Management of Technology and Innovation

MSC 514

Communication Systems and Strategy Program

Professor:	Paul Leonardi	Term:	Spring 2008
Email:	Leonardi@northwestern.edu	Day and Time:	F & Sat AM
Office Hours:	TBD	Location:	FSB 1-483

OVERVIEW

This course is designed to provide managers with a mix of approaches and techniques to manage technological innovation and change within their organizations. The course is divided into three modules. The first module examines how managers can design teams and organizations to promote innovation. The second module focuses on strategies and structures that encourage and impede effective product development. The third module explores practices that managers can use to implement new technologies and drive organizational change. In each of these modules, we will draw on hard evidence from empirical research about what works and what doesn't. We will also use case studies and student generated content to critically analyze factors for effective technology management.

There is no textbook for this course. All readings and case materials are available in PDF format for download from the course's blackboard site.

COURSE REQUIREMENTS

Readings

This course is run as a seminar. The readings assigned each week illustrate important concepts in the management of technology. Readings are based on evidence from empirical studies of various practices and strategies of technology innovation, development, and implementation in formal organizations. The readings are not fluff. They are assigned to provide fodder for discussion and lenses through which to interpret the material presented in the case studies. You should ask yourself the following questions about each reading:

1. What is the central problem the author(s) is trying to solve?
2. What primary mechanisms are posited?
3. What is the evidence to support the argument(s)? How convincing is that evidence?
4. What are the basic assumptions behind the analysis?
5. How do the concepts described in the reading and the insights generated by the analysis explain phenomena you've seen in your organization

Each week you will read several papers on a similar topic. When viewing the papers collectively you should ask yourself the following:

1. Do these papers provide complementary or conflicting evidence about the phenomenon in question?
2. Are there shortcomings in one the approach taken by one paper that could be addressed by another paper?
3. Consider a project that you've worked on in your organization, if you were to do it over again how would you use the insights from these readings to do things differently?

We will discuss aspects of all the readings in class. After all, there's no point in reading them if we don't implement their ideas! I will assume you have read all the materials and I will call on class members to answer questions.

Class Participation (30% of Final Grade)

I'll begin each class period by providing a general overview of the concepts for the day and a broad synthesis of the readings. Our goal in class discussion is application. You should leave class each day with some ideas about how you could apply the concepts we discuss to real projects in your organization. We will talk about each of the readings in more depth. I will ask that you apply as many of the concepts as you can to projects, events, or strategies that you've encountered throughout your career. When you share, it helps others to learn – and vice-versa.

We will also discuss the assigned case. The cases are selected to present students with a problem that can be solved in a number of ways. In some instances, the concepts from the readings may help to solve the problem, in others they won't. As a class, we will discuss different options to solving case problems and evaluate how well we think each of these options would work. When we discuss cases in class, you should employ the following strategies:

1. Make sure you are considering the problem that is presented in the case.
2. Think of four to five sub-questions that you need to answer before you can address the overall issue.
3. When discussing a specific issue, remember why you are discussing it and where it fits into the overall problem.
4. If you have considered some alternatives and rejected them, tell us what and why.
5. Summarize what you have learned and what the implications appear to be.
6. Don't fixate on "cracking the case." It is much more important to follow a logical thought process than to arrive at the solution.

Reaction Papers (30% of Final Grade)

You are required to submit five reaction papers. The five classes for which you submit reaction papers are up to you – reaction paper questions are available for every class save the first and last.

These papers should be limited to 600 words maximum. The critique should contain your response to the "reaction paper question" designated in the syllabus for that day. Since the

purpose of the critique is to invigorate your thinking in preparation for class discussion, these critiques must be submitted before **3PM** on the day before class in order for you to receive credit for your work.

Submit all work electronically to: XXXX You should include your work both in the body of the e-mail message AND as an attachment. The subject header should begin with your last name and the words "reaction paper" (Example: Lee – reaction paper.)

Reaction papers are graded by a check or a check-plus, where a check indicates an adequate response, and a check-plus indicates an above-average response. Most papers receive checks. Typically, above-average responses go beyond simply describing the concepts and examples from the day's readings, and demonstrate the author's ability to make broader connections and synthesize new ideas, without exceeding the word limit.

Process Audit (40% of Final Grade)

You are required to submit five reaction papers. The five classes for which you submit reaction papers are up to you – reaction paper questions are available for every class save the first and last.

You will work with one other class members to perform a "process audit" for one of your supervisors. Examine the factors that promote (or hinder) any of the three processes we've discussed in class: (1) innovation, (2) product development, or (3) implementation that occur in his/her area and recommend actions to your supervisor that will encourage more effective behavior. You will find your job less complex if you focus on one particular technology or service, and perhaps even one particularly successful (or disastrous) attempt at innovation, development, or implementation.

The project will be graded on five criteria.

1. How well do you integrate concepts (e.g., structural holes, disruptive innovations, networks, framing, etc.) into your analysis?
2. Are you able to make comparisons with other examples, such as the cases we've discussed in class?
3. Is your work expressed clearly, or is it difficult to follow?
4. Is your analysis insightful? Does it go beyond simply describing what happened and speculate on why it happened?
5. How relevant and useful are your recommendations?

Write-ups must be limited to 2000 words (excluding figures, tables, and appendices). One of the biggest challenges of the assignment is to determine how to present relevant material about your company's technology, organization, and markets without losing the space you need for analysis. Points will be deducted from write-ups that exceed this limit. The written portion of this assignment is due on the last day of class.

On the final day of class, each team of two will make a 12 minute (strictly enforced) presentation to the class outlining your findings and recommendations. You will have eight minutes to answer questions from the class about your work.

COURSE SCHEDULE

The course is divided into three modules: (1) Innovation, (2) Product Development, and (3) Implementation. Each week there are two required readings and most weeks there are case studies too. Questions are provided to stimulate your thinking about the case. Reaction questions are provided each week as a guide for your reaction papers.

MODULE 1: INNOVATION

Week 1: Innovation as Technology and Market Creation

Saturday April 5, 2008

Readings

1. Christensen, C. M., Anthony, S. D., Berstell, G., & Nitterhouse, D. (2007). Finding the Right Job for Your Product. *MIT Sloan Management Review, 48*(3), 38-47.

2. Shane, S. (2000). Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science, 11*(4), 448-469.

Case Study:

1. Positioning the Tablet PC

   Microsoft is preparing for the launch of the Tablet PC, which allows users to use a pen (stylus) to run Windows and Windows applications, annotate documents, and create handwritten documents for later reference or even conversion to text. The Microsoft Tablet PC team is grappling with two critical issues related to the final marketing plan. The first concerns the positioning of the Tablet PC. The second concerns the initial target market for the device.

Case Discussion Questions:

1. Something
2. Something
3. Something

Reaction Question:

1. Under what circumstances does it make sense to treat technology and market creation as a co-evolutionary process? Under what circumstances is it not?

Week 2: Promoting Creative Think

Friday April 11, 2008

Readings:

1. Hunter, S. T., Bedell, K. E., & Mumford, M. D. (2007). Climate for Creativity: A Quantitative Review. *Creativity Research Journal, 19*(1), 69-90.

2. Sutton, R. I. (2001). The Weird Rules of Creativity. *Harvard Business Review, 79*(8), 94-103.

Case Study:

1. IDEO Product Development

   IDEO is the world's leading product design firm. To innovate, the firm places an important role on prototyping and experimentation. IDEO used these tactics to design the very successful Palm V handheld computer. In this case, a studio leader is asked by a business start-up (Handspring) to develop a novel hand-held computer (Visor) in less than half the time it took to develop the Palm V, requiring several shortcuts to IDEO's legendary innovation process. The case focuses on: 1) prototyping and experimentation practices at a leading product developer; 2) the role of playfulness, discipline, and structure in innovation processes; and 3) the managerial challenges of creating and managing an unusually creative and innovative company culture.

Case Discussion Questions:

1. How would you characterize IDEO's process?
2. How does IDEO routinize creative thinking?
3. Should IDEO accept the Visor project at all?
4. Would you try to negotiate a longer lead time?

Reaction Question:

1. How do you balance creativity with productivity?

Week 3: Structural Determinants of Innovation

Saturday April 19, 2008

Readings:

1. Burt, R. S. (2004). Structural Holes and Good Ideas. *American Journal of Sociology, 110*(2), 349-399.

2. Rizova, P. (2006). Are You Networked for Successful innovation? *MIT Sloan Management Review, 47*(3), 49-55.

Case Study:

1. Technology Brokering and the Pursuit of Innovation

   This case considers the role of design in mediating between innovations and established institutional fields as entrepreneurs attempt to introduce change. Analysis of Thomas Edison's system of electric lighting offers insights into how the grounded details of an innovation's design shape its acceptance and ultimate impact. The notion of robust design is introduced to explain how Edison's design strategy enabled his organization to gain acceptance for an innovation that would ultimately displace the existing institutions of the gas industry. By examining the principles through which Edison brokered innovations across different domains, the study shows how entrepreneurs can exploit the established institutions while simultaneously retaining the flexibility to displace them.

Case Assignment:

1. Map out the network of people who you talk to in your organization. Create a list of names of people you go to for (1) advice about business processes (not your own career), (2) resources for your work, (3) good ideas. Then, pick three co-workers who are at your same hierarchical level. Either ask them to answer the same questions or you can do a hypothetical mapping based on who you think they talk to.

Reaction Question:

1. Think about your organization’s place in its particular industry. Who should you be connected to that you’re not? What ties do you have that you should eliminate

MODULE 2: PRODUCT DEVELOPMENT

Week 4: Thinking Strategically About Product Development

Friday April 25, 2008

Readings:

1. Brown, S. L., & Eisenhardt, K. M. (1995). Product Development: Past Research, Present Findings, and Future Directions. *Academy of Management Review, 20*(2), 343 -378.

2. Christensen, C. M., Overdorf, M. (2000). Meeting the Challenge of Disruptive Change. *Harvard Business Review, 78*(2), 66-76.

Case Study:

1. Flight of the Kittyhawk

   Hewlett-Packard decided that, to grow more rapidly, it needed to design a revolutionary disk drive product that would create an entirely new market or application for magnetic recording technology. The company designed the “Kittyhawk” drive. The company followed most of the "rules" good managers follow in such situations: heavyweight project team, lots of senior management support, etc. But it still failed. The case explores some of the reasons for this failure.

Case Discussion Questions:

1. What would you rate as the strengths and weaknesses of the way HP supported and structured the Kittyhawk development team?
2. What do you think of the way the team set out to find a market for Kittyhawk?
3. What are the root causes of the failure of the Kittyhawk project?

Reaction Question:

1. Which product development strategies outlined by Brown and Eisenhardt (if any) would work best for disruptive products?

Week 5: Communication Issues in Product Development

Saturday May 3, 2008

Readings:

1. Pinto, M. B., Pinto, J. K., & Prescott, J. E. (1993). Antecedents and consequences of project team cross-functional cooperation. *Management Science, 39*(10), 1281-1297.

2. Dougherty, D. (1992). Interpretive Barriers to Successful Product Innovation in Large Firms. *Organization Science, 3*(2), 179-202

Case Study:

1. Sacred Ground (video to be shown in class)

   This video tells the inside story of the first stormy year in the struggle to design the Freedom Tower, the signature skyscraper to rise on the site where the World Trade Center once stood. The central battle involves relative newcomer Daniel Libeskind -- who, in February 2003, won a competition to design the site's master plan after the original six designs for the site were overwhelmingly rejected by the public -- and David Childs, the architect handpicked by the site's developer, Larry Silverstein, to actually build the tower. By the spring of 2003, the two architects were designing two very different towers and New York Governor George Pataki ordered them to find some way of cooperating. The architects finally worked out a deal, referred to by some observers as an "arranged marriage," in which Childs would design the Freedom Tower with Libeskind's collaboration.

Case Discussion Questions (to think about during the video shown in class)**:**

1. Why couldn't Libeskind and SOM ever see eye to eye?
2. What were the different interpretive frames held by the various groups?
3. Would it have been better to dismantle the cross-functional (of sorts) team structure?

Reaction Question:

1. How can you reap the advantages of a cross-functional team while simultaneously breaking down its interpretive barriers?

Week 6: Structuring The Development Process

Friday May 9, 2008

Readings:

1. Henderson, R. M., & Clark, K. B. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. *Administrative Science Quarterly, 35*(1), 9-30.

2. Chesbrough, H. W., & Teece, D. J. (2002). Organizing for Innovation: When is Virtual Virtuous? *Harvard Business Review, 1*(7), 127-134.

Case Study:

2. Greeley Hard Copy – A (skim) B (read)

   Hewlett-Packard's Greeley Hard Copy Division is the market leader in the production of desktop flatbed scanners for personal computers. The division has been working to develop a portable scanner product for the past five years with mixed results. The new general manager, Phil Faraci, faces mounting pressures in the flatbed scanner markets, but is also presented with a new technology that has the potential to be a breakthrough for portable scanners. Faraci must decide whether or not to pursue the new portable technology, and if so, how to structure the organization to make product development successful where it has failed in the past.

Case Discussion Questions:

1. Skim the (A) case.
   i. Why it is so challenging to manage Lobo and Zorro simultaneously?
   ii. At the end of this portion of the case, several possible options of how Faraci might choose to handle Zorro are presented. What are the pros and cons of each?
2. Read the Greeley Hard Copy (B) case.
   i. What are specific organizational arrangements and features that promote effective product development and why?
   ii. If you were Faraci, what recommendation would you make to Stedman?

Reaction Question:

1. When should you think about redesigning the organization for a new type of product?

MODULE 3: IMPLEMENTATION

Week 7: Intervening in Communication About New Technologies

Saturday May 17, 2008

Readings:

1. Edmondson, A. C. (2003). Framing for Learning: Lessons in Successful Technology Implementation. *California Management Review, 45*(2), 34-54.

2. Fulk, J., Schmitz, J., & Ryu, D. (1995). Cognitive elements in the social construction of technology. *Management Communication Quarterly, 8*(3), 259-288.

Case Study:

1. Talking about Technology

   Managers at a major U.S. automaker is implementing a new software tool called safety process automator (SPA) to automate the way that crashworthiness engineers build and analyze computer simulations of crash tests. Engineers are resistant to using the technology so trainers work to actively "pitch" the technology to the user community. Two different trainers construct distinct framing strategies. This study analyzes how those framing strategies influence what engineers think of SPA and how they incorporate it into their work.

Case Discussion Questions:

1. How did each of the frames proposed by Chowpa and Eileen shape the way that engineers thought about SPA?
2. Why did these different frames have different effects?
3. Is one frame preferable to the other or was one just lucky/unlucky?
4. Would you have one united strategy or multiple strategies to frame SPA to potential users?

Reaction Question:

1. How can you, as a manager, intervene in people's interpretations of a technology? Should you? Why or why not?

Week 8: Culture, Information, and Change

Friday May 30, 2008

Readings:

1. Orlikowski, W. J., & Hofman, J. D. (1997). An Improvisational Model for Change Management: The Case of Groupware Technologies. *Sloan Management Review, 28*(2), 11-21

2. Leonardi, P. M. (2007). Activating the Informational Capabilities of Information Technology for Organizational Change. *Organization Science, 18*(5), 813-831.

Case Study:

1. Mount Auburn Hospital

   Mount Auburn Hospital is preparing to introduce a physician order entry (POE) system throughout the hospital, starting with the labor and delivery ward. POE systems replace paper-based and oral medication ordering processes with an information system; the physician uses the system to enter medication orders, which are then transferred to the hospital's pharmacy. This is Mount Auburn's first experience with POE systems, and the implementation team must determine how best to introduce the technology to the physicians and other personnel who will use it.

Case Discussion Questions:

1. Something
2. Something
3. Something

Reaction Question:

1. How tightly should you manage the way people use a technology after it is implemented?

Week 9: Taking Advantage of Unintended Outcomes

Saturday June 7, 2008

Readings:

1. Tyre, M. J., & Orlikowski, W. J. (1993). Exploiting opportunities for technological improvement in organizations. *Sloan Management Review, 35*(1), 13-26.

2. Harrison, M. I., Koppel, R., & Bar-Lev, S. (2007). Unintended Consequences of Information Technologies in Health Care - An Interactive Sociotechnical Analysis. *Journal of the American Medical Informatics Association, 14*(5), 542-549.

Case Study:

1. 7 Unintended Uses of the IPod

   When Apple launched the IPod, music industry specialists and investors talked about the potential the new technology had for reconfiguring people's personal relationship with their music. Further, Apple executives seem to have little idea that the IPod would be used for many other tasks than simply for music downloading/listening. These seven articles highlight ways in which people are using their IPods that have little to nothing to do with music and how this malleable technology can be reconfigured in the context of use to support numerous user objectives.

Case Discussion Questions:

1. What encourages people to use the IPod in ways other than designers intended?
2. Under what conditions would you expect people to stop experimenting with the IPod's capabilities?
3. Should Apple encourage alternative uses of the IPod? Should they try to create separate new technologies that try to meet people's needs? Should they redesign the IPod to do new things? Should they just design a generic technology?

Reaction Question:

1. How tightly should you manage the way people use a technology after it is implemented?

Week 10: Last Day of Class

Friday June 13, 2008

No Readings – Come prepared with PowerPoint slides on Flash Drive for Presentations