Corporate Innovation: Real options for a multi-business firm

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Course Overview and Objectives

This course is a natural follow on to your first strategy course. It gives you an opportunity to explore some topics in greater depth and apply the knowledge and skills you have in new settings.

Main Focus: New Business Investments in Uncertain/Turbulent Environments

The broad focus of the course is on strategic management in uncertain and turbulent environments. Managers often throw up their hands and argue that planning isn't useful in a rapidly changing business. However, with the right tools, strategic management can have an even greater impact in this setting. We place special emphasis on evaluating uncertain strategic investments in a multi-business context.

Learning Objectives

Our primary goal is to synthesize the set of tools and knowledge students have gained to address challenging strategic management problems. By the end of this course, students will be able to:

1. Analyze how firms can create value based on strategies that span industry boundaries (corporate strategy, joint ventures, and M&A);
2. Apply real option tools to make strategic decisions under uncertainty in turbulent environments;
3. Develop solutions to manage organizational dilemmas associated with real options; and
4. Apply/integrate knowledge and skills learned across the curriculum (especially quantitative & qualitative data analysis).

The purpose is not to inflict new theory or new buzzwords but to make you use what you know to address business problems. Pedagogically, this course is case-based and relies extensively on learning through groups. Groups help you cope with the workload and develop more rigorous analyses.

Who should take this course?

This course is valuable for those who aspire to formulate and evaluate business strategy in very uncertain environments. It covers both quantitative analytical tools and qualitative organizational analysis associated with real options. This objective may fit well for those who seek careers in consulting, entrepreneurship, general management, and investment banking (among others).

Evaluation

Students will be evaluated based on both their individual and group participation. This includes group case writeups, presentations, and discussion leadership, as well as individual participation in class discussion and a case-based final exam. The de-emphasis of lecture puts added pressure on you to come to class prepared – hence the heavy focus on group and individual preparation and participation.

Summary		
Group:	3 Written case analyses (ppt)	40%
Individual:	Class participation	30%
	Final exam	30%

Assignments

Group Assignments. Coordination is a major part of management. This is especially true of strategic management, which demands the close coordination of an executive team on highly complex issues. Accordingly, we will form groups (of 3-6 people) on the first day of class. Select your own groups, preferably based on complementary functional expertise and common schedules to ease coordination. Note that group grades will be adjusted by peer appraisals (see next page).

*Group case analyses/presentations (40%)***.** Since this is a case-based course, it is essential that you come prepared to each class. Your group is responsible for coming to class prepared to present their analysis for 3 of the 5 cases we will be covering. This means emailing the instructor a brief presentation that covers the problem, the analysis performed (including assumptions made), and the solutions you would recommend. Pay attention to any clarification of the assignment that is in the syllabus – the cases may not always be clear on what the problem is. Your email should arrive before 8:00am on the day it is to be discussed in class. Guidelines for presentations:

- ✓ Presentations should be 2-5 slides with no fonts smaller than 24pt.
- ✓ Quantitative analysis can be inserted in the slides (as needed) and backed up in a spreadsheet.
- ✓ Email presentations to the instructor before 8:00am the day the case is to be discussed in class. Include your group number in the subject line of the email and in the file name of the presentation (e.g., group 2 → Disney-2.ppt).
- ✓ If a spreadsheet is needed, please attach that as well using the same file naming convention.

I will select one group to actually present their analysis in class. I will notify them and email all of the presentations to the class list as soon as I can on the day of class. However, before completing the assignment, you will not know whether you will present so all groups should be prepared. Groups are responsible for fielding questions about their analysis and leading discussion of the case briefly as well.

Individual Assignments. The remaining 60% of the grade will be based on individual work including class participation and the final exam.

Participation. Participation makes up half of the individual grade (30% of the total grade). For the learning process to be effective, you must carefully prepare the cases/readings before class and actively participate in the case discussion during class. I expect you to be fully prepared for each class and may call upon you to start the discussion or answer a specific question during the class on any day.

Ability to present one's ideas concisely and persuasively and to respond effectively to those of others is a key success factor in any managerial position. One of my goals is to help you sharpen that ability. Accordingly, I expect you to effectively participate in the class-analyze, comment, question, discuss. Participation enables you to learn from your colleagues and to help them learn from you - which is what the case method is all about. I also expect the class to help deal with people who monopolize the discussion without contributing to the learning process of others.

Final exam. The other half of your individual grade is a case-based final exam (30% of your grade). This will involve preparing an analysis of a challenging case in a limited time frame. I will have safeguards to make sure that individuals work independently despite the fact that this is a take-home exam and violations of the honor code will carry serious penalties. I will provide more details about this as the time approaches. There will be no midterm exam.

Grade Distributions

I do not apply a forced curve in a mechanical fashion. If a classmate does good work, that will not automatically reduce your chances of getting a good grade. However, the course is sufficiently challenging that top grades will not be easy to come by.

Peer Evaluation for Group Assignments

Group grades will be adjusted by peer appraisals of each member's contribution. This will help you to enforce norms of strong effort for all members. The average of peer ratings can raise or lower an one's group portion of the grade by up to one grade. This is a *zero-sum* exercise – not all members can get grades above the group grade. However, if people pull their weight or there is disagreement about individual contributions, all members will get the same grade (averages will approach 10 points).

Example: At the end of the semester each person will allocate points to all other members. The following example illustrates the process for a group with 4 members with a group grade of A-:

- The rater allocates a total pool of points to other members. The point "pool" equals 10*(group size-1). In a group of 4, each member would allocate 30 points among the others.
- Each member allocates so that major contributors get more points while others get fewer. The following example illustrates what the results might look like:

	Members				**Total**
Raters	**Anne**	**Bill**	**Connie**	**David**	**Allocated**
Anne		13	4	13	30
Bill	17		3	10	30
Connie	14	7		9	30
David	16	10	4		30
Average	15.67	10.00	3.67	10.67	40
Adjusted Group Grade	A	A-	B+	A-	

Teaching Methods

We will be using two main approaches in this class: case analysis and experiential exercises. While both are highly interactive and discussion-oriented, they accommodate different types of learning. Most of the cases have quantitative elements and the analysis tends to be quite structured and rigorous. This is ideal for those who are analytic or left-brained learners. The experiential exercises include activities like negotiations, bidding wars, and contests with building toys. These tend to be more creative and facilitate right-brained learning. Most of your courses do not emphasize both approaches. Please recognize that even if you don't like a particular activity, others may benefit greatly from it. You can find additional information about right- and left-brained learning at:

- Hemispheric dominance test & information: http://www.mtsu.edu/~studskl/hd/learn.html
- Learning styles resources: http://www.tangischools.org/schools/phs/techno/dayfour.htm

Academic Integrity

The assignments above and on the schedule are clearly marked as individual or group – there should be no confusion. I expect you to uphold the highest standards of academic integrity. Academic integrity is enforced at HEC. The penalties are rather severe and violators typically get the most serious of the alternative penalties. I don't relish the thought of putting anyone through this but it behooves all of us to make sure that academic integrity is taken seriously.

Course Materials

All of the readings and cases we will be using are in a packet of materials for the course (there is no textbook). Electronic copies of any of the materials are available on request.

Overview of the Schedule*

The course is divided into two modules that explore corporate strategy under uncertainty. For each session, I've indicated topics and what you must do to prepare for class. Remember that participation and preparation are necessary for you to get the most out of this course. Icon key: 🕮 = course packet; 🗐 = written assignment; 💻 = quantitative case.

Date	Topic/Class activities	Required Assignments*	Pages
Module 1: Corporate Strategy and M&A			
1. 4/30A	Intro/ Overview of Corporate Strategy Exercise: Paper chase	🕮Goold and Luchs, Why diversify? Four decades of thinking	15
B	Managing core competence; Micro Design intro Video Case: 3M Laserdisk	🕮Coyne, Hall & Clifford: Is your core competence a mirage?	13
2. 5/3A	Vertical integration; Case	🕮Case1: Disney's "The Lion King" 🕮Stuckey & White, When & when not to vertically integrate	12 12
B	The role of corporate headquarters Exercise: Micro-Design technology transfer	🗐 Negotiation strategy worksheet due (Ind. assignment)	
3. 5/7A	Mergers and Acquisitions; Case Video Case: "Jack & me"	🕮Case2: The GBS Acquisition 💻 🕮Lubatkin & Lane, Psst...The merger mavens still have it wrong!	7 14
B	Bidding under uncertainty, M&A & human assets Exercise: Simulated corporate acquisition	🕮Chanmugam, et.al., The intelligent clean room: Ensuring value capture in mergers and acquisitions	7
Module 2: Technology, Uncertainty, and Competitive Advantage			
4. 5/10A	Strategy under uncertainty: the need for flexibility Exercise: Heads up	🕮Zahra et al, Transforming Technological Pioneering into Competitive Advantage	17
B	Trees, Forests and Risk: A real options approach; Case	🕮Case3: Merck & Co.: Evaluating a drug licensing opportunity 💻 🕮Coles & Rowley, Revisiting Decision Trees	6 5
5. 5/14A	Black/Scholes valuation method; Case	🕸Case4: Real Options at Polaris Energy 💻 🕮Luehrman: Investment opportunities as real options: getting started with the numbers	6 11
B	Exercise: Real Options in Real Organizations	🕮Janney/Dess, Can real-options improve decision-making? 🕮Coff & Laverty, Real Options on Knowledge Assets	15 7
6. 5/16A B	Credible commitment vs. real options; Case Course wrap-up & evaluation; prep for exam	🕮Case5: Airbus A3xx: Developing the largest commercial jet💻	10

* Additional *optional* readings are not listed here. You must check the detailed schedule below for links to these.

Detailed Course Schedule

Module 1: Corporate Strategy and M&A

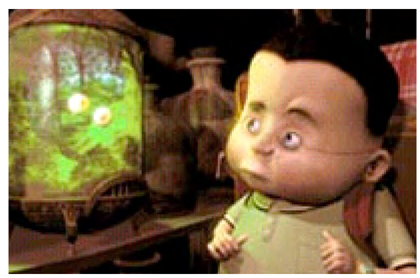
1. **4/30A: Introduction/Corporate Strategy – Managing-multi business firms**. We begin a module on how to create value in the multibusiness firm. So many prominent firms have multiple businesses and yet, as we shall see, the prospects for creating value are actually quite limited. This class will involve some lecture and discussion to refresh you on the topic, which was covered briefly in your first strategy course. We will use the "Paper Chase" exercise to introduce the topic of planning in a dynamic competitive environment.
   a. Read:
      1) 🕮Goold and Luchs, *Why diversify? Four decades of thinking (15p – skim this if you covered corporate strategy well elsewhere)*
      2) **Optional**: Palich, Cardinal, & Miller (2000): *Curvilinearity in the Diversification-Performance Relationship: An examination of over three decades of research*. Strategic Management Journal, 21: 155-174.

b. Discussion Questions
   1) Consider a firm that has multiple lines of business and answer the following questions:
      a) Can you think of any good reasons why the firm's portfolio might be worth more together than if they spun each company off?
      b) Which of the value creation strategies described in the Goold and Luchs article do they seem to apply?
   2) What competencies must the firm have to execute the value creation strategy successfully?

B: Managing Core competence & knowledge-based assets. This class focuses on the notion of core competence. What is it and how can a multi-business firm create value using a core competence. In class, we will view a short video case involving 3M's optical recording project (CD). I will also introduce the Micro Design discussion case.

c. Read:
   1) 🕮Coyne, Hall & Clifford: *Is your core competence a mirage?* (13p)
d. Discussion questions:
   1) What action steps are required to manage core competencies? What must the corporate headquarters accomplish?
   2) What are the challenges associated with such a strategy? How difficult is it to pursue?

2. **5/3A: Vertical Integration**. We will discuss the Lion King case including some problems with defining and managing core competence. In addition, the Lion King case will focus us on the value of and need for vertical integration. Our client, WildBrain Animation, has few of the lines of business that Disney has and this will focus on how to leverage an asset (e.g., film), when you don't own all of the complementary resources.
   a. Read:
      1) 🕮Stuckey & White, *When and When Not to Vertically Integrate (12p)*
   b. Written Case Analysis (🕮Case1: Disney's "The Lion King")



      1) *Your Client*: WildBrain Animation (WA – see www.wildbrain.com) might be interested in applying Disney's strategy. You were hired to analyze the strategy and identify what businesses WA needs to own to pull off the strategy for their first solo movie (Hubert's Brain). WA is a much more focused film producer with no theme parks, cruise lines, TV networks, cable stations, etc.
      2) *Hint*: This scenario pushes you to think critically about the minimum lines of business that Disney needed to own to pull off their strategy. What are the alternatives for WA? Can they still do it?
         a) *Premise*: WildBrain Animation is known for their work on Rocky and Bullwinkle, Dudley Do-Right, Cats and Dogs among others. They are working on a new original full length animated film based on a short that they created earlier called Hubert's Brain (see a short video clip at www.wildbrain.com/film.html).
         b) WildBrain Animation does not own the array of complementary businesses that Disney deployed in the Lion King. How should that affect their strategy? Can it still be accomplished?
      3) *Links* (optional follow up – not required to complete the case analysis):
         a) www.wildbrain.com
         b) www.aardman.com/flash.asp
         c) www.pixar.com
         d) www.dreamworksanimation.com

B: Role of the headquarters. We will be doing a simulation of a technology transfer in a multi-business corporation. Each person will take the role of one of the division managers and negotiate the terms of the transfer. This is a fun exercise and it highlights many of the management dilemmas inherent in a creating value in this setting.

c. Read:
   1) Micro Design role worksheet and background (Handout)
   2) Individual written assignment: Negotiation worksheet (Micro-Design handout)
   3) *Negotiating Objective Worksheet*: The exercise requires you to negotiate with another member of the class on the appropriate terms for transferring the technology. Not surprisingly, you will be evaluated based on your division's bottom line. You are to study your briefing and make some decisions about what your ideal agreement would look like. I will collect these worksheets at the start of class so make notes on your analysis elsewhere.

3. **5/7A**: **Mergers and Acquisitions.** Clearly M&A is one way that corporations grow and build new lines of business. In this class, we extend our discussion of value creation in a multi-business firm to the M&A arena. Class will revolve around the GBS case but will include a brief documentary video ("Jack & Me") about an employee in a target who tried to interview his new boss.
   a. Read:
      1) 🕮Lubatkin & Lane, Psst...The merger mavens still have it wrong! (14p)
      2) **Optional**: Coff, R. 1999. *How Buyers Cope with Uncertainty When Acquiring Firms in Knowledge-Intensive Industries: Caveat Emptor*. Organization Science, 10(2): 144-161.
   b. Written Case Analysis (🕮Case2: The GBS Acquisition) 💻
      1) *Your Client*: Craig Andrews hired you to assess Eastern Manufacturing Corporation's strategy to acquire the GBS network.
      2) *Hint*: Consider the following.
         a) Value Creation Strategy: Which of the strategies is EMC TRYING to use to create value (perhaps more than one)? They won't create value if they aren't trying. Also, see the "Guilty until proven innocent" slide – do you think the strategy will be successful?
         b) Valuation Models. There are several ways that you might attempt to value GBS. The two most likely are using multiples and using a straightforward NPV approach.
            - Multiples. Which of the multiples makes the most sense? Perhaps an average? First, which of the targets is most similar to GBS? Second, which of the buyers might have similar value creation opportunities as EMC? Third, which of the transactions is most structured like the proposed GBS deal? Even having considered these, the multiples may have factors embedded in them that do not reflect the GBS context.
            - NPV Model. You will need to make some assumptions. What is GBS worth as is? What is GBS worth once EMC makes operational changes? What is the time horizon for valuation? The time horizon for implementing the proposed changes?
         c) Bid Range: Use the range of estimates to recommend an opening bid for EMC. Note that if it is too low, it may draw in rival bidders (consider 1st Union's acquisition of Wachovia for a mere 6% premium). You should also indicate the highest you feel EMC should go in its bidding process if a rival bidder were to emerge.
         d) Recommendations for Andrews: Finally, assume that EMC closes the deal using your bidding strategy. What should they do next to begin realizing the gains envisioned. What are the barriers to their implementing your recommendations?

B: Bidding under uncertainty/M&A involving human assets. We will extend the discussion of M&A to transactions involving human assets. Part of the time will be spent on a simulated acquisition of Gourmet Adventures. After our experience discussing the GBS case, how would you think human assets would affect the process?

c. Read:
   1) 🕮Chanmugam, Shill, Mann, Ficery and Pursche (2005), The Intelligent Clean Room: Ensuring value capture in mergers and acquisitions, J. of Business Strategy, 26(3): 43-49.
   2) **Optional:** Coff (2003), *Bidding wars over R&D intensive targets*: Knowledge, opportunism and the market for corporate control, Academy of Management Journal.
d. Discussion questions
   1) Compare the GBS acquisition with the takeover of a traditional manufacturing firm. How would your recommended bidding strategy differ in the two situations?
   2) How would your approach to the due diligence differ? Implementation?

Module 2: Technology, Uncertainty, and Competitive Advantage

4. **5/10A: Strategy Under Uncertainty: The need for flexibility.** How do firms make investments under great uncertainty? This class begins our focus on making strategic decisions under uncertainty. First we will do the exercise, "getting a head" to discuss the role of luck in innovations.
   a. Read:
      1) 🕮Zahra et al, *Transforming Technological Pioneering into Competitive Advantage (17p)*
      2) 🕮Coles & Rowley, *Revisiting Decision Trees (5p – skim this refresher if you need it)*
   b. Discussion questions
      1) How can firms develop strategy when the competitive environment is changing rapidly?
      2) How can decision-makers account for uncertainty when making strategic investment decisions?
   c. Links on real options:
      1) Real option valuation: www.adainc.com/approach/rov.html
      2) PriceWaterhouse services: www.pwcglobal.com/ca/eng/about/svcs/fas_cvc-ose_rov.html
      3) About real options: www.real-options.com
      4) Real Options links: www.puc-rio.br/marco.ind/ro-links.html

   B: Trees, Forests and Risk: A Real Options Approach. When we use a simple discounted cash flow approach to value new opportunities, we typically account for uncertainty through the discount rate (e.g., higher Beta in the WACC). However, this may have grave implications on our time horizon – projects must pay back quickly to be judged as having merit. What are the implications for investing in sustainable competitive advantage? We then focus on the Merck case and their strategy for adopting new technologies through licensing technology developed by others.
   d. Written Case Analysis (🕮Case3: Merck & Co.: Evaluating a Drug Licensing Opportunity) 💻
      1) *Your Client*: Rich Kender hired you to analyze Merck's decision of whether or not to invest in LAB's new drug Davanrik.
      2) *Hint*: The following hints may be of use:
         a) Consider the following questions:
            - How has Merck been able to achieve substantial returns to capital given the large costs and lengthy time to develop drugs?
            - What are the risks associated with the venture from both sides? How might this play out in negotiations?
            - Should Merck license Davanrik? If so, how much should they be willing to pay?
            - What types of option value are embedded in this decision? What are Merck's alternatives to access this potential?
         b) Sensitivity analysis: The case provides sufficient information to build a decision tree. What types of sensitivity analysis would be most valuable?

5. **5/14A**: **Black-Scholes Valuation Method**. In the Merck case, we focused on decision trees for approximating option value. The Polaris case offers a situation in which not only can a real options approach be used, the option value can be calculated using the Black-Scholes method. As we shall see, this case will ultimately highlight some unexpected pitfalls of a real options approach. We will use existing Black Scholes calculators – no need to memorize the formula…
   a. Read:
      1) 🕮Luehrman: *Investment opportunities as real options: getting started with numbers* (11p)
      2) 🕮Janney/Dess: *Can real-options improve decision-making?* (15p)
      3) **Optional**: Bowman & Moskowitz: *Real options analysis and strategic decision-making*. Organization Science 12(6): 772-777.
   b. Written Case Analysis (🕮Case4: Polaris Energy) 💻
      1) *Your Client*: Sam Michaels, VP of the Advanced Pollution Control Technologies section at Polaris Energy Corp. hired you to analyze the decision to invest in Spectrum's new technology for removing nitrogen oxides (NO_X).
      2) *Hint*: Consider the following questions.
         a) Describe the real options embedded in the investment and operational practices of electric utility companies such as Polaris.
         b) Evaluate Polaris' investment in Spectrum. What is the value of the proposed deal to Polaris? To Spectrum? Here are some valuation hints:
            (a) There is sufficient information in the case to apply Luehrman's approach to approximating the Black & Scholes model or you may use the Black & Scholes model directly.
            (b) To do this, you must value the options that have different time horizons separately.
            (c) It may be appropriate to perform sensitivity analyses for parameters when you are unsure of their value.
         c) What are the potential pitfalls of structuring this deal as a real option? Do the benefits outweigh the costs?
      3) *Links* (optional follow up – not required to complete the case analysis):
         a) Acid rain: www.epa.gov/airmarkets/acidrain/
         b) Reducing NO_X: www.eia.doe.gov/cneaf/electricity/nox_emissions/contents.html
         c) *Links* to online Black Scholes calculators:
            - http://janroman.net.dhis.org/BlackScholes.php
            - http://www.blobek.com/black-scholes.html
            - http://arec.arizona.edu/arec313/optval.htm

   B: Real Options Meet Real Organizations. We now turn to the question of how real options work in organizations – beyond valuation techniques. In the exercise, "Brother can you spare a few mil?," we simulate some of the organizational issues surrounding real options. How would options work in practice?
   c. Read:
      1) 🕮Coff & Laverty, *Real Options on Knowledge Assets (7p)*
   d. Discussion Questions:
      1) What are some possible challenges in applying a real options approach?
      2) How does real option valuation differ from financial options?
      3) How would you cope with the challenges you identified?

6. **5/16A: Credible Commitment v. Real Options**. Options are all about the value of flexibility. In this class, we examine some of the potential costs of maintaining flexibility. We will spend the class on an analysis of Airbus's decision to invest $13B in the world's largest commercial jet.

a. Read:
   1) **Optional:** Prahalad & Hamel (HBR): *Strategic Intent (14p)* (http://ejournals.emory.edu/direct/?issn=0017-8012&origin=1)

b. Written Case Analysis (Case5: Airbus A3XX: Developing the world's largest commercial jet)
   1) *Your Client*: Noël Forgeard (Airbus CEO) hired you to analyze the decision about whether to move foreword with the A380 jumbo jet.
   2) *Hints*: The following are some hints (note, your assignment is to respond to Noël Forgeard and not to answer each question below. Nevertheless, these may help you get started):
      a) *Coping with Uncertainty*. How should they cope with the uncertainty in this decision? What are the pros & cons to alternative methodologies? You will need to justify your approach briefly.
      b) *Boeing's Response*. The case suggests several possible Boeing responses and you may come up with some novel ones on your own. Consider each possibility:
         - What resources would be required for each possible response? What might be the perceptions of the anticipated payoff?
         - How do Boeing and Airbus compare in their ability to withstand competition?
         - How will Boeing's response affect Airbus' decision & strategy?
      c) *Breakeven*. How many planes must be sold per year to break even? The following are some key assumptions to consider.
         - Expenditures:
            - Assume Airbus' to be a single entity using equity financing (unlevered cost of capital using CAPM =11% -- parameters given on p8),
            - Exhibit 10 is a starting point for assuming the timing of cash outlays.
         - Revenue**:**
            - The "realized" price/plane is $225M (p8). Analysts estimate operating margins at 25-30% -- higher than Boeing's margins.
            - Revenue might be considered as the terminal value from a perpetuity growing from 2008 at the rate of inflation (2%, p8). Alternately you could plot a different growth trajectory.
            - What is the demand for very large aircraft likely to be?
            - Can they sell enough planes annually to make the venture worthwhile?
   3) *Links* (optional follow up – not required to complete the case analysis):
      a) Airbus: www.airbus.com
      b) Airbus A380 Navigator (requires 1024x768 screen resolution):
      c) Airbus A380: www.airbus.com/product/a380_backgrounder.asp
      d) Boeing: www.boeing.com/flash.html

B: Wrap-up/Student Feedback. We will conclude with a brief overview and answer any questions related to the final exam. We will then complete formal course evaluations and discuss next steps & areas for improvement in the course.