

The Critical Triple Constraint

Introduction

This feedback is the result of reflection following a Project Management training course that made me want to clarify the choices available to an entrepreneurial company with a classical start-up configuration where the business owners are much involved in the day to day running of the company. It takes into account questions and remarks exchanged during the discussions which took place during the training course.

In practice, the company expects project managers to get the job done on time and to keep customers happy – unless the customers ask for too much – and all of this without having much influence over resource hiring, purchases or how indirect expenses get allocated to their project. As is often the case, people end up putting in a great deal of overtime and emotional energy, because of course the process is relatively immature – all adrenaline and perspiration. Project managers feel as if they are torn in three directions. And, of course, they are!

The Triple Constraint

In practice, the triple constraint in project management can give us three quite different kinds of project. This analysis is quite paradoxical, because in each case, the dimension which is the least fixed is the one on which you have to focus to manage the project.

(1) Time-pressed project (critical path)

Cost and scope are tightly fixed. When price and functionality cannot be sacrificed, there will be pressure on deadlines. Project managers focus on prompt execution and expedite on-time delivery of each milestone. The steps to each critical delivery milestone are choreographed with clear plans laying out the precise activities and responsibilities of each stakeholder.

You could rely on a tool such as MS Project, milestones, checklists, responsibilities and interdependencies.

(2) Scope-critical project (critical purpose)

Cost and time are fixed: design to cost, time to market. The market is highly competitive and technology evolves very quickly. Too late and you've lose most of your revenue. Over cost and your market share collapses. The project manages scope with an eagle eye on priorities, so that non-essentials are gradually eliminated as customers learn what they really want.

You could use a configuration management tool, with a traceability matrix and key metrics on testing, as well as a prototyping and modelling approach designed to reduce the cost of learning and changes.

(3) Cost-challenged project (critical chain)

Time and scope are fixed, cost is variable. The customer's loyalty is all-important in this kind of project and costs escalate in order to secure business for the future. Management should track all expenditures, direct and indirect, and relate these to the project technical progress, whilst ensuring that productivity levels and quality levels are maintained.

You may use a spreadsheet to track the different kinds of costs and productivity performance indicators, or a project planning tool with an adequate resource consolidation capability.

Comments about these three extreme types of project

The type (1) project is the customary situation. For cost and scope to be non-negotiable is in theory a good solution for both customer and supplier. However, if the customer has misunderstood the real requirements, or if the supplier has under-bid to get the business, then there will be change orders, scope creep, cost creep and probably missed deadlines as well. This is a very frequent scenario, in which case time-pressed projects can flip into types (2) or (3), depending upon the nature of the customer – supplier relationship.

The type (2) project relies upon a healthy trust-based relationship between customer and supplier where each discovery of critical requirements and shedding of inappropriate requirements is based on an exchange of data, relating to benefits and opportunities divided by costs and threats. Trust can be strengthened by external competitive pressures and by co-location or teambuilding. Sometimes, the customer gets less than they asked for, but more than they needed. The emphasis is on fitness for purpose, and not just on the quantity of features. Type (2) projects that are not well managed can often flip into types (1) or (3).

The type (3) project becomes an affair for those that manage the corporate bottom-line: senior managers. Hence, cost-challenged projects often receive a great deal of executive attention that replaces much of the project manager's day-to-day control. For example, they will put pressure on resources and capacity, leading to make or buy decisions, such as sub-contracting. Type 3 projects occur when there is an emergency. Results are crucial, the deadline is now and the organisation has to throw the shop, the emergency services, the army, the law, safety constraints and everything else that comes to hand in order to save itself. Obviously, even a minor emergency may require resources to be pulled away from other projects, necessitating a hard look at the strategic priorities in the project portfolio. These are the projects that in the last resort can require overtime and encouragement for exceptional effort. It is less frequent for a type (3) project to return to a type (1) or (2).

Each of these types is an exaggeration, but we must keep in mind that in many ways it is easier to conceive of each case as an extreme, than to work out the nature of the hybrids.

Implications for Processes and Competencies

How can project managers develop their skills and an organisation enhance its methods, tools and processes in order to manage more effectively these different kinds of projects?

1. Time-pressed projects:

Effective implementation of the basic project management toolkit will help project managers to master time-pressed projects. Time-pressed projects rely on excellent organisation, reporting, communication and coordination skills. Templates for some of the documents mentioned below are contained within the course notes.

1.1 Project Charter ¹

Since most projects will start off on this basis, it is important to establish some kind of project charter that identifies the project manager, sponsor, and customer representative and clearly defines the level of authority afforded to the project manager. The project charter should

¹ Clarifies the roles of the core team members (results, relations, organization, ideas)

indicate what is considered to be in and out of scope, provide a feasibility level estimate for the overall project, key objectives, a brief survey of risks and list some key stakeholders.

1.2 Project Requirements Document ²

A functional specification prepared by the customer stipulates the requirements. To this could be added some background from the sales team about customer objectives and priorities, assumptions, constraints, risks, critical success factors, milestones, deliverables, payment aspects and communication planning. This would help the project manager and the project team to thoroughly understand the project right from the start.

1.3 Work Breakdown Structure ³

This is the tool to get people on the same page with a common understanding of the content of the project. It provides a team view of the tasks that have to be done to meet the objectives. Commercial proposals can include a work breakdown structure that gets carried forward into the project plan. In this way the customer would have a similar view of the project to the project team.

1.4 Project Plan ⁴

Project schedules are currently produced in some detail and this can make them difficult to read, unless they are broken down into discrete sub-networks no larger than a page. The advantage of producing a Gantt chart of high visual quality is that it looks quite official. *Critical Path* methods ensure that the bar-chart is based upon an analysis of interdependencies and resource availabilities. The customer would know exactly who has to do what and when in order to get the solution delivered on time. The overall project plan could usefully include a risk plan, a communication plan and a quality plan (list of acceptance tests).

1.5 Project Dashboard ⁵

A summary one page overview of the project with summary milestones, traffic lights, key performance indicators, review of actions, key issues, top risks and links to principle documents can help all concerned to obtain a quick and accurate impression of the project status. This is very useful to provide management with a flash view of the status of the project and allow the team to feel on top of events.

1.6 Project Close-Out Report ⁶

The project close-out report is often neglected at the end of a project, because participants forget to get started on lessons learned early enough. A learning log maintained throughout the project reminds us of the importance of continuous learning.

1.7 Meeting Protocol ⁷

A standard meetings document would improve the preparation, organisation, management and follow-up of meetings, say in about four pages and act like a check-list. This could even include a tool to help to check the quality of the meeting in terms of contributions, listening, summarising, supporting, decisions taken, commitments and actions planned.

² Address as early as possible the problems of interpretation of requirements and project initiation

³ Obtain agreement from all the participants about the work breakdown structure

⁴ Divide up the project schedule to make it modular and easier to use

⁵ A visual project dashboard appeals to both project team members and decision makers

⁶ The project close-out report carries forward estimates, risks and lessons learned.

⁷ Guidelines on standards for preparation, status reviews, minutes and milestone updates to make meetings work

2. Scope-critical projects

Scope-critical projects demand enhanced skills in customer-relationship management, stakeholder management, an understanding for the business of the customer and for one's own organisation, and a heightened ability to anticipate potential problems and to take proactive initiatives.

2.1 Facilitated Workshops ⁸

Scope-critical projects rely more on joint application development, which involves white-board models, problem solving techniques and team decision-making. Project team members would need to develop enhanced skills in conflict management, negotiation, creative problem solving, application modelling, risk analysis and cost versus benefits analysis.

2.2 Prioritized Product Breakdown, Backlog or Requirements List ⁹

In a cross-functional team it is important that there is adequate participation from interested parties. It is a team effort, led by a facilitator, where the arbiter of priorities is the 'product owner', 'user ambassador' or 'voice of the customer' responsible for decisions that are the results of a discussion and take account of risks, costs and constraints that have been shared by the team. Critical Purpose is art of planning the deliverables around the priorities in order that no work is done until it is strictly necessary, and so that priorities are delivered first.

2.2 Traceability Matrix ¹⁰

The traceability matrix formalises the link between user requirements, the technical architecture and the test plan. It helps to validate that each requirement has been delivered and tested and keeps people focused on results that satisfy the customer.

2.3 Change Management Procedure ¹¹

Managing changes requires a comprehensive but easy to use change request form and a change management process. It is always essential to ask whether the change would be worthwhile, and to analyse the risks of implementing or not implementing.

2.4 Configuration Management ¹²

Configuration management will become increasingly necessary when there are calls for cost efficiencies through reusable components, when there is a need to ensure traceability and to analyse the strategic impact of changes to functions and components. Good configuration management encourages a modular architecture, allows reversibility if necessary, controls version updates, facilitates non-regression and can reduce the cost and risk of late changes.

2.5 Kanban Chart and Burndown Chart ¹³

A Kanban Chart is a progress chart that helps to visualize the progress of tasks from left to right on a visual wall chart. A 'Burndown Chart' indicates the amount of work that has been completed, the work that is remaining and the 'velocity' of implementation to meet targets.

⁸ People are usually aware of a few team working techniques and welcome new approaches

⁹ The prioritized product backlog is agreed between the 'voice of the customer' and the development team

¹⁰ An essential tool that people get accustomed to using, and that provides important benefits

¹¹ The change control process should be simplified to encourage ideas, or reinforced to prevent drift

¹² Configuration management should focus on critical items initially and evolve towards architectural design

¹³ Kanban Charts and Burndown Charts aid team communication

3. Cost-challenged projects

Cost-challenged projects can have major consequences on the company's revenue stream, and indeed have often become cost-challenged because of problems having been escalated. Skills include risk management, cost management and contingency management. Costs are the business of the company's senior officers and therefore skills that are pertinent to the team include the ability to communicate and to manage upwards towards an executive, a sponsor, a steering committee or a visionary.

3.1 Expenditure Authorization ¹⁴

This includes some business planning, return on investment, payback, comprehension of the importance of cash flows and stakeholder benefits. It entails a willingness to develop a cost analysis, to recognize business value and to be aware of the interests of the stakeholders.

3.2 Portfolio Management ¹⁵

Portfolio management creates a process for the selection and the prioritisation of projects. Subsequently, decisions taken to allocate resources to a project, to accelerate a project, or stop a project can be interpreted in terms of the portfolio strategy, which is implicitly driven by the company's overall business goals.

3.3 Resource Management ¹⁶

Resource management provides benefits at every level of a project organisation. At local level and in the individual projects, resource planning enables resources to be shifted from low priority to high priority tasks and to respect deadlines. At departmental levels, resource planning helps to resolve bottlenecks and to plan for training courses, holidays and back-up resources. At executive level an overall workload profile feeds decisions on growth paths, recruiting, expenditure planning, and reallocation of resources, resource prioritisation, and new business development.

3.4 Cost Management ¹⁷

Without some degree of cost responsibility, project managers have little ultimate responsibility for success or failure, because they have no control over inputs. Cost management involves tracking of man-hours invested on different tasks, monitoring material purchases and keeping an eye on indirect expenditure, as well as ensuring that technical progress on the project is proportionate to spending. In other words, the project manager who manages costs is thinking about value for money and probably paying more attention both to the organisational needs and to those of the customer.

3.5 Constraints Management ¹⁸

Critical chain method is a constraints management approach that first cushions the critical path with extra resources, by diverting resources as much as is possible from less important tasks; then protects sensitive points in the schedule, such as where paths converge, where there are transitions between resources, and at the end of the project. The buffer that this creates is a contingency to be managed at project level by the project manager.

¹⁴ A huge majority of project managers would like more responsibility for cost performance management

¹⁵ Project managers like to see the big picture and to understand how their project fits in

¹⁶ Resource planning soothes the feeling of being overwhelmed and reduces departmental tensions

¹⁷ Cost management develops cost awareness and cost responsibility, whilst helping to understand value

¹⁸ Constraints management, including critical chain, concentrates resources where there is the greatest risk

3.6 Contingency Management ¹⁹

The total of all the risks quantified in terms of probability multiplied by impact should give an idea of the realistic level of cost contingency to set aside for the project. Contingency can be expressed as a provision (cost), a list of prioritised requirements – must, should, could (scope) or float time (time). Contingency needs to be visible in order for it to be managed, but visibility requires trust between the different parties involved, otherwise everyone will bury some contingency where it cannot be detected, hence making it more probable that the overall costs and duration of the project will increase.

Conclusions

When an organisation grows beyond a certain size (this can be 50, 150 or 250 employees) then it eventually find itself constrained to set up processes than can enable the right decisions to be taken without consuming expensive and rare executive resources. It needs to standardize on approaches that would have been informal, just as we automate day-to-day activities in order to concentrate on higher-order activities.

This is well-known. However, these processes must not stultify, delay the company's dynamic, or deaden the entrepreneurial spirit. Therefore they should be light, if possible, and applied with a light touch. Our experience confirms that successful businesses have a clear compelling, but well-defined vision, and also ensure the flexibility that is necessary to do the job, rather than the other way around, which would be to work in a straitjacket, but with no vision of where to go.

By understanding that there are different kinds of projects within the triple constraint, an organization can prepare, organize and set-up to be more elastic and responsive to different conditions, situations and circumstances as they evolve within the projects.

¹⁹ Risk management is often the key to project success and contingency planning supports risk management