

Open Innovation: The New Imperative for Creating and Profiting from Technology

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Course Opportunities: This book may be used effectively in a number of different courses, because its focus relates directly to concerns in them:

- Managing Innovation
- New Product Development
- Industrial Engineering
- General Management
- Corporate Entrepreneurship
- Managing Intellectual Property

BOOK OVERVIEW

No company can afford to rely entirely on their own ideas to advance their business anymore, and no company can restrict their innovations to a single path to market. This book outlines a new paradigm of open innovation, which can enable companies to create and profit from their ideas – and others' ideas - in today's distributed knowledge environment.

Open Innovation outlines a new environment for R&D, and demonstrates that this new environment replaces the logic of an earlier era, where innovation was closed off from outside ideas and technologies. It calls for a new logic for the R&D function, one that requires R&D managers to become conversant with business models, and new structures for taking technology to market. And it requires senior managers in the firm to change the charter of their R&D organization, to turn it into an effective vehicle to source external knowledge, as well as an effective generator of knowledge.

John Seely Brown, the chief scientist at Xerox, and the Director Emeritus of Xerox PARC, has written a compelling foreword to the book. He writes that our thinking about the innovation process has become stale, and that the book uniquely makes a powerful contribution to "innovating Innovation."

Open Innovation is broken down into an Introduction and 9 chapters that outline the past, present, and future of industrial innovation:

- Introduction: an overview of the themes in the Book
- Xerox PARC: the Achievements and Limits of Closed Innovation (Chapter 1)
- The Closed Innovation Paradigm (Chapter 2)
- The Open Innovation Paradigm (Chapter 3)
- The Business Model: Connecting Internal and External Innovation (Chapter 4)
- From Closed to Open Innovation (Chapter 5)
- Open Innovation @ Intel (Chapter 6)
- Creating New Ventures Out of Internal Technology (Chapter 7)
- Business Models and Managing Intellectual Property (Chapter 8)
- Making the Transition: Open Innovation Strategies and Tactics (Chapter 9)



There are a few ways these materials may be sequenced. I will outline my preferred structure, with four modules. Your choice of structure may recombine these modules in a different order, depending on the goals of your course. For example, one year I began with the third module first. Now, I start inside the firm, and then begin to move more outside as the course progresses.

My structure below inductively builds an appreciation for the merits of the traditional industrial R&D paradigm, before launching into its issues and problems. It then discusses the crisis that this paradigm is facing today. A central feature of this crisis is the role of the Business Model of the firm, which usefully focuses a company's activities, but also frames and limits its search for new innovations. New players enter the industrial innovation system as well, as suppliers of innovations, or as intermediaries brokering connections to them. The closing cases provide a capstone for integrating the insights that move companies toward an *Open Innovation* perspective.

Course Modules and Content

- The first module explores the **Virtues and Limits of Closed Innovation**, the traditional approach to industrial innovation. The many achievements of vertically integrated, internal innovation will be explored here. Then, the tensions between internal research and internal development will be developed.
- The second module is about **Innovation and the Business Model.** The sources of value from an innovation derive from the business model that connects that innovation to the market. When a business model creates great success for a company, that model takes on a dual-edged character: becoming a barrier to change, as well as a source of advantage.
- The third module examines **Sources of Innovative Ideas**. Once we understand the barriers to change, we must then find out how companies can overcome their disabilities, and where to look for new ideas. We will examine university research, military research, individual inventors, and corporate discovery processes. Intermediaries play an interesting role in linking companies to these different sources of innovation.
- The fourth and final module considers **Creating Innovation Capabilities**. In the prior two modules, the cases typically consider innovations one at a time. Here, we examine systems of managing multiple innovations. These systems are in flux, as companies experiment with new modes of innovating. We will examine these experiments, and look for processes and structures (including incubators, spin-offs, corporate venture capital) that can create a capability to develop and execute innovations repeatedly.

MODULE 1: THE VIRTUES AND LIMITS OF CLOSED INNOVATION

Using the book in this module

At the end of Module 1, I assign Chapters 1 and 2 of *Open Innovation*. There, the achievements and limits of Closed Innovation are explored, along with the historical roots of Closed Innovation. These chapters introduce concepts and language that will be useful throughout the course, including:

- Open and Closed Innovation
- Buffer between R and D



• Playing chess vs. playing poker

Case Studies

Title: Pilkington Float Glass--1955

Author: Kim B. Clark Product #: 695024

Comment: This case shows the long and painful process of internal innovation within Pilkington. There are B and C cases available, if desired, to provide updates of the company's slow process towards a new process for making smooth glass, the float process. At different junctures, Pilkington must decide whether to continue the work, which is becoming very expensive, or whether to terminate the work. Schedules and milestones are missed repeatedly, because the project is attempting to achieve something that has never been done before, and there are numerous "unknown unknowns." Eventually, however, Pilkington does in fact achieve an enormously valuable innovation, which yields lower costs for itself, and licensing revenues for its process of billions of dollars over a period of more than 30 years.

Title: Du Pont Kevlar Aramid Industrial Fiber

Author: Clayton M. Christensen

Product #: 698079

Comment: Du Pont is one of the great success stories of internally focused, vertically integrated industrial innovation during the 20th century. As its understanding of polymer chemistry grew, Du Pont was able to predict and then develop a wide variety of innovative materials, including nylon, rayon, Teflon, and Kevlar. As with Pilkington, above, these innovative materials required many, many years before they created significant profits. However, they did make enormous profits for Du Pont, and Du Pont reinvested those profits in further internal R&D, creating a virtuous circle.

This case, though, shows a promising new material, Kevlar, struggling to penetrate a market application, tire cord, for which its properties and costs are not ideal. The question of "technology push" takes center stage: not all technologies have attractive market applications. Du Pont must engage its marketing creativity to identify and exploit attractive markets for Kevlar.

MODULE 2: INNOVATION AND THE BUSINESS MODEL

Using the book in this Module

Chapter 4 describes the central Business Model concept quite clearly, and gives a detailed working definition of the term. I assign this chapter early in this Module with the Eli Lilly case, and use its language to query students on the elements of each case's business model. Also, the cognitive framing that a business model imposes upon a business figures prominently in this module, particularly in the Eli Lilly case, though also in the Genzyme case. Indeed, the business model is the root cause of disruption for disruptive technologies. Core concepts include:

- Target market
- Value proposition
- Value chain



• "Make" vs. "buy" choices in constructing the value chain

Case Studies

Title: Eli Lilly and Co: Innovation in Diabetes Care

Author: Clayton M. Christensen

Product #: 696077

Comment: Summarizes Eli Lilly's history of innovation in its business, describing how the dimensions along which innovations have been made in the industry have changed. Lilly's innovation strategy has been to pursue ever higher performance products, while others in the industry have pursued more convenient products. At the time of the case, Lilly is contemplating offering services, not just products, to diabetic patients. Teaching Purpose: May be used in courses on managing innovation and managing new product development.

Title: Molding the Impossible: The NYPRO/Vistakon Disposable Contact Lens Project

Author: Clayton M. Christensen

Product #: 694062

Comment: NYPRO, Inc., one of the world's leading manufacturers of plastic injection-molded products, is asked by the Vistakon Division of Johnson & Johnson to manufacture molds that Vistakon will use to produce disposable contact lenses. The required dimensional tolerances for NYPRO's molds are ten times tighter than it has ever achieved before. The case describes how engineering teams in these two companies attempt to work together to develop a capable process for making molds and lenses. Teaching Purpose: Provides a detailed description of the engineering problem-solving process. Especially focuses on why customers and vendors need to solve process development problems jointly, but illustrates the problems incurred when working in a cross-company team.

Title: Genzyme: Engineering the Market for Orphan Drugs

Authors: Henry W. Chesbrough and Clarissa Ceruti

Product #: 602147

Comment: Genzyme has made money with external technology in orphan drug markets generally considered to be too small to be attractive to other drug companies. Now competition is entering these same markets, placing Genzyme's business model under new pressures. Teaching Purpose: Illustrates novel approach to targeting drug markets and creative ways to use external technology.

MODULE 3: SOURCES OF INNOVATIVE IDEAS

The previous two Modules looked at innovation inside the firm. This module moves the focus outside the firm into the surrounding environment. The key concept underlying this module is **whether and when we will see markets for innovations**, where companies can buy and sell ideas.

Using the Book in this Module



I assign **Chapter 3** at this point, to develop and explore the idea that ideas are now widespread through society for most industries. When knowledge is widely distributed, companies' innovation processes should reorganize to make full use of that knowledge. Concepts discussed here include:

- Sourcing external technologies for internal development
- Utilizing external technology to create value, while using internal technology to claim a portion of that value
- The locus of industrial innovation has changed. Startups and small firms are now an integral part of the knowledge landscape

After the Patent & License case, I assign **Chapter 8**, which links intellectual property directly to a company's business model. This nicely integrates the second module with the third module, and provides a novel and insightful perspective on markets for innovation. Key points that emerge here include:

- Technology has no economic value absent a business model
- Valuing intellectual property depends on the business model employed
- In a world of abundant knowledge, companies should be active buyers and active sellers of IP

Case Studies

Title: Centagenetix (A): Building a Business Model for Genetic Longevity

Authors: Henry W. Chesbrough and Frank Angella

Product #: 602087

Comment: Describes a start-up company seeking to exploit population genetic data from long-lived, healthy people. The company must address legal, financial, ethical, and personal issues among its team to launch the company. Teaching Purpose: Illustrates complexities of taking medical research out to the market and the conflicts that arise.

Title: What's the BIG Idea?

Authors: Clayton M. Christensen and Scott D. Anthony

Product #: 602105

Comment: CEO Michael Collins must decide if and how a process he developed to further innovation in the kids' industry could port over to other industries. The process was based on Collins' experiences as an inventor and as a venture capitalist, and it allowed his company to be an intermediary between inventors and innovation-seeking companies. The process seemed to be working quite well in the kids industry and Collins had to decide what would "travel" to a different vertical. Teaching Purpose: Demonstrates how innovation that might not happen internal to a company can happen once it is removed from a company's processes. Also raises questions as to whether you can develop a process to identify good invention ideas or whether it is an "art."

Title: NeuroTherapy Ventures: Catalyzing Neurologic Innovations

Author: Henry W. Chesbrough

Product #: 602124

Comment: Discusses the impact of limited market size on epilepsy therapies and shows how an early-stage venture fund can catalyze faster development of new treatments. Teaching Purpose: Illustrates potential market failures for new drug development in epilepsy market and shows novel organizational vehicle to commercialize greater innovation from epilepsy research.



Title: Milcom

Author: Henry Chesbrough

Product #: 602006

Comment:

Title: The Patent & License Exchange: Enabling a Global IP Marketplace

Authors: Henry W. Chesbrough and Edward Smith

Product #: 601019

Comment: The Patent & License Exchange (pl-x) is a start-up company seeking to create a market for intellectual property over the web. The company has targeted the United States as its initial market, and has developed its services and processes for the United States. Now it is entering Japan. How well will its services fit the Japanese market for intellectual property? Teaching Purpose: Institutional context of intellectual property. Markets for intellectual property: benefits and requirements.

MODULE 4: BUILDING INNOVATION CAPABILITIES

Using the book in this module

Chapters 5, 6, and 7 update material in the IBM, Intel, and Lucent cases above, and can be used after each case. Those chapters also tie in each firm's model to the themes of the course. Concepts discussed here include:

- Companies can no longer afford the not-invented-here (NIH) syndrome
- Companies should not restrict their internal technology solely to their internal paths to market.
 Instead, they should enable others' business models, and extract a profit from their use of internally developed technology
- Companies should proactively develop programs to target promising external research, to incorporate into their own business model

Chapter 9 is a summary of the book, but also a call to action. It provides numerous practical suggestions for how to navigate the transition from a Closed Innovation mindset towards an Open Innovation mindset. These ideas provide a useful conclusion to the course. Concepts discussed here include:

- Identifying the source of recent important ideas in your own industry
- Taking a VC to lunch
- Building closer relationships with leading academic research centers
- Utilizing external research projects to fill gaps in your own product roadmap
- Using corporate funds to monitor, invest in, and occasionally acquire promising startup companies

Case Studies

Title: Managing Research at IBM in Internet Time

Author: Henry W. Chesbrough

Product #: 601058



Comment: IBM must adapt its research process to the volatility of the Internet market. Issues include incentives, research charter, reward systems, and linkages to business units and customers. Teaching Purpose: Documents the transition of a central research lab to the issues and opportunities of the Internet.

Title: Intel Labs (A): Photolithography Strategy in Crisis

Author: Henry W. Chesbrough

Product #: 600032

Comment: Intel has evolved a new approach to managing its industrial research, the distributed labs model. The benefits and limits of this model are explored. Teaching Purpose: Illustrates a new approach

to managing industrial research, the distributed labs model.

Title: Inxight: Incubating a Xerox Technology Spinout **Authors:** Henry W. Chesbrough and Christina Darwall

Product #: 699019

Comment: Xerox has established a new spinoff that utilizes software technology developed at its PARC research facility. This spinoff, Inxight Software, is formulating its plans to commercialize PARC's technology via an OEM component business model. Teaching Purpose: Alternative organization structures to commercialize R&D; internal and quasi-external incentives, authority, and decision making.

Title: PlaceWare: Issues in Structuring a Xerox Technology Spinout

Author: Henry W. Chesbrough

Product #: 699001

Comment: Xerox has established a process to spinout technologies it develops that do not fit with its current business needs. To structure these "spinouts," a number of issues arise on how to treat people and intellectual property. PlaceWare is the first technology to go through this process. Teaching Purpose: Commercializing technology, corporate entrepreneurship.

Title: Intel Capital: The Berkeley Networks Investment

Author: Henry W. Chesbrough

Product #: 600069

Comment: Discusses how Intel Corp. uses corporate venture capital to explore new technologies in new markets. Intel combines external investments with internal research and development. Teaching Purpose: Shows an instance of externalized R&D and how external investment can complement internal R&D.

Title: Lucent Technologies: The Future of the New Ventures Group

Authors: Henry W. Chesbrough and David Lane

Product #: 601102

Comment: Lucent Technologies' New Ventures Group has created innovative ways to commercialize Bell Labs research. The success of this approach now forces the group to evaluate whether to stay inside Bell Labs or become an external venture capitalist group. Teaching Purpose: To explore a type of corporate venture capital organization and to identify issues in commercializing research discoveries.