

INVESTMENT-CENTRIC PROJECT MANAGEMENT

Advanced Strategies for Developing and
Executing Successful Capital Projects

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M.A.Sc., P.Eng.



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PREFACE

*“It is not even wrong.” Wolfgang Pauli’s
response to a student’s research paper.*

This book began in October 2014, nearly thirty years after I first became acquainted with the practice of project management. Back in 1985, I graduated from the Royal Military College of Canada (the equivalent of West Point in the U.S. and the Royal Military Academy at Sandhurst in the UK) and joined the Canadian Armed Forces as an aerospace engineering officer on the then-new CF-18 aircraft fleet implementation program. Within a week of starting my tour of duty, project management infiltrated a significant portion of my functions. Things like planning, execution strategies, budgets, schedules, change control, crisis resolution, work allocation, contractor oversight, and configuration management entered my vernacular under the auspices of military concepts. As I later joined the corporate world in 1989, managing projects became an organic extension of that first career in uniform. Decades later, project management continues to anchor my professional activities and those of NAIAD Company Ltd., the consulting firm that I founded in 2000. Over the years, I have managed several projects from the aerospace, defense, industrial, manufacturing, and oil and gas sectors. Some were small in scale and budget (less than \$500K), while others breached the billion-dollar threshold. In one instance, the project concerned the design of a test furnace destined for the International Space Station. In another case, I managed the construction of an industrial pipe coating facility. My assignments have been tied to the energy sector, such as TransCanada’s 650 km-long gas pipeline transporting five billion cubic feet of gas per day; Sunco’s Fort Hills secondary extraction plant producing 166,000 barrels of oil per day; and Shell’s LNG (liquefied natural gas) plant in Kitimat, British Columbia, rated at 26 million tons per year, to name a few salient examples. Each and every time, complexity became inevitable—spawned in part by the globalization of delivery strategies. In the process, I acquired an expertise in global execution strategies, construction and modularization, engineering delivery, and cross-cultural project management.

Over time, I also began to notice an unsettling disconnect between the expected outcomes promised by formal project management principles and the frequent occurrences of budget and schedule transgressions. I have managed projects that were structured by their owners in strict adherence to the practices

prescribed by the Project Management Institute, yet failed utterly in terms of cost overruns, busted timelines, and crippled plant performance. This disconnect is not limited to the energy sector, but reverberates across industries and project scales alike. Global statistics, for example, record that over 65% of \$500M projects fail, despite the professionalization of their execution. If professionalized project management is the right way of running expansive projects, why do so many still fail?

This book posits that the current interpretation of traditional project management in terms of plans, processes, and procedures, cannot, in fact, deliver its purported guarantee of success. The failure record simply overwhelms the proposition to the point of nullifying it. Many believe that the failure of projects is rooted in their teams' failure to execute according to plan. Granted, success will not ensue without cogent plans, proficient processes, and effective procedures. But these elements are only a means to an end, rather than being the end for which they are too often confused. The reality is that there is more, much more to project management than plans, processes, and procedures. A new paradigm is required, built on a new foundation that is itself erected upon a different perspective. What is that perspective? The true purpose of a project is to realize an asset that maximizes returns to its shareholders over its economic life. The project is merely the means to that end, and an investment vehicle to transform a concept into a physical operation that generates revenues and profits for its owners. This recasting also entails a dramatically different paradigm shift of the meaning of project management. It is no longer limited to the commonly accepted definition but broadened into three separate but intertwined mandates: it is an organization, it is a business, and it is a relationship nexus. The paradigm at the core of this book has a name: investment-centric project management.

CHAPTER SUMMARIES

PART 1—WHY

Part 1 addresses the reasons for redefining the practice of project management through the lenses of terminology, leadership, theory, interactions, and decision making.

Chapter 1 introduces the premise that the current state of the art in project management is adequate as a foundation to oversee the development of projects, but cannot be considered a complete theory considering the persistence of high failure rates seen worldwide in industrial initiatives large and small. The text also presents the reader with a new perspective on the objective of a project: to realize a revenue-generating asset that will deliver sustained investment returns to its shareholders over the economic life of the asset.

Chapter 2 establishes the foundational principles of project management, erected upon a new definition for projects and project management. It recasts project management as a corporate endeavor that is executed along three axes: organization, business, and relationship. It sets the underlying perspective of the discussion from the owners. The text also introduces the concept of *valunomy* as the metric from which economic decisions are made.

Chapter 3 highlights the importance of leadership to the success or failure of a project. Leadership is explored from the organizational and relationship viewpoints, across a spectrum of five leadership archetypes. It recommends what archetype is best suited to what project, and which ones should be shunned.

Chapter 4 sets down the theoretical foundation of project management, through the concept of the *unit transformation process*. The unit transformation process is both a technique and a methodology for mastering the complexities of a project, the sequencing of its execution, and the accountability for doing so. *Accountability* is no longer monolithic, but instead is comprised of three distinct functional roles of accountability, approval authority, and execution responsibility—forming the *directrix* principle.

Chapter 5 extends the *directrix* discussion by juxtaposition of its antithesis: the dabbler. Dabblers, meddlers, micromanagers, and superfluous team personnel are a direct consequence of a project management philosophy that insists on reviewing and approving everything, by everyone, from every other party.

The traditional *review and approve* approach is abandoned in favor of the more efficient *check-but-verify* approach, which slims down labor costs and schedule timelines. It introduces the idea that project management is performed at the *interface between dependent unit transformations*.

Chapter 6 takes on the sacred cow of project budgets and schedules, which are traditionally prioritized ahead of an asset's future performance during work execution. Project execution mindsets are explored. The text suggests a fundamental change in one's consideration of a project budget from the traditional obsession with immediate cost minimization *now*, to the budget as an investment vehicle for the asset's *future* performance. The idea of operating with the commonly-accepted *constraint trifecta* (cost-schedule-quality) is shown to run *counter* to the well-being of the asset. The new concept of a constraint diamond is advocated as the guiding axiom of cost management.

PART 2—WHERE

Part 2 concentrates on the realms of project management practice that actually matter to the outcome of a project.

Chapter 7 introduces the notion of the *project ecosystem* (i.e., PECO). The ecosystem comprises eight layers that must be traversed from the outside in, to achieve project success. The PECO encompasses all the sources of risk that are external to the project.

Chapter 8 deals with the issue of money, addressed from the *long-term investment* perspective. Can the owner afford the project? Should he afford the project? What should be spent on what? When? The text makes the case that *all spending decisions* on a project must serve the asset's future performance rather than myopically aiming at cutting costs during a project's development. If a project is worth the risk, which buttresses its very existence at this stage, then one should select a budget that is realistic and cognizant of the asset's *intrinsic value*.

Chapter 9 introduces the organizational principle of the *framework* as overseer of project managers and the PECO. The framework is a corporate function designed to marshal the resources of the project owner to fulfill the requirements of the project. The framework is *accountable* to the owner for the performance of the project management office. The latter is, in turn, *accountable* to the framework for the development of the profitably performing asset.

Chapter 10 tackles the topic of execution metrics by going beyond *key performance indicators* (KPIs). The text introduces a comprehensive system—*performance assessment metrics* (PAM)—to measure what matters across time, between players, and throughout execution phases.

PART 3—HOW

Part 3 explores the sequencing and planning of a project, starting with a set of rules and guidelines underlying the development of the execution strategy *per se*; then discusses the principal components of a project execution strategy, including the all-important issue of risk management.

Chapter 11 completes the discussion of project oversight—this time focused on management planning and orchestration. It delineates the roles of the framework and those of the project management organization, abandons the idea of project execution plans, and replaces it with an overall execution plan drafted by the framework team—also known as the *baseline asset execution framework* (BAEF). This chapter also offers guidelines for content development, based on the *what, why, when, where, and how* (W5H) technique.

Chapter 12 is the third salvo directed at the minutia of work execution. It develops the sequencing of the execution work into 80 *life-cycle phases*, defines the completion milestone of a project as the point in time when the asset has been proven to be profitably performing, and emphasizes the necessity of completing all deliverables associated with one phase before starting another phase.

PART 4—WHO

Part 4 takes up the matter of team formation, personnel selection, and recruitment strategies adapted to combat local inflationary pressures and exploit global labor markets.

Chapter 13 presents strategies and tactics for developing team hierarchies based on the physical configuration of the asset. It suggests the harmonization of the many tracking processes along that same basis, emphasizes the *directrix* in the functional reports, and provides guidelines for creating efficient and valunomic chains of commands with and without a project team. It introduces the concept of “A” organizations as a preference over “A” teams.

Chapter 14 addresses the issue of labor shortages, skill set atrophy, labor cost inflation, and outsourcing. It promotes the idea of miscegenation as a remedy for chronic labor shortages and turnover rates, highlights the link between project execution and team development, and develops further the concept of “A” organizations.

PART 5—WHEN

Part 5 delves into the practice of project management when things are under control and also when things go off the rails.

Chapter 15 explores various elements of routine project execution. It develops the mechanism of the *collection substrate* construct to integrate all tracking information and explores communication strategies, interface management, and risk management.

Chapter 16 explores situations when projects have gone off the rails. It uncovers their sources—along with the means to avoid them. It delves deeply into the built-in failure roots of various contract types, circles back on the ramifications of the project ecosystem on execution strategies relying on global sourcing, and discusses the effects of failed accountability assignments and how to fix them.

PART 6—WHAT

Part 6 highlights project management practices from the trenches of day-to-day project execution.

Chapter 17 consists of a selected overview of mechanics and mechanisms (M&M) that are applicable to the nuts and bolts of daily execution. It develops topics from the innovation perspective; contrasts the merits of database applications against spreadsheets; and introduces the concept of the *3-D model kernel* for anchoring all information that is developed during execution into a single-point-of-access repository.

Chapter 18 wraps up the M&M discussion with an in-depth analysis of project closeout—the forgotten child of project execution strategies.

Chapter 19 contains commentaries and conclusions.

PART 7—APPENDICES

Part 7 includes the appendices, the bibliography, and the lexicon (including mathematical symbols).

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I wouldn't be me, without you with me.

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ABOUT THE AUTHOR

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Downloads for *Investment-Centric Project Management: Advanced Strategies for Developing and Executing Successful Capital Projects* include numerous templates and materials to help ensure your successful deployment of large, complex, investment projects.

DEDICATION

This book is dedicated to my wife, Margaret, and my children, Michael, Gabrielle, and James.

PART 1—WHY

The subject of project management is introduced through an investigation of first principles. A foundation is laid down as to the meaning, direction, and mindsets of managing projects.

1

INTRODUCTION

*“In theory, theory and practice are the same.
In practice, they are not.” Yogi Berra*

BETWEEN PROJECT SUCCESS AND FAILURE

The World of Projects

Humans have managed projects since the dawn of civilization. They built pyramids, warships, cities, irrigation systems, and the international space station. The language would have been different then, but not the challenges that we see today. Projects have forever faced constraints that will sound familiar to the modern reader: budgets, timelines, changes, labor, transportation logistics, construction techniques, quality assurance, and buy-in from rulers. What is perhaps different today is their complexity, arising as much from performance expectations as from regulatory and social demands.

It is no exaggeration to remark that our modern world creates wealth and advances the collective well-being on the strength of the project as an enabler of the creation process. The very idea of a project is so enmeshed into the reality of business that it is effectively invisible. If you are reading this book in a coffee shop right now, stop and take a look around, starting with the space itself. Everything that you see, touch, and hear was made by employees of a business, at some time, somewhere in the world. Their work was most likely executed within the confines of a project that was mandated by the owners of the business. Notice the shop, the table, the chair, the cup, the light fixtures, the electricity flowing through them, the cash register, the washrooms in the back, the painted parking lines on the pavement. If you are sitting at an airport awaiting the end of yet another delayed flight, pause for a few seconds and try to imagine the unfathomable complexity of the construction of this airport. Once you are

seated in the airplane, remember that you are about to be transported safely by hundreds of thousands of parts working homogeneously, supplied by a myriad of vendors scattered across the globe. Then consider that each one of these parts came to life as an outcome of a project designed to birth it. Lest you are still not convinced, try to figure out exactly what's going on electronically when you pay for those peanuts, by credit card, 30,000 feet above an ocean. The magnitude of these invisible modern conveniences is simply staggering, yet effectively invisible to the casual observer. The technological underpinnings of our modern world are its very air supply: invisible, omnipresent, and a guarantor of death six minutes after it has been cut off.

A New Project Perspective

Projects are themselves underpinnings of technological underpinnings. People regard them (at least for those few of us who pay heed to such matters) as they would gravity: it's always there and therefore unnoticed (unless you need brakes), and it's always working in mysterious ways. Most people define gravity in terms of what it does: pull masses together. Far fewer will speak in terms of space-time warping predicted by general relativity. Rarer still are those who can dwell in its mathematics. The same goes with the management practices underlying project execution. Most project professionals will define a project in terms nurtured by traditional project management (TPM) orthodoxy. The Project Management Institute (PMI), for example, will define a project as *an agent of change, undertaken as a temporary endeavor to create a unique process, product, or services*. Few people would disagree with such a characterization. It is sufficiently generic to allow countless interpretations that remain true to its spirit. Nevertheless, this definition (along with its many variants) is also sufficiently amorphous as to be useless. It explains why 30% of \$20M projects, 50% of \$100M projects, and 70% of \$1B projects will fail. A better definition is this:

A project is the development of a profitably performing asset (PPA).

The asset is the revenue-generating entity to be operated commercially for the benefits of its shareholders. An asset, for example, can be an industrial plant, a pipeline, an airport, a workers' camp, a cultural event, or a piece of equipment. *The asset exists to deliver sustained returns on investment (ROI) to shareholders throughout its economic life.* The causality is irreversible: the asset is wanted; therefore, the project is initiated to transform the initial concept into a revenue stream. However, it is not enough for the asset to generate revenues. It must do so profitably, such that its shareholders will maximize their ROI over the long run. That life spans the entire existence of the asset, from concept to development, from start-up to full operations, to modifications and decommissioning,

or to its sale. *Once again, the causality must be grasped unequivocally: shareholders will agree to foot the bill for the asset if and only if it is designed to maximize shareholder value over the long term*—nothing else matters. If the case can be made to invest in this asset, it follows that the sole, and indeed the ultimate purpose of the ensuing actions, will be to configure this asset in such a way that it will deliver the promised ROI.

The Return-on-Investment Imperative

The maximization of ROI rests on three vectors: the volume of revenues generated by the asset, the cost incurred to generate them, and the profits resulting from the combined effects of revenues and costs. In this context, the project is never an end unto itself; it is merely the means to the end sought—the PPA. The project no longer ends when commissioning is completed, which otherwise completely misses the purpose of the asset since you have no clue whether the asset is profitably performing or not. On the other hand, if one agrees that the PPA is the purpose of the project, it stands to reason that the project should end when the profitability has been proven. This could be several months after operational start-up occurred. Defining the end in this manner has profound implications on the way budgets are managed, including the necessary abandonment of the cherished constraint trifecta (budget-schedule-quality), which forces the project manager to choose to control two and accept the third to land where it will. *You cannot achieve a PPA if you manage by this constraint trifecta.* Otherwise, the only guarantee is that the budget will be spent, and the work may be finished on time. You will leave the entire matter of profitability undefined, unknown, and unpredictable.

Traditional Project Management

As recently as the early 1900s, projects were executed without any formal framework. The professionalization of the practice of project management really began in the 1950s. Today, project management is considered to be a full-fledged career vocation and is subject to professional accreditations from governing organizations, such as PMI, to name but one. Project management principles underscore the execution of projects of any size, anywhere on the planet. These principles have evolved in tandem with the rise in project complexity. Control underscores their purpose—control over budgets, schedules, scope of work, labor, work sequencing, design, changes, construction, procurement, logistics, regulatory filing, communications, and risks. In many instances, they have been incorporated in specialized software. In all instances, they provide project teams with the procedures to manage work execution. TPM principles generate certain expectations in the minds of the organizations footing the bill, such as completing

projects *on budget and schedule* (OBaS), in compliance with performance targets, without undue upheavals, and with minimal bad publicity. Ultimately, organizations embrace TPM for its putative guarantee of success. We therefore pose a simple question: does the track record validate the premise?

The Reality of Failure

As we will see in Chapter 2, failure statistics across regions and industries cast a shadow on this TPM assertion. In fact, they point to a different conclusion: TPM practices do not guarantee project success to owners, or furnish sufficient probability of success to justify the initial investment. It is worth emphasizing once again the harsh reality of industrial projects far and wide: \$20M projects will fail 30% of the time; above \$100M, 50% will fail; and beyond \$1B, a staggering 70% will suffer the same fate. This state of affairs was the impetus for this book. The evidence is inescapable: projects underscored by a TPM framework exhibit a high probability of failing to satisfy their starting expectations. There are several reasons why TPM fails, which will be investigated in this book. Some project professionals may be tempted to explain away the failure record with the widely held belief that *the fault is not with the accepted principles of project management, but with the failure to implement them*. Experience shows that this is too simplistic an explanation. For every problem, there is a solution that is simple, elegant, and wrong (H. L. Mencken). The fact of the matter is that *every single project involving your author* was executed within a formal TPM framework. Most of them adhered faithfully to the rigid plans, strategies, and procedures imposed by the owner at the outset. Almost none of them came in on budget and on schedule.

Project versus Program versus Function

What is a project? In this book, a project is an endeavor with a start and end date. Examples include building a house or a plant, taking a trip to Andalusia, and designing a new hire procedure. When the end date is missing, it is a program, such as developing a new drug or a team of aspiring Olympians. When both dates are missing, it is a function. Running the accounting department is a function. The PPA philosophy is applicable integrally to projects, and partially to programs; but projects will be the focus of the discussion from this point forward. Projects are further divided into *spend* and *investment* types. The spend project is not required to generate revenue upon completion. Otherwise, it is an investment project. The distinction is fundamental to the PPA philosophy. *Spend projects* are managed by the constraint trifecta shown in Figure 1.1. The overriding concern of the execution strategy is to minimize costs. *Investment projects* are managed by the constraint diamond of Figure 1.2, and strive to

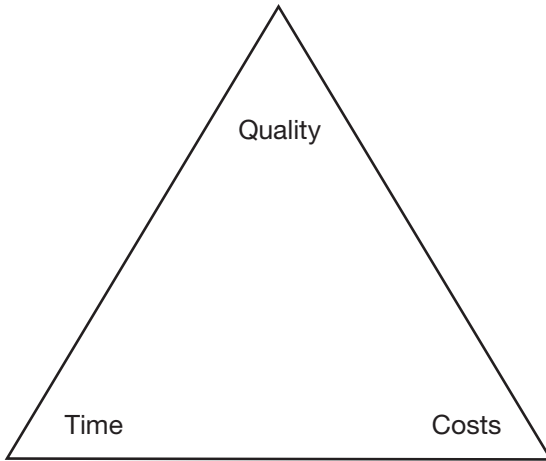


Figure 1.1 Constraint trifacta: classic management choices between costs, time, and quality

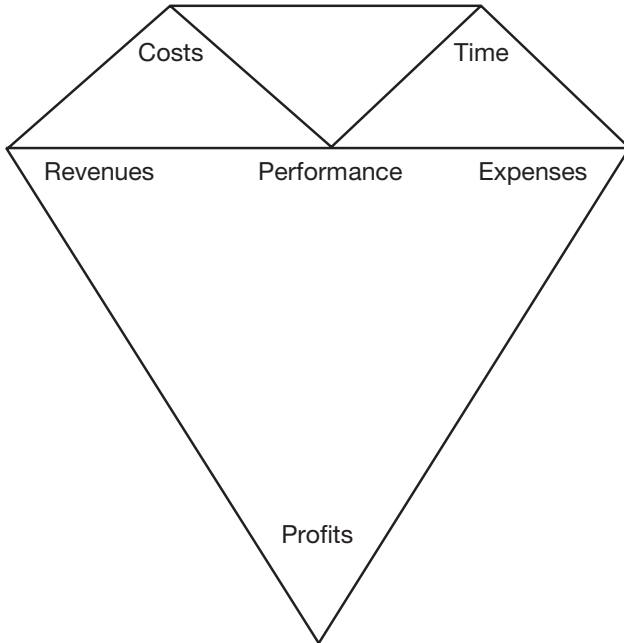


Figure 1.2 Constraint diamond: PPA objectives for project management. The budget drivers now include revenues, operating expenses, and profits. Note the inversion of the constraint diamond.

Table 1.1 Examples of spend and investment projects

Spend Projects	Investment Projects
Build a house	Build a rental property
Repair a car	Restore a collectible car ahead of an auction
Acquire an original Olenska painting	Buy the Olenska watercolor painting collection
Vacation travel to Emerald Lake Lodge	Client retreat at Emerald Lake Lodge
Buy a high-end racing bicycle	Buy a boat or plane
	Build a pipeline, an airport, or a mine
	Buy a petrochemical plant to modify it

maximize the asset’s long-term ROI performance. Examples of the two project types are shown in Table 1.1.

Both types produce the same outcome: an asset. Both are justified from the outset on the assumption that this asset will be realized. For this reason, the PPA philosophy applies to both, equally. Nevertheless, the investment project will be the primary perspective of this book since its scale and costs are generally orders of magnitude higher than for a spend project. The most bang for the investment buck will accrue to large-scale projects with million or billion dollar budgets—things like civil infrastructures, airports, sea ports, city development, pipelines, plants, power generation, mining, technology development, and movies. As the reader will discover, *investment projects* fail when they are managed by the constraint trifecta.

THE JUSTIFICATION FOR THIS BOOK

One may very well ask, “why bother with yet another book on such a well-worn topic, given the plethora already offered on the market?” The reason is threefold: genuine project management is dramatically different than the TPM orthodoxy; project owners cannot afford the failure rates; and project success lies beyond the procedural horizon embraced by traditional practice. This book is not a *recipe book* on how to create a schedule, write a procurement plan, or develop a change management process. Readers who are simply interested in the tools of the trade are encouraged to consult information that is offered online or inside brick walls. The *raison d’être* for this book are altogether different: (1) to address the shortcomings of TPM practices; (2) to redefine projects, project management, and their associated mechanics and mechanisms; (3) to alter the interpretation of project management away from tools and techniques,

and toward the relationship aspects of projects; and (4) to equip the reader with a cohesive project delivery framework that will guarantee success, predictably, and repetition. The text will explore the underlying reasons for the disturbing failure statistics and offer practical, coherent solutions tested in the trenches of project execution. The methodologies, strategies, and techniques described herein will resonate with new and experienced project professionals alike, who struggle with the ever-present threat of budget overruns, schedule slippages, construction misfires, and plant deficiencies. Owners, operators, design firms, and constructors will discover the common threads that unite them in their shared and individual commercial objectives.

Few organizations can afford to deploy their project capital as inefficiently as history reveals. Fewer still can afford the status quo in an era of low commodity prices, complex global execution strategies, and regulatory minefields. This book offers project owners and developers alike a road map to predictable and repeatable success, and a guarantee of future investment returns from their assets.

The Status Quo Is Often Justified but Rarely Justifiable

There are no quick fixes or magic bullets to remedy the failure record. There is no way to tweak one's project delivery organization and painlessly change the prevailing *status quo*. The journey begins with four initial steps to be taken by the reader. The first step is an acknowledgment of the importance of the proven practices of TPM. The TPM processes and procedures are valid, solid, and understood broadly. For instance, the emphasis on developing pertinent plans and strategies before any project work is initiated remains unquestioned by the PPA philosophy. The next step asks the reader to admit to the imperfections of a TPM and to recognize that too many projects continue to fail in spite of their TPM implementation. Simply put, something must be amiss in TPM, otherwise success would be the norm. Third, the *status quo* must be challenged. Tweaks will not suffice; if they did, natural selection would long ago have embedded them into the DNA of the principles. The fourth and final step is to introduce a new, two-part management paradigm.

New Project Management Paradigm

Part 1 of the new paradigm recasts the definition of a project as *the development of a PPA*, as introduced earlier in the chapter. Let us emphasize once more that the point of a project is to bring to life a physical asset that will make money for its owner. The asset is acquired to generate revenues and yield profits to its

owners. The asset is the justification for the project, not vice versa. *The asset exists to deliver sustained ROI to shareholders throughout its economic life.* The project is therefore a means to an end. It is the investment vehicle to conceive, develop, realize, activate, and operate the asset. All project activities, objectives, and decisions are resolved in favor of making the asset *profitably performing*.

Part 2 of the new paradigm redefines project management as the *controlled execution of a project*. This wording departs dramatically from the usual definition that, according to such authorities as PMI, is a set of skills, processes, procedures, and plans to execute a project in such a way that all stakeholders' needs are satisfied. In this interpretation, project management is reduced to allocating and managing resources to achieve a set of objectives. The definition takes on a pronounced procedural character which transpires, on a daily basis, into execution plans and strategies. Those are, in turn, constituted into management schemes for schedule, cost, quality, human resources, communications, risk, procurement, construction management, systems, and standards. The managing of a project is thus encapsulated in the aphorism: *if you fail to plan, you plan to fail*. However, although planning is a necessary condition to execution success, it is not a sufficient one. For example, your author was involved with a multi-billion dollar project whose execution strategy tallied 800 pages of plans, procedures, processes, and templates. Despite this depth of detail, the endeavor would eventually flounder. The fact of the matter is that a plan is akin to a music partition, one that is regarded as the end unto itself. But notes are only the starting point. The music that ensues is brought to life by executing this partition. The execution requires skilled players, aligned in synchronicity and led by one individual (and never, you will notice, a committee). The piece "*La valse des patineurs*" by Waldteufel can be played by a high school band and by a professional symphonic orchestra. The notes, the cadence, the phrasing, and the instruments are the same, yet listen to the difference!

On the Merits of a Plan

Any military commander will tell you that a battle plan is valid up until the battle commences. Afterward, the fog of war casts such a long shadow upon the intended theories of the battle plan as to render them ineffective. In battle, the victor keeps his eyes on the ultimate objective—be it to prevail in battle, take the hill, conquer the beach, or win the war; but never about how each combat unit recharges its weapons. A project, like an army, can win all the battles, yet still lose the war.

INVESTMENT-CENTRIC PROJECT MANAGEMENT (ICPM)

Striving to Thrive

In the new paradigm, profitability of the future asset sits at the top of management's priority. The management of the project, being circumscribed by the constraint diamond (see Figure 1.2), becomes investment-centric. The ICPM approach transforms the project organization into a full-fledged institutional structure. The structure is divided into three management functions: the organization, the business, and the relationship nexus—which will be refined in Chapter 2. In short, the *organization* deals with the application of knowledge, skill, tools, and techniques to project activities; the *business* deals with money; and the *relationship nexus* transcends the personal and functional relationships that make or break a project.

Anchors of ICPM Execution

The ramifications are profound. The tools and techniques of TPM are retained integrally in an ICPM schema, but not as execution anchors (anchors being, as a group, the foundation of the delivery strategy). The first ICPM execution anchor is the end of a project. Whereas in TPM, the end coincides with the end of commissioning (following construction), in ICPM the end occurs when the asset has been proven to be profitably performing. Practically, this means weeks or months later than commissioning.

The second ICPM anchor is the budget philosophy. In a TPM framework, all projects are of the *spend* type, subject to the constraint trifecta (see Figure 1.1). The work is always managed with a view to minimize costs. In the PPA paradigm, all projects are of the *investment* type, with the budget being the investment vehicle to realize the asset. *All project costs* are justified on the basis of maximizing the future investment returns, in accordance with Figure 1.2. Short-term cost savings are shunned if they run counter to this basis.

The third ICPM anchor concerns work sequencing. The traditional approach calls for dividing the scope of work into a series of phases (usually four to six), culminating in the commissioning of the asset. The design philosophy explicitly assumes that each output can be designed individually and linearly, while the design work spans two or more phases. These outputs are then explicitly assumed to accrue in perfect convergence over time to produce the final, integrated outcome. These various assumptions are rarely corroborated by reality for they ignore the effects of complexity. Any time multiple moving parts are in play (the quintessence of *investment* projects), complexity will arise. Complexity

is, in fact, an emergent feature of such multi-part systems, and is manifested by the nonlinearity of coupled interactions between the components making up the system. The ICPM schema takes it for granted that complexity will arise. It seeks to corral that complexity by sequencing the work in such a way that outputs are produced once, at a specific phase of the execution. The nature of the outputs proceeds organically over time. It enables the gradual build up of the asset from requirements to specifications to individual systems, assembled into installations, networked together into the plant. Proceeding in this way allows the pursuit of maximized future investment returns (which will otherwise be compromised by pursuit of real-time cost savings).

The salient differences between TPM and PPA projects are highlighted by the three ICPM anchors. Others will be introduced throughout the text, such as the unit transformation processes (UTP), leadership, direct accountability, the *getting-to-no* mindset, team structures, framework, risks, collection substrate, asset configuration, and “A” organizations. Taken together, they amount to a comprehensive and cohesive execution infrastructure. Migrating from TPM to PPA necessitates a holistic transformation at both project and corporate levels.

TPM versus PPA Perspectives

We illustrate these ramifications with an example from the movie industry (a movie is, in a pure sense, an investment project). We wind back the clock to the 1970s, a time of revolutionary upheaval in cinema, with Hollywood seeking to redefine itself in contrast to its past. The industry was infused with fresh blood from such immortals as Spielberg, Lucas, and Coppola, whose names need only be spoken to turn admiration into inspiration. Back then, as now, the *movie project* was deemed completed when ready for theatrical release. In one instance, the project was espoused by a young, mildly successful moviemaker bent on trampling the conventions of storytelling. Not surprisingly, filming was plagued with production problems, technical failures, editing misfires, and painful budget and schedule overruns. When, at long last, the final version was ready for prescreening, studio executives were less than enthused, to the point where they feared an impending failure of the whole affair. The studio chose to limit the initial release to a mere dozen theaters across the U.S. By traditional project management standards, the movie project was a failure—budgets and schedules were busted; many technical processes went off the rails. The lack of faith in the project by the studio executives was so pronounced that they agreed to sign over the merchandising rights of the film back to its director (in an ultimate effort by said director to get the movie released). Against all odds, the movie made it to the screen. And so it was that, on May 25, 1977, the failed movie project *Star Wars Episode IV* hit theaters.

Evidently, had the definition of the movie project included the revenue phase, the assessment of its success would have varied ever so slightly from the studio's original stance. Had the studio executives focused more on the contents and magic of the film's cinematographic execution, rather than harp on the budget and schedule woes, they might have anticipated the magnitude of the film's impact and invested *more* money and *more* time on the special effects. Surely, they would then have retained the merchandising rights that would eventually make the director, George Lucas, a wealthy man.

ELEMENTS OF STYLE

Per force, the basis of this book is tied to the author's experience in the oil and gas sector, in the big leagues of gas and oil pipelines; processing facilities; SAGD and heavy oil extraction; oil sands; and liquefied natural gas. Many projects were on a massive scale (\$300M and more) within execution frameworks spanning the globe, carried out in multiple phases that were spread over years. Its woes and tribulations are broadly common to other sectors and offer a treasure trove of examples from which to extract the necessary insights. The scope, size, duration, and nature of a project will affect the execution details, of course, but the execution *methodology* remains nearly universal, regardless of the nature of the project. The failure rates observed in large industrial projects—like building a plant, an airport, or an Olympic arena—are seen in other types of projects that don't even involve construction. Software development, app creation, summer festivals, and political campaigns are but a few examples. The theory, axioms, principles, and techniques discussed in this book will therefore apply to the individual experience of the readers, including the elements of the methodology that will pertain to fabrication, construction, and labor resources. The way to construct a plant, a pipeline, or an airplane is identically equivalent to developing voice-recognition software, deploying a marketing campaign, or organizing a peewee hockey tournament.

Readers from all walks of project life should find in these examples relevance to their own experiences. In places, readers will notice educated guesses to inform the thought process, which could take a variety of forms such as *in all likelihood*, *in many or most cases*, or *it would be reasonable to deduce*. However, frequent recurrence of these forms throughout the text would prove tedious. The reader is invited to infer them when the context leads to the suggestion of broad assumptions or conclusions. In other places, the topics are presented in accessible mathematical expressions. Fear not the math: it adds substance to concepts that would otherwise appear undeveloped or hard to describe. Elsewhere, the reader will notice a reliance on juxtaposition as a comparative device

to highlight the range of embodiment of certain topics. This black-on-white juxtaposition simply serves to contrast more clearly the boundaries of the topic's range. It does not imply a corresponding black-and-white reality. Rather, the real range will normally span a continuum from one extreme to the other. Life is not so much a binary proposition as it is a canvas of 28 shades of penumbra i.e., shade or shadow).



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