Technology Management & Forecasting
MG 526 / SV 399 Fall Term 2009 O 159, Bloomington

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Course Description:
This course introduces the concepts of innovation, technology evolution & technology strategy. The primary techniques used in technology forecasting (monitoring, growth curves, scenarios, analogy, expert judgment (Delphi), road-mapping and simulation) are described & example forecasts are examined. Technology management strategies are suggested by an even blend of theory and case analysis.

Grading:
- Class Participation 10%
- Case Analysis (4 of 5) 20%
- Scanning / Monitoring Project 15%
- Technology Forecast Project 15%
- Midterm Exam 20%
- Final Exam 20%

Scanning / Monitoring & Technology Forecast Project:
Students write a 2-part report on a technology-related topic of their choice. Topics must be approved by the instructor. Students submit a 1/2 page description of their topic in week 2. Students collect and organize information on their topic throughout the term, giving an oral progress report in week 8. Two printed copies of the final report will be turned-in. Part one of the final report will summarize & organize the results of their monitoring effort. It will include a list of issues identified & possible future trajectories for those issues identified. Showing issue change over time is a required feature. A list of references is required. The second part of the report will be the use of forecasting techniques to focus on some aspect of the topic.

Case Analysis:
Students write short (3 page max., double spaced) papers on each case. These will be turned in during the class in which the case is discussed. Late papers graded at 50%. Observation of key points & lessons learned, identification of options, and links to course readings are the core. Summary of case data should be less than 25% of paper. Addressing the breadth of issues in a case, and where possible presenting an integrated solution, is preferred to a deep focus on a single issue.
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<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
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<td>Sept 8</td>
<td><strong>Course Overview</strong>&lt;br&gt;Definitions &amp; Concepts: Invention vs. Innovation&lt;br&gt;Generic Innovation Management Strategies&lt;br&gt;Monitoring / Scanning technique &amp; trends&lt;br&gt;Innovation Audit</td>
<td>Burgelman 1-12; Tushman 5 strategies&lt;br&gt;Rasmussen article Agriculture example&lt;br&gt;Gelsinger article (forecast example)&lt;br&gt;Rossini &amp; Porter article&lt;br&gt;Porter Ch 8</td>
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<td>Sept 15</td>
<td>•• Kodak case discussion; •• Forecast topic&lt;br&gt;Innovation spectrum, Technology life cycle&lt;br&gt;Hamel Video, Core Competence&lt;br&gt;Assessing innovation success &amp; profitability Technology in Strategy; Art of Foresight</td>
<td>Abernathy &amp; Utterback -Burgelman 253-258&lt;br&gt;Teece -Burgelman 32-48&lt;br&gt;Prahalad &amp; Hamel -Burgelman 66-77&lt;br&gt;Fusfeld -Burgelman 62-66; (EDS slides)&lt;br&gt;WFS article aging example; Trends audio</td>
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<td>Sept 22</td>
<td><strong>Criteria for Effective Innovation, Selling Technology&lt;br&gt;S-Curve limits, Disk drive example&lt;br&gt;S-curve (Gompertz &amp; Fisher-Pry) techniques&lt;br&gt;Innovation ‘chutes &amp; ladders’; Attackers Advantage</strong></td>
<td>White -Burgelman 97-104, (Ford &amp; Ryan)&lt;br&gt;Christensen -Burgelman 259-284&lt;br&gt;Porter Ch 9, 10; (Modis slides)&lt;br&gt;Utterback Ch 9; Foster Ch 2 + Append.</td>
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<td>Sept 29</td>
<td>•• Bendix Case discussion&lt;br&gt;Christensen Video, Disruptive innovations&lt;br&gt;Innovation Killers, Culture-Innovation links&lt;br&gt;Forecasting by Analogy technique&lt;br&gt;Delphi technique - Adv. manufacturing ex.</td>
<td>“SeeingWhats Next” book ch 1 to 4&lt;br&gt;Christensen article -Burgelman 846-854&lt;br&gt;Hindo 3M example -Burgelman 949-954 (Zakaria Ch 6); Martino slides (de Haan &amp; Peters article)</td>
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<td>Oct 13</td>
<td>•• Exam #1  ••&lt;br&gt;The Limits to Growth&lt;br&gt;Causal ‘analytical’ models technique&lt;br&gt;S2S Scenario Planning technique; Apple Video Business models</td>
<td>(Meadows handout) TFSC review&lt;br&gt;Senge Ch 17&lt;br&gt;Schumacher S2S slides&lt;br&gt;Coates paper</td>
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<td>Oct 20</td>
<td>•• Electronic Arts Case discussion -B 164-225&lt;br&gt;Technology Roadmaps technique&lt;br&gt;High Tech Management&lt;br&gt;mini case: Xerox Parc</td>
<td>(Phaal et al article, TFSC)&lt;br&gt;(Maidique &amp; Hayes Burgelman 226-236)&lt;br&gt;(Burgelman 725-728)</td>
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<td>Oct 27</td>
<td>Student Scanning Presentations&lt;br&gt;Davila video - Innovation Management&lt;br&gt;mini case: Gunfire at Sea</td>
<td>(Burgelman 486-496)&lt;br&gt;Tech Standards IMD</td>
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<td>Nov 3</td>
<td>Managing Internal Corporate Venturing&lt;br&gt;Enactment of Technology Strategy&lt;br&gt;Strategic Intent Champions</td>
<td>Burgelman 955-964&lt;br&gt;Burgelman 989-1005&lt;br&gt;(Hamel Burgelman 577-588)&lt;br&gt;(Howell &amp; Higgins article)&lt;br&gt;IBM Innovation Survey slides</td>
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<td>Nov 10</td>
<td>•• SAP AG in 2006 case discussion -B 1160-1193&lt;br&gt;Crossing the Chasm&lt;br&gt;Diffusion of Innovations&lt;br&gt;Star Performers at Bell Labs&lt;br&gt;Role of Hubs</td>
<td>(Moore Burgelman 429-435)&lt;br&gt;Rogers slides&lt;br&gt;(Kelley &amp; Caplan article)&lt;br&gt;(Leifer handout)</td>
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<td>Nov 18</td>
<td>•• Final Exam, Paper due November 18 ••</td>
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Core Concepts & History of the Field
Burgelman Ch 1
Loewe, Pierre, et al, "5 “Innovation Styles” for Organizing the Innovation Process"
  European Management Journal, Vol 19, pp 115-125
Abernathy, William & Utterback, James, "Patterns of Industrial Innovation", Technology Review, 1978, in Burgelman 253-258
Teece, David, (1986) "Profiting from Technological Innovation: Implications…", Burgelman 32-48
White, George (1978) "Management Criteria for Effective Innovation", Burgelman 97-104
Utterback, James "Innovation as Chutes & Ladders", Ch 9 in Mastering the Dynamics of Innovation, 1994
Foster, Richard, Ch 2 in Innovation: The Attackers Advantage, 1986

Forecasting Techniques & Examples
Porter, Alan, "Monitoring", Chapter 8 in Forecasting and Management of Technology, Wiley Interscience, 1991
World Futures Society, "The Art of Foresight", 2005
Christensen, Clayton,"Exploring the Limits of the Technology S-Curve", Burgelman pp 259-284
Growth Curves, Chapter 10 in Forecasting and Management of Technology, Wiley Interscience, 1991
Modis, Theodore, "Predictions 10 Years Later", www.growth-dynamics.com
Chevron Energyville simulation, http://www.willyoujoinus.com/
Schumacher, Terry, "Building Team Vision with Scenario Planning", PICMET Conference, 1997
Walsh, Steven, "Roadmapping a Disruptive Technology: The Emerging Microsystems & Top-down Nanosystems Industry", Technology Forecasting & Social Change, pp 161-185, 2004

Implementation & Productivity Issues
Maidique & Hayes, "The Art of High Tech Management", Burgelman 226-236
Kelley, Robert & Caplan, Janet, "How Bell Labs Creates Star Performers", HBR July 1993, pp 128-139
Moore, Geoffrey, "Crossing the Chasm", Burgelman 429-435
Seifert, Ralf & Vare, Arnaud, "Fighting Technology Standards Competitions', IMD, 2008
Leifer, O'Connor & Rice, "Implementing Radical Innovation in Mature Firms: The Role of Hubs", Academy of Management Executive, 2001
Garnier, Jean-Pierre, "Rebuilding the R & D Engine in Big Pharma", HBR May 2008, pp 68-76
D'Hooge, Herman, "User-Centered Innovation: Implications for Technology Managers", PICMET 2005

Study of Innovation & Energy Issues at the Societal Level
Drucker, Peter, "The Next Society", The Economist, November, 2001
"Untangling e–conomics", The Economist, Sept. 2000
Meadows, Meadows, Randers & Brehrens, Chapter 1, The Limits to Growth, 1973
Bishop, Peter, Book Review of the The Limits to Growth series, Technology Forecasting & Social Change, 2006
**Current Issues**
IBM Innovation Survey 2006
National Innovation Initiative Report, Council on Competitiveness, 2004
Keen, Andrew, *The Cult of the Amateur: How Today's Internet is Killing Our Culture*, 2007
Schumacher, Terry, *Business Models*

**Cases: (Students prepare written analyses)**
Grant, Robert, "Eastman Kodak: Meeting the Digital Challenge"
Roth, Steven & Porter, Michael, "Bendix Corporation" (EFI) Burgelman 3rd edition
Rogers, Gregory & Christensen, Clayton, "The Flight of the Kittyhawk" Burgelman 509-521
Oliver, C. & Burgelman, Robert, "Electronic Arts" Burgelman 164-225
"SAP AG in 2006: Driving Corporate Transformation" Burgelman 1160-1193

**Mini-Cases: (Instructor presents for discussion)**
"The Lab that ran away from Xerox", Burgelman 725-728
Morrison, "Gunfire at Sea", Burgelman