Rules-Based Project Management in Matrix Organizations: A Concept for Optimizing Organizational Performance in Multi-Project, Shared-Resource Environments

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Introduction

Organizations with projects that compete for limited resources may be able to optimize performance of project portfolios and provide better financial returns via a rules-based project task management system.

A rules-based project management system is a set of prioritization rules and supporting information systems that project task owners and their managers use to determine which project's tasks should be worked on next.

The system allows all parties to make decisions that optimize the use of company assets to produce the most impact in the shortest time. It "right tracks" projects with a minimum of administrative effort. Management gains new, actionable insight into the health and efficiency of the entire system.

Rules-based project management employs many traditional project management principles and techniques. But, in several significant ways, it challenges traditional project management paradigms that can get in the way of business results.

Part 1: The Conceptual Origins of Rules-Based Project Management

The rules-based project management concept is just that—a concept—without extensive field testing, although at least one simulation of a simple rules-based task prioritization scheme has shown positive results (Agrawal, 2012). Moreover, the version this author describes is based on, and is an extension of, a real project success story.

In 2004, the author led an engineering development project in a mixed R&D/manufacturing facility. The project required the development engineering team to design a new product and then establish the supporting manufacturing process through a series of experiments on the production floor.

Project length, in large part, depended on how fast test lots ran through the factory. In the planning phase, the engineering community at the plant advised the project team on what processing speeds to expect based on similar efforts in the past, and the project team incorporated those estimates into the project schedule.

When the experiments got started, the author monitored progress as the experiment lots proceeded through the factory and he began to work with the machine operators and their supervisors to make sure the project stayed on schedule. He observed wide variation in the time it took for otherwise similar processing steps, and through investigation, discovered that operator and supervisor decisions on the floor had a major impact. Despite a general awareness that the new product was important and had a certain priority status via an existing "hot lot" system, in the absence of clear priority rules and management support, the operators and supervisors often set the experiments aside.

Further investigation identified key reasons for this behavior. Supervisors focused on standard production numbers and either overtly or tacitly encouraged operators to put off the project experiments. Engineers running other projects with schedules of their own occasionally intervened personally on the floor to influence decisions. Finally, the experiments themselves required more effort than standard work and some operators found it convenient to push the work to the next shift in spite of supposed priority. None of this was a surprise, and time buffers built into the schedule took these factors into account.

The author began to consider the relationship between the new product's "speed to market" value and the decisions made on the production floor, and ran some sensitivity analyses to determine how much the company would benefit by shaving weeks or months from the schedule.

It turned out that the product would be an industry leader and command relatively high margins in an otherwise low-margin market. Getting to market faster would greatly increase the profitability of the manufacturing site for every day saved.

The next step was to figure out how to speed up the flow of the experiments. The key was to drive appropriate, nearly automatic decisions on the floor through a flexible set of rules backed up by all levels of management and the operators themselves. The rules had to make sense and everyone needed to know the stakes and payoff for success. There had to be a simple communication system that allowed anyone with an interest to see how things were going.

After several discussions with plant management (including engineering and production), the group reached consensus on certain flexible operating rules and communication methods. Operator representatives then weighed in on the rules. Initial objections included the usual concerns: impact to standard production, the impact on other initiatives and projects, etcetera. But the argument based on financial incentives for an early product release prevailed. No one was exactly sure how things would work out. Would the benefits of speeding up this one project really offset the opportunity costs incurred elsewhere?

In general, the rules stated that if a new product "hot lot" arrived at a station, the operator was to process it at the next available opportunity. Exceptions included supervisor-authorized hot customer lots and critical maintenance. Other exceptions were at the discretion of the supervisors answerable to the production manager and plant manager.

Perhaps the single most effective communication tool was a series of posters the project team put up throughout the plant that explained the three top strategic site priorities including the new product and its expected business impact. The plant manager conducted a series of shift meetings to explain the intention of the new system, and he and the author published progress results daily for plant consumption. The project team worked closely with the production supervisors to monitor station-to-station progress and resolve issues.

Management also rightly focused on enforcing the rules more strictly at constraint operations where capacity was at a premium. The plant had implemented capacity management techniques based on Eliyahu Goldratt's Theory of Constraints (1990) several years earlier so engineers, supervisors, and operators were keenly aware that slips at these stations meant incurring time lost that could not be recovered. On the other hand, the rules allowed for more flexibility at non-constraint, higher capacity stations.

The rules extended beyond the floor. When the project required functional engineering support, the author's project also got top priority, with logical, agreed-upon exceptions and safety valves. The overall effect was electric. The experimental lots moved through the factory nearly three times faster and reached speeds of 2x theoretical and sometimes less—an unheard-of result. Supervisors saw enthusiasm for the project build among operators. Production did not suffer nearly as much as feared, and other projects moved at an appropriate pace. In the end, the product got to market a year ahead of schedule and the company enjoyed an extra year of high-margin sales that far outweighed the costs.

As the author moved on to other project and program jobs, the experience at the manufacturing plant stuck with him. What are the guiding principles that might be applied elsewhere? How might such a system work, and what are the implications in different phases of project, program, and portfolio management?

Some of the author’s observations from experience:

1. In the absence of guidance, a significant number of task owners prioritize the wrong tasks among competing projects.

2. Management typically has little understanding of the true dynamic relationship among relative project resource requirements, constraints, prioritization-driven speeds, and business returns. Static “resource leveling” tools are crude and misleading approximations of actual situations in a dynamic environment.

3. Management typically underestimates the financial effect of prioritization and also underestimates its ability to influence relative project speeds through the lever of prioritization, and therefore, fails to set effective priorities at all—a clear lapse in leadership fundamentals that enables misalignment, inefficiency, chaos, and stress at lower levels of the organization when projects compete for resources.

4. Management pays little, if any, attention to the idea of “churn”—the lost time individuals and organizations incur to reorient themselves when they are forced to—or choose to—switch from one task or project to another in an attempt to keep them all moving per predictive scheduling norms.

5. Typical PMO metrics and certain project management paradigms that shape project planning, kickoffs, and in-progress management are inconsistent with prioritization principles and drive counterproductive behaviors. Commonly used project and portfolio management software reinforces the counterproductive paradigms.

What might happen to business results if a company implemented a new type of project and portfolio management scheme based on effective prioritization and corresponding operating rules? The balance of this paper explores the concept of rules-based project management and how it might work in practice.

Part 2: The Rules-Based Project Management Concept—Manufacturing Analogy and Operations

2.1 The Factory

A project-focused, matrix organization is analogous to a specialized type of manufacturing plant or “factory.” The project’s end deliverables are products, and the manufacturing plant consists of the various skilled stations (functions) run by individuals and small groups that work on those project tasks sequentially or in parallel until each project is finished. Each station, if faced with more than one available task, has to choose what to work on next.

Rules-based project management prioritizes the work of this factory at all stations simultaneously to optimize output. Here’s how it happens:

- Middle management organizes the **stations** (groups of employees)—based on the type of work done within a given function. A station can be as large as a functional area with multiple interchangeable individuals and associated contributors, or as small as a single individual with a unique skill (some examples include etch process engineering, security evaluations, and procurement).

- Each station has a **backlog** of uncompleted assigned project tasks associated with active projects. Some are ready to work on now; others will be ready to work on later.

- Management implements a continuously updated, universally available **information system** to guide and organize the work and provide the status of each task and project.

The graphic below depicts the various information system components within the rules-based project management concept and their interrelationships.

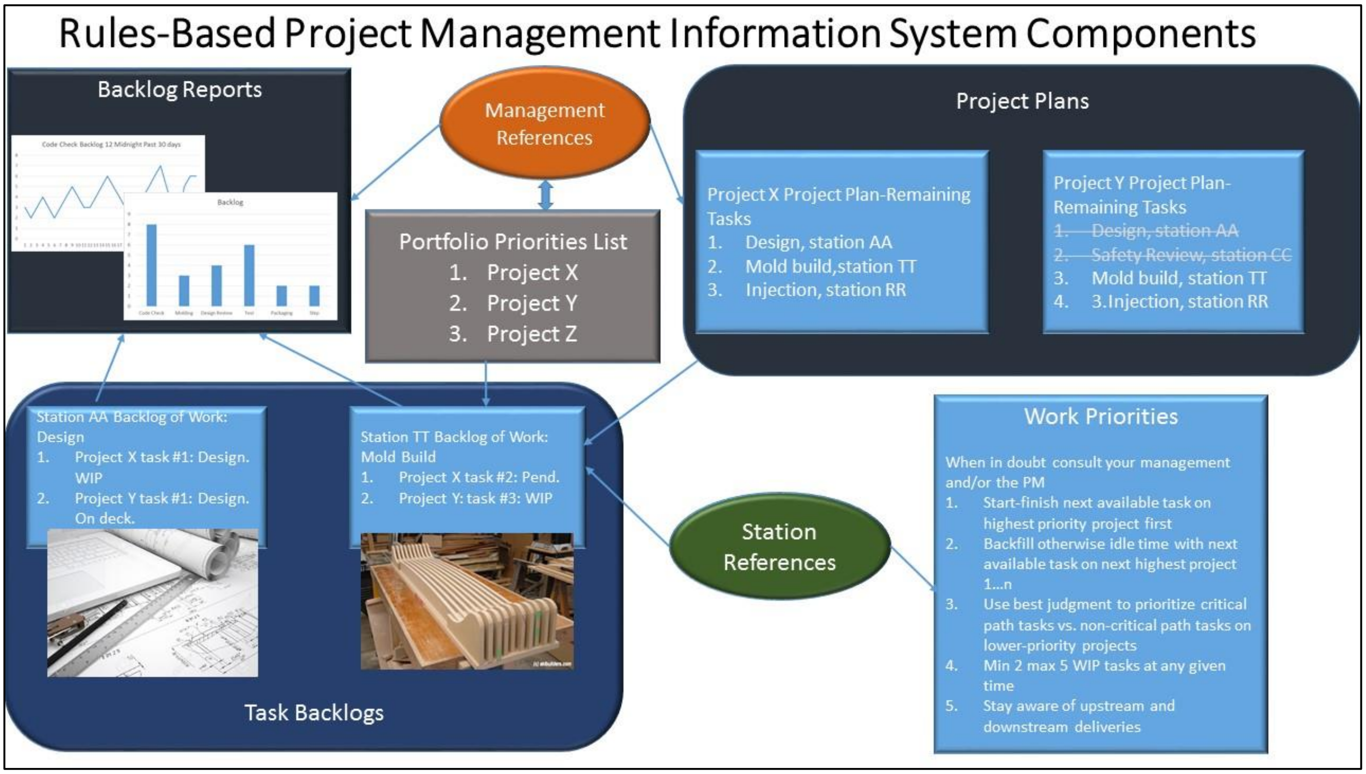

Figure 1: Rules-based project management information systems components.

- Project managers create, publish, and maintain **project plans** that show the sequenced tasks remaining for all active projects—and the stations that will do the work. These plans *do* estimate task durations including expected “bake” times and external dependencies, but *do not* predict cumulative finish times or dates and *are not* used as baselines to determine performance to the cumulative schedule. Planning is much simpler and faster via a rules-based system. (See section 5.2).

- The Project Management Office (PMO) creates, publishes, and maintains a **portfolio prioritization list** that shows all active projects, ranked by relative value (strategic, return on investment, return on capital, a weighted combination, etc.) Organization leadership periodically directs the PMO to update the list to add projects as others finish or are cancelled. Depending on responsibilities and organizational design, the PMO may have different priority lists and set up different management systems for more or less independent resource groups and their portfolios (see Part 6: Defining the scope of “the organization”).

- Organization leadership publishes and maintains a list of **work priority rules** that guide station owner decisions with respect to the order of task execution. A typical starting rule: “Tasks associated with the highest priority project on the portfolio prioritization list should be started at the first available opportunity and finished in the shortest possible time span.” In mixed environments where production or sustaining operations at a station compete for resources, the rules cover those situations.

- Station managers maintain **task backlogs** that show all tasks assigned to the station, but not yet completed. Backlogs show the schedule of work and task status. The task backlog charts should be as detailed as necessary, but not more so, and units should be normalized across all stations, such as “workdays” or “clock hours” per task. Suggested items:

  - The station name
  - A date/time stamp for the report
  - A shorthand display of the task number within the project, the task name per the project plan, and a yes or no indicator of whether or not the task is on the project’s critical path
  - The related project’s priority, name, and number
  - Task status, updated daily at a minimum, or as tasks complete
  - An estimate of effort in hours of actual work it will take to complete the task including any necessary “bake” time, taken from the project plan
  - The upstream task dependency and any available finish date-time estimate
  - The downstream task dependency and projected delivery date-time for work-in-progress tasks

- Management information systems include **backlog reports** that summarize the backlog of work at each station across the plant, focusing on the tasks ready for action or in process, but not yet completed. Management can use status and trend information for tactical and strategic constraint management.

2.2 Station Operations

Task owners refer to the priority lists and perform work according to the rules, generally tackling the tasks associated with the highest priority project first, the next in line second, etcetera, barring management-approved and directed exceptions. Under this type of rule scheme, the top-priority project should face nearly zero idle time between tasks, and should see resource conflicts only when existing resources are already being consumed on active, critical path tasks associated with that same project.

2.2.1: The Backlog Display

Here is a possible station backlog display.

Station: Software Code Check (SWC) 10:00am 5/23

Prior.#.Name	Task#.Name.Crit (Y/N)	Backlog Value (days)	From.When	Status	To.When
1.66549.Tank	32.Code Check.Y	1	Rec'd	WIP	XYZ. 5/23 5pm
1.66549.Tank	37.Code Check.N	2	Rec'd	On deck(1)	
1.66549.Tank	42.Code Check.Y	1	ABC	Pend	
1.66549.Tank	45.Code Check.N	1	ABC	Pend	
2.56732.Airplane	15.Code Check.Y	1	Rec'd	WIP	XYZ. 5/24/10am
3.48623.Auto	75.Code Check.Y	1	ABC. 5/25 4pm	Pend	
4.75239.Train	46.Code Check.Y	1	Rec'd	On deck(2)	

Backlog total: 8

Figure 2: Possible station backlog display.

In this example, the station owner has a simple backlog of seven tasks associated with four active projects. The tasks are grouped by project in the order of project priority.

- 66549 Task #32 is the top-priority task on the top-priority project, and is thus the top focus for the station team. The projected finish tells the downstream station owner (XYZ) to get ready for a handoff.
- 66549 Task #37 is ready, waiting on deck to become actively worked next.
- 66549 Tasks #42 and 45 are pending delivery from the typical upstream station (ABC) and an issue is identified that needs resolution on task 42 before it hits the station. The project manager and station manager should collaborate to resolve it before the task hits the station.
- 56732 Task #15 is active, but subordinate to the top task, meaning that the station resources work on it during natural idle time on the top task if available. The team has projected a delivery time to the downstream operation and should stick to the projection as well as they can and adjust the time as required.
- 48623 Task #75 will be ready for work when upstream station ABC delivers it, now projected as 5/25 at 4:00 p.m. by that station.
- 75239 Task #46 is received, ready, and on deck for action next unless pre-empted.

2.2.2 The Rules in Action at the Station: Rational Choices

As previously stated, at a high level, the station personnel work on the highest priority project's tasks first and then move on to the next items. If a station adheres to this simple rule, outcomes are generally better than complex rules designed to bring all projects in "on time" (Agrawal, 2012). But application of common sense might take rules-based prioritization a step further.

For example, the questions arise: What if a top-priority project has a noncritical task ready, but a lower-priority project also has a task ready, but it *is* critical? It might not make sense for the station to slow down a lower-tier project, and in fact, the station should not slow it down *if there is no impact to the higher-value project*.

In this example, the station owner has decided to work on 56732 Task #15 (a critical path task for its project) instead of working on 66549's Task #37 (a noncritical task). This may, in fact, be the right call. If in doubt, the station owner can contact the project managers or the project managers can contact the station owner to discuss the options and arrive at a consensus.

Implicit in the rules: If there is a dependency not captured in the plan—such as a small, but important collaboration from another functional area in order to complete the larger deliverable—the unnamed functional area will collaborate immediately on top-priority projects and use its best judgement for collaboration on lower-priority projects. Station owners are responsible for managing the situations and alerting project managers to issues.

Other situations may dictate conscious deviations. Two common situations come to mind: long lead time items and external "hard" dependencies.

The first situation may arise when a task on a lower-priority project is an upstream dependency for a long-lead time item which could be worked in the background without adverse consequences—maybe even by external resources. An example: a short design task that, when completed, triggers a long-lead time purchasing cycle.

The second situation may occur when failure to complete an upstream task means a significant delay due to "missing the bus" downstream. An example might be submission of a design to an external component manufacturer that only accepts submissions during a defined time window.

In both of these situations, the station owner, project manager, and middle management need to make conscious decisions based on business judgment and common sense.

Clearly, rules-based project management does not remove all conflict. Employees have to exercise judgment at several levels. But it does take care of a large portion of it—much more than in current systems where decisions are left almost entirely unguided.

Rules-based project management also has a side benefit: reduced churn and greater local efficiency. Rather than moving all projects on the list a little at a time and switching back and forth, the task owners are encouraged to complete all work on a single prioritized task before moving on to the next item. Thus, the system reduces the "hidden cost" of time lost as the task owner reorients from one task to another.

Discipline comes into play when stations make poor decisions, such as "clearing out" a bunch of smaller items on nonpriority projects because they are easier and make the list look shorter, all at the expense of the really important projects. Leadership has to enforce the rules and reward good decision-making skills.

Discipline also extends upwards: Executives and middle managers must take active responsibility be accountable for holistic project resource management. The next section explores the ways companies can use data from a rules-based project management system to optimize resource utilization.

Part 3: The Project Pipeline: Constraint Management—Optimizing Project Resources Across a Portfolio

3.1: The Theory of Constraints Concept

Goldratt's "theory of constraints" (TOC) has been a game-changer in many manufacturing settings for at least twenty years. His "critical chain project management" (CCPM) methodology, a derivative of theory of constraints, applies theory of constraints principles to project management. Rules-based project management and its data sets provide management with a practical means to implement the resource-leveling concepts within both TOC and CCPM.

> The **theory of constraints** (**TOC**) is a management paradigm that views any manageable system as being limited in achieving more of its goals by a very small number of constraints. There is always at least one constraint, and TOC uses a focusing process to identify the constraint and restructure the rest of the organization around it. TOC adopts the common idiom "a chain is no stronger than its weakest link." This means that processes, organizations, etc., are vulnerable because the weakest person or part can always damage or break them or at least adversely affect the outcome. (Wikipedia, n.d.)

The key takeaway for project portfolios is that some resources are in demand more than others, and if projects intersect at those points, they restrict overall portfolio output and management needs to plan, monitor, and react accordingly. Standard project management planning tools attempt to identify resource constraints by integrating project plans across a portfolio to check the loads on a given set of resources—or "station" as described earlier. CCPM focuses on capacity management at those constraints. Rules-based project management takes this a step further and provides management with a dynamic view of what is actually happening at any given station.

Executive and middle management can (and should) use rules-based project management data to implement TOC across any given project portfolio. Management, as the primary resource owner, can and should take responsibility and be accountable for overall project total output and individual project speed, much more so than in traditional systems. Management must continually monitor data in various reports and make tactical and strategic resource moves that directly correlate to system output and speed.

3.2 TOC Reports and How to Use Them

A typical report or set of reports in a rules-based project management system should show the current backlog totals (in the chosen units) at each station, plus trends for past periods. Management has to determine the granularity of the data required for good decision making. Data for the past ten weeks by daily average totals is one example. Peak daily backlog for the past month might be another way to get the appropriate insight. So, what does management do with the data?

- Current spikes in backlogs represent acute pressure points that may be temporary or not. Reactions might include:

    1. Increased vigilance regarding rules adherence at the station. Every moment counts as a constraint and experience teaches us that the temptation to violate rules is heaviest at these points because so many projects are affected by the backlog buildup.

    2. Short-term, immediate capacity fixes: temporary staffing, for example.

- Long-term upward trends represent structural constraints. Management should consider permanent incremental capacity increases to speed up the pipeline, but not so fast as to just shift the backups downstream.

- Low average backlogs, downward trends, or prolonged periods of low or zero backlogs may provide, after careful analysis, opportunities for cost savings or realignments without jeopardizing throughput.

Here's a simple example of a backlog trend report for a single station called "Code Check":

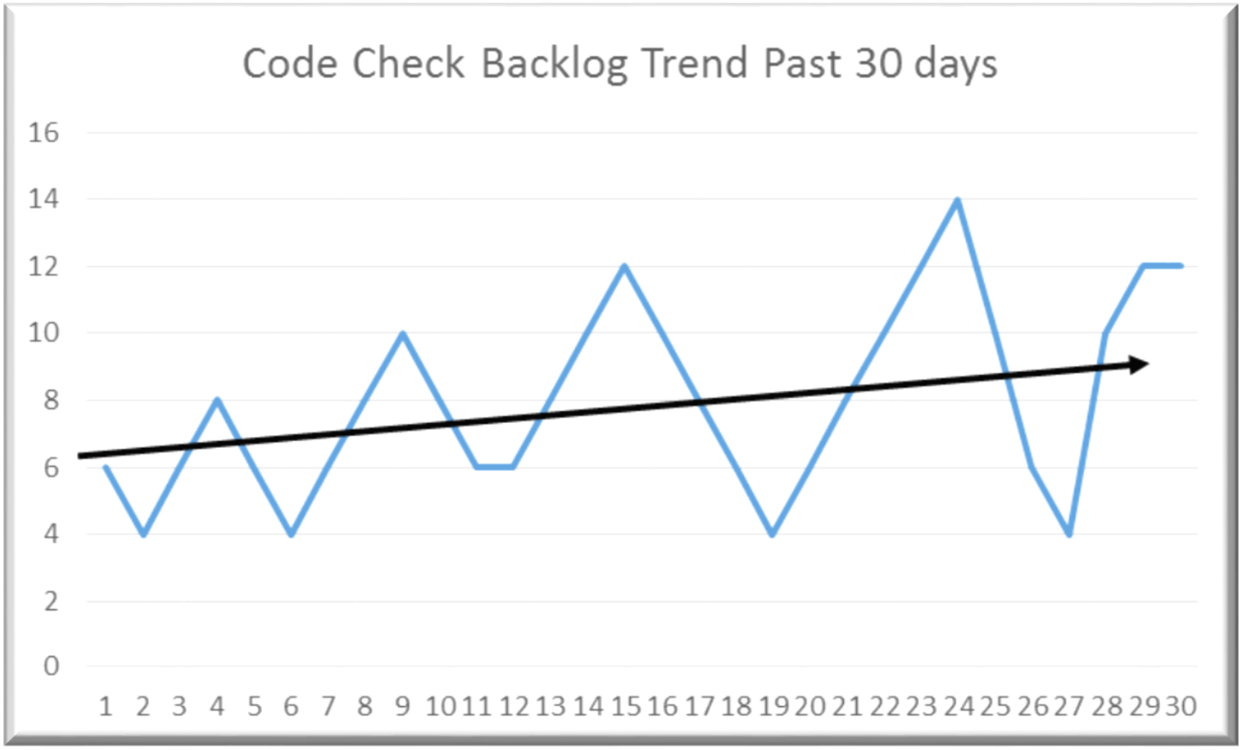

Figure 3: Backlog trend.

In this case, management should probably watch this particular station closely to see if the upward trend continues. If it does, then this particular function may become a constraint and thus present an opportunity for an effective capacity increase. So far, the station has been able to recover, but if the backlog "saw tooth" bottom starts to shift upwards consistently, it is time to act.

Backlog data also enables macro-capacity management through "starts" regulation. If executive management and the PMO truly understand system constraints and capacity, they can improve the health and operation of the system by feeding new projects into the system only as fast as the known constraints can handle the added work without unacceptable spikes in backlogs. Here is a simple example of a backlog (snapshot) report.

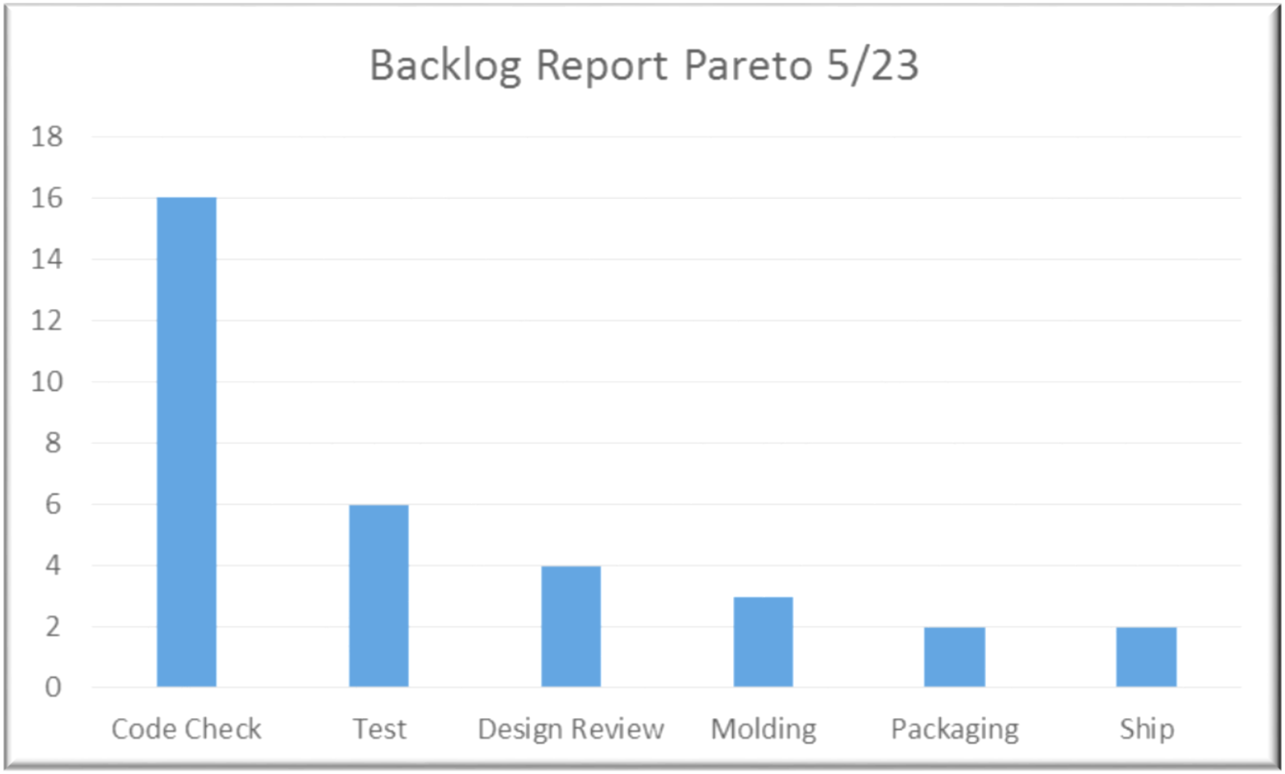

Figure 4: Backlog report example.

In this example, Code Check shows the existing highest backlog. It may or may not be an issue depending on capacity, but this Pareto report is another clue regarding system health.

Depending on how the data are reported, it may need to be normalized against capacity to give a more complete picture of the actual situation. For example, if backlog units are in total worker-hours of effort, but two workers will be on the job, the backlog of work in hours should reflect that capacity. Management will want to know how much work is in process or on deck, and how soon it will be cleared.

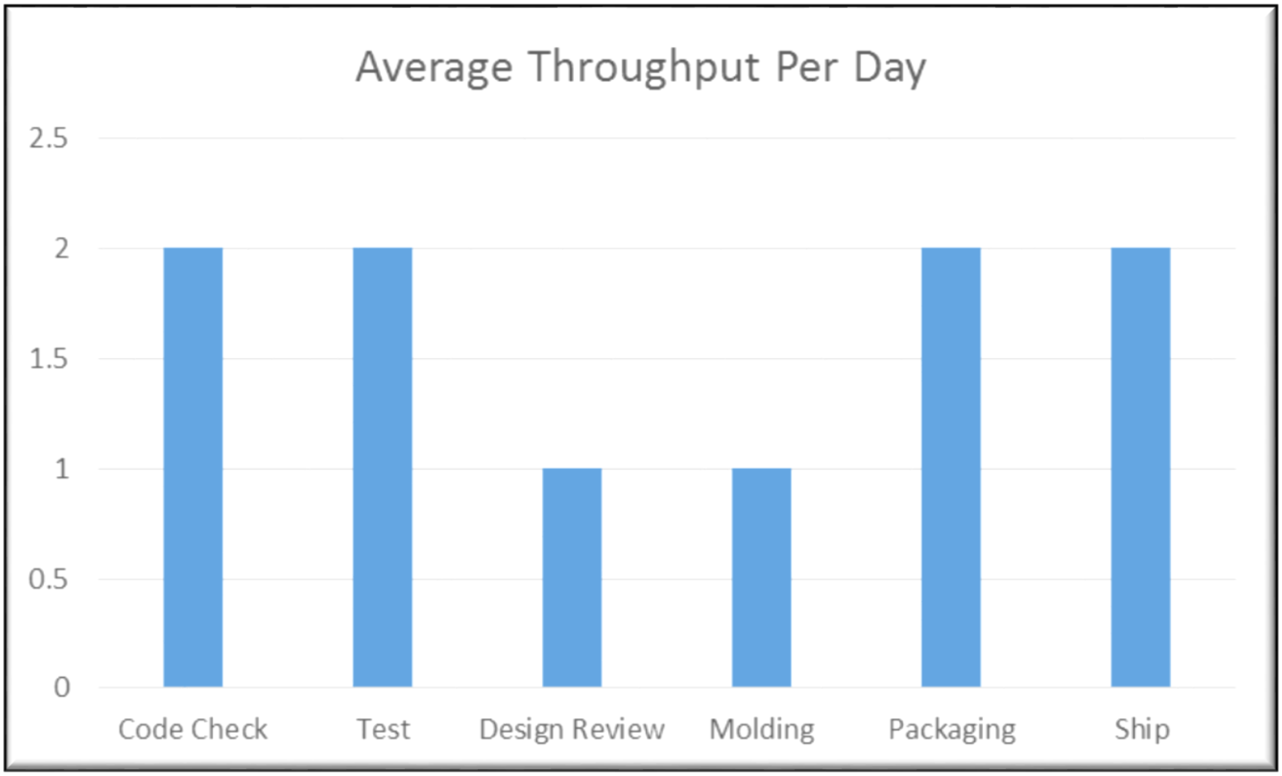

Figure 5: Average throughput per day.

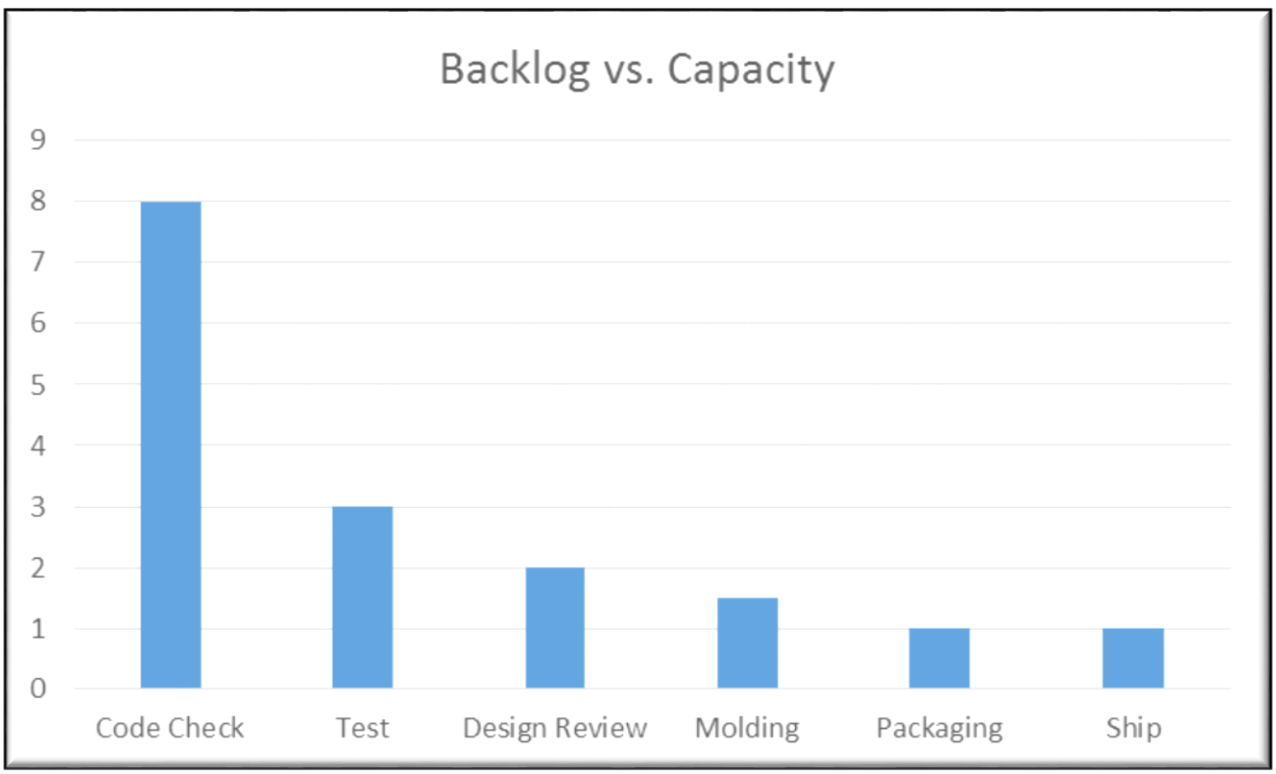

Figure 6: Backlog vs. capacity.

The backlogs vs. capacity have a direct correlation to average project cycle times (average project completion speeds normalized for total effort). If management overloads constraints, backlogs will spike at the constraint stations and cycle times will increase without any throughput benefit. Non-constraint stations will appear to be (temporarily) busier, and thus, more efficient; but in reality, are just piling up work on the constraint stations to no good purpose.

Pile-ups are not just annoying—they create additional churn and reduce efficiency. Slow cycle times also reduce quality because it takes longer to discover errors or problems for a given project. And overloading a system also reduces agility: Management can't implement portfolio changes as effectively, and may miss business opportunities that arise on short notice.

Constraints should not be a total surprise. Station managers should already know at least an estimate of the units of effort per day a station can handle, and the task owners should more or less know the units of effort it will take to do a particular job. One major deliverable from a project planning exercise should be a reasonably accurate station backlog value for each task. When the PMO adds the new project profile to the stack and runs the total backlog against capacity, it will have a static view of capacity—in essence, a prediction of where backups are likely to occur. Management can then pay close attention to actual station throughput and take action as needed.

3.3 TOC and Project Starts Management

Here is an example of how management might use the data to regulate starts: If the Code Check station (the presumed constraint station) can handle two backlog units per day and the current active projects will consume sixteen backlog units as they get accomplished, then it will take a minimum of eight days for the last project in the pipeline to get through the system (and likely more, with all the other non-constraint steps after the last time it uses the constraint station). If, on average, it takes eight days from project kickoffs to the point where Code Check work is required, there is a chance of underloading—so the group that manages project starts will want to feed at least two backlog units into the system per day, and perhaps a few more to build an acceptable buffer to prevent productivity gaps. But overloading the system will just extend the cycle time and mask idle time temporarily at the other stations that are before the first use of the constraint station.

Management can decide what the correct balance should be. A good practice: Determine what buffer is necessary at the constraint to keep it fed in spite of variances in upstream station performance. Management should never "starve" a constraint since gaps there represent productivity losses that can't be regained. Once that buffered backlog level is reached and is steady, project starts should be gated at a pace dependent upon actual constraint backlog clearance.

An analogy: fluid through a funnel—where the liquid represents the work-in-process input, output, buffer, and overload—and the funnel itself represents capacity constraints. The following graphic depicts various constraint-regulated starts, strategies, or modes.

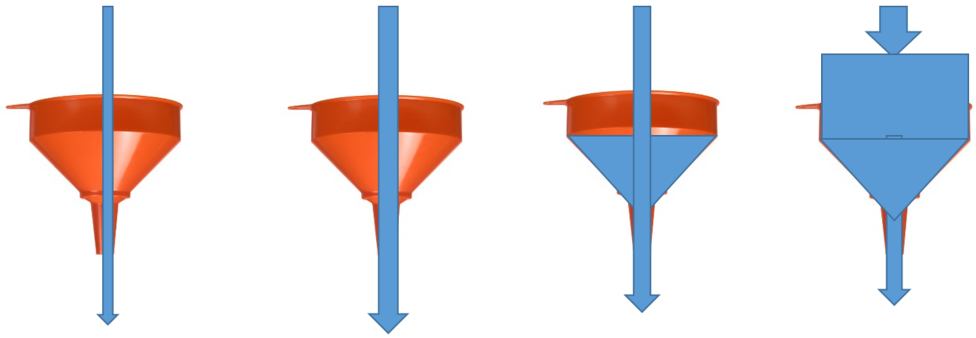

Figure 7: Constraints analogy—fluid through a funnel.

Too little flow into the system starves the output. Trying to balance the input and output flows *without* a buffer is risky if the input flow may be interrupted from time to time.

Consistently overloading the constraint—clogging the system—is equally bad.

The optimum: Match the buffer to the variability of the inputs. Attempt to keep a little in reserve at the constraint, represented by the fluid level within the funnel. If the flow is interrupted upstream, the buffer level will drop, but as the non-constraint upstream processes recover, the buffer will be brought back to its normal level.

3.4 Lean Manufacturing Line Balancing and Project Portfolio TOC

Note that TOC says little about how to manage constraints over time. The assumption is that management chooses the constraint—perhaps because the resources there are the most expensive—and manages it.

But management generally wants to increase efficiency and throughput, and the obvious targets will be the constraint operations where resources are added, and non-constraint operations where management may want to reduce capacity and cost. As management addresses one constraint, others emerge and management may address those in turn.

The natural outcome, if taken to its logical conclusion, will be a perfectly smooth pipeline with no obvious constraints, or more likely, continuously shifting constraints that approximate a smooth pipeline.

As station capacities even out, the system should resemble a lean manufacturing setting where manufacturing steps are organized per line-balancing principles, and takt time regulates starts and output rates (*takt time* in lean manufacturing terms is the tempo at which system outputs are expected, expressed as available production time divided by the units of production). Lean manufacturing system experts design factory production lines around the takt time concept.

3.5 TOC Conclusions

In this author's opinion, the entire concept of project cycle time and true capacity analysis in relation to project starts management is unexplored territory for most project-focused, matrix organizations. The nearest most organizations come to true capacity analysis comes during predictive planning, where staffing demands are aggregated into an overall profile that is "resource leveled." That is a reasonable starting point, but until management studies the dynamics of resource constraints and gets down to real effort-driven task analysis, static resource leveling may not yield particularly satisfactory results.

Because projects are, by definition, unique and tasks have varying levels of complexity, capacity and line speed management in a project portfolio context is likely to be more art than science. But without it, management may be missing a great opportunity to improve operations.

Part 4: The Project Prioritization Principle—Making More Money Faster with Rules-Based Project Management

4.1 Overview of the Project Prioritization Principle

Because of the advantages of reduced churn and better efficiency, even if all projects in a given portfolio were of equal value, a rules-based system and arbitrary prioritization may provide better results than a portfolio system without prioritization. But the real payoff is likely to come for portfolios with large variation in expected project returns by project.

To see why, let's explore the prioritization principle:

<u>The Axiom:</u> Business optimization requires that the highest-value projects get prioritized and completed in the shortest possible time relative to projects of lesser value.

<u>The Corollary</u>: It is a mistake to devote resources to lower-value projects *if the higher value projects are delayed as a result.*
<u>The Complication:</u> Asymmetrical tradeoffs—the value of early completion of one project or a block of projects versus total effect on the timing of the return of the remainder of the portfolio.

Relative project value can be judged any number of ways that make sense to the business, but NPV (net present value) is perhaps the best "apples-to-apples" comparison among all of the projects in a portfolio since it normalizes inputs and outputs over a given period of time (see Investopedia CFA Level 1 Exam Guide).

Of course, financial benefits are not the only reason to prioritize a project. Management will have to use its best judgment and leaven the mix with any strategic considerations that outweigh strictly financial returns. It may want to employ a more holistic approach to its ranking system, such as the system described in the Innotas article, *Project Scoring and Prioritization for Maximum Results* (2012).

But in general, why is completing the most important projects in the shortest time usually so important? To state what should be obvious, faster returns are better than slower returns. Speed pays.

4.2 Examples of Prioritization Analysis

<u>4.2.1 Basic Example</u>

Figure 8 shows an (overly) simple example of a portfolio value matrix.

		Project Finish Period and Returns by Period				
Project	Benefit per month realized on completion, ranked	1	2	3	4	5
1	$500	500	500	500	500	500
2	400		400	400	400	400
3	300			300	300	300
4	200				200	200
5	100					100
Returns		500	900	1200	1400	1500
				Cum value		$5,500

Figure 8: Portfolio value matrix.

Assume that trade-offs are one-for-one, meaning that any particular project pull-in of projects #2-5 by one period causes a delay in *one* of the other projects of *one* period. Note that any displacement (push to the right of the top project cash flow start date and corresponding pull to the left of any other project) will reduce the cumulative portfolio value for a given timeframe.

Also note that in this simplified scenario, the value that management assigns to each project is based exclusively on the cash flow after launch. In reality, the value analysis has to take into account a lot more elements: ROI, strategy, politics, costs, etcetera. Once management makes the call, however, the rule holds true given the trade-off assumptions: The highest value projects should always have priority over others of lesser value.

So, what if management can pull in a lower-priority project without delaying the top project? The company should absolutely do it, and under rules-based project management, as long as it does not delay the finish of any higher-value project, it is an expected outcome. Task owners do not ignore tasks on lower-priority projects, they just do what is next on their own backlog's priority list first. With rules-based project management, project managers and functional managers make sure this happens. Figure 9 shows an example of the financial effect.

		Project Finish Period and Returns by Period				
Project	Benefit per month realized on completion , ranked	1	2	3	4	5
1	$500	500	500	500	500	500
2	400		400	400	400	400
3	300			300	300	300
4	200		200	200	200	200
5	100					100
Returns	1500	500	900	1200	1400	1500
				Cum value		$5,900

Figure 9: Financial effect.

In this example, assume project #4 can be pulled into an earlier finish date without impact to projects 1–3. Its earlier finish is beneficial to the portfolio because the cumulative value in the same amount of time is higher—US$5,900 instead of US$5,500—and the rules-based project management system promotes this outcome.

4.2.2 The Complication: Aggregating Effects Over Time Across a Complex Portfolio

The value analysis has to take into account exceptions to the assumption of one-for-one trade-offs. What if a delay in project #1 would result in the ability to either pull in a lower-return project by more than one month, or would allow two lesser-value projects to be pulled in by one month apiece? If either of those cases apply, or a combination, it might be wrong to assign project #1 the top spot. The next two diagrams illustrate these situations.

		Project Finish Period and Returns by Period				
Project	Benefit per month realized on completion , ranked	1	2	3	4	5
1	$500		500	500	500	500
2	400		400	400	400	400
3	300	300	300	300	300	300
4	200				200	200
5	100					100
Returns	1500	300	1200	1200	1400	1500
				Cum value		$5,600

Figure 10: Value analysis.

In the above example, management pushes project #1 and pulls in project #3 by two months, resulting in a net portfolio gain of US$100.

The next table shows the effect of asymmetrical trade-offs among *multiple* projects:

		Project Finish Period and Returns by Period				
Project	Benefit per month realized on completion , ranked	1	2	3	4	5
1	$500		500	500	500	500
2	400		400	400	400	400
3	300			300	300	300
4	200			200	200	200
5	100				100	100
Returns	1500	300	900	1400	1500	1500
				Cum value		$5,600

Figure 11: Asymmetrical trade-offs.

In this example, management pushes project #1 by one month and that allows both projects #4 and #5 to finish one period earlier, resulting in an absolute cumulative portfolio value increase for the five-period time frame.

In all of these cases, management has to also factor in the aggregate benefit flows to arrive at the proper prioritization scheme.

Just like the decisions task owners have to make at their stations, rules-based project management and the priority list decisions are not necessarily clear-cut. Management should prioritize projects only after a relatively careful analysis to predict the consequences and optimize actual outcomes. The more asymmetrical the trade-offs, the harder the decisions are likely to be. But management should not leave it to chance—it should take full ownership of the analysis process and resulting priority decisions.

It may be that, for a given portfolio, trying to fast-track projects will not be the obvious right choice, particularly where there are no clear-cut winners. Where there are clear advantages, though, rules-based project management may be a good way to go. And even where the benefits appear to be less than clear-cut for a given portfolio, the side benefits from a rules-based system—organizational cohesion and reduced churn—may tip the balance in favor of strict prioritization and rules-based project management.

Finally, most organizations' project portfolios are likely to follow the Pareto Principle—80 percent of the benefit will come from the top 20 percent of projects—and rules-based project prioritization is more likely than not to be an effective optimization method.

4.3 Prioritization? What Prioritization? How Typical Portfolio Management Techniques Undermine the Project Prioritization Principle

Many organizations think they effectively prioritize the work associated with top-priority efforts, but in reality, they do not. They usually start with a cut line below which they don't fund or start a proposed project. Sometimes, the vetting process is continual; but most often, there is a "season" for vetting projects that is tied to financial calendars. Management might give particular projects that survive this process somewhat more attention and publicity than others, but that is not the kind of prioritization it takes to optimize business results. Why not?

In a traditional portfolio management setting, management assigns teams to projects and asks them to put together project plans with predicted delivery dates. Team members know management will hold them accountable for on-time delivery within budget, *often irrespective of relative project priority or "high visibility" status*.

When project execution starts, what happens—even to the high-visibility projects?

Under "exception-based reporting"—typically "red-yellow-green" reviews, management *silently impedes priority projects as resources get spread out in order to make sure that "no project gets left behind."* Sometimes, priority projects will have more frequent executive reviews, but in most cases, if the project is "on schedule" according to the predicted schedule, management does not pay much attention and ignores opportunities for pull-ins.

If too many projects are red, during the next planning cycle, management may focus on "better planning." Project teams usually react by adding buffers into their tasks. And as all experienced project managers know, these buffers often become self-fulfilling prophecies.

Another related response: Management insists on more intensive planning to cover all contingencies in the vain hope that all variables may be comprehended—and dealt with among all projects—in order to produce more accurate individual project schedules. By insisting on more detailed planning, and on the companion activity of centralized resource planning to cover all projects—sometimes trying to predict months in advance what conditions will be like in an inherently chaotic environments—the planning cycle itself gets lengthened and actual work on all projects anywhere on the priority list can get delayed. But where the rubber really meets the road is in the day-to-day work after the project is started in earnest.

The simple exercise of determining “What should I work on next?” is, by default, left to the judgment of the task owner, and in the absence of clear direction, the task owner does what he or she thinks is right based on understanding, misunderstanding, intuition, feel, energy, interest, and perceived pressure.

Management could train task owners in some sort of independent task prioritization methodology like reactive prioritization, but that might be even more complicated than the scheme proposed in this concept paper and lead to no better, or even worse, results (Freed, 2000).

Sometimes, no one but the project manager is really paying all that much attention to delays at the task level, but when someone does, the reaction may depend more on the requester’s clout or relationship with the task owner than it does to a rational choice based on what is actually best for the company. By the time management figures out what is going on and problems are “escalated,” it is often too late to make up for lost hours, days, or weeks.

Traditional systems defeat the business objectives of the project prioritization principle. So, is more intensive planning and more schedule reviews the answer? Absolutely not. Better *leadership* is. Better *communication* is. Better *decision making* throughout the organization is. And it does not happen without a *system* to make it happen.

It takes a published and maintained list of priorities that gets the entire workforce moving in the same direction, and good data. The prioritization scheme and reporting in rules-based project management naturally resolves resource conflicts quickly, and where there are conflicts, they are obvious. Management immediately has visibility into problem areas via task backlogs and project progress (or lack of progress) and can address them by exercising business judgment.

A very small amount of workforce discipline, encouraged not through coercion or relationships, but through information, can turn the question “What task, and from what project, should I work on next?” into a powerful, positive force to apply the right resources at the right time to the right project.

Part 5: Paradigm Shifts with Rules-Based Project Management

5.1: Overview

As stated in the introduction, a rules-based system departs from traditional project and portfolio management in a number of significant ways. Project planning, project starts, and performance metrics are some key items worthy of discussion.

5.2 Plan Phase Deliverables

A committed final delivery date is not an outcome of the project planning process in rules-based project management. Why not, and doesn’t this violate a key foundation of project management? Yes and no.

Project managers in a rules-based system still take their teams through WBS creation and sequencing. These activities are tasks that must be integrated into the systems—and the program manager is responsible for organizing these tasks and getting them into the system.

But when it comes to task durations, the focus is on *theoretical* task durations based on estimated effort vs. capacity, excluding any and all assumptions about task readiness for action. In many ways, this makes planning much easier and faster for team members because they don’t have to guess at all the contingencies that might affect the effort. The project manager wants to know how long something actually takes with 100 percent focus, plus any included unavoidable “bake time” without any buffers. The only assumption should be the resource capacity allocation: Will one or two or three people be working on the station task, and how does that affect theoretical time to completion? The estimates should also capture any task-specific risks such as the chance of a process failure.

The resulting theoretical “schedule” end date *estimate* is not a commitment or even a target, except for the highest priority projects. The plan <u>is</u> a blueprint for action and a reference point for the project manager, station managers, and task owners to use within the information systems once the project has started. Actual finish dates are outcomes within the dynamic system based on prioritization and actual application of resources in the pipeline.

Note that the highest priority projects should achieve project speeds relatively closer to theoretical, and thus project managers can (and should) continually update expected high-priority project finish dates internally to the organization with few or no contingency buffers. For *external* reporting purposes, executive management, depending on the situation, may want to add some sort of cumulative buffer based on the risk analysis that *is* an output from the planning process, following critical chain methodology.

Note also that for the lower-priority projects, schedule risk increases in proportion to the project’s rank at any given time and any projected finish date will become less and less accurate the lower the rank. With experience, project managers should become better at predicting finish dates, but such predictions should not be a prominent part of a scorecard or review since they could distract the organization from its real mission to complete the most important projects in the shortest time possible. Going back to a red-yellow-green system based on predicted finish dates will, in fact, do just that.

If management does want a firm commitment for external parties anyway, it can either re-rank the project to put it closer to the theoretical end of the spectrum or add in additional buffers to reflect the position of the project in the system. If management is dissatisfied with the overall speed of the projects in a given portfolio, it should analyze the production pipeline and make the necessary capacity changes.

5.3 Project (and Personnel) Performance Metrics Will Have to Change

At a high level, the metrics for the organization as a whole should be in tight alignment with financial performance or strategic goals instead of individual project on-time completion. One of the major benefits of the rules-based system is metrics alignment top to bottom throughout the organization—everyone should, in some way, be focused on getting to the biggest benefits for the organization as a whole as quickly as possible.

But if an organization drops “on-time completion” for all but the top project (or few projects) at a time, it creates a problem: Project managers naturally want to drive assigned projects to completion “on time” or even ahead of time and be recognized for their work. With rules-based project management, if a project manager is not working on a higher-priority project, the best they can do—and what they should do—is plan the tasks and sequences well, manage risks, monitor progress, assist with hand-offs, and make sure that the functional areas are working on project tasks per the rules.

Managers of project managers will have to judge merit by other means. How accurate was the task planning and sequencing? What was the quality of the risk analysis? Were hand-offs and escalations handled appropriately? Did the project manager follow and enforce rules appropriately?

Station managers may have to look at things differently as well, and upper management should be evaluating them on their resource efficiency to plan—“to plan” because for non-constraint operations, some slack will be built-in by design and should not be cut without careful analysis—and by other metrics that support the system. For instance: Generally, does the station team play by the rules? Were strategic and tactical staffing shifts, augmentations, and reductions implemented as directed or planned?

With rules-based project management, executives have greater roles and responsibilities. They more directly than ever before control the levers of success. They choose the priorities, pick the rules, and own the system resource configurations that ultimately dictate project speeds. They can't just start a bunch of projects all at once and put pressure on lower-level managers to sort it out in a dog-eat-dog environment, holding them "accountable" for on-time completion to dates that are at best guesses to begin with. On the other hand, they should find their ultimate goal—profitability—easier to achieve.

5.4 Project Starts Methodologies May Need to Change

Organizations should jettison seasonal, inflexible portfolio management processes that release all projects at once annually, vs. incrementally adding projects to the portfolio on a continual basis according to opportunities that become available according to their own schedule, not a calendar.

The release of projects should be gated by capacity analysis results and dynamic constraint management data. It's likely that entrenched financial systems and paradigms drive bad behavior and represent significant challenges. But if this is not changed, the organization will have a difficult time managing constraints properly, and the unnecessary pressures may cause frustration among employees.

Part 6: Other Implementation Challenges

- **Defining the scope of "the organization**": Very large and complex organizations may want to implement a rules-based system by division or department, where at least 80–90 percent of projects can be completed by personnel shared within that division or department. For example, it may make sense for a car company to run separate instances of rules-based project management, one for its design-development department and a separate system for its IT department, if there is not much project overlap between the two departments. Division managers can collaborate on cross-functional, inter-departmental tasks as needed to make sure competing priorities are handled appropriately.

- **Defining the scope of the "station" and assigning tasks**: If skill sets and the tasks they perform are discrete, this is easy. But there are many tasks that are collaborative in nature and require a team approach and an iterative, fluid process for completion. A project manager may have to arbitrarily pick a task owner with the understanding that cross-station cooperation is expected.

- **Cross-organizational competing priorities:** What one organization treats as high priority may not be urgent to another. For example, an IT department may have a global, high-priority program to improve networking services at local manufacturing plants, but the local plants have other, higher-priority projects or concerns. IT management should take the lead in promoting the anticipated benefits to, and getting buy-in from, plant management in order to get the fullest cooperation possible. IT management may even want to get higher management levels to provide guidance.

- **Excessive reprioritization**: The system's credibility (and the executive's) will suffer if an executive changes the priorities too often. In general, once a project hits a "top tier" level, it should not be demoted. Exceptions should be rare. Chronic interruptions such as customer-driven special deliveries are better handled by adding policies to the basic rules. Beyond the top-tier, however, all is fair game. Priorities do change. If a "hot" project emerges, then organizational leadership should add it below the existing 1-2-3 projects at the appropriate level.

- Related to the above item: **project manager incentives**. Actual finish dates will be harder to predict the lower down the project sits on the priority list. PMOs should spread project assignments as evenly as possible, top to bottom, along the priority list. Everyone should get a chance to shine. The PMO will have to use its best judgment with respect to the rotation.

- **Politics and local autonomy:** Managers who tend to exert power behind the scenes to get their pet projects done at the expense of the priority projects have to be reined in. But rules-based project management should not be an excuse to avoid accountability for reasonable local goals—there must be a balance.

- The **“idle time” and “work-life balance” paradigms** must change. There will be natural peaks and valleys for project managers and other resources. It’s okay to take time off in slack periods to recharge, anticipating “overdrive” periods. It’s also expected that peaks will require temporary extra hours. When these are excessive or repeated too often, it’s a sign of a true constraint and it is management’s responsibility to relieve it. When there is too much idle time, it is a sign that resources should be permanently reassigned. The work patterns may not fit traditional “minimum weekly hours” requirements or traditional vacation allocations. On the other hand, with an automated system, it should be relatively simple for backup project managers to step in and manage project workflows.

- **Training**: All levels of the organization will need to understand the rules-based project management concepts in order for it to work correctly. But it can be introduced in increments, starting with the project prioritization list, followed by rules (guidelines), and then followed by reporting systems.

- **Management software**: It seems obvious that this system (fully realized) needs a certain level of information automation to function well in a modern setting. As far as this author knows, there is no off-the-shelf software package that is tailored to a rules-based project management approach. For small shops, manual updates may be okay, but for larger organizations, a centrally organized, standardized, and automated system is a must.

Conclusion and Summary

Rules-based project management, simply put, requires that the highest-priority projects get done in the shortest time relative to all other projects. Highly visible metrics and clear rules that govern task prioritization ensure that happens.

It expects executives to make hard choices, enforce a new level of discipline, and show uncommon leadership. It expects middle managers and the PMO to run their areas of responsibility in a collaborative, non-competitive manner where everyone plays as a team and everyone takes pride in company successes. It expects discipline and periodic extra effort from all concerned, but for good and obvious reasons that build company pride if managed correctly.

Implementation may not be easy or even appropriate depending on circumstances, and may require management to jettison entrenched traditional project management and line-management techniques.

Rules-based project management, executed correctly and in the right circumstances, can provide a tremendous business competitive advantage. It aligns work top-to-bottom and optimizes business results.

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