Turn planning art into planning science

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EXECUTIVE SUMMARY

Even though organizations spend $6 trillion each year on a variety of projects, many are delivered late and cost more than budgeted. The problem often lies with the network-based planning models that have been used for decades. Enterprises that organize their project management around workflows produce better results that cost less and finish on or before deadline.

Project management has become very scientific in the manufacturing world, yet it still remains an art in engineering. In manufacturing, managers can rely on formal systems to plan and execute operations and implement best practices like lean and Six Sigma to improve efficiency, but these systems and concepts can be difficult to apply in engineering and other projects.

The cost of managing projects as an art form is high. Approximately $6 trillion is spent every year on projects ranging from research and development to infrastructure and construction, and many of those projects are delivered late and over budget.

It's not for lack of effort that managing projects continues to struggle along. Around the world, organizations spend $1 billion every year on project management (PM) software, yet most project management happens outside of formal systems. Either the teams involved do not create formal plans – even after spending considerable time and effort creating plans – or managers rely on spreadsheets, to-do lists and endless meetings and phone calls to get projects done. Project schedules, scope and resources are all managed outside of formal systems.

This leads some to the conclusion that formal project management is unnecessary overhead instead of an enabler that drives work toward a successful conclusion.

The wrong model

The real issue is the planning model used in formal project management. An example of this is shown in Figure 1. This model, a network of tasks, is not only cumbersome and prone to errors, but it has more serious issues:

1. It lacks a framework. Tasks can be defined ad hoc. If five individuals in the same organization were given the same project, they would develop five different plans. This is not conducive to getting everyone on the same page, especially in situations where the same people support multiple

projects. It also hinders post-execution analytics.

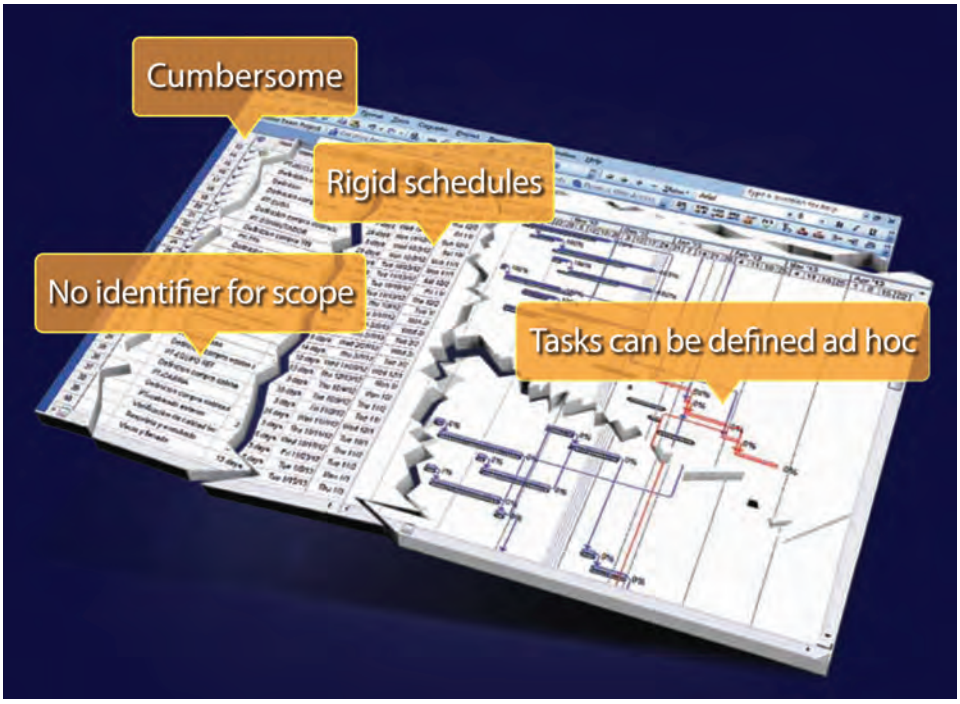
2. It's incomplete. Scope is a key variable that affects project schedules and costs, but it has to be tracked separately in other systems/spreadsheets. With network-based plans, it's very difficult to perform scope what-ifs. For example, what happens to the schedule if we add or delete scope? How much scope can be accommodated if the project has to be finished by a certain date? Also, when projects don't finish on time, it's impossible to quantify how much of the delay was caused by scope changes versus poor execution.
3. It's inflexible and does not support execution best practices. Network-based schedules are rigid, as the tasks defined have hard start and finish dates. However, managers need flexibility to respond to the constant changes and uncertainties that occur during project execution. Without such flexibility, managers inevitably stop following the formal project plans and start using spreadsheets, to-do lists and similar tools to manage day-to-day schedules. Furthermore, organizations are adopting best practices like agile and kanban that provide flexibility, but network-based planning models don't support such activities.

Without a good planning model, projects will continue to be managed outside of formal systems, and project completion within stated timelines and budgets will remain a hit-or-miss proposition.

To turn project management from an art into science, a robust planning model is needed that:

- Makes planning simple
- Provides a framework for task definition
- Facilitates integrated management of scope, schedule and effort
- Creates flexible schedules
- Supports execution practices like agile and kanban

Figure 1. The planning models used most often in project management have no defined framework, are prone to errors, do not track scope and don't support best practices.



New workflow-based planning models that meet the above criteria already are being used successfully for projects ranging from new product development to construction and many other types of endeavors.

Gantt charts come full circle

To gain perspective on the current status of project management, it's important to understand the history of Gantt charts. These charts were invented more than 100 years ago, when there were no computers and project managers needed an easy visualization of project status. By design, Gantt charts were kept simple and included only 20 to 50 tasks for even the most complex projects. They never were designed for or used to manage day-to-day execution.

Beginning around the mid-20th century, with the advent of computers, a mistaken belief began to take hold, the belief that projects now could benefit from the application of computing power by adding all the execution details to Gantt charts. Unfortunately, the result was not just a proliferation of tasks but constant planning churn.

The problem remains that uncertainties abound in projects. There is no way to know in advance the exact duration and sequence of all required tasks, or even the tasks themselves. This explains why the Gantt schedule is put aside as soon as execution begins.

Today there is a growing recognition that Gantt charts are not the proper vehicle for managing execution. Instead, a growing number of organizations are using techniques like agile and scrum (especially in software development projects) and kanban boards (in engineering and construction projects). Gantt charts are used only in PowerPoint slides for executive reviews, the purpose for which they were originally invented.

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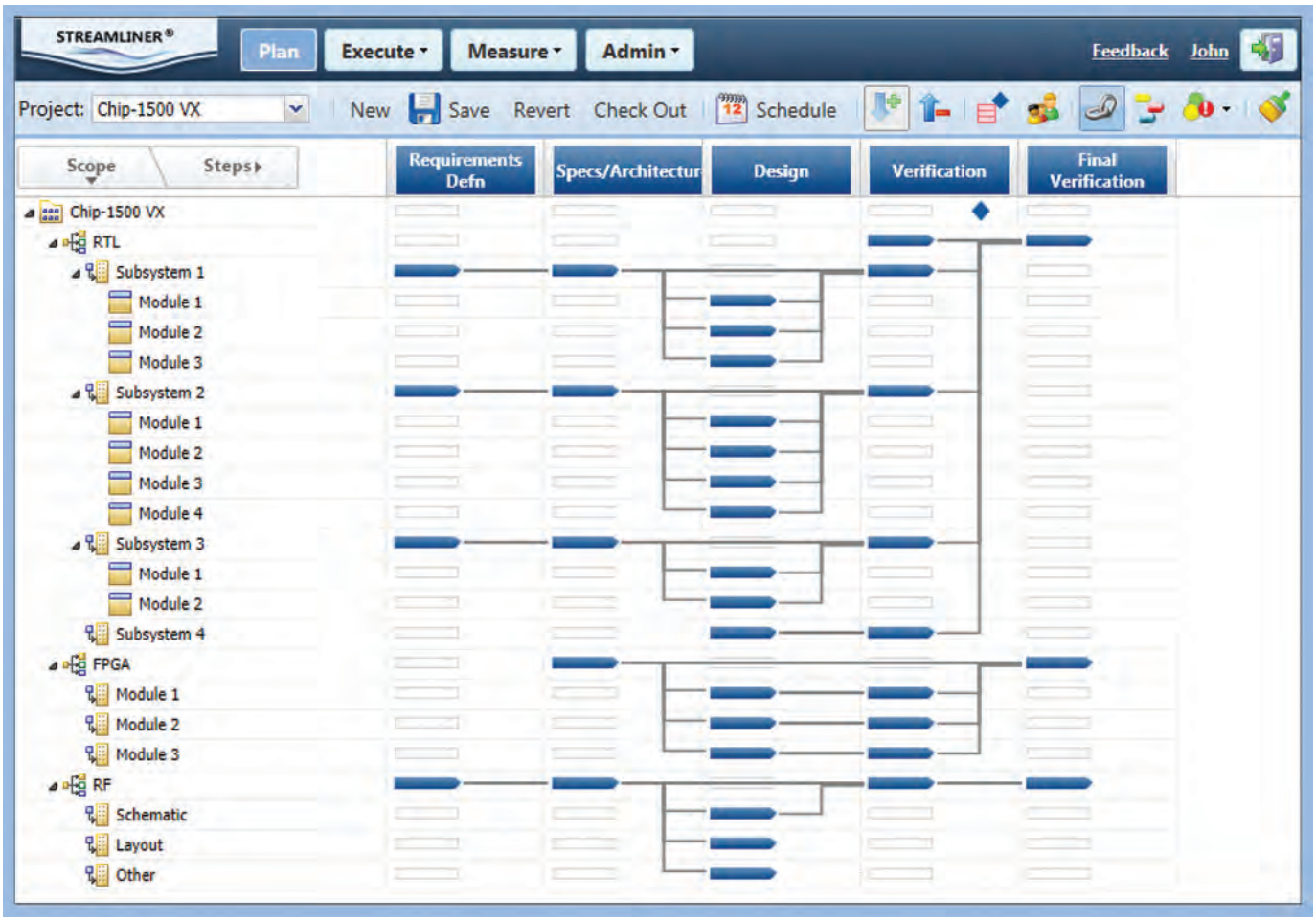
Basing plans on workflow

All projects, whether they are centered on software, engineering or construction, include one or more repeating workflows. As an illustration, these flows could include:

- For software development projects:

A MATRIX THAT FLOWS

Figure 2. Workflow-based planning models reduce errors, standardize workflows, support best practices and allow for flexible scheduling.



Module design, feature design, feature coding, feature testing, integration and module testing
- For pharmaceutical research projects: Hypothesis, simulation/ experiment and validation
- For product development projects: System design, component design, component drawing, virtual integration and validation, physical build and physical testing

While the detailed tasks in each of the flows cannot be defined up front, high-level steps can be. Moreover, this process remains the same from project to project. What changes from one project to another, however, is scope, or what the project is delivering.

A good way to understand this approach is to illustrate it via a simple example. Start by creating a matrix with the standard workflow of the project along the top of the grid from left to right. Along the left side of the matrix, divide the project into its elements – systems, subsystems, features/ components/experiments. The result is a simple, visual matrix that transforms the complex network of tasks depicted on the Gantt chart into a series of linear workflows. Each row in the matrix becomes a manageable workflow.

With this approach, instead of performing 50 engineering projects, an organization processes 1,500 (repeating) workflows. Instead of developing an airplane, an aviation firm is processing 10,000 workflows (of maybe 50 different types) over a three-year period. And so it goes from project to project.

Whereas simple projects could be represented by two to three matrices, or one for each repeating workflow, complex projects comprising multiple subsystems/modules might require more. This planning matrix, an example of which is shown in Figure 2, has the following advantages over a Gantt chart:

The result is a simple, visual matrix.

- Easier visualization
- Reduction of data entry time and planning errors
- Standardization of not only workflows, but also schedule estimates for each workflow
- Ability to perform scope, schedule what-ifs (what if we increase or reduce scope) and track scope changes
- Flexible scheduling (the sequence of workflows does not have to be fixed up front)
- Ability to use best practices

Proven results

A number of organizations already have used workflow-based models to make planning and execution more efficient.

A provider of wireless telecommunications chips took 19 months to go from its first set of prototype chips, called "first silicon" in industry lingo, to shipping its wireless local area network product. At the time, 61 other companies were chasing the same market. In their fast-moving market segment, managers knew that when it came time for the company's second-generation product, they needed to reduce cycle times dramatically.

The most challenging aspect of planning was the time it took to create and finalize project plans. Every week lost in planning was one less week available for execution. For the first-generation product, the company used a variety of traditional project planning approaches: Gantt-based tools, Excel and, perhaps the most popular, the whiteboard.

For the product's second iteration, management defined standard workflows for the hardware, firmware and software modules. This gave project participants the ability to perform rapid what-ifs, allowing the engineering and marketing groups to finalize the project plan in one week instead of four.

In execution, a major challenge always is keeping the plans up to date as marketing requirements change and delays happen. Being able to add or remove scope against standard workflows solved the plan status problem. Not having rigid schedules for every step in the workflow solved the execution delay problem.

Visualization of workflows also allowed managers to see quickly what was happening during execution and where the bottlenecks were. Which engineers and specialists were overtaxed? Who had extra capacity? This allowed managers to make good decisions quickly rather than spending hours in meetings that produced no conclusions.

Most importantly, the workflow-based planning model helped the organization significantly reduce multitasking. Managers were able to control the number of workflows they put into execution at any time. They also could see which tasks were the most important to complete on a daily basis to move the project forward. Engineers could focus and finish the tasks on hand instead of jumping from one unfinished task to another.

With faster planning and decision making and more efficient execution, the company was able to reduce its cycle time from first silicon to release from the 19 months it took the first time to eight months, an improvement of almost 60 percent.

In another case, take the digital camera group of a large technology company. Like many consumer electronics organizations, managers saw that their people were working hard, but they still were not meeting deadlines and were not as productive as they needed to be. In the year before implementing a workflow-based planning model, the company had released six different models of digital cameras. Only one of these releases came on time during the all-important spring window. To compete effectively in a very crowded marketplace, the company needed to release eight to 10 different models each year because, in this market, consumers require a broad array of products at different price points. In addition, at least half of the new models needed to be released in the spring to ensure that the company's products would find shelf space in stores.

Developing digital cameras is no simple task. The camera group operated out of four sites in three countries. The department also used several original design manufacturer partners in Taiwan and China. Communications between sites needed to be smooth. The goal was to increase the number of new cameras while consuming the same or fewer resources and, of course, to release half of the models during the spring window.

Prior to implementing workflow-based project management within the engineering organization, there was no mechanism for setting global priorities. Each program manager used his or her own system, from bubble charts to spreadsheets to Microsoft Project. When the management team decided to move to a workflow-based system, it established a single source of management information that would be used throughout the organization. This way, management could track progress and set global priorities. In tandem, the executives sharply reduced the amount of work in process. This gave teams the ability to focus completely on tasks until they were completed and, because the workflow-based planning system made priorities clear, teams always knew which tasks they needed to finish first.

For the first time in the history of the unit the camera group delivered its new models ahead of schedule.

The results were outstanding. In the course of a year, the camera group went from introducing six unique models to releasing 15. Seven of these models were released in the spring and 15 out of 15 met their release target – a vast improvement from the single model the year before.

Product launches were cleaner with fewer stops and starts, and for the first time in the history of the unit the camera group delivered its new models ahead of schedule. The teams improved significantly in meeting their cost and quality commitments, and morale improved sharply throughout the organization because there was so much less thrashing and firefighting.

More importantly, both of these organizations, like others who have adopted workflow-based project management, now think that they have consistency in planning, that the plans are used in execution to manage day-to-day priorities, and that status reports from their formal system are reliable. ❖