The Innovation Approach

David Roach's *The Innovation Approach: Overcoming the Limitations of Design Thinking and the Lean Startup* addresses a critical challenge in product innovation: perfecting the front end of the innovation process. Roach introduces a robust approach that guides innovation towards creating robust product concepts that are desirable, feasible, and viable. His model presents a novel, well-constructed iterative process, each cycle comprising four core activities: secondary research, benchmarking, primary research, and ideation. Each cycle in his model is meticulously detailed, combining the strengths of Design Thinking and Lean Startup methodologies while skillfully avoiding their common pitfalls. Clear, insightful, and engaging, this book is not only an enjoyable read but also an indispensable resource for managers in product and service innovation. A must-read for those seeking to drive successful innovation in their organizations.

—***Robert G. Cooper*, Professor Emeritus at McMaster University, Canada, and ISBM Distinguished Research Fellow at Pennsylvania State University, USA**

The Innovation Approach: Overcoming the Limitations of Design Thinking and the Lean Startup

BY

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This book is dedicated to "mon frère" Professor Dr. med Michael Klaus Schmidt, an innovator and passionate clinician whose generosity of spirit I will forever miss.

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Preface

You are a progressive group. You believe that innovation is crucial to your organization's long-term vision. You keep up to date with emerging trends both in the marketplace and the modes of organization. You tend not to be at the bleeding edge but consider yourself a fast follower. You're not seduced by fads but employ techniques that stand the test of time. The intuitive appeal of Design Thinking makes sense to you and seems to be a great fit for your organization. Its empathetic, team-based approach and collaborative work style are exactly what your organization espouses. However, after the initial excitement and perhaps some early wins, it doesn't seem to be delivering the benefits that you thought. Perhaps it's because your organization has lost its entrepreneurial drive, but after dabbling with methods like the Lean Startup, it seems to have only confounded the problem. You continue to search for answers…

If this reminds you of your journey…this book is for you…

THIS BOOK IS NOT A CRITIQUE OF EITHER DESIGN THINKING OR THE LEAN STARTUP, BUT A WAKE-UP CALL TO THE GENERALLY POOR IMPLEMENTATION OF THESE FRAMEWORKS

This book has been in various forms of development for close to four decades. Over my career, I have always been relatively successful at innovation, but my early career was characterized by ad hoc "hit and miss" approaches, based more on entrepreneurial intuition than a consistent methodology. What always fascinated me was whether there was a modest approach with broad enough application to improve the outcomes of the innovation process? Today, when I interact with executives or my graduate students, I liken the innovation process to America's pastime – baseball. Baseball is one of the few sports where a 70% failure rate makes a player a superstar. A player who can put the ball "in play" 30% of the time (a.k.a. a "0.300 hitter") is rare in a game where *all players* have developed the "skills," but few have mastered the *consistency* required to reach this pinnacle. Surely, innovation management must have a similar process …

At the time, one of my former bosses challenged me by stating that although I may have shown some ability to create successful innovations, it likely wasn't repeatable and certainly could not be "systematized." As with most things in life, I took this as a challenge and have spent the past decades researching, applying and modifying best practices. My journey has taken me to top institutions such

as Harvard, MIT, Babson, Kellogg, University of Chicago, to name a few … to learn from the best of the best. After applying many of these "broad-brush" approaches, I eventually reached a point where a deeper dive into the academic field was necessary – receiving a PhD in the area of product management. Throughout this process I continued to apply this knowledge, resulting in several breakthrough innovations in aerospace, medical devices and consumer products. It also resulted in many failures, but my hit rate approached that of a 0.300 hitter. What became clear is that there are fundamental principles and building blocks that form the basis for successful innovation management approaches.

It also became clear that there is an unbreakable relationship between innovation and entrepreneurship. These two somewhat complementary constructs are conjoined and can either work synergistically or be at cross purposes. From an academic perspective, firms or individuals have what we refer to in strategic management studies as "capabilities." These capabilities differ between innovation and entrepreneurship but have often been incorrectly lumped together. Innovation is the process of *creating value for a target audience*, while entrepreneurship is about *recognizing, crafting and exploiting* commercial (or social) opportunities. These are two disparate types of capabilities which when managed synergistically often lead to success, while when in conflict almost inevitably lead to failure. My research and the overwhelming anecdotal evidence suggest that individual actors often mistake their capabilities in either of these spheres leading to poor outcomes. The capability required to research, conceptualize and execute innovations differs radically from the capability to recognize (i.e., uncover) opportunities and craft them into something commercially or socially viable. Successful innovators surround themselves with entrepreneurial talent, while successful entrepreneurs surround themselves with innovation talent. But more about this in Chapter 1.

Although initially thrilled by the advent of novel methodologies such as Design Thinking and the Lean Startup, I quickly became disillusioned by their implementation. Although the lines between innovation and entrepreneurship have always been blurred, these methods quickly reached an unmanageable level of populism driven by a surge of internet-based promotion. Both methods have many merits. However, neither adequately addresses the innovation–entrepreneurship interface, specifically from a "capabilities" perspective. Moreover, in practice, they suffer from what I refer to as the "boardgame" principle, where individuals follow a planned route somewhat analogous to the boardgame *Snakes and Ladders*. In *Snakes and Ladders*, players move their token on a board in a quasi-linear fashion, where ladders are used to fast forward through the process, while snakes result in sliding back. Conceptually, Design Thinking advocates for a nonlinear approach where assumptions should be challenged or revisited throughout the process. On the other hand, the Lean Startup promotes "pivots" when new information comes to light. In practice, however, individual actors once locked into a path rarely revisit key facts and assumptions, while pivoting is often the outcome of poor management of the innovation process, once the team has effectively reached a dead end. Compounding this situation are the many "how to" books and websites written on these subjects. Each in their own way provides lengthy checklists, questions to be answered and case examples (note: mostly from

behemoths such as Apple, Google, Tesla, etc.) which are mostly unsuitable for typical organizations. In practice, individuals and/or teams become overwhelmed by these choice options and retract to simplified heuristics, in effect cherry-picking areas of comfort. In keeping with my analogy, they fast forward through steps only to inevitably slide back. This is neither *effective* nor *efficient*. For instance, a favorite comfort area is the brainstorming process, which is creative, fun and highly visible to management and/or investors. This approach mostly ignores decades of well-established best practices and is *inconsistent* with the successful management of the innovation process.

This book chronicles my journey through the merits and obstacles of innovation management. It is not about criticizing or altering best practices developed and tested over time. As a matter of fact, this book is complimentary to these methods and practices. For instance, there is no benefit in reiterating the approach and/or benefits of brainstorming or customer discovery. These steps are well documented and generally well understood. Instead, I hope to build upon these many solid foundations from both a practitioner and academic perspective. As a result, I will endeavor where possible to link recent tools and techniques back to their origins to convey an understanding of the lineage of these concepts. Once core principles are fully understood, it is much easier for individuals to apply them in the correct manner, context and measure. I will also go beyond the narrow confines of core concepts into advanced tools and techniques, as well as system-level capabilities that support a robust innovation management system.

This book is divided into four broad categories. The first section revisits *systems of innovation* and how they relate to new methodologies such as Design Thinking and the Lean Startup. This knowledge is used to propose a *complimentary* model of innovation management. Building upon this model, *core steps and capabilities* are discussed under the presumption that successful management of these steps increases the overall *effectiveness* of the process. When steps are more effective, they also become more *efficient* in the long run. Core steps include background research (secondary and benchmarking) followed by primary research. Once these steps are completed, ideation activities can then be undertaken to generate meaningful concepts. I will argue that these core activities are sequential in nature and build upon each other. They represent the core of an *innovation cycle*, which provides the basis for the next iterative cycle, where the innovation problem is redefined and enriched. This is the transition to the next phase where *advanced tools and techniques* are engaged. These techniques or *themes* involve the application of adoption theory, lead user research and design for sustainability. Each of these themes involves a repetition of the *innovation cycle*, albeit with a refined focus. This allows fledgling concepts to be amplified, improved and stress-tested. The book concludes with a discussion of *system-level capabilities* which include team selection and governance, project management essentials and business model innovation. Together these form the innovation approach.

The book is structured to blend theory with practical application of techniques. To accomplish this CASE STUDIES and IN PRACTICE sections are highlighted throughout. Case studies emphasize examples of innovation management at work. The in practice sections feature the application of techniques

described within the chapters. Throughout, key concepts are highlighted to reinforce *effective* steps within the innovation approach.

For managers, my hope is that "the approach" can breathe new life into their innovation practices by allowing them to increase the effectiveness of their innovation activities. For founders, practitioners and consultants, the approach may lead them to fine-tuning their processes, resulting in better outcomes for their organizations or clients. For my academic colleagues, my hope is that the opinions throughout this manuscript may become the kernel for new avenues of research inquiry that are so badly needed at the innovation–entrepreneurship interface.

In closing, innovation and entrepreneurship have always had a strong and synergistic relationship. Innovations that are not adopted commercially or socially remain inventions. Every entrepreneurial endeavor requires some form of innovation. As a result, many tools, techniques, and systems have been developed to reconcile these somewhat disparate approaches. Design Thinking has emerged as the de facto standard for innovation management, while the Lean Startup methodology has become the prevailing approach for entrepreneurial pursuits. While both systems have significant strengths, they suffer in practice from philosophical gaps. In practice, Design Thinking has become subservient to the brainstorming process, while the Lean Startup suffers from the notion that "pivoting" is the solution to all that ails the business model. Based on almost four decades of practice and research, this book begins with the philosophy that *a poor concept can rarely be converted into a success*, while *the most robust concepts often suffer from an unachievable business model*. Rather than a critique of these popular methodologies, this book serves as a *compliment to these approaches* focusing on the front end of innovation where most of the critical innovation and entrepreneurial decisions take place.

My hope is that this book will be somewhat controversial, but embraced by most …

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First and foremost, I would like to thank my "number one," Katy Schurman. A former student and now indispensable colleague, she has painstakingly reviewed every aspect of this manuscript. She not only contributed her superior organizational skills but also provided many insightful comments and suggestions. I'd also like to extend a special thanks to Dr. Nancy Kilcup who has always graciously accepted the role of "number two." She, along with Katy, have allowed me the privilege of writing this book by taking care of all the other things happening in my hectic world. I will look forward to supporting them in all their future endeavors.

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There are many others too numerous to mention that have all played a role in my journey. These range from my academic colleagues to the many business associates I have had the pleasure to learn from. A few notable mentions include Dr. Robert Cooper, whom I met in the mid-1990s whose approach charted the direction of a lot of my practice and his Austrian colleague Dr. Angelika Dreher whom I met over the course of writing this book. Her understanding of the relationship between Design Thinking and the Stage Gate™ system mirrored my practical experience in countries such as Germany. I'll look forward to keeping in touch with her.

Finally, my family. My wife, who has always been there no matter what crazy directions I decided to pursue. It is now my turn to support her as she embarks on her own adventure in creative writing, where her poetry will certainly shine. To my children, who when asked, generally know what their pappa has been up to. They've always been an inspiration to me and have become adults that we genuinely enjoy spending time with.

Finally, my dear friend, colleague and business partner Professor Dr. med Michael Klaus Schmidt. I wish I could have handed him the first copy of this book.

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Section I

Introduction

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Chapter 1

Systems of Innovation

Several approaches to innovation management have been developed over the decades. This chapter provides an overview of these approaches, distinguishing between systems, methods, processes and techniques. Approaches such as Lean, Agile and Stage Gate™ are reviewed and their relationship to both Design Thinking and Lean Startup are explored. These approaches are then examined for a common set of best practices. The chapter concludes with a set of criteria which form the basis of effective innovation management approaches for the front end of innovation.

Introduction

Innovation management is a broad topic, ranging from approaches to research and development (R&D) to economics and government policy. Since this book is about the innovation approach, it is focused on the development of innovation capabilities for the management of the process. These capabilities form the foundation for the fundamental premise of this book, namely that *a poor concept can rarely be converted into a success*. As a result, the focus will be on what is often considered the front end of innovation (FEI) where i*deas are transformed into robust concepts*. These activities range from the initial vision or inspiration for the project to the development and evaluation of concepts. Once concepts are considered desirable, feasible and viable (usually resulting in an Alpha-level prototype) they are then ready for the more rigorous back end of innovation (BEI) process, where detailed design, testing and launch activities dominate.

This chapter will focus on various innovation approaches to establish best practices. These will then be compared to current popular approaches such as Design Thinking (DT) and the Lean Startup (LS).

Innovation Approaches

Several approaches to innovation management have been developed over the years. Most involve approaches to R&D or new product development. These often involve confirming customer requirements, establishing economic viability or determining product–market fit. As a result, the field is littered with

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intersecting strategic approaches, including methodologies, systems, processes and techniques. Thus, it is crucial for both practitioners and academics to clearly distinguish between these often-interchangeable terms.

Systems refer to a set of interconnected or interdependent elements that work together to achieve a common goal. They involve the integration of various components and processes, whose interactions create a functional whole. *Systems thinking* involves understanding how these mechanisms interact, knowing that all interactions synergistically impact outcomes. The best description I have heard to describe systems thinking is to picture a windchime at rest. When you touch the windchime at any point, all parts are affected, which determines the outcome (i.e., creation of sounds through chiming). This demonstrates systems are only as strong as their components and the synergy between their interaction.

Methods describe organized approaches within a system to accomplish specific tasks or solve problems. They provide a structured approach to achieve outcomes, normally through step-by-step procedures, guidelines or protocols. They provide a framework to ensure consistency and efficiency in achieving desired results.

Processes are sequences of interrelated activities or steps that transform inputs into outputs. They are often used to define how work is done within an organization, system or method. Processes provide a structured way to manage resources and tasks, providing consistency and repeatability. These are the mainstay of organizational efficiency and quality assurance systems.

Tools or techniques are instruments or resources that aid in performing tasks. They facilitate the application of processes and can be tangible, intangible or conceptual in nature. For instance, open-ended, probe and learn interviewing techniques (somewhat intangible) form the basis for customer listening methodology. Conversely, a well-designed questionnaire (tangible) would follow a process to elicit customer feedback. Both can be used within an innovation management system to provide input into customer requirements. As a result, tools and techniques can take the form of templates, guidelines or software programs.

Last is *philosophy*. Many of the approaches rely on a "vision" or an overriding aspirational set of principles. This vision sets in motion all of the above.

In summary, a *system* is a broad framework of interconnected components, *methods* are orderly approaches to accomplish tasks, *processes* are sequences of activities that transform inputs into outputs and *techniques* are resources that aid in implementing processes effectively. Understanding the distinctions between these terms is essential for effectively applying these somewhat convoluted concepts in practice.

These simple definitions will aid in understanding the vast body of work related to innovation management in the next sections.

Product Development Management Association

The most comprehensive resource for innovation management is the Product Development Management Association (PDMA). The PDMA is considered the ultimate source of best practices in managing new product development and comprehensively covers most of the systems, methods and processes considered

state-of-the-art. They stress three key areas, specifically (i) portfolio, (ii) process and (iii) product life cycle management as part of an overall innovation management strategy. Supporting this strategic framework is the role of teams (and their leadership), various innovation management techniques and market research used for decision-making. Together they form what they refer to at their Body of Knowledge (BOK) (PMBOK Guide, 2021).

From an innovation management perspective, portfolio management is a *project selection* activity. It is a necessary step in most organizations to align corporate strategy with innovation objectives of the firm. Its fundamental purpose is to manage and spread risk across the range of innovation projects. These innovation undertakings have been categorized as incremental, derivatives, hybrids, platforms and lastly, R&D projects (Wheelwright & Clark, 1992). Product life cycle management on the other hand refers to the management of in-market products which require periodic maintenance to keep them positioned within the market. These activities range from incremental product improvements, to adjustments in features and pricing. This leaves the systems on how to move from project selection (i.e., portfolio) to market-ready innovations.

Stage Gate™ System

Foundational to the PDMA BOK is the most well-known product innovation management approach – Dr. Robert Cooper's Stage Gate™ system. This system emanated from his PhD research in the late 1970s, driven by his fascination with the significant differences between company success rates in new product development. Traditional methods at the time involved a stepwise approach most often performed by narrowly focused departments. In this epoch, R&D would hand off their design to engineering, who would hand it off to manufacturing, who would eventually hand it off to the marketing department to launch the product. The process was functionally disciplinary, linear and time-consuming. His research uncovered best practices (and by association limitations) of this approach. He recommended a management structure to not only "do the right projects but do the projects right." Key to his recommendations was the importance of upfront homework, a truly cross-functional team approach, unique differentiated products and strong market orientation throughout the process. As a result he developed an idea-to-launch management system that he trademarked as the Stage Gate™ system. It covers both the FEI and BEI through to post launch review. In effect it provided a macro-level structure designed to systematize the business innovation management process. More recently he has refined his system to align with agile techniques where he incorporates sprints, scrums and interim gates which he refers to as "upgates" (Cooper & Fürst, 2023).

By the turn of this century, this method became the de facto standard for managing the innovation process within both large- and medium-size firms. However, it had limited adoption in small and micro enterprises mostly due to the significant management overhead imposed on these organizations. It did not provide enough "how to" knowledge (i.e., techniques), only providing guidelines on what should be considered at each stage between gates. Also hindering these smaller

firms was the general lack of management experience, which left technique selection to nascent management teams.

As a result, the Stage Gate™ system was not widely adopted or was poorly executed by most small enterprises and virtually unknown in the startup and early-stage community. Where it was occasionally applied in early-stage companies, it was mostly forced upon founders by their financial partners who mistakenly applied "big business" management systems to the innovation process. This proved to be time-consuming, bureaucratic and generally inefficient and as a result quickly fell out of favor in the startup community, paving the way for approaches such as the Lean Startup (LS).

The Stage Gate™ methodology is a blend of *solution-driven* and *problem-driven* innovation.

Integrated Product Development

Integrated product development (IPD) evolved from concurrent engineering, where design is integrated throughout the product life cycle from conceptualization to end-of-life. Based on a holistic approach, this system forces innovation processes to align with the product life cycle, to design in (or out) aspects of the product's value proposition. It relies on the premise that careful consideration at the early stages of development (i.e., the FEI) will result in a more thoughtful life cycle impact. This notion is strongly supported by many practitioners and academics who posit that up to 80% of product life cycle impacts are embedded once the innovation concept is locked in (Ulrich & Eppinger, 2012). This approach fundamentally relies on stacking the FEI to establish richer early product definition, one of the key tenants of the Stage Gate™ system.

Thus, IPD forces the design team to simultaneously consider such things as functionality, production, maintenance, quality and disposal. It differs from conventional methods by advocating that these areas should be contemplated concurrently, simultaneously impacting the quality of the product and productivity of the process. Like the Stage Gate™ system, it builds upon orderly decision points to move from one part of the process to another. It accomplishes this by relying on many of the same techniques including, voice of the customer (VoC), strategic alignment (e.g., portfolio selection), cross-functional teams and basic project management techniques.

This system tends to be *solution-centric* rather than problem-centric.

Lean Product Development and Innovation

Often referred to as Lean Product Innovation (or Lean for short), this innovation *methodology* has its roots in the lean production approach pioneered by the Toyota Motor Company (Kennedy, 2003). At its core, the Lean system is about waste elimination. Its success within automotive manufacturing spurred interest in expanding its principles outside of this area. As companies such as Toyota began to push the limits of waste reduction within their production systems, it became clear that the logical next frontier was to eliminate waste at the source (i.e., the design of the product itself). Not only could it streamline the design

process by improving quality, cost and timeliness, much like IPD it would also impact the entire product life cycle. This was one of the driving forces behind Eric Ries' LS philosophy (Ries, 2011).

This methodology by its nature is best deployed by large organizations for complex but generally incremental products. Incremental innovation projects rely on tried and tested technologies reconfigured to the application at hand. In the automotive industry, most of the novelty of a new product involves minor adjustments to component architecture. For instance, the styling of the vehicle may undergo cosmetic changes, but the remainder of the vehicle remains unchanged. As a result, there is little uncertainty in retooling a production line to make different parts. One of the key outputs from this system is its proactive risk management approach. Lean innovation understands that it is based on incremental innovation, not advanced or radical innovation. As a result, one of the highlights is that it proactively reduces risk by *parallel processing activities*. Keeping the project requirements "flexible" as long as possible allows for the more uncertain aspects of the project to be fully road-tested (no pun intended). When the technology is "ready for prime time" (i.e., effective, robust and scalable), it replaces the incumbent technology on the product roadmap.

As with all best practices in innovation management, it relies on significant upfront information gathering. Also like both the Stage Gate™ system and IPD, its success is based upon a truly cross-functional team that is empowered by senior management to act in the best interest of the product, rather than their functional specialty. Much of the thinking supporting the LS is based on this Lean philosophy.

This methodology tends to be *solution-centric* rather than problem-centric.

Agile Product Innovation

Agile Product Innovation (or Agile for short) is a *methodology* that evolved from the software industry in the mid to late 1990s where quick iterative bursts of development are followed by rapid tests. The objective is to get to an optimum solution quicker, better and cheaper. The premise being that short, focused development cycles are preferred over longer more comprehensive development cycles. Often used terminology includes such things as sprints and scrums. Scrums refer to nonlinear, fixed-length iterations akin to a rugby scrum, where the players huddle, determine the next play, then execute a short burst play, only to re-huddle and do it again.[1] Similarly, sprints refer to the period of work involved between evaluation processes, akin to the stage portion of the Stage Gate™ system. Foundational to the entire methodology are quick and dirty iterations leading to artifacts that can be assessed. Daily builds result in artifacts often referred to as focused prototypes (Ulrich & Eppinger, 2012).

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[1]Although the term has been bandied around for decades, the concept was first introduced to describe the nonlinear team approach as espoused by Robert Cooper's Stage Gate™ system.

In the software industry today, daily build and test iterations are the norm. Unlike tangible products, software is continuously and infinitely changeable. However, some of this rational has spilled into tangible product development methodologies over the years. For instance, the Stage Gate™ system was modified to include aspects of agile through their Agile Stage Gate™ approach (Cooper & Fürst, 2023). Thus, Agile should be considered a *methodology* rather than a system, since its fundamental principles are integrated throughout other innovation *systems*.

In practice however it has delivered mixed results. Trying to apply software project management philosophy does not necessarily deliver the gains but can often deliver losses. Tangible or hardware products are time-consuming, expensive and not forgiving to rework. When software-based Agile is superimposed on hardware projects it often comes with unrealistic scope, timelines and costs. The Silicon Valley approach, based on agile thinking and advocated by the LS community, often suffers from this approach.

This methodology tends to be *solution-centric* rather than problem-centric.

The MIT Model – Product Design and Development

In 1995, Karl Ulrich and Steven Eppinger published their seminal book – Product Design and Development sometimes referred to as the MIT model (Ulrich & Eppinger, 2012). Their focus was on physical products, however, they emphasize that their broad approach is adaptable to all innovation projects. Although their book takes a very linear approach, they go to great lengths to emphasize that innovation is not a linear process. They also emphasize the importance of cross-disciplinary capabilities of the team, which range from business, engineering to operational functions. Their approach is based on the core functions of marketing, design and manufacturing.

They frame the development process as a set of physical steps analogous to baking a cake or assembling an automobile. Like a cake, not only are the proper ingredients required, but the appropriate sequence of activities is necessary to produce an acceptable result. Like baking, the wrong sequence of activities can produce unwanted interactions even though the ingredients are appropriate. Like bakers, no organization or team follows the same recipe or process. This they contend highlights that innovation management is part science and part art.

Ulrich and Eppinger (2012) spend an entire chapter, discussing how to build requirement definitions through first identifying customer needs; specifically, their experience in their use environments. They stress that the team should identify customer needs *without* knowing how they will eventually address those needs. They emphasize that the process of gathering needs from raw customer data and subjectively interpreting these needs is key to establishing early requirements. To accomplish this, they don't differentiate between secondary and primary research activities, suggesting multiple approaches ranging from interviews, focus groups, observation to surveys. They state that greater than 90% of customer needs should be revealed after 25 hours of data collection. As a practical guide, they suggest that fewer than 10 interviews are probably inadequate, while 50 is too many.