

BA 505: TECHNOLOGY STRATEGY (Spring 2006)
T/Th 11:00-12:20, Wohlers Hall 243
College of Business, University of Illinois at Urbana-Champaign

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INTRODUCTION AND COURSE OBJECTIVES

Consideration of technological innovation poses new challenges for the manager and gives the manager new tools with which to achieve competitive success. If we define strategy as “The art and science of combining a firm’s structure, resources and capabilities, and strategic positioning to gain a sustainable competitive advantage given the environment in which the firm operates”, it becomes clear that technology affects almost every aspect of a firm’s successful strategy:

- It changes the nature of ADVANTAGE
- It changes the nature of COMPETITION
- It changes the SUSTAINABILITY of advantage
- It changes the firm’s ENVIRONMENT
- It changes the RESOURCES the firm has at its disposal
- It changes the definition of the firm’s POSITION
- It changes the STRUCTURE of the firm

Managers need not—and *should* not—accept these changes passively. Technological innovation also provides firms the means to reshape themselves and their competitive landscape to their advantage.

THE RELATIONSHIP OF TECHNOLOGY STRATEGY TO OTHER MBA COURSES

This course follows a 503 course that included a theme on Technology Management and a theme on Strategy. Your experience in those themes will provide us with a launching pad to pursue topics from each theme more deeply and to combine ideas from the two themes to generate insights not available from either independently. We will also cover numerous new topics. The class is distinct from classes regarding specific technologies, e.g., information technology.

TECHNIQUES FOR LEARNING TECHNOLOGY STRATEGY

To accomplish our objectives, we will use a variety of learning techniques: lectures, outside of class assignments, readings, written reports, presentations, and most importantly, class discussion.

Readings, lecture, and discussions

I will lecture some in class. However, we will all learn more if class is much more of a discussion. In order for us to have a discussion, it is important that you have completed and thought about the assigned reading. The *Class Schedule and Assignments* section includes some key questions to help focus your reading.

Analysis of real world events

Strategic thinking and analysis are best learned through practice. In addition to two formal cases, we will also read articles from the recent business press. The articles will

cover a variety of technologies, however, this is *not* a course on technology *per se* and you are *not* expected to have any existing knowledge in the technology.

How much you get out of the analyses depends on your preparation and active participation. Each of us must be fully prepared for each class, and there will be assignments throughout the term to help focus our preparation. *Everyone* is expected to participate effectively in each class to comment, question, and analyze.

Exams

There will be two exams during the semester. The exams will test both your mastery of the concepts in isolation and your ability to apply them.

EXPECTATIONS AND POLICIES

Preparation

I will assume that you have read everything assigned. It is especially valuable if you come with questions about the readings. Poor preparation is a disservice to your fellow learners and will negatively impact your participation grade

Class participation

Most of the learning in our class will occur through discussion. Therefore, we need everyone's active participation. Meaningful participation obviously requires having carefully read and thought about the day's material, but that is *not* enough. You also need to speak up. Brilliant insights are, of course, always appreciated, but you can also contribute by asking questions, politely disagreeing with me or another student, or following up on a fellow student's comments with further insights or evidence. There are usually many valid ways of looking at any issue we study, so don't worry about being "wrong".

Homework

One purpose of homework assignments is to enhance class discussion. Therefore, assignments must be turned in via First Class *before class begins* on the day they are due.

You should bring a copy to class for your own reference during discussion. I will *not* accept assignments in class, in my mailbox, under my door, or via e-mail. There is no credit provided for late assignments.

Teamwork

The two case analyses will be done as team projects. I will assign teams early in the course. Everyone is expected to participate fully in their team's efforts. A confidential peer evaluation will take place at the end of the semester.

Attendance and punctuality

We need to accomplish maximum learning in each session, since we only meet for seven weeks. You cannot contribute to our learning if you are not in class. At the same time, I understand that you have other responsibilities, e.g., job-hunting. To balance these pressures, you have *one* excused absence. You can use it as you wish: job interviews, family weddings, mental health days, Cubs' game, whatever. You are still responsible

for turning in your homework via First Class *before* the class session you will miss. *Please note that I will not make arrangements for homework after the fact.* For each absence beyond this one, 10 points will be deducted from your individual participation grade. You may not use your excused absence on the day of an exam.

In the event of illness, please bring a note from either the Emergency Dean or the Health Center to the next class session.

Please be on time for class. If lateness becomes an issue, I reserve the right to treat a class for which you are late as a missed class, leading to the deductions noted above.

Course Organization

Your class assignments are shown in the *Class Schedule and Assignments* section below. While subject to change, this syllabus should guide your work planning for the course. You are responsible for completing assignments as described in the syllabus, even if I do not mention them in advance.

Technology

All mobile phones and pagers should be turned off during class. Please do not leave and re-enter the class. Use of laptops in the class is a privilege and not a right. Laptops are to be used for class activities only. If you are seen surfing or e-mailing during a class, you will lose laptop privileges.

Suggestions

If you have special inquiries or constructive suggestions concerning the progress of the class, please feel free to talk to me. You can make an appointment by telephone, e-mail, or simply leave a message in my mailbox in Wohlers 339.

INSTRUCTOR BIOGRAPHY

I'm particularly excited to be teaching this class because the mix of theory and practice matches my background. From 1994 to 1996, I directed research on Japanese business practices and government policy at the Washington, D.C., offices of the law firm Dewey Ballantine. In this capacity, I founded and managed a team of researchers supporting high technology clients including Eastman Kodak, the Semiconductor Industry Association, and firms in the steel, chemical and electronics industries. Our work was profiled by the *Washington Post* ("‘Dream team’ helps Kodak make its case," June 26, 1995) and by *Wall Street Journal* writer John Fialka in his 1997 book, *War by Other Means*.

In previous positions, I helped U.S. aerospace researchers gain access to leading-edge technology from throughout the world as an international policy analyst for the National Aeronautic and Space Administration's Scientific and Technical Information program. In this position, I supported negotiations with government agencies and aerospace companies in Japan, Australia and India and interacted with U.S. industry and various U.S. government agencies. As Japanese information specialist for SCAN C2C, Inc., I performed research on Japanese technology and commerce for clients including General Electric, IBM, Ford Motor Company, and the U.S. Government. Other consulting and executive education clients have included General Motors, the Japan Technology Evaluation Center, Air Products & Chemicals and Hewlett-Packard.

Prior to joining the faculty at Illinois in 2001, I earned a Ph.D. in international business and a Masters of applied economics degree at the University of Michigan. I previously earned an M.S. in library and information science from the University of Illinois and a B.A. in Japanese studies and mathematics from Earlham College. I also studied advanced Japanese at Middlebury College's Summer Language School.

My research interests include buyer-supplier relationships, the management of innovation in industries including flat panel displays and personal computers, and competitive intelligence.

I'm lucky to have a wonderful wife and two great kids, ages six and nine. In my spare time, I enjoy weight-lifting, eating good food, and biking.

COURSE TEXTS AND CASES

Textbook: There is no required text for the class. Although we won't use it directly in this class, I think the text from the technology theme of BA 503, Melissa Schilling's *Strategic Management of Technological Innovation* is one of the best books on the topic.

Readings: *BA 505 (Technology Strategy) Readings*, available at TIS.

COURSE REQUIREMENTS AND GRADING

(1) Mid-term exam	200 points
(2) Final exam	200 points
(3) Class participation	150 points
(4) One-page write-ups (Best 4 of 5, 50 points each)	200 points
(5) Cases (2 case assignments, 100 points each)	200 points
(6) Peer evaluation by team members	50 points
Total	1000 points

The final grading schedule is based on your points out of 1000, as described below.

FINAL GRADING SCALE

<u>Course Points</u>	<u>Grade</u>	<u>Honor Points</u>
980 - 1000	A+	4.00
930 - 979	A	4.00
900 - 929	A-	3.67
870 - 899	B+	3.33
830 - 869	B	3.00
800 - 829	B-	2.67
770 - 799	C+	2.33
730 - 769	C	2.00
700 - 729	C-	1.67
650 - 699	D	1.00
Below 650	F	0.00

EXPLANATION OF ASSIGNMENTS

Exams (400 points total)

Midterm	(200 pts)
Final	(200 pts)

Both the mid-term and final exam will be closed-book and closed-notes.

Class participation (200 points)

Active participation in the class is an essential part of the learning experience. Meaningful participation means making a contribution to our discussion, not merely talking, and it does not mean merely repeating facts or simply agreeing with what others have already said. Case discussion demands that we listen carefully to the statements of others, ask them to explain or defend controversial points, and expect to defend our judgments as well.

One-page write-ups (200 points total)

The *Class Sessions and Assignments* section lists five one-page write-ups (sessions 3, 4, 6, 9 and 12). Each asks you to respond to a question based on the assigned readings for that day in one page or less (12 point or larger, single-spaced). It is important that you respond *in your own words*, rather than copying from the readings—the goal is for you to synthesize and apply the material, not just repeat it. The assignments will be graded for accuracy, completeness, and insight.

You will be graded based on the best four of the five assignments. You could either do all five and be able to discard your poorest performance, or choose one to skip and have each grade count. It is entirely up to you. It is *not* possible to complete a write-up retroactively, that is, you can't "go back" and complete an assignment you chose not to complete.

Case analysis (250 point total)

Peer evaluation (50 points)

Team members will confidentially rate the contribution of their teammates.

HP: Flight of the Kitty Hawk (100 points)

Following the failure of the Kittyhawk project, you have been hired by Dick Hackborn to provide a "post-mortem" analysis of the failed project. He has asked you to address three questions.

1. What did we do right and what did we do wrong in how we structured and supported the Kittyhawk Development team?

2. What do you think of the way the team set out to find a market for the Kittyhawk? What did they do right and what did they do wrong?
3. In hindsight, what should we have done differently and why?

I'm leaving the length and format of the memo up to you. However, I'm going to take the part of Dick Hackborn and will, just as he would, stop reading when I get bored or frustrated. I strongly recommend you pay close attention to the guidance supplied by the Tyson article from Session 1 and remember that you are writing for a senior executive. The Kittyhawk failure is important to Hackborn (me), but there are a lot of other issues demanding my attention. Perfect English is not the issue. Organization is.

Obviously, you should draw upon our discussions to date to develop and support your answers.

Domino Printing Services (100 points)

Rick Mitchell has hired your consulting firm to advise him regarding Domino's potential development of laser technology. He specifically wants you to address whether Domino should acquire SLS and/or DEI.

Again, I'm leaving the length and format of the memo up to you, and will read it like an over-worked, over-stressed executive would. Note that this memo addresses a much more momentous and complex question than did the Kittyhawk memo and, therefore, reasonably merits a longer report.

Important: This is a sizable piece of analysis. You do NOT want to wait until April 27 to start it. After session 10 (April 20), we will have covered most of the relevant material for you to begin your analysis.

SCHEDULE

Week	Tuesday	Thursday
1	1. 3/14/2006 Introduction	2. 3/16/2006 Technical competitive intelligence
	Spring Break. Have fun!	Spring Break. Have fun!
2	3. 3/28/2006 Types of innovation	4. 3/30/2006 Modularity & modularization
3	5. 4/4/2006 Modularity & modularization II	6. 4/6/2006 Disruptive technology
4*	7. 4/11/2006 Case I	8. 4/13/2006 Midterm exam
5	9. 4/18/2006 Sources of innovation	10. 4/20/2006 Alliances and acquisitions as tools for technology competition
6	11. 4/25/2006 Markets for technology Guest speaker: Lesley Millar, UIUC Office of Technology Management	12. 4/27/2006 Technology in the international context
7	13. 5/2/2006 Case II	

* Wednesday, 4/12/2006, Michael Dell Interactive video conference, 12-1, location TBD
Not required, but highly recommended.

CLASS SESSIONS AND ASSIGNMENTS

Session 1 Tuesday 3/14/2006	Introduction
Read	None
Submit	Nothing
Key points	

Session 2 Thursday 3/16/2006	Technical competitive intelligence
Read	<p>Ashton, Johnson and Stacy (1994) "Monitoring science and technology for competitive advantage" <i>Competitive Intelligence Review</i> 5(1): 5-16.</p> <p>Brenner (1996) "Technology intelligence and technology scouting" <i>Competitive Intelligence Review</i> 7(3): 20-27 <i>Not in course pack. I'll distribute in class in session 1.</i></p> <p>Mogee, M. (1991) "Using patent data for technology analysis and planning. <i>Research Technology Management</i>. July/August 43-49.</p> <p>Tyson (1993) "The packaging and dissemination of intelligence". Ch 6 of Bernhardt <i>Perfectly Legal Competitor Intelligence</i>. <i>Don't spend too much time on the content of this article right now. I'm giving it to you as a guide to writing effective memos as much as anything. It will be valuable for your two case memos later in the semester.</i></p>
Submit	Nothing
Key points	<ul style="list-style-type: none"> • What is technical competitive intelligence? • How can companies ethically monitor their competition? • How can competitive technical intelligence support sustainable competitive advantage.

Session 3 Tuesday 3/28/2006	Types of innovation
Read	<p>Abernathy, W. and Kim Clark (1985) "Innovation: Mapping the winds of creative destruction." <i>Research Policy</i> 14(1): 3-22. <i>Read pages 1-13.</i></p> <p>Henderson, R. M. and Clark, K. B. (1990) "Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms." <i>Administrative Science Quarterly</i>. 1990; 35:9-30. <i>Read pages 1 to 19.</i></p> <p>Teece, David J. (1998) "Capturing value from knowledge assets: The new economy, markets for know-how, and intangible assets." <i>California Management Review</i>. 40(3):55-79. <i>Read pages 62-75.</i></p>
Submit	One-page write-up 1: Using the language of Henderson and Clark, a radical innovation can overturn an existing company's knowledge about both components that make up a product and how they fit together—often creating a new dominant design. Since an architectural innovation actually reinforces existing knowledge about the components, it would seem to be less of a challenge to an existing company. Yet Henderson and Clark argue that architectural innovations can be the hardest type for firms to adapt to. <u>In your own words, why might this be the case?</u>
Key points	<ul style="list-style-type: none"> • Along what dimensions have innovations been categorized? • Along each dimension, think about the impact on the creation/destruction of sustainable competitive advantage for both established and new firms.

Session 4 Thursday 3/30/2006	Modularity & modularization
Read	<p>Baldwin, C. & K. Clark (2003) "Managing in an Age of Modularity" in Garud, Kumaraswamy and Langlois, eds. <i>Managing in the Modular Age</i>, 149-161.</p> <p>Langlois, R. and P. Robertson (2003) "Networks and innovation in a modular system", in Garud, Kumaraswamy and Langlois, eds. <i>Managing in the Modular Age</i>, 78-100</p>
Submit	One-page write-up 2: In your own words, give at least two reasons a firm would find it beneficial to invest in making their product more modular.
Key points	<ul style="list-style-type: none"> • What is modularity? • What are the advantages of modularity?

Session 5 Tuesday 4/4/2006	Modularity & modularization II
Read	<p>Chesbrough, H. and K. Kusunoki, (2001). "The Modularity Trap: Innovation, Technology Phases Shifts and the Resulting Limits of Virtual Organizations", in: I. Nonaka and D. Teece (eds.), <i>Managing Industrial Knowledge</i>, London: Sage Press, 202- 30</p> <p>Shapiro, C. and Hal Varian (2003) "The art of standards wars", in Garud, Kumaraswamy and Langlois, eds. <i>Managing in the Modular Age</i>, 247-270.</p>
Submit	Nothing
Key points	<ul style="list-style-type: none"> • What are some of the disadvantages of modularity? • How does modularity affect who in the value chain makes money?

Session 6 Thursday 4/6/2006	Disruptive technology
Read	Bower and Christensen, 1995. "Disruptive Technologies: Catching the Waves." Harvard Business Review (HBSP item 95103) Gilbert, C. (2003) "The Disruption Opportunity" Sloan Management Review (HBSP 9-SMR-101) Layne, N. (2006, Mar 3) "Music phones to slice into iPod growth" Yahoo News. Wald, M. (2006 Feb 28) "Tiny jets may usher in new era, F.A.A. says" New York Times.
Submit	One-page write-up 3: The Wald article describes the looming introduction of "tiny jets". Although the article isn't totally clear, these jets are both smaller and slower than current business jets. From the view point of current business jets, are these tiny jets a disruptive technology? Discuss why or why not.
Key points	<ul style="list-style-type: none"> • What is a disruptive technology? • How do disruptive technologies affect incumbants? • What opportunities do disruptive technologies provide new entrants? • The Bower and Christensen article shows that time and time again, hard-drive firms fell prey to disruptive technologies. Why didn't firms learn from what had happened before?

Session 7 Tuesday 4/11/2006	Case I
Read	Hewlett-Packard: The flight of the Kittyhawk HBS Case 9-697-060
Submit	Case memo I (see Explanation of Assignments)
Key points	

*Wednesday, 4/12/2006, Michael Dell Interactive video conference, 12-1, location TBD
Not required, but highly recommended.*

Session 8 Thursday 4/13/2006	Midterm exam
Read	None
Submit	None
Key points	

Session 9 Tuesday 4/18/2006	Sources of innovation
Read	Chesbrough, H. (2003). Open Innovation. Cambridge: Harvard Business School Press. Introduction and Chapter 9.
Submit	One-page write-up 4: In your own words, explain why "open innovation" has become so much more important than it used to be.
Key points	<ul style="list-style-type: none"> • Why has open innovation become more important than it used to be? • If open innovation means taking in knowledge from outside the firm, how can open innovation lead to sustainable competitive advantage?

Session 10 Thursday 4/20/2006	Alliances and acquisitions as tools for technology competition
Read	Chesbrough, Henry W. and Teece, David J. (1996) "When is virtual virtuous? Organizing for innovation." Harvard Business Review. 74(1):65-71+.
Submit	
Key points	<ul style="list-style-type: none"> • What dictates the best way to govern an alliance?

Session 11 Tuesday 4/25/2006	Markets for technology Guest speaker: Lesley Millar, UIUC Office of Technology Management
Read	Grindley, P. and David Teece (1997) "Managing intellectual capital: licensing and cross-licensing in semiconductors and electronics." in David Teece, ed. Managing Intellectual Capital, 193-224.
Submit	
Key points	<ul style="list-style-type: none"> • While licensing out technology can generate revenues, what strategic issues does it raise for the firm?

Session 12 Thursday 4/27/2006	Technology in the international context
Read	<p>Bush (2006) "Boeing's plan to land Aeroflot" Business Week.</p> <p>Dietz, M., Lin, S. and L. Yang (2005) "Protecting intellectual property in China" McKinsey Quarterly, no. 3 (web)</p> <p>Hennock, M. (2006) "Lenovo: The making of a legend". BBC News website</p> <p>Lohr, S. (2006, Feb 16) "Outsourcing is climbing the skill ladder" New York Times (web)</p> <p>von Morgenstern, I. (2006) "How foreign companies can compete in China's high tech markets" McKinsey Quarterly (Web exclusive, January)</p>
Submit	One-page write-up 5: Taking into account all of the readings for today, what pluses and minuses do you see to Boeing's relationship to VSMPO?
Key points	<ul style="list-style-type: none"> • What risks and opportunities face high-technology companies due to globalization? • If you have extensive non-U.S. experience, how has globalization affected firms and consumers in your country?

Session 13 Tuesday 5/2/2006	Case II
Read	Domino Printing Services: Technology development or acquisition. Cranfield School of Management ECCH # 602-031-1
Submit	Case memo II (see Explanation of Assignments)
Key points	

Final Exam time and location TBD

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