CIMS System for Industrial Innovation

A Handbook for Innovation Leaders

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Preface

The main purpose of the CIMS System for Industrial Innovation is to help organizations quickly develop ideas into legitimate, profitable business opportunities; capture these opportunities in a compelling business case to secure the necessary resources; and establish the necessary governance system and plan required to implement them. In other words, the System for Industrial Innovation lays out an entire business system and strategy for actually doing breakthrough innovations.

Innovation is never a single event; innovation is the process of combining ideas and building on the successful efforts of those who went before.

The same can be said for the CIMS System for Industrial Innovation. Its roots go back 20 years to when Angus Kingon, Mike Zapata, Steve Barr, James Jeck, David Baumer, Raj Narayan, and Roger Debo authored the TEC Algorithm over a span of years. Funded by the NSF and the Kenan Institute of Engineering and Technology, The TEC Algorithm is the backbone of the Poole College of Management’s entrepreneurship program. It has been used to launch scores of successful ventures and serves a great base on which to build the CIMS System for Industrial Innovation.

The tools and techniques used in the System have been in development for many years. To test the usability of the workbook and templates, Professor Steve Markham has piloted them in multiple MBA courses: Global Strategy, Management of Technology and Innovation, and Building Business Models. Numerous B2B companies have employed many of the tools and techniques presented in the book. Based on their feedback, not only on the templates, but the entire workbook approach, we periodically make refinements to the System for Industrial Innovation.

After reading the book, leaders - and the teams they mobilize - will have a much better understanding of what it takes to create truly unique and differentiated offerings for their markets. Moreover, if they follow the proven path we have laid out for them, they will be able to do this in less time, with fewer resources, and have a far better chance of success. In a very real sense, the CIMS System for Industrial Innovation helps “de-risk” breakthrough innovation.

We have organized the book in the following manner:

Chapter I – Introduction describes the primary target for this Handbook – Innovation Leaders. These are the especially talented and dedicated people charged with leading their organizations’ perpetual pursuit of new and differentiated products and services. The chapter also explains why we named it a System for Industrial Innovation. It is intended for mature, B2B companies that for a variety of reasons have a tougher row to hoe when it comes to innovation.
Chapter 2 - *Foundations of Industrial Innovation* lays out the basic framework that underlies breakthrough innovation – the Valley of Death. It also describes the pioneering efforts that went into the TEC Algorithm, the first successful process for crossing the Valley of Death. The Algorithm’s method for – connecting ideas to products to the markets with “enduring customer needs” – is the essence of breakthrough innovation -- and the System for Industrial Innovation. The world has changed in 20 years. The chapter explains the new requirements confronting Innovation Leaders and how and why a modern Innovation System must deal with them.

Chapter 3 - *A System for Industrial Innovation* overviews the entire process and the governance system (roles and responsibilities, decision authorities, and metrics) required to institutionalize it.

In it the authors explain the philosophy that guided its construction, i.e. the “Big Idea”. The chapter also describes how we have employed big data analytics tools to gather, filter, and present information in ways never before possible. Breakthrough innovation is all about making substantial bets on sometimes uncertain market opportunities. These tools are intended to provide Innovation Leaders and their organizations with the confidence to do just that.

*Chapter 4 - Convert Ideas into Opportunities; Chapter 5- Create the Compelling case; and Chapter 6 - Adopt and Implement* layout the three modules and six major phases of the CIMS System for Industrial Innovation:

### System for Industrial Innovation

#### 1. Convert Ideas into Opportunities
- A. Define Idea
- B. Build Opportunity

#### 2.0 Create the Compelling Case
- A. Elaborate and Evaluate
- B. Develop Business Case

#### 3.0 Adopt and Implement
- A. Govern and Implement
- B. Measure and Improve

Module 1.0 – Convert Ideas into Opportunities
- A. Define Idea
- B. Build Opportunity

Module 2.0 – Create the Compelling Case
- A. Elaborate and Evaluate
- B. Develop Business Case

Module 3.0 – Adopt and Implement
- A. Govern and Implement
- B. Measure and Improve
In addition to providing a holistic approach to breakthrough innovation, these chapters provide users with a complete tool-box of decision support tools. A series of templates (provided via an electronic workbook) help ensure the speed and integrity of the System. By gathering and assessing only necessary information – and “filling in” their workbook before proceeding to the next step - project teams adhere to the System’s recommended workflow. Also, using the workbook in this fashion memorializes the entire project for subsequent review and learning.

Fuller descriptions of important concepts called out by the System are found in Chapter 7 - Tools and Techniques. These topics were too large to include in the “mainline” of the Handbook (Chapters 4-6), but should be referred to as needed to fully grasp and implement the CIMS System for Industrial Innovation.

Special Thanks

The authors would also like to thank CIMS members. Without their financial support and participation over the last four years the research findings that define the System for Industrial Innovation would not have been possible:

- Air Products & Chemicals, Inc.
- American Coatings Associations
- Armstrong World Industries, Inc.
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- BP America
- Cisco Systems, Inc.
- Eastman Chemical Company
- Eisai Co., Ltd.
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- Pentair Water Pool and Spa
- Pitney Bowes, Inc.
- Xerox Corporation

In a very real sense this book is for them and organizations like them striving to master innovation.
Chapter 1. Introduction

A. Innovation Leaders

This handbook is intended primarily for managers charged with dramatically changing their organization’s top line performance. At the Center for Innovation Management Studies (CIMS)\(^1\), we call these people Innovation Leaders. Position and title do not define these people; they may, or may not, hold the title of Chief Innovation Officer. They may just as likely be found at the business unit or functional level, e.g., SBU GM, Head of R&D, Business Development, or Marketing, and so on. In these cases, Innovation Leaders are the self-appointed leaders of innovation for their units and the firm. At CIMS, we believe that innovation is everyone’s responsibility.

Innovation Leaders are usually seasoned, influential executives. While we have great respect for mid-level managers and idea champions at all levels, it is our experience that it is almost impossible to lead major innovation programs from these ranks. More important than their position in the organization are the traits Innovation Leaders possess:

- They don’t review innovation initiatives, but rather roll up their sleeves and spend a good portion of their time working with Innovation Project Teams and potential customers to understand first-hand the needs and wants of these customers.
- Drawing on their experience, they can gauge when a product in development will not be profitable and convert it to a service opportunity. They can spot an unmet need during the business model-building process, and they have the stature to change course to go after the better opportunity.
- Innovation Leaders are team players; they are generally inclusive and respectful of others – particularly their peers. Because of the respect they engender, they can quickly mobilize resources across the organization.

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\(^1\) CIMS is a research center of the Poole College of Management at NC State University. CIMS exists to help its sponsor companies make their products, processes, services, and ultimately their business models command greater revenues and profits and stand out from the competition. CIMS itself is a model of open innovation. It can test ideas with people who have “done it”, i.e. executives charged with improving their member company’s capacity to innovate. Or it can launch investigations into solutions not yet in the literature using its network of faculty, from universities across the globe, to advance the many disciplines of innovation. CIMS staff facilitates and automates this exchange by hosting bi-annual meetings, conducting on-demand phone conferences and webinars, and providing all of its deliverables (research findings, lessons learned articles, novel tools, and assessments) via its interactive and secure website (for more details go to [http://cims.ncsu.edu/](http://cims.ncsu.edu/)).
They have a clear view of what is in, or out, of alignment in terms of skills and capabilities, metrics and incentives, and how people are collaborating in order to get the most of their collective efforts.

Most importantly Innovation Leaders are decisive. After a reasonable amount of time, if an opportunity does not pan out, they kill it – freeing resources for other projects in the portfolio.

CIMS caters to Innovation Leaders; they set CIMS research agenda.

Innovation Leaders play an important role in the System for Industrial Innovation. They help form and gather resources for the organization’s main innovation management system, which we call the Innovation Portfolio Committee. Most important, they have the authority to launch projects that address opportunities and fill gaps in the portfolio. (For more information on the responsibilities and importance of the Innovation Portfolio Committee, see All Important Adoption and Implementation starting on pg. 22).

From our observations of these unusually valuable people for over 30 years, they are not seeking silver bullets. Rather, it is just the opposite. They want solutions that will last. They are willing to take the time to study, plan, design, and implement a robust innovation program for their organizations. They are determined that innovation not be treated as a fad, but that it become embedded and part of their organization’s DNA.

If this describes you, or someone you aspire to be, please read on...

B. B2B companies have the toughest task

CIMS favors mature B2B companies.

B2B firms are at least one level of customer removed from their end user. In other words, the people who buy their products are not the same as the people who use these products on a daily basis. Hence these firms have more difficulty seeing, understanding, and quantifying the opportunities new markets present to them.

In addition, these companies typically rely on third-party reports to build estimates of their market size and broad segments of buyers within their market. But because they lack both an intimate relationship with end users and a deep understanding of their needs, B2B companies often find these definitions are so general that they are all but useless for creating new breakthrough products.

Compounding the problem, large, mature B2B companies typically serve multiple masters – many different customers with different needs. For example, IBM sells computers and services to financial institutions, automotive companies, pharmaceutical firms, local and federal governments, and so on,
ranging from huge user communities to very small ones. Which industry and end-user customer segment is the right focus for deep relations? Whom should IBM excel at serving?

1. Strategic diffusion

Large, mature firms often suffer from strategic diffusion.

Simply expressed, strategic diffusion is too many complex strategic battles being fought at the same time. Research done by the Corporate Executive Board shows an alarming number of case history companies were suffering from strategic diffusion well before revenues flattened and their stock price took a beating.

Strategic diffusion can show itself in two forms:

- Form No. 1: This form exists in multi-industry companies, with management teams engaged in strategic confrontations across a broad front of dissimilar businesses. These conglomerates often extend management across too many industries stretching strategic control too thin. These companies often wake up to find multiple businesses turning down at once.

- Form No. 2: This is when too many strategic initiatives get launched simultaneously within the same business, trying to solve everything at once. Management teams dilute their efforts and their execution across too many activities.

Regardless of the form strategic diffusion takes, several common, irrefutable symptoms reveal themselves in the portfolios of these firms. The portfolios are crammed with projects, with few winners among them. The cycle time of the development projects is lengthening, not shortening, as contention for an ever-thinning set of engineering resources rises. Execution and quality of the projects suffer causing even more redo and delays.

Another symptom of strategic diffusion is the increasing number of failed projects. Before the projects even get finished, the market has past them by. In this case the only resort is to cancel them, but even this may be beyond the abilities of a strategically diffused organization. They have no better reasons for opting out of a project then they did for selecting it in the first place.

The worst result of strategic diffusion is the toll it takes on the organization’s business performance. Unless executives are just plain lucky, a strategically diffused organization will never achieve its business objectives.

2. Success breeds complacency

Having been successful for a number of years, many mature companies now view breakthrough innovations – major innovations that are new to the world, or at least to their industry – as being too
risky. The risk associated with breakthrough innovation manifests itself in many ways, but usually the first one expressed is that the financial rewards of such initiatives, if any, are seen to be happening too far in the future. Mature B2B companies often fall captive to Wall Street and seek to constantly post quarterly results that beat estimates. The risk of the familiar seems small; the risk of the novel seems large.

Consequently, such firms can fall victim to what we call the “stuck in incrementalism” syndrome, undertaking only small changes. What innovations they do produce tend to be incremental in nature: extensions or derivatives of their current product or service platforms. Of course, this aversion to taking a risk and pursuing breakthrough innovations can only lead to one outcome -- the inevitable commoditization of their products and services, declining margins, and stagnant growth.

We believe that all organizations should devote some portion of their portfolios to breakthrough initiatives that seek to create whole, new competitive platforms -- and new potential sources of revenue growth. Depending on the industry, the actual percentage of resources dedicated to breakthrough initiatives will vary. But the point is, in every case a company must set aside some resources to explore more radical ideas.

We understand that derivations based on existing product and service platforms can be very productive, from a time-to-market standpoint, for reinforcing a company’s promise of brand value as well as creating significant economical benefits for the firm. Project portfolios must contain both incremental and breakthrough innovation projects in order to be balanced from a risk/return standpoint.

CIMS calls the ability of organizations to create an entire stream of profitable products from a set of core components and competencies Platform Management. It is when these platforms start becoming obsolete, or when companies try to force them into market segments they were not designed for that trouble occurs. To learn more about the importance of Platform Management to profitably managing incremental innovations, see Innovation Management Maturity Assessment (IMMA), in Chapter 6.D. Measure and Improve.

3. New metrics required

It is also important that companies use different metrics for this portion of the portfolio. For their incremental innovations, mature businesses usually measure planned and actual increases in unit volumes, revenue, and earnings in relation to their P&L plans. These metrics are not useful for measuring the progress of early-stage breakthrough initiatives. They may even undermine breakthrough innovation efforts.

In contrast, breakthrough initiatives should employ metrics that track progress in understanding customers’ problems and learning how to solve them. Measures might include the number of interactions per month between senior management and customers; the team’s success in rapidly creating prototypes for early feedback; the results of market tests; the volume and nature of customer
complaints about the product, from the introduction of the initial prototype onward; and the team’s ability to respond to those complaints. (Reference: Bruce Harreld, et al., “Six Ways to Sink a Growth Initiative,” Harvard Business Review). To learn more about the importance of Portfolio Management and Metrics to managing breakthrough innovations, see Innovation Management Maturity Assessment (IMMA) in Chapter 6.D. Measure and improve.

C. Getting the all important market concept correct

As noted, B2B companies have a particularly hard time seeing the market. Yet we know that a company’s ability to crystallize the market concept – the target segment and how the company’s offerings can do a better job of meeting the customer’s needs – is far more important than how well the company fields a fundamentally new product or technology. In fact, research by Procter & Gamble suggests that 70% of product failures across most categories occur because companies misconstrue the market. New Coke is a classic market concept failure by an existing mature firm; in contrast, Netflix got its market concept right. In each case the outcome was determined by the company’s understanding of the market, not its facility with the enabling technologies. But it was likely easier for a start up like Netflix, which didn’t have to face the barriers of past practice.

Second, establishing the nature of the market can head off a costly “technology push.” This syndrome often afflicts companies that emphasize how to solve a problem, rather than what problem should be solved, or what customer desires must be satisfied. (Reference: George Day, “Is it real? Can we win? Is it worth it?” Harvard Business Review, December 2007). Sometimes, a simpler solution, rather than more technology, is the right answer.

The solution for Innovation Leaders in both mature businesses as well as start-up firms is a systematic process – complete with proven tools and techniques - that will help them see and quantify new market opportunities. Key decision points in the System for Industrial Innovation employ big data analytics to provide the information executives need to make the hard decisions associated with risky, breakthrough innovations. The solution must also foster an organizational spirit of entrepreneurship that mature industry B2B firms often lack. While we know mature companies’ business models have been optimized for operational excellence, they can still take on some risk and look beyond quarterly results in order to reignite their growth engines. They may also have to look beyond the boundary of their own organizations, for partners to help co-create these new products and ventures, sharing the risk and providing much needed expertise.
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