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INTRODUCTION TO THE PM TOOLBOX

Conventional wisdom holds that project management (PM) tools are enabling devices that assist a project manager in reaching an objective or, more specifically, a project deliverable or outcome. While this traditional role of PM tools is more than meaningful, we believe that there is greater opportunity to provide value to an organization and its project managers. In particular, each PM tool can be part of a set of tools that makes up a project manager's PM Toolbox.

The PM Toolbox, then, serves a higher purpose: (1) to increase efficiency of the project players, (2) to provide the right information to support problem-solving and decision-making processes, and (3) to help establish and maintain alignment among business strategy, project strategy, and project execution outcomes.

Project management tools support the practices, methods, and various processes used to effectively manage a project.[1] They are enabling devices for the primary players on a project: the project manager, the specialists who make up the project team, the executive leadership team, and the governance body.

PM tools include procedures, techniques, and job aids by which a project deliverable is produced or project information is created. Similarly, *A Guide to the Project Management Body of Knowledge* and other sources use the phrase "tools and techniques" in place of what we define as PM tools.[2]

PM tools may be either qualitative or quantative in nature. To illustrate, consider two examples: the team charter and Monte Carlo analysis. They differ in the type of information they process. The team charter provides a systematic procedure to process qualitative information about authorizing a team to implement a project. Monte Carlo analysis is a risk-planning tool that uses an algorithm to quantify risks. The heart of both the qualitative and quantitative groups of tools—and all PM tools belong to one of these groups—is in their systematic procedure.

Note that we don't talk about software tools here. True, many PM tools that we discuss in this book exist in a software format. However, our focus is not on tool formats. Rather, we concentrate on the substance of PM tools: the use of tools to manage projects more effectively and efficiently.

The design of a PM Toolbox should mirror the approach an organization takes for establishing standardized project management methodologies and processes. A highly

standardized set of methods and processes will in turn require an equally high level of standardization of the PM Toolbox. Less standardization introduces more variability in PM Toolbox design and use, and therefore more possibility for inconsistent results.

In practice, as organizations strive to grow and mature, project execution efficiency and repeatability become increasingly important as the leaders of the organization look for consistency in achieving business results. This means that project managers must be armed with the right tools—those that support the business strategy, project strategy, and project management methodologies and processes. It also means that the same tools should be used across the gamut of projects with limited exceptions.

Standardization of a firm's PM Toolbox does not happen overnight. Rather, it is an evolutionary process. In a practical sense, PM Toolboxes will look quite ad hoc at first. The tendency is to begin building the PM Toolbox with existing tools due to a project manager's familiarity with them. So the early-stage PM Toolbox has more to do with familiarity of use than with standardization. As a firm begins to mature its project management practices, standardization of methodologies and processes begins to take hold. This is when the PM Toolbox also begins to become more standardized, as well as more aligned with the project strategy and the business strategy of the firm.

Construction of a PM Toolbox should be systematically driven, meaning that PM tools are a vital part of an organization's overall project execution mechanism. However, project execution must first be aligned to company strategy to be most effective. When this is the case, the PM Toolbox becomes strategically aligned as well, as illustrated in Figure 1.1.

As illustrated by the downward arrow, business strategy drives the project strategy, which in turn drives methods and processes, which influences the PM Toolbox design. For this downward flow to work, the PM Toolbox supports the project management methodology and processes implemented by an organization. The methodology and process in turn helps to implement the project strategy, which supports and is aligned to the business strategy of a company in its quest for growth (upward arrow).

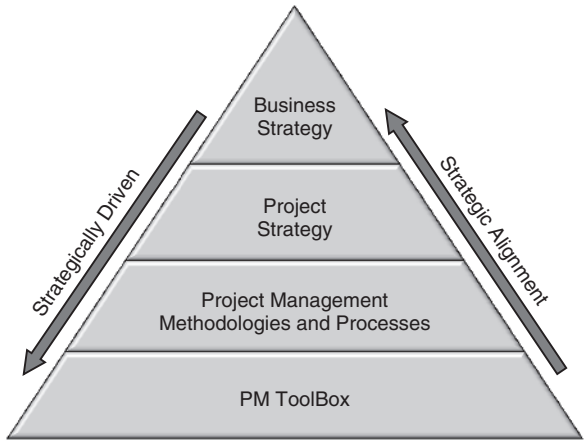

Figure 1.1: Strategically Aligned PM Toolbox

ENABLING BUSINESS AND PROJECT STRATEGY

Looking at how projects and the management of those projects support the business strategy of an organization is critical to understanding the strategic importance of the PM Toolbox. Since alignment between the PM Toolbox and business strategy is driven from the top of the pyramid (Figure 1.1), we start from there.

Historically, the strategic management and project management functions and processes of a company have been defined and performed as independent entities, each with its own purpose and set of activities.[3] Companies have come to realize, however, that the time, money, and human effort invested in refining and improving each of these independent functions and processes have not brought them closer to turning their ideas into positive business results. Increasingly, this fact is leading business leaders to the realization that strategy and project execution can no longer remain independent if they wish to repeatedly achieve their desired business benefits and business value. Rather, they must be integrated so that the formation of strategy and the execution of strategy are tightly aligned.

Use of the Porter model is a simple approach to demonstrate at a high level the alignment among business strategy, project strategy, and PM Toolbox design (Figure 1.2).[4]

The essence of business strategy lies in devising ways to create both short-term and long-term growth and sustainability for an enterprise. To equip themselves with the opportunity, companies rely on their organizational resources.[5] Visualize, for example, project management as an organizational resource. Useful for this visualization can be the framework of generic strategies, shown in Figure 1.2.[6]

		DIFFERENTATION	
		Low	High
COST	High		**Business Strategy:** Differentiation **Project Strategy:** Fast Cycle Time **Business Strategy:** Schedule Planning Schedule Management Risk Management
	Low	**Business Strategy:** Low-Cost **Project Strategy:** Cost Containment **Business Strategy:** Cost Planning Cost Management	**Business Strategy:** Best - Cost **Project Strategy:** Cost and Quality **Business Strategy:** Cost Planning Cost Management Performance

Figure 1.2: Aligning Business Strategy, Project Strategy, and PM Toolbox

To understand the effect of business strategy, let's use Porter's model as an example to evaluate the strategies for three companies producing liquid crystal display (LCD) projectors.

The core of differentiation strategies (high differentiation/high cost quadrant in Figure 1.2) is an ability to offer customers something different from a company's competitors. This may include fast time to market (which we used as an example in Figure 1.2), high quality, innovative technology, special features, superior service, and so on. When striving for product superiority, LCD projector companies pursuing these strategies provide cutting-edge features that customers are willing to pay a premium price for.

Companies focusing on low-cost strategies aim at establishing a sustainable cost advantage over rivals (low-cost/low-differentiation quadrant). The intent is to use the low-cost advantage as a strategy to underprice rivals and take market share away from them. Another strategic option is to earn a higher profit by selling at the going market price. This is pursued with a good basic product that has few frills and continuous quest for cost reduction without giving up quality and essential features.

Best-cost companies combine upscale features with low cost (low-cost/high-differentiation quadrant). This should lead to superior value by meeting or exceeding customer expectations on product features and surpassing their expectations on price. At the same time, the aim is to become the low-cost provider of a product that has good-to-excellent features and use that cost advantage to underprice rivals with comparable features. Because such a company has the lowest cost compared with similarly positioned rivals, the strategy is called a best-cost strategy.

In Figure 1.2, the blank quadrant of high cost/low differentiation is not a viable option in the quest for short- or long-term business growth.

Now, let us use the model to see how the business strategy shapes project strategies. Examples of three companies—Sirius, Park, and Prima—will help us illustrate the point.

Sirius's business strategy is one of differentiation. The strategy uses innovation and time-to-market speed as competitive advantages. The business strategy is executed through product development projects, whose job it is to roll out new advanced LCD projector chips faster and faster. This is where the project strategy comes into play, focusing on overlap across project phase activities to shorten the project cycle time and the management of risk due to a number of new technologies. The project strategy emphasizes time and risk management.

Park's business strategy is quite different from that of Sirius. Instead of the differentiation and time-to-market emphasis that Sirius relentlessly pursues, Park has set out to become the low-cost leader in the industry. To develop the ability and become the leader in the industry, Park has had to employ a project strategy to continuously lower project and product cost goals. Part of that effort has been perfecting project cost planning and management methods for managing cost cutting within the projects. Nurturing these competencies supports Park's low-cost advantages.

The strategies of Sirius and Park exploit their schedule- and cost-focused project strategies, respectively. In contrast, Prima relies on a best-cost strategy. The goal is to have the best cost relative to competitors whose LCD projectors are of comparable quality. Accordingly, their project strategies emphasize high quality and low development

cost. Project management methodologies and practices aim to accomplish cost and quality goals through excellent cost and performance management.

These examples provide a context from which we can construct a common base of understanding. First, companies select business strategies as a means of operating within the markets that they serve. Although each type of strategy has the same goal—to create and sustain business growth, ways to accomplish the goal differ. One company builds a strategy on the basis of differentiation, another on low cost, and still another on a best-cost approach.

Second, companies align their project strategies with their business strategy. Consequently, in the case of Sirius, Park, and Prima, each company's project strategy is focused differently: schedule focus (Sirius), cost focus (Park), and cost/quality focus (Prima).

Any of these approaches is, of course, acceptable. What is critically important, however, is that care should be taken to ensure that the projects and their associated project strategies align to and support the business strategies of the enterprise.

PROJECT MANAGEMENT METHODOLOGIES AND PROCESSES

As an organization grows and becomes more mature in its practices, the need for standardization of methodologies and processes invariably arises. This is due to increased need for repeatability and consistency of project outcomes.

But what does standardization really mean? If we seek a standardized sequence of project activities (that culminate in project deliverables and outcomes), then *standardized* means the degree of absence of variation in implementing such activities.[7] Let's use Figure 1.3 to explain this.

At one extreme, there may be a complete variation in the project management methods and processes. Literally, every time a process is performed, it is performed in a different way. Obviously, 100 percent variation means that standardization is equal to zero. This is often referred to as an ad-hoc approach. At the other extreme, methods and processes may be 100 percent standardized, meaning a process is performed in the same way every time. In this case, variation is zero percent. Between the two extremes lies a continuum of methodologies and processes with different ratios of standardization and variation.

Take, for example, process S on the *x*-axis of Figure 1.3, one of the many possible PM methods (e.g., the critical chain scheduling methodology). The degree of standardization and the degree of variation add up to 100 percent. If we go down the diagonal line to other methods, the degree of standardization will increase, and the degree of variation will decrease; but their sum will remain constant at 100 percent. Moving up the diagonal line will lead to a higher variation and lower standardization, still with the sum of 100 percent. Using plain language, the lower the variation, the higher the standardization; and the more varied the implementation of project activities, the less standardized they are.

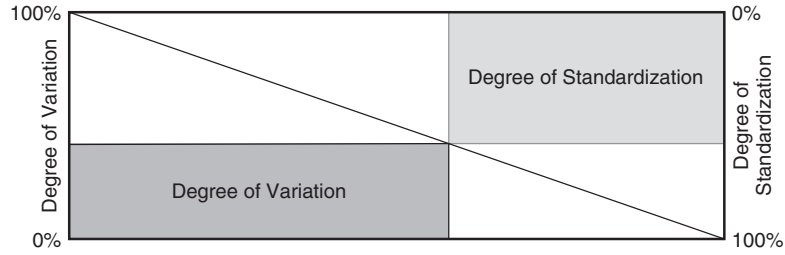

Figure 1.3: Continuum of PM Methods and Processes

This means that organizations have a host of options when developing their methodologies and processes—they can be more standardized or less standardized. The rationale behind standardization is to create a predictable process that prevents activities from differing completely from project to project, and from project manager to project manager. Put simply, standardization saves project players the trouble of reinventing a new method and process for each individual project.[8] As a result, the process is repeatable despite changes in customer expectations or management turnover. The higher the standardization, the higher the repeatability.

When establishing standardized methodologies and processes, organizations have a host of options to choose from. Some companies adopt one of the well-known project management methodologies such as the PMBoK, PRINCE2, or Agile Scrum. Many establish their own methodologies and processes based on how they normally perform their project work. Still others combine approaches by utilizing elements of the standard methodologies and then augmenting and customizing based on the culture of their organization.

The decision about how much to standardize project management methodologies and processes is a decision about the ratio of standardization and variation (popularly called *flexibility*). It is driven by business strategy and by the types of projects needed to realize the business strategy. Generally, projects of higher certainty will strive for higher levels of standardization and lower levels of flexibility. According to experts, the majority of projects in organizations belong to this group.[9] Projects that face high uncertainty require lower standardization and higher flexibility.

Selecting PM tools one at a time demands a substantial amount of resources and expertise. It is not reasonable to presume that each project manager—especially if he or she is less than experienced, as is the case with many—would have the resources and expertise to quickly, smoothly, and consistently select his or her own set of tools. Rather, such managers end up struggling to find the right PM tools and how to use them, introducing variability in results. In contrast, having a standardized PM Toolbox capable of supporting the methods and processes results in minimum variation (see Table 1.1).

Often, project managers assume that the PM Toolbox is of a one-size-fits-all nature. This, of course, is incorrect. The PM Toolbox can come in many sizes, shapes, and flavors. Logically, this is an issue related to the project management methodology and types of projects the methodology serves. Since the PM Toolbox is aligned with the PM methodology used, it is understandable that the level of standardization of the methodology

Table 1.1: One-Tool-at-a-Time versus the PM Toolbox Approach

	Impact on SPM Process	
Requirement	**One-Tool-at-a-Time**	**PM Toolbox**
Speed	Lower	Higher
Repeatability	Less repeatable	More repeatable
Concurrency	Less likely	More likely

impacts the standardization level of the PM Toolbox. For example, a methodology that is highly standardized will probably be supported by a highly standardized PM Toolbox.

Regardless of whether an organization's project management methods and processes are standardized, flexible, or semiflexible, a PM Toolbox needs to be designed so that it aligns with both the PM methods and processes employed as well as the strategy of the project and the business strategies driving the need for the project. To accomplish this, a process for selecting and adapting the PM Toolbox is needed.

CONSTRUCTING AND ADAPTING A PM TOOLBOX

PM tools serve two roles. First, in their conventional role, the tools are enabling devices for reaching a project deliverable. Second, in their new role, they serve as basic building blocks to construct the PM toolbox.

There are three major steps, each including several substeps, in constructing and adapting a PM Toolbox for specific projects or a project organization (Figure 1.4):

1. Secure strategic alignment
2. Customize the PM Toolbox
3. Improve continuously

As detailed in the previous sections, aligning the PM Toolbox with the organization's business strategy tells us in broad terms what categories of project management tools to select. This alignment drives the next step—customization of the PM Toolbox—by

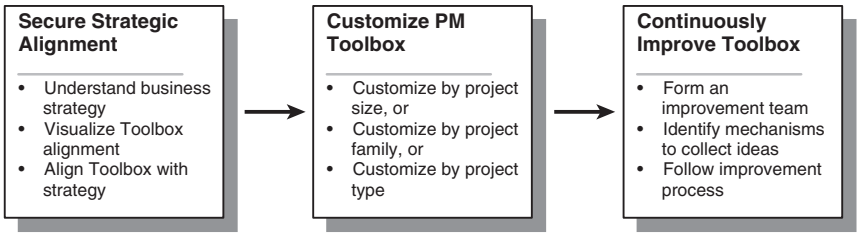

Figure 1.4: Steps for Constructing and Adapting a PM Toolbox

selecting specific tools to use on the projects. The deployment of the PM Toolbox in real-world projects will reveal its glitches and generate new learning, which leads to the third step—continuous improvement of the toolbox. Details about each step follow.

Secure Strategic Alignment

One of the primary purposes of the PM Toolbox is to enable the implementation of projects that affect the organization's strategic business goals. To make this purpose happen, the PM Toolbox needs to be in alignment with both the business and project strategies, as we discussed earlier in this chapter. To be successful in designing the Toolbox, therefore, project managers must have an understanding of the business strategy, at least knowing if their company follows a fundamental strategy of being a market leader, a market follower, a cost leader, or a customer service leader. However, many of them do not have this level of understanding. Why? Among many reasons for this is the fact that in many organizations, strategy formulation and implementation is viewed as the executive's domain. They are tasked with charting the business strategy for the enterprise. Project managers often are not in a position to access this knowledge or show little interest in gaining it. Project managers need to be tenacious by probing and digging to comprehend the strategic reasons for executing the projects they are in charge of, even if the strategy is not communicated to them.

This lack of strategic knowledge can create substantial obstacles for project managers and will limit the strategic alignment of their PM Toolbox. To remove the obstacles, project managers need to have conversations with top managers and convince them that business strategy is key to planning and implementing projects and that project managers need this knowledge in order to secure expected returns on their projects. Our mandate is simple: Gain an understanding of your organization's business strategy, or designing the toolbox will be like shooting an arrow into the fog—we don't know where the target is or whether we hit it.

Visualizing Alignment

Part of understanding how a toolbox should align to business strategy is the ability to clearly visualize the relationship. Earlier in the chapter, we laid the foundation for the alignment by using examples of three companies—Sirius, Park, and Prima—to illustrate how the PM Toolbox can be focused to support business strategies.

To visualize this alignment, in Figure 1.5 we show what we conveniently call investment curves—a more precise term is the net present value curves—for three comparable projects performed in alignment with their base business strategies.

Each curve shows four important points: (1) project start, (2) time to deployment, (3) time to breakeven, and (4) salvage point. Project start is the time when the project is initiated and begins to consume resource hours and budget; therefore, the cash flow begins to turn negative. Investment and negative cash flow continue to increase until the project is completed. At that time, the project outcome (a product, service, or other capability) can be deployed, which constitutes time to deployment. Instead of time to deployment, some project managers prefer the term *project cycle time* or, simply, *project completion*. Note that *negative* cash flow usually reaches its peak at the

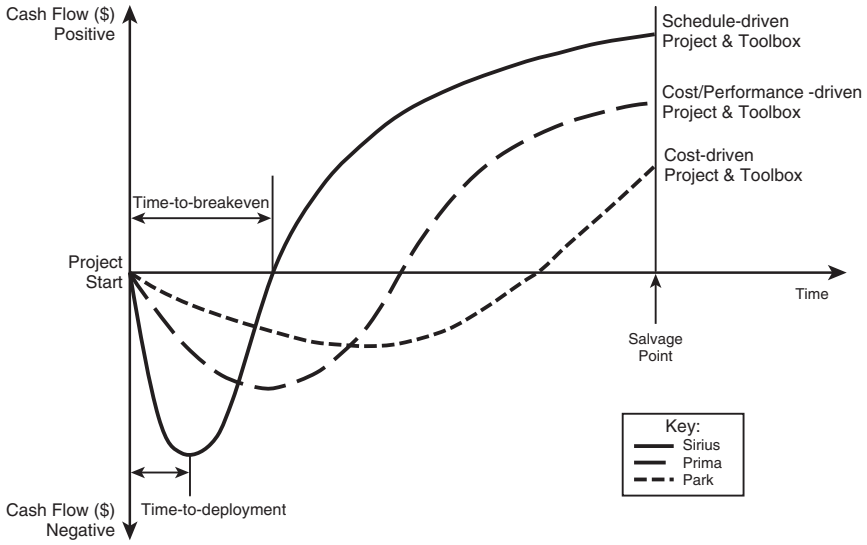

Figure 1.5: Visualizing a Strategy-Driven Toolbox

time-to-deployment point. After that, the use of the project output begins to generate returns (revenue, cost savings, efficiency gains), and the curve begins to turn upward.

Hopefully, the upward trend will continue until at least the time-to-breakeven point is reached. This is the point where all investments in the project are equal to returns generated by the use of the project output. Beyond that point, the cash flow turns positive and typically continues to do so until the project output is salvaged.

We use the curves to explain the nature of the PM Toolbox's alignment with the business strategy for each of the three companies discussed earlier. Consider, for example, Sirius. A primary element of Sirius's differention strategy is project cycle time speed. Figure 1.5 illustrates that point: Time-to-deployment and time-to-breakeven points are reached much sooner than for the other two companies. For this to be possible, Sirius needs a timeline-driven toolbox in which the central role and priority belong to tools that can help enable fast cycle times. These may include tools such as the Gantt chart, time-scaled arrow diagram, critical path diagrams, milestone charts, and so on (Chapter 6). This does not mean that other components of the typical PM Toolbox such as cost, risk, and stakeholder tools are ignored. Quite to the contrary—they are important and have their role in the toolbox as well, but they are subjugated to timeline-driven tools.

The case is different for the toolbox for Park, a company that concentrates on cost leadership. Logically, then, most projects within Park are cost driven, searching to minimize project cost whenever possible. This logic is apparent in Figure 1.5. The Park curve shows less negative cash flow than those of Sirius and Prima. It is the intended goal and realized outcome of project actions. To accomplish the project strategy, Park is willing to take the longest time to reach time to deployment and time to breakeven. Crucial in this

effort is a cost-driven toolbox that emphasizes cost, cost, and cost. Correspondingly, cost estimates and cost baselines are carefully prepared, as is the assessment of return on investment, even for small cost-cutting projects (Chapter 5).

The intent to align the PM Toolbox with the business strategy is aggressively pursued in Prima as well. The driving force is the best-cost strategy that is also translated to the project level. As can be seen from Figure 1.5, time to deployment and time to breakeven are shorter than Park's, but longer than Sirius's. This means that cost focus is lower than Park's but higher than Sirius's. Such cost philosophy is closely intertwined with the need for the project to emphasize performance goals more than the other two companies. Given this situation, how does one shape a cost-performance-driven PM Toolbox?

A combination of well-balanced performance and cost tools has the priority. Formal and informal voice of the customer tools and feature requirement tools are crucial for hitting customers' expectations, as are cost estimates and cost baselines. To Prima and its customers, delivering on schedule is important, as keeping customers satisfied is not possible without delivering when promised. Nevertheless, schedule goals are subjugated to performance and cost. Other tools, such as a risk management plan, are modified to support the combination of cost and performance focus. For example, the risk management plan may be focused on lowering cost rather than schedule (Chapter 14).

As can be gleaned from our discussion, the nature of alignment of the toolbox is reflected in the balance of two issues. First, many of the tools show up in all three toolboxes. The second issue concerns the situational approach: adapting tools to account for the characteristics of the three toolboxes (see Table 1.2)

Customize the PM Toolbox

There are multiple options for customizing a strategically aligned PM Toolbox. Three options are perhaps the most viable:

1. Customization by project size
2. Customization by project family
3. Customization by project type

The options are three different ways to select and adapt the toolbox. Each option has the purpose of showing which specific project management tools to select and adapt for the PM Toolbox. For this to be possible, each option is based on the particular methodology used, which has a large influence on the choice of tools.

An in-depth knowledge of individual tools is a prerequisite to each of the options because you need to understand how each tool can support a project deliverable. We will describe the customization options in turn and offer guidelines for selecting one of them for implementation.

Customization by Project Size

Some organizations use project size as the key variable when customizing a PM Toolbox. Their logic is that larger projects are more complex than smaller ones, or that size drives differences in project management methodology complexity. The reasoning here is that as the project size increases, so does the number of activities and resulting project deliverables associated with a project, as well as the number of interactions among

Table 1.2: Characteristics of Strategically Aligned Toolboxes

	Company's Core Business Strategy		
	Differentiation	Low-Cost	Best-Cost
	Nature of PM Toolbox		
Characteristics of the PM Toolbox	Schedule Driven	Cost Driven	Performance-Cost Driven
Central role and priority belong to schedule tools	✓		
Management attention is on schedule performance	✓		
PM spends majority of time managing to schedule	✓		
Schedule tools are primary basis for decisions	✓		
Other tools adapted to support schedule tools	✓		
Central role and priority belong to cost tools		✓	
Management attention is on cost performance		✓	
Project manager spends majority of time managing cost		✓	
Cost tools are primary basis for decisions		✓	
Other tools adapted to support cost tools		✓	
Central role and priority belongs to cost-performance tools			✓
Management attention on performance and cost			✓
PM spends majority of time managing performance requirements and cost			✓
Performance and tools are primary basis for decisions			✓
Other tools adapted to support performance tools			✓

them. Worst of all, this number of interactions grows by compounding, rather than linearly.[10] Such increased complexity, then, has its penalty—larger projects require more work to coordinate the increased number of interactions.

Since different project sizes require different processes and tools, we first need a way to classify projects by size and then customize their toolboxes. For size classification we draw on the experience of some companies. In Table 1.3, we present three examples. All companies use three classes of project size: small, medium, and large. The units used to measure project size are dollars or person-hour budgets. On the basis of the size, the companies determined the managerial complexity of its project classes and processes. The complexity further dictated the PM Toolbox makeup, a simplified example of which is illustrated in Table 1.4. For the sake of simplicity, only the toolbox is shown, leaving out the project deliverables.

Table 1.3: Examples of Project Classification per Size in Three Companies

	Project Size		
Project and Company Type	**Small**	**Medium**	**Large**
Product development projects in a $1 billion/year high-technology manufacturer	$1–2m	$2–10m	> $10m
Infrastructure technology projects in a $300 million/year food processing company	< $50k	$50–150k	> $150k
Software development projects in a $40 million/year customer relationship management software company	300–400 person-hours	1,000–3,000 person-hours	>3,000 person-hours

Table 1.4: Examples of PM Toolbox Customization by Project Size

	Project Phases			
Project Size	**Initiation**	**Planning**	**Execution**	**Closure**
Small	Project charter	Scope statement	Progress report	Final report
		WBS		
		Responsibility matrix		
		Milestone chart		
Medium	Project charter	Scope statement	Progress report	Final report
	Skill inventory	WBS or PWBS	Change process	Change log
		Responsibility matrix	Change log	Postmortem report
		Cost estimate	Gantt chart	
		Gantt chart	Cost burn down	
		Risk plan	Risk register	
Large	Project charter	Scope statement	Progress report	Final report
	Stakeholder matrix	WBS and PWBS	Project indicators	Postmortem report
	Stakeholder strategy	Responsibility matrix	Change process and log	Closure checklist
		Cost estimate	Time-scaled arrow diagram	
		Time-scaled arrow diagram	Slip chart	
		P-I matrix	EVM	
			Risk register	

EVM = earned value management; P-I = probability-impact; PWBS = program work breakdown structure; WBS = work breakdown structure.

As Table 1.4 indicates, some of the tools in the toolboxes for projects of different size are the same, while others are different. For example, all use the summary status report (Chapter 12) because all projects need to report on their performance. Since managerial complexity of the three project classes and their processes call for different tools, some of the tools differ. A P-I matrix (Chapter 14), for example, is needed only in large projects. To be successful, the process team designing the toolbox should carefully balance the standard tools with those that account for the specific size of the project.

Experience of these companies offers several guidelines for customizing the PM Toolbox by project size:

- Identify a small number of project classes and their methodologies.
- Define each class by the size parameter.
- Match the project size with the proper toolbox, each tool supporting a specific project deliverable.

Note that while customization by project size offers advantages of simplicity, it also carries a risk of being generic, disregarding other situational variables. To some, these other variables may be of vital importance, as will be pointed out in the next section on customization by project family.

Customization by Project Family

When the PM Toolbox is strategically aligned, you can opt to customize it by family types within an industry. Many companies choose such options in a belief that project families in their industry are sufficiently unique to merit an industry-specific project family methodology and toolbox.[11]

As a group of organizations that compete directly with each other, an industry is characterized by the nature of its environment and business risk. For example, companies in the high-technology industry face an environment of dynamic technology change. Because of this, their portfolio abounds with fast time-to-market projects driven by the desire of their customers to continuously buy the latest and greatest technological products and services. Combined, the business environment and risk profile create similar challenges in families of projects. For example, a family of new product development projects in high-tech industries face similar challenges. So do facilities management projects, manufacturing projects, marketing projects, and information technology projects within the same industry.

Often, project families are defined by the novelty of the capabilities the projects produce. Generally, the more novel the capability, the more complex the projects.[12] This is because increasing novelty (newness or uniqueness) in projects leads to more uncertainty, elevating the need for more flexibility in the processes and the supporting toolbox. For example, as novelty grows:

- The more evolving the scope statement and WBS become.
- The project time line becomes more fluid.
- The cost estimates follow the fluidity of the schedules and scope.
- More risks need to be identified and managed.

Table 1.5: Customizing the Toolbox by Project Family

Project Family (Novelty)	Project Phases			
	Initiation	**Planning**	**Execution**	**Closure**
Derivative projects	Project charter	Milestone chart	Progress report	Final report
	Financial scoring model	Requirements baseline		
		WBS		
Incremental projects	Project charter	Scope statement	Progress report	Final report
	Financial scoring model	WBS or PWBS	Change log	Change log
	Stakeholder map	Requirements baseline	Gantt chart	Retrospective
		Cost estimate	Cost burn down	
		Gantt chart	Risk register	
		Risk plan		
Breakthrough projects	Project charter	Scope statement	Progress report	Final report
	Voting Models	WBS or PWBS	Project indicators	Postmortem report
	Stakeholder map	Requirements baseline	Change process and log	Closure checklist
	Stakeholder strategy matrix	Responsibility matrix	Milestone chart	
		Cost estimate	Slip chart	
		Milestone chart	EVM	
		P-I matrix	Risk register	

EVM = earned value management; P-I = probability-impact; PWBS = program work breakdown structure; WBS = work breakdown structure.

A simple example reflecting these trends in adapting the toolbox for the three classes of project families is illustrated in Table 1.5.

As the table shows, the toolboxes of the three classes of projects are similar in some and different in other aspects. For example, all use schedules and progress reports. Still, the schedules differ in that simple projects rely on a simple milestone chart, while complex projects use a rolling wave type of the time-scaled arrow diagram. Obviously, the variation in the novelty of the project is the source of the differences.

Customization by Project Type

While the previous two approaches to PM Toolbox customization rely on one dimension each—project complexity and project family as defined by novelty, respectively—customization by project type uses both dimensions.[13]

To make it more pragmatic, we will simplify the model, while maintaining its comprehensive nature. Each of the two dimensions includes two levels: (1) novelty of the capability under development (low, high) and (2) project complexity (low, high). This helps to create a two-by-two matrix that features four types of projects: routine, administrative, technical, and unique (see Figure 1.6).

A routine project is one having a low level of capability novelty (less than half of the features are new) and low complexity (few cross-project interdependencies). Due to the low levels of novelty and complexity, the project scope can normally be frozen before project execution begins or early in the execution stage. Scope also remains fairly stable, with few scope changes. With scope remaining stable, project scheduling, cost management, and performance management are also quite static.

Typically, routine projects are performed within a single organization or organizational function (e.g., infrastructure technology). Examples include the following:

- Continuous improvement project in a department.
- Upgrading an existing software application or existing product.
- Adding a swimming pool to an existing hotel.
- Developing a derivative model in a washing machine product line.
- Expanding an established manufacturing line.

Administrative projects are similar to routine projects in terms of novelty. Business goals and scope are normally well defined, stable, and detailed. The added complexity requires the coordination of multiple organizational functions and the mapping of the many functional interdependencies, but the lack of capability novelty allows for standard scheduling techniques. The same added complexity generally means larger project size, with higher financial exposure, justifying the need for detailed bottom-up cost estimates reconciled with financial targets contained in the project business case. Risk is primarily related to the increased number of interactions between the function's project teams; therefore, additional risk planning and analysis is required.

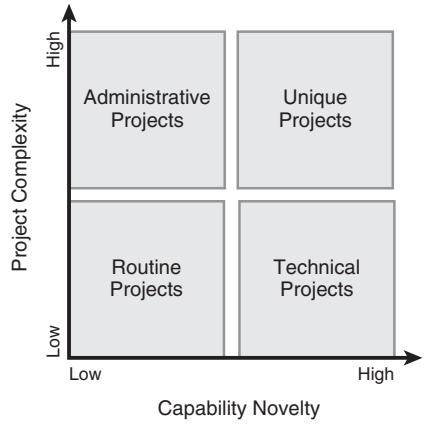

Figure 1.6: Four Project Types

Some examples of administrative projects are as follows:

- Corporate-wide organizational restructuring.
- Deploying a standard information system for a geographically dispersed organization.
- Building a traditional manufacturing plant.
- Developing a new automobile model.
- Upgrading an enterprise computer system.

Technical projects consist of more than 50 percent of new technologies or features at the time of project initiation. This creates a higher degree of uncertainty that requires project flexibility. The goals, scope, and work breakdown structure (WBS) are simple due to the low level of complexity, but they may take longer to fully define. The rolling wave or similar approach can be used, meaning that only the schedule for the following 60 to 90 days can be planned in detail, while the remainder of the project schedule is represented only by milestones. Similarly, cost estimates are fluid as well. A detailed cost estimate for the next 60 to 90 days can be detailed, while cost estimates for the remainder of the project are at the summary or rough order of magnitude level. The increased technical novelty results in increased technical risk and the need for a more rigorous risk management implementation and tools. Here are some examples:

- Reengineering a new product development process in an organization.
- Developing a new software program.
- Adding a line with the latest manufacturing technology to a semiconductor fab.
- Developing a new model of a computer game.

For unique projects, business goals, detailed scope definition, and WBS development takes time to evolve as a result of many new features and cross-project interdependencies. The evolving nature of scope leads to the need for fluid schedules. Project mapping and rolling-wave scheduling processes can be used to contend with the fluidity. Similarly, cost estimates for milestones are more detailed in the near term and more summary level for the longer term. A high level of project complexity exists due to multiple organizational functions required to execute unique projects, requiring integration tools such as the project map. Combined capability novelty and project complexity push risks to the extreme, making it the single most challenging element to manage. In response, a rigorous risk management plan is needed, as well as a combination of tools such as the probability-impact (P-I) matrix and Monte Carlo analysis (Chapter 14). Example technology projects include:

- Building a new light rail train system for a city.
- Developing a new-generation integrated circuit.
- Developing a new software suite.
- Constructing that latest semiconductor fab.
- Developing a platform product in an internally dispersed corporation.

Now that we have defined the four project types, we can move on to the next step: Describe how the two dimensions impact the construction of the PM Toolbox. Taken overall, the growing technical novelty in a project generates more uncertainty, which consequently requires more flexibility in the tools chosen. In Figure 1.7 we show

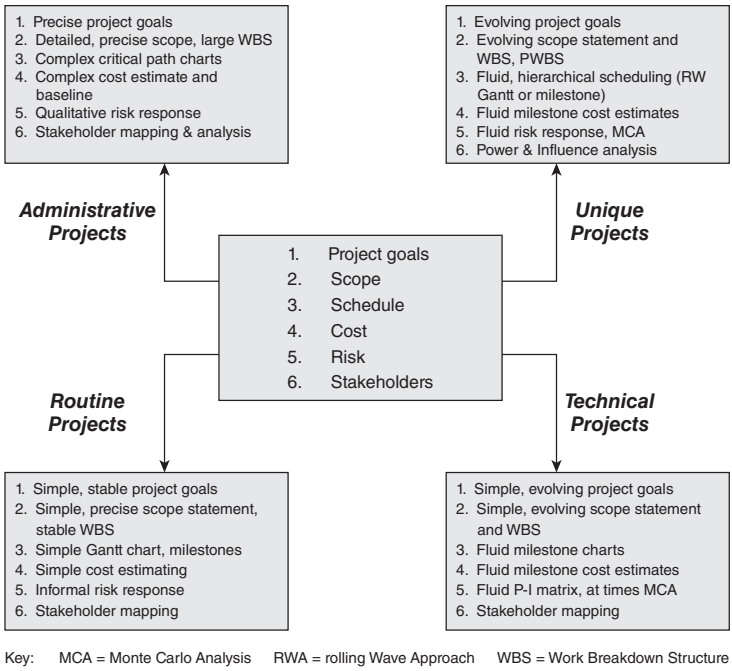

Figure 1.7: Customizing the PM Toolbox by Project Type

examples of several tools that have to be adapted to account for different processes driven by different project types.

A summary comparison of the tools for the four project types reveals that they use very similar types of tools. For example, all use the WBS. Still, when the same type of tool is used, there are differences in their structure and how they are used. Consider, for instance, Gantt and milestone charts. Both are used in the routine and unique projects, but terms of use are significantly different. This is the situational approach—as the nature of the PM processes changes, so does the PM Toolbox.

Which Customization Option to Choose?

We offer three options for the customization of the PM Toolbox. Each has its advantages, disadvantages, and risks, and fits some situations better than others. To assist with the selection, refer to Table 1.6. Customization by project size is a good option when an organization has projects of varying size and needs a simple start toward more mature forms of customization. In addition, projects of varying size characterized by mature processes lend themselves well to this customization option. In an organization that has a stream of projects that feature both mature and novel capabilities but project size is not an issue, customization by project family may be the best option. This is also a good option to go for when projects are dominated by a strong industry or professional culture.

Table 1.6: Project Situations and PM Toolbox Customization

Situation	Customization by Project Size	Customization by Project Family	Customization by Project Type
Simplest start to PM Toolbox customization	✓		
Projects of varying size with mature capabilities	✓		
Projects with both mature and novel capabilities, size not an issue		✓	
Projects with strong industry or professional culture		✓	
Projects of varying size with both mature and novel capabilities			✓
Need for a unifying framework for all organizational projects			✓

Customization of the PM Toolbox by project type is also a good option in situations where an organization has a lot of projects that significantly vary in size but also in novelty of the solutions, such as a portfolio of government research and procurement projects. Organizations searching for a unifying framework that can provide the customization for all types of projects—from facilities to product development to manufacturing process to customer service to information systems—may find customization by project type an appropriate choice.

Continuously Improve the PM Toolbox

Once the Toolbox has been customized, it will be more effective if it is continuously improved. Without such improvement, the Toolbox will gradually lose its effectiveness and its ability to support the project management methods and tools employed and the business strategy of the organization.[14] Avoiding such a predicament and instead sustaining an effective toolbox can be achieved through the following steps:

1. Form a PM Toolbox improvement team.
2. Identify mechanisms for collecting improvement ideas.
3. Follow an improvement process.

Form an Improvement Team

The toolbox improvement team is usually part of the process team responsible for designing and managing project processes. This team has the total responsibility for simplifying, improving, and managing the implementation of the PM Toolbox. Each team member owns a piece of the toolbox, and, overall, the responsibility should be distributed as evenly as possible across the team. When forming a team, it is important to understand that management enforces, while the team operates and owns the

toolbox. Since it is mostly project managers that must use the toolbox, we recommend that the majority of the toolbox improvement team come from the PM ranks.

Identify Mechanisms for Collecting Improvement Ideas

Ideally, there should be a continuous stream of suggestions and ideas to improve the customized toolbox. To secure such a stream, you can require that project teams address PM Toolbox improvement suggestions as part of the retrospective or postmortem reviews (Chapter 13). If the reviews find a need to change the toolbox, the team should submit a change request. Change requests may come at any time from anyone involved in projects. Note that requests are not the only way to collect the toolbox improvement ideas. A survey, brown bag information-gathering sessions, or focus groups may also be viable options to collect improvement ideas.

Follow an Improvement Process

A toolbox improvement process should define steps for acting on change requests, including an escalation process for brokering requests that are turned down. Quickly collecting and responding to PM Toolbox change requests is of vital importance. Also significant are requests to deviate from various tools that are included in a toolbox, usually the standardized tools. Deviations from standardized tools help to ensure that a toolbox remains flexible. Since most deviation requests are submitted while a project is in progress, it is important to respond as soon as possible. At a later time, the requests can be evaluated to determine if the toolbox should be permanently modified to include the requests.

Effectively constructing and adapting a PM Toolbox is predicated on the user's knowledge of individual PM tools. To help increase our readers' knowledge, the chapters that follow will detail a multitude of useful tools that can be chosen for inclusion in your own PM Toolbox.

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