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Simplifying Project Management Software Selection:

A Balanced Approach

Over the past fifteen years, I have written, taught, lectured and consulted on the topic of Specifying, Evaluating and Selecting Project Management Software. This includes a formal seminar, a book *Project Management Using Microcomputers* (Osborne/McGraw-Hill-1986), a chapter on that topic in David I. Cleland's *Field Guide to Project Management* (VNR-1998) and a video produced by IBM's Skill Dynamics.

Information Overload

In my enthusiasm to fully cover the topic, I more often than not got carried away with details. This compulsion to cover every aspect of software selection and use may have been technically sound, but, in retrospect, may have failed to have the desired effect. I may have made my audience more knowledgeable and aware (an important objective), but did I leave them in a better position to make a selection decision (the ultimate goal)?

Looking back, my approach was to use a work breakdown structure to organize the details. There were about a dozen first level subjects, each with several sub items, making for about 200 total characteristics and features to consider. I was shocked into recognizing the error of my ways when a client in one of my seminars came to me at the end and exclaimed "This is the first time that I attended a seminar where I left with more questions than I had at the start."

This was not an isolated case, and I recognized that I was causing "information overload". Actually I had some cognitive dissonance, as I wanted the audience to become aware of all of the things that should be considered in selecting software, while also trying to make the process easier. I had to correct the common belief that "all PM software was essentially the same" while avoiding the possibility of scaring people away from getting these tools. I fear that my extensive coverage of the topic was as intimidating as it was helpful.

The Simplified, Balanced Approach

Now that I have fully berated myself in public, I want to offer a more simplified approach to PM software selection. Recognizing the growing popularity of "The Balanced Scorecard" philosophy, we will reduce the 200 items to just four major categories, and look for comprehensive and balanced support for these four areas.

It is important that the software that is selected will meet the needs of the entire community that is involved in projects, and that it provides complete and quality support for the firm's project management process.

The Four Key Categories

Subject to the possibility that we may be moving from an overly detailed approach to an overly simplified approach, we will consider these four important areas:

- The User Interface
- Data Management
- The Scheduling Engine
- Multi-user Access & Communication

If we can satisfy all four categories, we are likely to have a product that we can use effectively as part of a computer-based project management system. If any one of these areas is unduly weak, we can expect failure of the entire system.

The Scheduling Engine

As our software systems get more and more sophisticated, and the user base gets more widespread (and less computer-savy), the software selection process tends to focus more on the User Interface characteristics. As a response, the software developers have placed a special emphasis on making it easy to put the data in and to navigate about the tool.

Likewise, as the user base for the system output expands, the need grows for improved data management and manipulation. Here too, the vendors have responded with razzle-dazzle features that slice and dice the data from every conceivable angle.

Chances are that these two items (the user interface and data management) are the ones that get most of everyone's attention. Yet it is in the scheduling engine where we see significant differences, and where deficiencies can lead to ineffective computer-based PM applications. So let's look at the scheduling engine criteria first.

Across the board, the available products keep on getting better in these first two areas and the user community has benefited from these improvements. But let's think a bit about why you are using project management software in the first place. Here's a list of typical objectives:

- Store system calendars
- Store resource pool data
- Store project key dates and milestones
- Store the project workscope
- Store the project work breakdown structure
- Store time and work estimates, resource assignments and costs
- Calculate schedules
- Assist in assigning resources
- Resolve resource scheduling conflicts
- Calculate budgets
- Plot cash flow curves
- Collect and calculate applied time (timesheets)

- Collect task status and recalculate schedules
- Collect actual costs
- Calculate earned value performance results

In addition, many users may wish to add the following, either in the basic product or in add-ons:

- Identify risk areas
- Quantify risk items
- Calculate risk mitigation options
- Employ Critical Chain scheduling protocols
- Store typical plan templates and estimates
- Integration with ERP products and data
- Incident tracking
- Change control

Think about these functions. What kind of data do you need to input, calculate, or output regarding these items? Can the tool that you are considering handle these data, in the manner that you need for your business? Can you create discrete models of your plan in the system? Or do you have to "jury-rig" them to make them fit the systems limitations?

Are the algorithms in the program sophisticated enough to calculate correct and efficient schedules? Can you repeat the calculations and get the same result each time? Can you preserve defined constraints? Can you define complex assignments?

When you attempt to resolve resource conflicts (via resource leveling) are you left with gaps where resources are available to work but are not assigned to tasks that could be worked on? Are the resource schedules consistent with the task schedules (I have experienced products that could have a task scheduled for two days, but show the resource as working on it for five days)? Are the earned value calculations correct? These are not idle questions. These are all items where I have found deficiencies in some PM software products in the past.

Chances are that you assumed that all products work about the same and will produce similar results. My evaluation of the popular products show that this is not true.

While I chose to use the term *scheduling engine* for this key category, you can see that it goes well beyond basic scheduling. On one hand, almost all of the popular products use the traditional activity-on-the-node critical path scheduling approach, and the serial algorithm for resource leveling. However, each vendor has designed its own characteristics around these two basic calculation models, that may add or detract from the basic capabilities.

In addition to evaluating for fidelity and consistency, for ability to handle your specific needs, and for usability, you will also want to consider other performance characteristics, such as speed of opening files, calculating schedules, leveling resources, saving files, and manipulating data.

And don't forget to examine all of these items from the point of view of multi-project management. Working with multiple projects places extra demands of the system. These may include the ability to handle large amounts of data, the ability to identify and manipulate multiple project data, control of and access to the resource pool, and control over replacing data in individual projects after working in multi-project mode.

All of the above may be overlooked when evaluating the user interface and data manipulation characteristics of a product. Yet, they are at least as important to having a successful system.

Data Management

This category is receiving greater attention every year, as well it should. Here are some of the capabilities that can be supported by advanced data management functions:

DATA ACCESS AND TRANSFER

- As we move toward multi-project management and project portfolio management, the data expands exponentially. We also may need to access data from multiple data sources. For instance, additional, non-project data may be generated by Enterprise Resource Management (ERP) systems. This data may have to be coordinated with the project data.
- Hence, we are moving away from fully proprietary databases, toward popular, open database systems. Whether utilizing ODBC conventions or storing in Oracle or SQLServer, the process should be close to invisible to the user. The process should also be fast and secure.
- Where data resides in several locations and in several databases, you may wish to consider data warehousing systems.

SLICING AND DICING

- As the user base expands, different people need to access different information. The general projects database will almost always hold way more data than any one person will need at any one time. We look for a robust data manipulation capability to allow the user to slice and dice the data as needed to support individual knowledge requirements.
- In days past, we often needed an external repository for the data and had to learn an arcane command language to make data queries. Today, it doesn't matter if the data is internal or external. In the latter case, the link is usually transparent to the user. Also, today's products provide a simplified query process, often menu and/or icon driven. Knowing that these capabilities are now available, why settle for anything less?
- In larger data systems, the process can be improved by using On-Line Analytical Processing (OLAP) engines. OLAP systems arrange the data into pre-formatted groups (or cubes) to speed up access.

ADMINISTRATION & CUSTOMIZATION

- Individual users should not be required to set up the OLAP cubes or the slice and dice queries. The software should come with an administrator capability, to facilitate design of the data system, including retrieval and security.
- The administrator should be able to determine the information needs of each user and tailor outputs, queries, spreadsheets and graphical presentations as appropriate to meet these needs.
- Data must be able to be presented in user-defined time-phased segments, arranged to system-defined hierarchies. Graphical presentation is very popular.

SUMMARIZATION

- Caution is advised when reviewing the software for summarization capabilities. Most products provide a large variety of data fields, for text, dates, costs, etc. Today, we are provided with almost unlimited user-defined fields. However, you should be aware that sometimes the data in these fields can only be sorted or filtered, but not summarized. Do not take it for granted that all data fields can be summarized or rolled-up to a defined hierarchy. Yet, this capability is paramount to advanced data manipulation and reporting.

User Interface

The first thing that anyone notices is the user interface. We all like the graphical user interface style, such as supported by Windows and Macintosh. Here, again, there are some things to look for and some things to avoid.

There are several ways that the user interface can facilitate access to the system functions.

- The most popular mode is via graphical icons. I find these to be useful only if there is text along with the icons or there are pop-up tool tips (text appears when cursor is mover over icon).
- Drop-down menus is my preferred mode. This allows me to move through the menus and learn what functions are available.
- Hot-key codes (usually combinations of Ctrl or Alt with F1 through F12) can reduce key strokes are mouse movement, but I usually can't remember the codes.
- Several programs can only call up specified functions by clicking the mouse in a particular place on the screen. The call may require a left-click, or a right-click, or a double-click. Sometimes these will immediately initiate a function and other times it will open a window that presents a selection of functions. This capability is fine -- when available in addition to accessing these functions from the menu bar. I find it to be unacceptable for such functions to be available only via these "hot-spots" as there is no way to learn that they are there unless you already know.

Under this category, I also include those features that help me to input and view my data. These would include:

- Flexible screen arrangement
- Drop-down or "pick" lists
- In-cell editing
- Custom, saved views

The User Interface can be considered to be part of a larger group, called Usability. To this group, we can also add:

- Ease-of-learning
- Ease-of-use
- Macros
- Context-sensitive Help
- Tutorials

Multi-user Access & Communication

It is over forty years since critical path scheduling was developed and made available to computers. Initial computer systems assumed that single projects would be managed by a co-located group. Over the next twenty years, mainframe and minicomputer systems changed as the developers recognized that project participants were scattered. The time-sharing systems of the 70's allowed data input and analysis to take place in multiple locations.

It is about twenty years since this technology was ported to microcomputers. Here too, at first, the system design favored the individual user, on single projects. Remember -- we called them "personal" computers. But it soon came apparent that the user base was in multiple locations, working on multiple projects. Again, the industry responded. However, they were hampered, somewhat, by technology that was really not designed to optimize multiple, decentralized users.

The initial developments were centered around computer networks. The concept of client/server systems was a key basis of emerging designs for multi-user project management. These eventually developed into multi-tier client/server systems which maximized the efficiency of the computer equipment while extending the user access and security.

During the past few years, this entire world of multi-user computing was turned upside-down by a tornado of sorts -- web-based computing. The web has revolutionized the way that we use the computer and what we can accomplish with it. And if there is any application area that can fully benefit from this new technology, it is project management. The improved access and collaboration capabilities, enabled by web technology, has totally changed the way that we use project management software, and the things to consider when selecting such software.

For many people involved in project management software selection, web support has moved to the top of the list of key selection criteria. Again, I would advise caution. Web support must be provided on top of solid scheduling capabilities. It should not be given such a weigh factor so as to allow it to dictate the selection process and subrogate the essential scheduling and calculation capabilities.

When we talk about web-based systems, there are several configurations. These include:

- Web-based services - A web-based application service, hosted by an external vendor. The user pays a usage fee to access the service.
- In-house total web-based system. The user owns the system and places the software on internal hardware.
- A hybrid system, utilizing client/server and web-based components.
- Web-based output (not really a web-based system, but rather web publishing)

Today, you can expect all modern project management systems to embrace the web to some degree. However, many of the early entries into the totally web-based segment of the market have sacrificed scheduling functionality, as compared to the more established products. The exception to this would be companies that have already established strong client/server systems that are redesigning the system to be fully web-based.

With every new release, web-based functionality increases. As this is being written, I am learning of new web-based products and product updates with new web capabilities. If web-based functionality is important to you, then you must specify these needs and search for products that support that criteria. Today, just about every product configuration is available. We had expected that, as the industry matured, several vendors would fall by the wayside. Surprisingly, the opposite has occurred. We are seeing a growth in vendors and products, and a greater variation in what they have to offer. For you, as a software selector, the greater choice will let you find what you want, but the act of choosing is more difficult.

Final Comments

As the user, you have to put all of the various benefits and deficiencies in perspective and weigh all of the attributes against your specific environmental preferences and needs. Another tradeoff area is track record vs. freshness. In general, the newer products are using more of the newer and advance technologies. You have to weigh the attractiveness of this against the benefits of a more established product, with proven performance. Also, another caveat; often the newer technology can exhibit more razzle-dazzle than substance. Check it out thoroughly.

Check out the vendors, also. Give them a call. Does someone answer the phone? Do they return phone calls promptly? Are they knowledgeable about project management? Some of the new products may sound exciting. But are these tested, shipping products, backed up by a vendor with an office and qualified staff? Checking this out is part of the software selection process.

Implementing a Computer-based Project Management Capability

One last thing. Selecting project management software is but a part of the process of developing a computer-based project management capability. There are five key phases of this process:

- Determine your project management methodology
- Select your project management tools
- Train for project management
- Establish an implementation plan
- Audit the implementation

I'm going to leave this for a follow-up article. Look for it soon.

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