TTMG 5001
MANAGEMENT PRINCIPLES FOR ENGINEERS

Fall 2011
Department of Systems and Computer Engineering
Carleton University

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Wed, 6-9 pm EST
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Instructor availability
The instructor is available via e-mail any time. E-mail is the preferred mode of communication. To speak to him, please call 613 520 2600 x 1642 (Carleton office).

Office hours
Instructor will hold office hours on Wed from 5:00 pm to 5:45 pm, or by appointment.

Calendar Description
TTMG 5001 [0.5 credit] (formerly 96.501)
Management Principles for Engineers
Develops a common level of knowledge among students on topics in project management, leadership, industrial marketing, managerial economics, and organizational behaviour. These topics are relevant for engineers and computer scientists who manage the engineering processes that deliver innovative communications systems, products and services.

Course Objectives
We learn about topics that are critical for technology-based companies that compete in the global market for communications products and services. These topics include:

- Product and service development
- Technical entrepreneurship and commercialization

The topics listed above cut across functional management areas and are examined from the perspective of the manager of the development project. These topics build on the literature in the fields of project management, industrial marketing, competitive strategy, organizational behavior, leadership and managerial economics.

This course introduces students to the literature in the field of engineering management.

Rationale
The course is integrated around the work that development project and commercialization managers actually do, and the context within which they act. In organizing the course, we rejected the traditional organization around functional areas such as human resources, R&D, marketing, finance, etc. for two reasons. First, engineers and computer scientists who are responsible for engineering processes in the real world make management decisions that are integrative. Rarely can these decisions be broken down into well-defined and stable functions. Second, the delivery of a course partitioned by function frequently turns into a series of disjointed lectures with no evident interdependences.

From our research and consulting experience and the research of others we found that in successful technology-based companies the development project is the main mechanism for learning and profit generation and that the project manager is the one person that can make or break the project.

All students in the Technology Innovation Management program are required to complete this course.

Benefits
Students will benefit from:

- Acquiring a set of tools and concepts that can be applied to improve existing product development organizations or establish new ones
- Developing the skills required to make, assess and communicate recommendations in technical and early market environments where there is not an abundance of information
- Using lessons learned in other settings to solve product development and commercialization problems
- Learning how to prepare a Gate 0 thesis presentation and a literature review
- Knowing how to access the engineering management and commercialization literature
- Developing personal skills in making, assessing and communicating recommendations on how to improve development and commercialization organizations

Class Sessions
Class sessions will be conducted as lecture and discussion sessions and student presentation sessions. Lecture and discussions sessions dominate the first part of the course while student presentation sessions dominate the second part of the course.

For the lecture and discussion sessions, there will be:

- Assigned readings
- A summary provided by the professor
- Changes to the professor's summary produced by the students
- Set of lessons learned produced by the students and professor real time in class

During the student group presentation sessions, groups will be asked to make short presentations on their assignments (max 10 minutes). Each group decides who presents what and the order. Before 5 pm the day prior to when presentations are due, each group will distribute to all members of the class the slides to be presented the next day. No exceptions. Presentations will be followed by clarification questions and discussions that involve the entire class. After all presentations are completed, lessons learned will be generated. The purpose of the lessons learned is to improve by a factor of 2X the content and style of the next presentations.

An excellent group presentation is max 10 minutes long, short, crisp and insightful.

Success as a manager depends on verbal communication skills. This course provides an opportunity for students to develop their ability to make, assess and communicate recommendations to their peers.

Classes are delivered both in-class and online. To join online, go to http://present.carleton.ca and log into the conference "TTMG 5001" with password "student". For the audio portion of the conference call into 613-366-1985 (local) or 866-964-7085 (toll-free), or clicking on the headphones icon. When prompted, enter the conference room 85001. When you use a VOIP connection, it is essential that you wear headphones.

Please see detailed instructions on joining an online classroom on the BigBlueButton website:

http://www.bigbluebutton.org/content/videos

For the weekly sessions, there will be assigned readings and tasks. The course material and recordings of the class sessions will be made available on the Moodle learning content management system at http://cms.sce.carleton.ca. The instructor aims to make a version of the slides available before every class,

however, they may be updated as a result of in-class discussion. Please check for updates after class. Contact the instructor, if you need an account.

Brand
The brand of the program is a valuable asset. All students are expected to work hard to protect and enhance the value of the TIM brand. All presentations are made using TIM templates and students must use Carleton email accounts.

The instructor will provide TIM templates.

Student Evaluation
Students are required to work in groups to complete two assignments, work individually to write a final examination, and make presentations during class sessions (presentations are also group efforts: every group member has to present). To determine the course grade, these will be weighted as follows:

- Assignment 1 (group) 30%
- Assignment 2 (group) 30%
- Final Examination (individual) 30%
- Presentations (group) 10%

Assignments submitted late and presentations not made will receive a grade of zero. All students in a group receive the same grade. Final grade reports will follow Carleton University guidelines.

Assignment 1: Literature review
Each student is required to work in a group (max of 3 students) to:

- Identify a topic or research question
- Review the academic and professional literature relevant to the topic or research question
- Identify at least three groups (e.g., entrepreneurs, top management teams of communication suppliers, government policy makers) who will be interested in reading your literature review and explain why
- Identify at least five insights you gained from producing the literature review

To understand what a good literature review looks like, please read the three articles assigned for next week: Brown & Eisenhardt (1995), Krishnan & Ulrich (2001), and Shane & Ulrich (2004).

The list of better journals includes:

- High profile journals: Management Science, Organization Science, Academy of Management Journal, Academy of Management Review, Harvard Business Review, California Management Review, Administrative Science Quarterly, Strategic Management Journal, and Sloan Management Review.
- Niche journals: Journal of Product Innovation Management, IEEE Transactions on Engineering Management, Research Policy, and R&D Management.

Millions of journal articles can be accessed online at: catalogue.library.carleton.ca. To access the journal articles, you will need your Patron Barcode Number and your PIN. Your Patron Barcode Number is in your student card. Any alphabetical characters should be in upper-case, e.g., 0200003188X. The first six digits of your Carleton Central PIN is your PIN.

Each group will present version 1 of Assignment 1 on Nov 2 (slides with TIM format). A document that includes the final version of Assignment 1 is due Nov 23 (max 15 pages, Helvetica size 10, 1 inch margins on the sides, double spaced). On Nov 23, each student will also present the final version of Assignment 1 (slides with TIM format).

In your document, use the reference style set by the Academy of Management Review.

Slide decks to be presented must be distributed to all members of the class before 5 p.m. the day before the presentation is due.

Assignment 2: Gate 0 thesis proposal
Each student is required to work in a group (max of 3 students) to:

- Prepare a Gate 0 thesis proposal following the guidelines in "TTM Thesis Development"
- Present and defend the Gate 0 proposal

Information on TIM thesis development is at:
http://www.carleton.ca/tim/sub/tim_thesis_development.pdf

The gate process is summarized at: http://www.carleton.ca/tim/sub/research.html

List of theses completed is at: http://www.carleton.ca/tim/sub/theses.html

A Gate 0 thesis proposal is comprised of the following sections:

- Research objective (i.e., what you will accomplish, outcomes that mark the end of the research)
- Relevance (i.e., who cares and why? use the literature to demonstrate that academics and managers care about your research)
- Literature streams reviewed and lessons learned from the literature that support the contribution your thesis makes (e.g., for each literature stream provide key findings and references)
- Contribution (i.e., explain what your contribution to the academic literature and to the solution of engineering management problems will be)
- Theoretical framework (e.g., if testing hypotheses, develop a diagram that presents and integrates your hypotheses; if using a grounded theory development approach, specify the methodology sources that will guide your research; if using a simulation approach, specify the salient features of the simulation approach to be taken that make it suitable for your purposes; if constructing a system, specify the engineering theory that will be used)
- Research method (e.g., if testing hypotheses, specify the sample, the population from which it will be drawn, and the statistical testing approaches to be used for each hypothesis; if using a grounded theory development approach, specify the data analysis approach that will be used; if using a simulation approach, specify how your simulation will be built, tested and used to generate insight into the real situation simulated; if constructing a system, specify how your system will be calibrated, tested and used)
- Data to be used and how data will be analyzed (i.e., specify the data that you will use to operationalize your theoretical variables if you are going to test theory develop new theoretical categories and testable hypotheses if you are going to develop theory develop, calibrate and test your simulation model or working system. Specify how you will obtain this data and from where)
- References (i.e., use Academy of Management style; make each reference complete; limit your reference list to your critical sources)

Each group will present version 1 of Assignment 2 on Nov 16 (slides with TIM format). Final version of Assignment 2 is due on Nov 30 (max 15 pages, Helvetica size 10, 1 inch margins on the sides, double spaced). On Nov 30, each student will also present the final version of Assignment 2 (slides with TIM format).

In your document, use the reference style set by the Academy of Management Review.

Slide decks to be presented must be distributed to all members of the class before 5 p.m. the day before the presentation is due.

Exam
The take home exam is an individual effort. The exam will be distributed on Nov 30 and is due on Dec 7, no later than 6 pm The exam must be delivered online or as specified in class.

Group work and free loaders
Group work is an important component of this course. You may elect to work in the same group to prepare both assignments or work in two different groups. Group conflicts are to be dealt with by the group in a way that is fair, fast and without personal attacks. The instructor does not settle group disputes.

The instructor will dissolve a group that is late submitting an assignment. A group of three is expected to deliver better work than a group of two.

Free loaders are not welcome anywhere. This course is no exception. The best way to deal with free loaders is to not include their names in the first page of the group assignments. If a student's name does not appear in an assignment submitted by his or her group, the student must submit his or her own assignment. Failure to do so, the student will receive zero for the assignment. There is zero tolerance for free loaders.

I deal with free loaders by first "encouraging" and then formally requesting them to leave the TIM program.

Students with Disabilities:
Students with disabilities who require academic accommodations in this course are encouraged to contact the Paul Menton Centre (PMC) for Students with Disabilities to complete the necessary forms. After registering with the Centre, make an appointment with me in order to discuss your needs at least *two weeks before the first assignment is due.* This will allow for sufficient time to process your request. Please note the deadlines for submitting completed forms to the PMC for formally scheduled exam accommodations.

Plagiarism:
Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Graduate Calendar for more details. Plagiarism is against the TIM culture. A case of plagiarism will be referred to the Chair of the Department and the Carleton University Ethics Committee. The instructor will not deal with the matter directly. The University has clear processes to deal with students who are suspected of plagiarism.

Administrative Details

- Please notify the instructor vie e-mail if you will not attend a class.
- You must be prepared for each class. You do so by reading the material assigned and being prepared to discuss in class how what was read can be applied in product development organizations.
- Each group must make his/her slides available to all other students by 5 pm the day before.

TTMG 5001 Class by Class Schedule Fall 2011

Date	Topic	Articles
Sep 14	Introduction and administrative matters	Course outline TIM program TTMG 5001 and TIM program Project/thesis development guidelines TIM project/thesis inventory
Sep 21	Session 2: Product development, literature reviews	Brown & Eisenhardt (1995) Krishnan & Ulrich (2001) Shane & Ulrich (2004)
Sep 28	Session 3: Product and service development, theory and models as practical aids I Identify topics for Assignments 1 and 2	MacCormack et al. (2001) Eisenhardt & Tabrizi (1995) Goldenberg et al. (2001) Haefliger et al. (2008)
Oct 5	Session 4: Product and service development, theory and models as practical aids II	Prügl and Schreier (2006) Bhuiyan et al. (2004) Ethiraj & Levinthal (2004) MacCormack et al. (2006)
Oct 12	Session 5: Product and service development, theory and models as practical aids III	Gerwin (2004) Tatikonda & Montoya-Weiss (2001) Van de Ven (1986)
Oct 19	Session 6: Technical entrepreneurship and commercialization I	Ferrier (2001) Gans, Hsu & Stern (2002) Gans & Stern (2003) Miller & Olleros (2007)
Oct 26	Session 7: Technical entrepreneurship and commercialization II	Teece (1988) Teece et al. (1997) Pisano & Teece (2007) West (2007)
Nov 2	Session 8: Presentation of version 1 of Assignment 1 Lessons learned from making presentations	
Nov 9	Session 9: Technical entrepreneurship and commercialization III	Anderson et al. (2006) Johnson et al. (2008) Yoffie & Kwak (2005) Chakravorti (2004) Sargut & McGrath (2011)
Nov 16	Session 10: Presentation of version 1 of Assignment 2	
Nov 23	Session 11: Presentation of final version of Assignment 1 and Assignment 1 document due	
Nov 30	Session 12: Presentation of final version of Assignment 2 and Assignment 2 document due Exam is handed out to students	
Dec 7	Exam is due before 6 pm EST. Submit exam online.	No class

To access the required journal articles in electronic form, go to:
http://catalogue.library.carleton.ca/ enter the name of the journal, select Web resource and click "Search". Click on link, and then enter your barcode number and PIN.

Required Readings for Session 2: Product development, literature reviews

- Brown, S. L., & Eisenhardt, K. M. 1995. Product development: Past research, present findings and future directions, ***Academy of Management Review***, 20(2): 343-378.
- Krishnan, V., & Ulrich, K. T. 2001. Product development decisions: A review of the literature. ***Management Science***. 47(1): 1-21.
- Shane, S., & Ulrich, K. T. 2004. Technological innovation, product development and entrepreneurship in Management Science, ***Management Science***, 50(2): 133-144.

Required readings for Session 3: Product and service development, theory and models as practical aids I

- MacCormack, A., Verganti, R., & Iansiti, M. 2001. Developing products on "Internet time": The anatomy of a flexible development process. ***Management Science***, 47(1): 133-150.
- Eisenhardt, K. M., & Tabrizi, B.N. 1995. Accelerating adaptive processes: Product innovation in the global computer industry. ***Administrative Science Quarterly***, 40(1): 84-110.
- Goldenberg, J., Lehmann, D. R., & Mazursky, D. 2001. The idea itself and the circumstances of its emergence as predictors of new product success. ***Management Science***, 47(1): 69-85.
- Haefliger, S., von Krogh, G., & Spaeth, S. 2008. Code reuse in open source software. ***Management Science*****,** 54(1): 180-193.

Required readings for Session 4: Product and service development, theory and models as practical aids II

- Prügl, R., & Schreier, M. 2006. Learning from leading-edge customers at The Sims: Opening up the innovation process using toolkits. ***R&D Management***, 36(3): 237-250.
- Bhuiyan, N., Gerwin, D., & Thomson, V. 2004. Simulation of the new product development process for performance improvement. ***Management Science***, 50(12): 1690-1703.
- Ethiraj, S.K., & Levinthal, D. 2004. Modularity and innovation in complex systems. ***Management Science***, 50(2): 159-173.
- MacCormack, A., Rusnak, J., & Baldwin, C. 2006. Exploring the structure of complex software designs: An empirical study of open source and proprietary code. ***Management Science***, 52(7): 1015–1030.

Required readings for Session 5: Product and service development, theory and models as practical aids III

- Gerwin, D. 2004. Coordinating new product development in strategic alliances. ***Academy of Management Review,*** 29(2): 241-257.
- Tatikonda, M. V., & Montoya-Weiss, M. M. 2001. Integrating operations and marketing perspectives of product innovation: The influence of organizational process factors and capabilities on development performance. ***Management Science***, 47(1): 151-172.
- Van de Ven, A. H. 1986. Central problems in the management of innovation. ***Management Science***, 32(5): 590-607.

Required readings for Session 6: Technical Entrepreneurship and Commercialization I

- Ferrier, W. J. 2001. Navigating the competitive landscape: the drivers and consequences of competitive aggressiveness. ***Academy of Management Journal***, 44(4): 858-877.
- Gans, J. S., Hsu, D. H. & Stern, S. 2002. When does start-up innovation spur the gale of creative destruction? ***RAND Journal of Economics***, 33(4): 571-586.

- Gans, J. S., & Stern, S. 2003. The product market and the market for "ideas": commercialization strategies for technology entrepreneurs. ***Research Policy***, 32: 333-350.
- Miller, R., & Olleros, X. 2007. The dynamics of games of innovation. ***International Journal of Innovation Management***, 11(1): 37-64.

Required readings for Session 7: Technical Entrepreneurship and Commercialization II

- Teece, D. J. 1988. Capturing value from technological innovation: integration, strategic partnering, and licensing decisions. ***Interfaces***, 18(3): 46-61.
- Teece, D. J., Pisano, G. & Shuen, A. 1997. Dynamic capabilities and strategic management. ***Strategic Management Journal***, 18(7): 509-533.
- Pisano, G., & Teece, D. J. 2007. How to capture value from innovation: shaping intellectual property and industry architecture. ***California Management Review***, 50(1): 278-296.
- West, J. 2007. Value Capture and Value Networks in Open Source Vendor Strategies. ***Hawaii International Conference on System Sciences***: 176-185.

Required readings for Session 9: Technical Entrepreneurship and Commercialization III

- Anderson, J. C., Narus, J. A., & van Rossum, W. 2006. Customer value propositions in business markets. ***Harvard Business Review***, 84(3): 90-99.
- Johnson, M., Christensen, C., & Kagermann, H. 2008. Reinventing your business model. ***Harvard Business Review***, 86(12): 51-59.
- Yoffie, D., & Kwak, M. 2006. With friends like these: The art of managing complementors. ***Harvard Business Review***, 84(9): 89-98.
- Chakravorti, B. 2004. The new rules for bringing innovations to market. ***Harvard Business Review***, 82(3): 58-67.
- Sargut, G, & McGrath, R. 2011. Learning to live with complexity. ***Harvard Business Review***, 89(9/10): 69-76.

Reference Texts

- Baghai, M., Coley, S., & White, D. 2000. ***The Alchemy of growth***. Perseus Publishing.
- Betz, F. 2003. ***Managing technological innovation***. John Wiley.
- Burgelman, R. A., Maidique, M. A., & Wheelwright, S. C. 2001. ***Strategic management of technology and innovation***. McGraw Hill-Irwin.
- Christensen, C., & Raynor, M. E. 2003. ***The innovators solution***. Harvard Business School Press.
- Clark, K. B., & Wheelwright, S. C. 1992. ***Managing new product and process development: Text and cases***. Free Press.
- Collins, J. 2001. ***Good to great: Why some companies make the leap … and others don't***. Harper Business.
- Cooper, R. G. 2001. ***Winning at new products: Accelerating the process from idea to launch***. 3rd edition. Perseus Publishing.
- Cusumano, M. 2010. ***Staying power: Six enduring principles for managing strategy & innovation in an uncertain world***. Oxford.
- Downes, L. and Mui, C. 1998. ***Unleashing the killer app.*** Harvard Business School Press.
- Fine, C. 1998. ***Clock speed: Winning industry control in the age of temporary advantage***. Perseus Books.
- Fleisher, C., & Bensoussan, B. E. 2002. ***Strategic and competitive analysis: Methods and techniques for analyzing business competition***. Prentice Hall.
- Foster, R., & Kaplan, S. 2001. ***Creative destruction***. Doubleday.

- Harris, J. 2002. ***Blindsided: How to spot the next breakthrough that will change your business forever*.** Capstone.
- Johnson, M. 2010. ***Seizing the white space***. Harvard Business Press.
- Jolly, V. K. 1997. ***Commercializing new technologies***. Harvard Business School Press.
- McGrath, R., & MacMillan, I. 2009. ***Discovery-driven growth***. Harvard Business Press.
- Moore, G. A. 2000. ***Living on the fault line***. Harper Business.
- Patterson, M. L., & Lightman, S. 1997. ***Accelerating innovation: Improving the process of product development***. John Wiley & Sons.
- Schein, E. H. 1999. ***Corporate culture: The survival guide***. Jossey Bass.
- Shane, S. 2005. ***Finding fertile ground***. Wharton School Publishing.
- Smith, P. G., & Reinertsen, D. 1998. ***Developing products in half the time, new rules new tools*.** 2nd edition. John Wiley & Sons.