

MGSC 898: Management of Technology / Innovation

(Spring 2006)

SYLLABUS

Instructor:

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Class Meetings: Mondays 6 p.m. to 8 p.m. (room 203) and Saturdays (Jan 21, Feb 4, Feb 25, Mar 25) 8:30 a.m. to Noon (room TBD)

Office Hours: Monday and Wednesday – 1p.m. to 2:15 p.m. and 3:45 p.m. to 4:30 p.m.

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Course Websites:

Information Website: <http://dmsweb.badm.sc.edu/gold/mgsc898/>

Main Website (private and password protected): <http://mgtscimsgn.moore.sc.edu/sites/mgsc898/>

NOTE – THE COURSE WEB SITES WILL NOT BE ACTIVE UNTIL APPROXIMATELY JANUARY 7th. YOU WILL NEED TO EMAIL BOTH ME AND DIMITAR A USERNAME AND PASSWORD COMBINATION FOR YOU TO USE WITH SHAREPOINT.


Textbook: Burgelman, Robert, Christensen, Clayton, and Wheelwright, Steven. *Strategic Management of Technology and Innovation*, Irwin McGraw-Hill, 2004. (Required) Hardcover (available at the Russell House Bookstore). Noted as BCW.

Excerpts from Brandenberger, Adam, and Nalebuff, Barry *Co-opetition*. Currency Doubleday. 1996. (Required). Will be provided in class. Noted as BN.

[Business Week Special Edition on Innovation](#). Noted as BW.

Select additional readings as discussed in class.

Course Overview, Objectives, and Structure

 **Overview:** Management of Technology / Innovation takes a general manager's perspective to examine the challenges of managing innovation and the impacts of innovation upon organizations. Although some companies have developed impressive functional expertise in innovation, integrating their contributions into a coherent whole still remains a significant challenge. But many of today's most vexing problems in innovation don't occur *within* these functions. They arise across the boundaries of functional organizations, in many ways. For example, finding ideas for new products, and the challenge of uncovering new markets, isn't just a marketing problem. An organization's structure, the systems through which managers' performance is measured and rewarded, and the formal and informal mechanisms used to allocate resources across competing projects, powerfully influences the types of ideas that get surfaced, pushed forward, and adopted.


Similarly, effective product development is not simply a challenge for engineering management. Many projects lack an adequate strategy for selecting and evaluating potential projects. Additionally, firms' failure to stay abreast of important technologies has little to do with the intrinsic difficulty or newness of the technologies *per se*. The failure frequently can be traced to biases in decision tools such as return-on-investment calculations employed in the resource allocation process.

Only from the viewpoint of the general manager can the complex challenges of integrating the work of people in multiple functions be understood and the apparent performance problems in new product development be traced to their underlying causes. And only the general manager can mold the resources, processes and values that affect innovation into a coherent capability to develop and launch superior new products and services repeatedly (Christensen, 1999).

Thus, this course focuses on the strategic management of technology and innovation in established firms. The conceptual framework of the course is an evolutionary process perspective on technology strategy and innovation. The fundamental ideas underlying this evolutionary perspective are (1) that a firm's technology strategy emerges from its technological competencies and capabilities; (2) that technology strategy is shaped by external (environmental) and internal (organizational forces); and (3) that the enactment of technology strategy, through the experience that it generates, serves to further develop the firm's technological competencies and capabilities. This course draws on multiple theories from a variety to different domains to develop analytical tools that address important challenges faced by managers in technology-based firms.

 **Objectives:**

- To develop an awareness of the range, scope, and complexity of the issues and problems related to the strategic management of technology and innovation.
- To develop an understanding of “state of the art” issues related to the management of technology and innovation.
- To develop a conceptual framework for assessing and auditing the innovative capabilities of a business organization.
- To develop insight concerning the skills necessary to be effective as a general manager in the innovation process.
- To offer some practice in defining and working out problems related to technological innovation and corporate entrepreneurship.

 **Structure:** The course structure follows the structure of the textbook, and consists of five parts:

Part I: Introduction: Integrating Technology and Strategy

In this part of the course, we will focus on how senior managers integrate knowledge about key issues relating to the firm’s technology with business and corporate strategy. We will also examine what general managers need to know about technology strategy to successfully run a high-technology firm.

Part II: Design and Evolution of Technology Strategy

This part of the course discusses the factors that impact a company’s technology strategy. It comprises five sections. First we will focus on distinctive technological competencies and capabilities and how they drive technology strategy. Then we will discuss the contextual forces that affect the evolution of a company’s technology strategy. These include technology trajectories, industry context, internal organizational context, and the firm’s strategic actions.

Part III: Enactment of Technology Strategy – Developing a Firm’s Innovative Capabilities

This part of the course deals with technology sourcing and corporate innovation. Here we will examine the role of R&D in a company’s strategic evolution, how to link corporate R&D to corporate strategy, and how to make sure that the output of the R&D function is successfully transferred to other parts of the firm. We will also examine the role of corporate entrepreneurs and discuss how to manage project champions / venture managers, and what some of the organizational design and associated incentive issues are related to corporate entrepreneurship.

Part IV: Enactment of Technology Strategy – Creating and Implementing a Development Strategy

This part briefly examines key issues associated with new product development. Time constraints will prevent us from taking full advantage of the resources in the text, but I encourage you to read some of these materials on your own.

Part V: Conclusion: Innovation Challenges in Established Firms


The final section recapitulates the key innovation challenges faced by established firms. In particular we will focus on the conflicts inherent in having to manage these various challenges simultaneously.

Course Evaluation

There is no pre-calculated grade distribution for this course. You will be given periodic feedback on how you are doing with letter grades for each assignment. The overall breakdown is as follows:

Weekly Effort and HW1	20%
Individual Case Summaries	20% (10% each)
Team Projects	40% (2 at 20% each)
Case-based Final Exam	20%

Assignments

 **Weekly Effort:** In the management world, your efforts will make the difference between a successful career and the less desirable alternative (lack of employment). Throughout the semester your ability to analyze complex problems (cases) and comprehend various concepts will be evaluated. You can earn participation either in class (there will be a means for the remote participants to e-mail or phone in comments during class) and/or by utilizing the discussion threads set up on the SharePoint site for the class. NOTE: If you choose to use SharePoint, you must make your posts BEFORE the scheduled discussion.

In **grading class participation**, I look at both quantity and quality of your contribution. It is possible to have a negative value for class participation. With regard to quality, some of the criteria are:


1. are the points made relevant to the discussion?
2. do they go beyond a mere recitation of case facts, and are implications clearly drawn?
3. is there evidence of analysis rather than expression of opinions?
4. are comments linked to those of others in the class?
5. did the contribution further the class's understanding of the issues?

6. is the participant a good listener?

After each class, I will make a note to myself regarding your input. In the past, students have felt shy about participating in the discussion. While in a business situation silence is apt to get you ignored for promotions, in this class it will get you called upon. *If necessary, I reserve the right to call upon students at random at any time.* Be prepared.

This weekly effort will make up 20% of your final grade and will include discussion on the cases and the conceptual chapters.

Again, remember that weekly participation can also be earned through contributions to the discussion threads on the class sharepoint site BEFORE the scheduled class period.

 **Individual Case Summaries:** Each person is required to complete two formal case write-up. This write-ups will cover issues from a particular case, and will be 5 pages or less (1 inch margins, no font less than Times New Roman 12 point — which is this font, on 8.5 by 11 inch paper, double spaced, 0.5 inch paragraph indents, headings and subheadings). This page restriction will not include the title page (no names should appear on the title page), executive summary, or figures/tables/graphs. Each case summary can be completed without extensive library or Internet research, using the information from the case.

Your write-up should include appropriate tables and/or graphs to illustrate your arguments. Sloppy presentation (poor grammar, misspelling, syntax, dog bites) will be penalized, but the logic of your analysis will be the main determinant of your grade. Please do not use fancy, store-bought covers; however, you should use a title page. Your paper should use page numbering, starting with the page after the executive summary (the introduction should be on page 1). For each page over the limit that you turn in, your paper will be docked 5%. *Papers missing the executive summary will be docked 10% of your otherwise earned point total.*

What I am looking for is an application of the course material to the specific issues in the case(s). Laundry lists are not valued – logic backed by evidence is necessary. Do not waste space with restating the facts of the case. Tables and/or graphs are great ways to communicate your insights rapidly and conveniently (do not include graphs provided in the case, however). You should use proper formatting of a formal document (headings and subheadings, topic sentences, executive summary, introduction, page numbering, and conclusion). But remember, you are not just repeating a story in this case analysis; you should be making an argument to a specific question or set of questions.

A low-level analysis would involve things like listing the buyers for a Porter's 5 forces analysis. A better analysis would discuss the power of the buyers. A stronger analysis would discuss the power of the buyers and support it with both quantitative and qualitative information. An ideal analysis would then make a recommendation for the company based upon this information. I will be looking for rigor of analysis (depth and support), breadth of coverage (number of issues), and style (uniqueness of analysis, creativity).

As an example, consider the following two sentences: 1) I believe the firm can increase its market share easily because the industry is growing; and 2) Maytag has built a strong brand name reputation, as evidenced by its 76% repeat buying rate, which allows it to charge a premium for its washers and dryers. Which one of these two writers would you hire to assist your company in its strategic analysis?

I will not give you a specific point breakdown for these cases. There is always a tradeoff between breadth and depth in these cases. You should cover the main questions of the case well, but a top rated paper will also cover the issues from the course module and the added information from class discussions prior to the case. The discussion questions for the day may or may not be included in your final write-up. There is a focus for each case given, but you are free to modify your analysis to best demonstrate your understanding of this class’s frameworks. Coverage of outside materials will improve your analysis, but you need to cover this class’s basic frameworks before adding advance analysis. Additionally, an analysis of the case must be done before you move on to recommendations ... analyze first, and then tie your recommendations directly to the analysis. If the industry’s buyers’ power is analyzed to be unfavorable for the firm(s) in the industry, then you should recommend how the firm(s) might lower the buyers’ power. The analysis should be based upon the frameworks discussed in this class. You have the opportunity to be creative and insightful in your analysis. Use this opportunity.

Please note: I expect to see significant effort in the development of an action plan. This involves consideration of alternatives, decision criteria to select amongst alternatives, and a detailed “cookbook” implementation plan down to a time line or schedule for the various steps that will be needed. Any estimates of the approximate costs and benefits associated with these steps should also be provided — and the uncertainty associated with your estimates.

Please do not put your name on the front of the papers, but on a separate page at the end of the document. This last page of your document should be the only occurrence of your name. Please white out any names on spreadsheet printouts and such.

Team Case Analysis Schedule – To Be FINALIED Later			
Group:	Cases:	Due Date:	Assignment:
Schumpeter			
Arthur			
Argyris			
Teece			

Harrigan			

Team Projects: You are required to form a team during the first week of class. If you are not local, do not worry. We will be relying heavily on the capabilities of SharePoint for collaboration and I can guarantee that you will not suffer if you are not physically located in Columbia. There is a separate discussion thread on the SharePoint site devoted to group formation. There are TWO Group Projects for this class.

Project 1:

Either on your IMBA field/internship projects or on the job, you may be asked by an executive to prepare a business assessment of a new technology that he/she has heard about or read about. You are to prepare such a high-level technical assessment report on the technology. The focus should be on "how can this technology affect a business," and "what technologies will this replace / obsolete" rather than, "how does this technology work." However, you need to demonstrate a good understanding of the technology and convey this in your web report.

You will need to get the professor's permission for the technology of your choice. A list of potential technologies is located in the discussion forum for Homework 1. I would prefer that only one team investigate an individual technology. Therefore, I suggest that you immediately select a technology that you would like to investigate and let me know as soon as possible.

The report should be concise and well organized. Your paper should include these subheadings:

1. **Description of the information technology** (A high level business and technical description that is oriented toward a senior manager that is technically literate, but not a "techie") (Value = 7.5%)
2. **Analysis of nature of technology** (How will it affect business? How will it transform our lives? What technology(ies) will it replace? What are the major challenges associated with this technology (for both designers and users?) How should the development of this technology be managed? Also include key political, social, business, and technical issues ... use the various tools provided in this course for this analysis) (Value = 40%)
3. **Industry Evaluation** (Who are the major players in for this technology and what do they bring to the table? What are the major opportunities and threats present?) (Value = 10%)
4. **Current status of the technology** (e.g., under R&D, newly released, mature -- estimate of reliability, estimate of availability, prediction of future development) (Value = 7.5%)
5. **Strategic context where this technology might best be applied** (Business strategy or organizational transformation this technology may help to support for the firm, if none, then explain why not) (Value = 10%)
6. **Action Plan For the Technology** (per course text ... should also address key issues brought out in number 2 above) (Value = 20%)
7. **References** Include the sources of your data as well as several useful references (list Hyperlinks) (Value = 5%)

This is a web page report and is different from a traditional text report. You have more creative liberty in the design and layout of this report than you do with a plain paper text page. Web pages allow you to add graphics, photos, video and audio files besides just text. You can add colored fonts, colored backgrounds, hyperlinks to supporting websites, to increase not only the readability of your work but increase the transfer of information and access to information that your readers may desire. Note that these types of enhancements are expected. You have the freedom to enhance the richness of your site with "relevant" images and hyperlinks, however, you must prepare the report so that it specifically responds to each of the sections above (Use all seven points as headings). For section two, you must use appropriate tables / graphics as outlined in the course.

You will probably have to rely heavily on comparisons of vendor information you gather from the net. Also, check out our '[Useful Links Page](#)' for IS news and reference resources, vendor links and consultants, etc. or our '[Links for Students](#)' page for more helpful resources on financial aid, job hunting, etc. You also have traditional library and CD-ROM resources to fall back on!

You can use your group workspaces on sharepoint to post your web sites.

You are to send Dimitar Kunev (dimitar_kunev@moore.sc.edu) an e-mail message containing the URL of your project by 5 p.m. on **February 13**.

Project 2: Field Project

This project is similar to the first, except that you will be using a real company. Pick a company that you or a member of your group currently work for, or have worked for in the past (i.e. individuals / groups are responsible for identifying the firm). You will then proceed to conduct an *innovative capabilities audit* of that firm. There are four tasks associated with this project:

1. **Develop your own conceptual framework** to do an audit of the innovative capabilities of a firm. By innovative capabilities, I refer to the set of characteristics of an organization which will facilitate the emergence and management of technological innovation projects, and the integration of such projects into the overall strategy of the firm. It will be important to look at the capability to generate and manage incremental as well as more radical innovations. The last part of the chapter "Technology and Strategy: A General Management Perspective" (BCW, pp. 8 – 12) provides an elementary outline of a conceptual framework, but part of this assignment is for you to determine what the key dimensions of a firm's innovative capabilities are.
2. **Using your own audit framework to write a report** (maximum fifteen to twenty double-spaced pages) on the innovative capabilities of the firm or a major part of that firm. Public data, preferably combined with data obtained from personal interviews, and the study of internal documents should form the basis for the descriptive part of the project. The report should focus on:
 - o analyzing the capabilities of the organization

- formulating recommendations to maintain, develop, and/or improve the firms' innovative capabilities
 - consideration of the implementation aspects of those recommendations
3. **A two-page executive summary** is required in which the key lessons (maximum 4) from the field project are succinctly discussed. These should be cast in generalized terms. All members of the class will get a copy of all the executive summaries.
 4. **A presentation to the class on your findings.**

A good project will be strong in the development of a conceptual framework and the descriptive quality of the case used to document its application, and show sound analysis and recommendations. A very good project will add depth of analysis and have specific, workable recommendations. An excellent project will provide unexpected insights that have implications for the management of innovation in general.

You are to bring a copy of your report to the class on the day of the group presentations (**Saturday, March 25**).

General Group Guidelines

Keep in mind that a number of related factors will determine the effectiveness of your project-related group work. First, there must be excellent collaboration between the group members. This will require assigning specific responsibilities for each group member and choosing a group leader. Second, there must be good access to the organization for the second project. Third, regular meetings between group members should be scheduled. You need to allocate time for various iterations between conceptualization, data collection, and analysis.

I strongly urge you to take advantage of the power of SharePoint for this project. You will have your own group workspace on the server (which is web based). Within those workspaces, you can assign tasks, post and edit documents (and keep previous versions), and have discussions. We will go over SharePoint during the first classroom session.

Key Deliverables will be noted in the schedule outline below. Note that P1 refers to your web-based report and P2 will refer to your capabilities audit.

Final Exam: There will be “case exam” as the final for this course. This exam will consist of a series of short answer and essay-style questions over a particular case from the text. This will be a take-home exam and will be due the last day of scheduled class (**April 3**). I will announce the related case on or around March 27.

Final Thoughts: There will be some additional reading assignments for the class in addition to the text. All readings for the week should be completed prior to the week that they are to be

discussed. Most of these will come from a recent special issue of Business Week and will be hyperlinked to the schedule below.

Behavioral Expectations:

1. Consider these classes to be business meetings. Your contribution is expected. As discussed earlier, this can take one of two forms ... through a SharePoint discussion thread or live and in person.
2. Be prepared for class and arrive on time. During our Saturday marathon classes, I will schedule periodic breaks.
3. I will do all that I can to use class time effectively and expect you to do the same. Please do not come late or leave early.
4. I do not mind if you drink during class (no alcohol please!). All I ask is that you clean up after yourselves and do not make a mess.
5. PLEASE USE A NAME CARD. I will pass around a seating chart during the second class session and will expect you to be in that seat for the remainder of our meetings.
6. For the purposes of general case preparation, you should not use others' notes or papers from other courses where these materials may have been taught. If you have personally had one of these cases previously, feel free to use your own prior notes on the material, but you are encouraged to re-think the content of the case in the context of this course since it may be different than how you saw it previously.
7. Group work is expected for the field project. However, all team members are expected to contribute equally to those projects. At the end of the semester, you will be given the opportunity to evaluate ALL members of your group and those evaluations will have an effect on the individual grades for each group member.
8. I am happy to discuss any issues with you on an individual basis. Please feel free to contact me via my cell phone or e-mail at any time (within reason).

Tentative Schedule and Calendar

Note: There will be no class on March 6, 2005 (Spring Break).

	Dates	Topics	Deliverables
1	Mon Jan 9	Part I - Integrating Technology and Strategy Introduction, Course Overview, Syllabus, SharePoint	

		<p>Introduction</p> <p>Reading Part I - Technology, Innovation, and Strategy: A General Management Perspective (BCW, 1-12).</p> <p>Business Unit Audit (on SharePoint)</p> <p>Corporate Level Audit (on SharePoint)</p> <p>Discuss HW 1 Assignment</p>	
2	<p>Sat</p> <p>Jan 21</p>	<p>Reading I-3 – The Core Competence of the Corporation (BCW, 102-112)</p> <p>Reading Part II – Designing and Implementing a Technology Strategy (BCW, 141-155)</p> <p><Break></p> <p>Reading – Excerpts from BN (handed out first day of class)</p> <p>Case I-3 – Electronic Arts in 1995 (BCW, 67-82)</p> <p>Case I-4 – Electronic Arts in 2002 (BCW, 83-101)</p>	
3	<p>Mon</p> <p>Jan 23</p>	<p>Part II – Design and Evolution of Technology Strategy</p> <p>Reading I-5 – The Art of High Technology Management (BCW, 130-140)</p> <p>Reading II-1 – Management Criteria for Effective Innovation (BCW, 172-178)</p> <p>Case II-1 – Asymmetrical Digital Subscriber Line: Prospects in 1997 (BCW, 157-171)</p>	<p>Group Membership Due</p> <p>Homework #1 due.</p>
4	<p>Mon</p>	<p>Reading II-4 – Customer Power, Strategic Investment, and</p>	<p>P1 Outline Due</p>

	Jan 30	<p>the Failure of Established Firms (BCW, 245-264)</p> <p><OPTIONAL> Reading II-5 – Disruption, Integration, and the Dissipation of Differentiability (BCW, 278-302) - Review Powerpoint before class</p> <p>Case II-5 – Small Camera Technologies (BCW, 265-278)</p>	
5	Sat Feb 4	<p>Reading II-6 – Crossing the Chasm – and Beyond (BCW, 362-368)</p> <p>Reading II-7 – Competing Technologies: An Overview (BCW, 368-378)</p> <p>Case II-10 – Digital Distribution and the Music Industry in 2002 (BCW, 378-398)</p> <p><Break></p> <p>Reading II-10 – Gunfire at Sea: A Case Study of Innovation (BCW, 431-440) (optional)</p> <p>Reading II-11 – Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms (BCW, 441-454)</p> <p>Case II-14 – Managing Innovation at Nypro (BCW, 501-510)</p>	P1 Progress Report Due
6	Mon Feb 6	<p>Reading II-12 – Strategic Dissonance (BCW, 478-490) (optional)</p> <p>Reading II-14 – Meeting the Challenge of Disruptive Technology (BCW, 541-549)</p> <p>Case II-15 – Hewlett Packard: The Flight of the Kittyhawk (BCW, 529-540)</p>	P1 Post Draft Web Site
7	Mon Feb 13	<p>Reading II-15 – Strategic Intent (BCW, 550-562)</p> <p><OPTIONAL> Reading II-16 – Strategy as Vector and the Inertia of Co-evolutionary Lock-in (BCW, 562-587)</p> <p>Case II-16 – Inside Microsoft: The Untold Story of How the Internet Forced Bill Gates to Reverse Course (BCW, 587-592)</p>	P1 Due

8	Mon Feb 20	<p>Part III – Developing Innovative Capabilities</p> <p>Reading – Enactment of Technology Strategy – Developing a Firm’s Innovative Capabilities (BCW, 657-670)</p> <p>Case III-1 – Dupont Kevlar Aramid Industrial Fiber (BCW, 674-682)</p>	P2 Company Name Due
9	Sat Feb 25	<p>Reading III-1 – The Lab that Ran Away from Xerox (BCW, 671-674)</p> <p>Reading III-3 – Markets for Technology and the Returns on Research (BCW, 690-708)</p> <p>Case III-4 – PlaceWare: Issues in Structuring a Xerox Technology Spinout (BCW, 762-773)</p> <p><Break></p> <p>Reading III-5 – Absorptive Capacity: A new Perspective on Learning and Innovation (BCW, 716-732)</p> <p>Reading III-6 – Making Sense of Corporate Venture Capital (BCW, 773-780)</p> <p>Case III-5 – Innovation at 3M Corporation (A) (BCW, 781-794)</p>	
10	Mon Feb 27	<p>Reading III-9 – Discovery-Driven Planning (BCW, 846-868)</p> <p>Case III-7 – Intel Corporation: The Hood River Project (BCW, 816-838)</p>	P2 Outline Due
11	Mon Mar 13	<p>Reading III-10 – Managing the Internal Corporate Venturing Process (BCW, 915-925)</p> <p>Case III-8 – Cultivating Capabilities to Innovate: Booz Allen & Hamilton (BCW, 869-887)</p>	P2 Progress Report Due
12	Mon Mar 20	<p>Reading III-11 – Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change (BCW, 925-938)</p>	P2 Draft Report Due

		Case III-11 – 3M Optical Systems: Managing Corporate Entrepreneurship (BCW, 902-915)	
13	Sat Mar 25	<p>Part IV – Creating and Implementing a Product Development Strategy</p> <p>Reading - Creating and Implementing a Product Development Strategy (BCW, 939-955)</p> <p>Reading IV-1 – Communication Between Engineering and Production: A Critical Factor (BCW, 970-976)</p> <p><OPTIONAL> Reading IV-2 – The New Product Development Learning Cycle (BCW, 977-990)</p> <p>Case IV-5 – Improving the Product development Process at Kirkham Instruments Corporation (BCW, 1062-1075)</p> <p><Break></p> <p>Group Presentations – 15 Minutes MAX per group.</p>	
14	Mon Mar 27	<p>Reading IV-3 – Organizing and Leading “Heavyweight” Development Teams (BCW, 1012-1023)</p> <p>Reading IV-5 – Creating Project Plans to Focus Product Development (BCW, 1051-1062)</p> <p>Case IV-6 – We’ve Got Rhythm! Medtronic Corporation’s Cardiac Pacemaker Business (BCW, 1076-1088)</p>	
15	Mon Apr 3	<p>Reading IV-7 – Accelerating the Design-Build-Test Cycle for Effective New Product Development (BCW, 1098-1107)</p> <p>Part IV – Conclusion</p> <p><OPTIONAL READINGS></p>	<p>Course Evaluations</p> <p>Final Exam DUE</p>

		Reading V-1 – Building a Learning Organization (BCW, 1162-1174)	
		Reading V-2 – The Power of Strategic Integration (BCW, 1174-1182)	