insight accumulates and graphs all the data from the entire dataset.

Non-cumulative snapshot graphs: PSM Insight graphs data from a single date; it does not accumulate non-cumulative data over several dates. The snapshot graph includes bars only for data from the specified date. However, if no data actually falls on the snapshot date that you specify, PSM Insight graphs data from the most recent date prior to the specified snapshot date. If you do not specify a snapshot date, PSM Insight uses the last date for which there are filtered data in your measure database.

You specify a snapshot date during Indicator Setup.

Snapshot graph
A snapshot graph captures the actual values of data items in bar graph style. This type of graph shows you the status of your project at a single point in time. A snapshot graph is often used to report:

- Design progress by CSCI
- Staff experience
- Problem report status by priority
- Software complexity
- Rework effort
- Effort allocation by activity
- Requirements stability by type of change
- Problem report aging
- Software productivity
- Software origin

Source
In Indicator Setup, a source is either the measure or a data item that you have selected to build a graph.

Source file
In the Import function, the source file is the electronic file in which you have data that you would like to import into PSM Insight. You name a source file in the Import function, on the Table Relationships screen. Imported data is converted from its original format into the PSM Insight database format with the mapping function in Import.

In the Export function, the source file is the PSM Insight file from which you export data to another PC software program.

Structure
The structure of a project defines the organizational levels of your project. Structure also defines the way that measurement data is organized and aggregated. For example, a structure could be an "Activity" structure, representing a hierarchical tree of work tasks that must be completed in the project. All entities in a structure are of the same type (e.g. software modules), but vary in size (e.g., component, routine, unit). A structure contains all the major project entities whose status you track with various measures. PSM Insight includes 3 pre-defined structures for your use. You can also define your own project-specific structures.

System level
Data collected or analyzed at the system level is not specific to one measure. System level data can be thought of as project-wide data, or data that is not specific to any level in your project structure. For example, you may track costs at a system level, rather than by software function, activity, or component.

Table
A table supplements an indicator with a grid that displays your actual data in columns and rows. A table is automatically generated when you create an indicator graph.

Tailoring
Tailoring is the first step in the Practical Software and Systems Measurement process, when you define your specific project tracking needs. Tailoring activities include:

- Identifying and prioritizing project issues
- Selecting and specifying software measures

Tailoring report
Tailoring reports are designed to help you in the tailoring process and to help you share information about your project with other staff. PSM Insight provides project-specific reports, and several PSM Guide Template reports. Each report can be generated as a summary report or a detailed report with lengthy descriptions.

Access these reports from the File menu by clicking Tailoring Report Gallery.

Template
A template is a pre-defined element in PSM Insight. When you tailor or define your development project, PSM Insight offers templates for the 7 most common issue areas, together with their categories, measures, structures, and attributes. PSM Insight also provides PSM measure templates, including pre-assigned attributes, structures, and data items. Templates are developed by the PSM Team, reflecting the best practices of DoD and industry managers. Templates are handy tools because they reduce the time it takes to tailor a project, and they provide guidance on the most important items to track in your project.

Threshold
The threshold of a graph is the limit, or target, of a series of data values.

Time
Time, when used to describe the data field type of a data item, is the time of day. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

Transfer direction
The data transfer direction is simply whether you are importing or exporting data with the PSM Insight Import/Export functions. When you import data into PSM Insight, you transfer electronic data from an external file into a PSM Insight file. When you export data from PSM Insight, you copy data from your PSM Insight project files to an external file for use by another software application.

Trend graph
A trend graph depicts changes in one or more data items over time. A trend graph has time on the x-axis, and data items on the y-axis. A trend graph is typically drawn as a line graph, not a bar graph. A trend graph is often used to report:

- Design progress by date
- Cost profile
- Software size over time
- Problem report status by date
- Effort allocation by date
- Resource utilization over time
- Requirements stability over time

True/False
True/False is a term used to describe the data field type of a data item as a value representing true or false. A data type is assigned to a data item on the Data Item Properties screen, and is used in data entry to validate incoming data.

Unit
A Unit is the lowest level of the Component structure in PSM 4.0. A unit is a subcomponent of a CI. All units associated with a CI comprise the entire software of that particular CI. A unit is the most detailed module of code tracked in your project.

WBS
WBS stands for Work Breakdown Structure. A WBS for software defines the software-related elements associated with project activities and products. Many measures are aggregated and analyzed at various WBS levels. You can define a WBS for your project wih the PSM Insight Structures function.

Weapon system
Items that can be used directly or indirectly by the armed forces to carry out combat missions.

X axis
An X-axis is the horizontal line on a graph. In PSM Insight, the X-axis represents time in a trend graph.

Y axis
The Y-axis is the vertical line on a graph. In PSM Insight, the Y-axis represents a data item that is assigned to a measure. The values are numeric, additive data.

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