

Software Review 133



ProChain Pipeline

Jon Collins reviews the ProChain Pipeline product, an add-on to Microsoft Project that supports the principles of the Theory of Constraints. He describes the tool and explains how it can be used in practice.

It is four years since this magazine carried a review of ProChain. It is worth giving a brief summary of the Theory of Constraints (TOC), with apologies to all those who have managed to find or preserve the June 1998 issue of *Project Manager Today*.

There are three products in the ProChain stable.

- First, there is ProChain itself, a tool that enables the techniques of TOC to be implemented and tracked for single projects. ProChain was released in 1997.
- Second, we have ProChain Pipeline, which enables resource usage and task dependencies to be synchronised and managed across multiple projects or programmes.
- Finally, there is ProChain Enterprise, which enables Web-based access to the ProChain repository, for example for reporting or information updates.

While this article covers all of the above, it is focused on how ProChain Pipeline can be used in organisations that face issues of resource allocation.

What is the Theory of Constraints?

Eli Goldratt first came into the public eye of business theory with his first book, *The Goal*, written about manufacturing production processes. Its central theme was how resolving the bottlenecks as the key to reducing product lead times. If the slowest link in the chain can only produce a set number of parts, then that number is the same as the units the whole chain can produce. If my car plant can only turn out three engine blocks a day, then I can only produce three cars a day, no matter how efficient the rest of my machines or people may be. Improving efficiency becomes a challenge of identifying and treating such bottlenecks, involving:

- Removal of the bottleneck, for example addition of equipment to enable more units to be produced, or outsourcing production in peaks of demand

- Modification of policies that caused the bottleneck in the first place: this often revolves around moving the production chain to a revenue-based model rather than a cost-based model.

The second bullet is crucial, as it is an indicator of how bottlenecks can arise in the first place. If a resource is not being used to 100% of its capacity, it is considered inefficient, even if otherwise its outputs end up being stockpiled as inventory. Goldratt makes the point that measurement determines behaviour, and so we must often re-evaluate the way we measure our processes if we want to improve them.

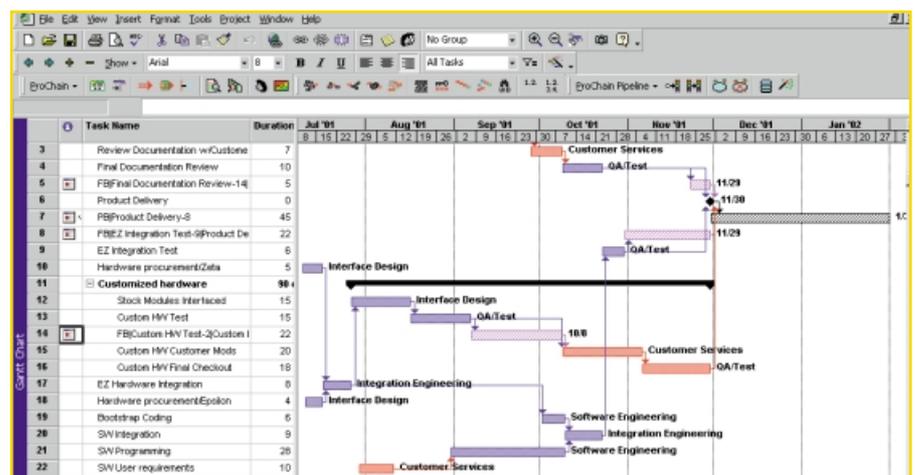
Applying TOC to project management

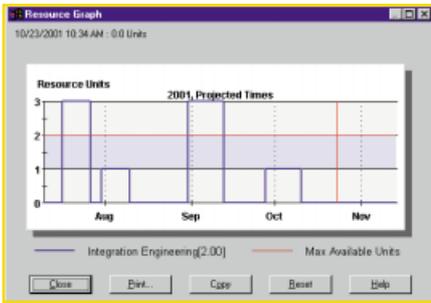
Since *The Goal*, Goldratt has developed his theories into new fields. The principles of TOC are applicable to project management, however constraints are far more likely to be in project resources than materials. Nobody has infinite time to allocate to specific tasks, and every manager would like to clone the people that are in high demand. TOC tackles this issue head-on rather than relying on the default attitude that 'things will work out.' We all know that, usually, things don't - overruns are an expected part of most, if not all projects.

Goldratt's application of TOC to projects is largely an assessment of human psychology. The first unfortunate reality, in the planning

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stage, is the tendency to build in contingency time to maximise the successful delivery of each task. For example, rather than saying a two-day task will take two days, four are allocated. The resulting plan may be stretched out a little but at least it is likely to be achievable. Sounds familiar? Unfortunately, it is in the implementation of the plan that (to use a favourite phrase of project offices) everything goes to worms. Goldratt uses the phrase 'Student Syndrome' to describe the second horrible truth about the way projects proceed. Consider the following: When a student is given a month to complete an assignment that takes five days, what does he do? Almost inevitably, the student waits until five days before the assignment is due before starting it. Immediately, should any part of the work be delayed, then the task slips beyond





the most current. For multi-project environments, in which ProChain Pipeline is likely to be used, the recommendation is to save project information to a Microsoft Project database (or indeed, any ODBC-accessible database, such as Oracle or Microsoft SQL Server) rather than flat files. Databases are better designed for multi-user, multi-access environment and indeed, the remote-access facilities of ProChain Enterprise can only be exploited if a database is being used.

There is a small issue that arise from changes Microsoft made (post-Project 98) to how projects are managed under the bonnet of the software. ProChain acts like another Project user, contending for the project files just as any other concurrent user. For this reason, a save is forced in Project when passing from 'normal' mode to 'ProChain' mode, but this isn't such a bad thing.

Using ProChain and ProChain Pipeline

Applying TOC becomes the application of a series of steps, which are presented in order.

Done correctly, and with suitable input information and expertise on the part of the user (no software can turn a poor schedule into a good one), out of the process drops an implementable plan.

The steps are as follows:

- **Level the resource loading across the project.** This removes any existing resource conflicts and gives you a more realistic, though maybe undesirable, timescale. Note that ProChain uses its own resource levelling algorithms: you should not be using Microsoft's built-in levelling function.
- **Identify the Critical Chain.** ProChain highlights in red (or the colour you choose), the chain of logical and resource dependencies across the project.
- **Create project, feeding and resource buffers.** These may be calculated according to very simple heuristics ('a quarter of project lead time' is what Goldratt specifies as a good start), or more complex formulae. Different kinds of buffers are necessary at different places in the project: the project buffer is the big one at the end, that ensures the project can still deliver on time should things go wrong within it.
- **Insert the buffers into the plan.** Adjust the project schedules to take into account the additional buffers.

need the capability to identify resource conflicts and bottlenecks across the projects. Finally, they require to re-schedule projects to treat these bottlenecks. It is difficult to see how this could be done without software: there are potentially so many tasks and contention points across multiple projects, that without tools even gaining a birds-eye view becomes a major challenge.

ProChain Pipeline provides a window onto a number of projects. To see how it works, let us work through the series of steps that a resource manager would follow, when adding a new project to an already-functioning pool of projects that follow TOC.

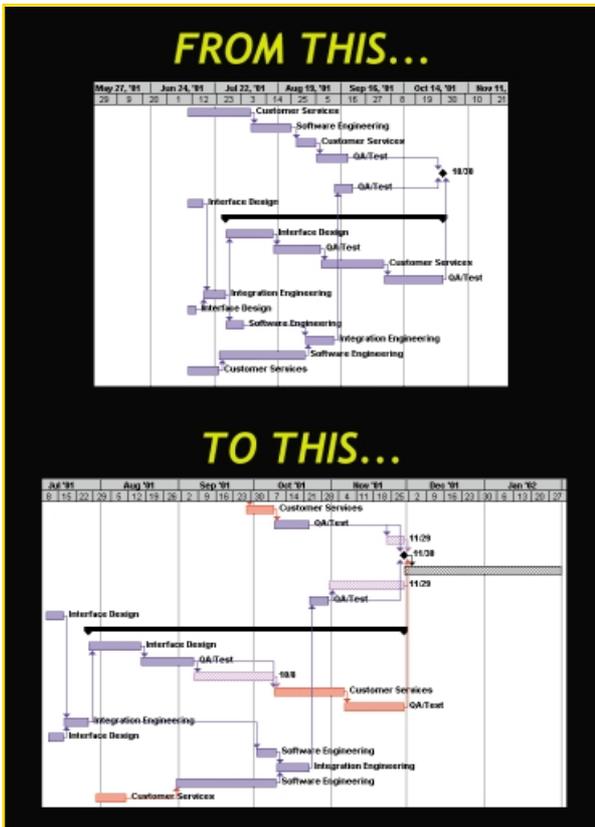
- **Import a project into ProChain Pipeline.** This is as simple as selecting the project data files and requesting their import within the tool.
- **View the project summary.** This gives information such as relative start and end dates.
- **View the resource summary.** This gives information about each resource involved across the projects. It is possible to drill down onto a resource to see where a specific resource is used on each project, and to see where there are conflicts.
- **Reschedule projects.** Pipeline offers a scheduling function that re-schedules selected projects in priority order such that contention is removed against other projects. It also inserts appropriate buffers to minimise the risk of problems in the project causing delays in another. The resource manager may choose to go back to the original project plan and adjust the plan manually based on local knowledge of the project, either before or after the rescheduling.

The resulting project plan provides a good indication of what the organisation is getting itself into when adopting TOC. For a start, it may look longer than was originally stipulated: indeed, it may be longer, as the timescales are more realistic. Also, at the end of the project is a single, potentially lengthy buffer of time. The temptation to superiors may be to say, 'we want the project to be delivered on the date at the start of the Project buffer,' and so they might: this is the point at which the project can deliver, should everything go according to plan. But we all know that, in the real world, it will not. The buffer is there for a purpose, and should stay.

As already discussed, multi-project environments require more complex resource management. First, managers need a bird's eye view across many projects. Second, they

Rescheduling of projects is a contentious area, as it involves gaining agreement from both project managers (who want it now), and department heads (who are already overstretched, 'you want it when?'). Scheduling is done based on project priority: the highest priority project is scheduled according to its own requirements, then other projects are re-scheduled in priority order to fit with prior scheduling decisions. So Project 3 is scheduled to fit with Projects 2 and 1, and so on. Not all projects will be part of the same multi-project setup: for example, an organisation may have Human Resources projects, building maintenance projects and software development projects. Pipeline provides the concept of project pools, which may be resource-managed and rescheduled independently of each other.

Pipeline is not a complex tool, but its



simplicity belies its power. Its tracking capabilities are far superior to those embedded in Microsoft Project, not least because they enable the monitoring of buffers to support decision making along the length of the project. It also enables the calculation and analysis of what-if scenarios, for example if an additional resource is added to the project, or if one project is scheduled before or after a second. If you do not subscribe to TOC, the tool will not benefit you as it will show information that does not interest you. If, however, you are behind TOC, Pipeline becomes indispensable.

Conclusion

There is much more to TOC than is documented here. Different buffer types have different names, uses and methods of determining their size; in scheduling, multitasking is considered an anathema; the impact of financial calculations (for example, the cost/benefit analysis of the project) is also explored and exploited. Before embarking on purchases of expensive software packages, it would be worth shelling out twenty quid on Eli Goldratt's book, *Critical Chain*. The next step, whatever your position in the organisation, is to convince your superiors that you can

reduce the lead times of your projects and deliver value, faster. TOC is not a silver bullet, neither is the software that accompanies the theory. ProChain is a tool to be used by savvy project managers that have the backing of their organisations to plan and manage projects in a non-traditional, altogether better way.

Right to Reply

Since 1997 the editors of *Project Manager Today* have understood the possibilities and opportunities available to organisations from using Critical Chain project management and have provided a useful thread of articles, conference speakers and information.

Many world class organisations are actively using Critical Chain and ProChain to manage projects of all types and are achieving very significant benefits, frequently with implementation help from Focus 5 Systems (European distributors) and ProChain Solutions Inc (USA based developers). The implementation experiences are also used to help ensure ProChain software is developed to Users' needs.

Recent additions provide focused resource graphs and improved project status and fever charts.

An important comment from the article is:

'Pipeline is not a complex tool, but its simplicity belies its power'.

It is scaleable and comprehensively supports single projects through to multi-project portfolios, programmes and enterprise wide management for project status and reporting.

Information is presented in powerful and easy to read graphical formats providing a common language understandable by all concerned. Support for the inevitable and wide variety of 'What Ifs' needed is extensive.

The software tools demonstrably help facilitate alignment of goals and obtain information from the data, giving managers the power to make better more effective decisions.

Alan Cohen is a Director of Focus 5 Systems Ltd who are the European Distributors for ProChain products and implementers of Critical Chain project management methods.

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