

INNOVATION AND TECHNOLOGY MANAGEMENT

Management 711
Spring Semester 2016

**Introduction to Abundance or Innovation and Technology Management for Products,
Processes and Services in National and International Markets**

Technology, Innovation, and How to use it: *The Road Less Traveled*



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Jan. 10th through April 17th 2016

Office Hours: Monday or as arranged

Monday 1:30 PM to 4:00 PM GSM Room 2158 or as arranged

Class files location on UNM learn: files used in this course (syllabus, power point slides, etc.)

Reference Books

- 1) **Abundance: The Future Is Better Than You Think** by Peter H. Diamandis, Steven Kotler, ISBNm978-1-4516-1421-3
- 2) **Strategic Management of Technology and Innovation**; by Robert Burgelman, Clayton Christensen, Steven Wheelwright ISBN-13: 9780073381541

Cases

- 1) Wii Encore? HBR 9-712-416

Purchase online link is <http://hbr.org/product/Wii-Encore-/an/712416-PDF-ENG>

- 2) “The Fate of the Vasa,” HBS 605-026

Purchase online link is <https://hbr.org/product/fate-of-the-vasa/605026-PDF-ENG>

- 3) Novozymes: Cracking the Emerging Markets Code

Purchase online link is <https://hbr.org/product/novozymes-cracking-the-emerging-markets-code/112084-PDF-ENG>

Simulation

CountryManager Simulation

About the books

Abundance: Abundance: The Future Is Better Than You Think

The authors of the book “**Abundance: the Future Is Better Than You Think**,” base their argument on the abundant versus scarcity vision of economics. The book is a “Best Seller” and was published in 2012. At its base the authors suggest that there are a number of technologies that are becoming exponentially more valuable to society. This exponential growth in technology capability is promoting great change and therefore opportunity. These technologies when embraced at their interface allow innovators to dramatically improve our society.

Strategic Management of Technology and Innovation

The authors of the book “**Strategic Management of Technology and Innovation**” seek to provide a traditional class text on the subject. In doing this the authors provide much of the seminal research in the field and thereby provide an exceptional reference base.

Course Objectives

General Methodology:

All management is about decision making and all management education should be focused on further developing your decision making expertise. Professional students in our class will work with first on cases and simulations and then choose from one of a set of real New Mexican businesses to apply your new knowledge base. We start with a strategic case

First you learn to recognize and manage strategic technology and innovations issues. Then you apply your knowledge to the specific strategic Technology Management issues in Wii Encore. This is case that concerns a firm, “Nintendo,” who redefined their industry standard product by bring external technology to it and then dominated the market. They now face the new industry reality where other firms have closed the gap and actually are starting to surpass them. This is a technology strategy and entrepreneurial decision process.

We next will embrace the project versus operations nature of technology and innovation within a firm. Here we will utilize a project management case and simulation to develop a greater understanding of the value of projects in firm strategy and an understanding of the role of the human factor in project develop for the

strategy of the firm. We will utilize a series of class based simulation that will allow you to apply your new knowledge in specific scenarios.

In this next set of educational experiences we will first provide you our oldest material and newest case the “Vasa.” The Vasa is a ship built by the Swedish King when Sweden was a global super military power. This emphasizes the strategic role in project management of “doing the right (in this case wrong) thing in the right way in the face of extreme stakeholder pressure. This case emphasizes the need for innovation process. Our last case is Novozymes. A newer case based on bio technology and genetic engineering. This case focuses on how a world leading enzyme manufacturer addresses the dynamic Chinese technology product paradigm needs. The case has Stakeholder objective alignment issues as well as horizontal functional lines integration issues.

Finally, our groups will assist a specific New Mexico firm. We have developed mentored classes to assist the students with specific industry, product, and lead user, expeditionary marketing (commercial development) challenges the specific firms have. We have a number of firms that are willing to work with the UNM’s top ten ranked* (*North America) Management of Technology and Innovation program (MOT).

- Our student professionals will learn from the firm executives while assisting them with technology management problems of importance.
- We will work in teams and will have to view ambiguous data and information in order to generate information and knowledge for these firms.
- We will use cases to highlight specific technology management and innovation issues
- We will familiarize you with Abundance and how technology change creates opportunity. Some management professionals are uncomfortable with the importance of technology and innovation in business. Yet these are the two biggest factors for 21st century corporate success in both the for-profit and non-for profit industries worldwide. This course is designed to provide the first step in the critical decision making centered on MOT.
- Most professionals already understand that the basis for business opportunity is change. In this class you will learn that the biggest change agent in business today is technology and the innovations that result from it. We will use simulations and scenarios to provide you a vehicle to implement your new understanding
- You as professionals will be initiated to a MOT mindset as well as a tool set. You will be enabled to correctly select and use quantitative and qualitative analysis that fit the needs of the organization we assist and projects we undertake.
- Students will use interaction and discussions concerning the firms they assist sand cases they undertake with their team members and the entire class in order to present their most effective solutions to the varied firms
- Students will use both team experience and individual efforts to embrace some of the fundamentals of management of technology and innovation.
- The main solution vector for the firms will be the materials that you are exposed to in class

By the very nature of professional management development members of our class will have a wide variety of expertise. Due to the varied pathways that you will and have utilized to become executives you have differing skills. Some of you will have prior experience in the difficult task of trying to manage technology and innovation while others will not. I hope that those of you that have some management of technology experience will share your expertise with your classmates. This will not only enrich the class but I believe you will find that it enhances your own understanding of the material.

This leads to another class issue - the duality of executive education needs and expectations. A large segment of any given graduate class will want to move quickly and thereby cover more material whereas other segments of the class will want to move less quickly and only probe into the material. I will aim to address the needs at the interface of these two groups.

Our readings, simulations, cases and tools will focus on the field's foundational material as well as newer engaging thoughts. I will as well post more advanced readings for those who are interested in a particular subject matter. You will need to individually and in groups take time each week to further the improvement in your abilities that this educational opportunity provides you. Just interacting in class will not suffice for an effective educational experience.

I. Nature of the Course

The essence of **Business Opportunity** is change. The largest single change agent in business today is **Technology**. The biggest emphasis in today's business is **Globalization**. MOT is how firms manage these changes. We provide the executives we teach the opportunity to develop a **mindset as well as a tool set** that will assist them in managing the technologies and innovation processes that form the basis of firm as well as regional economic competition.

This class will move from cased based experiential learning to simulation added case based learning to a hand's on mentored real firm strategic project consulting effort.

II. MOT Theoretical Background

"Newton's Laws" for the Management of Technology and Innovation (MOT)

1. Solow won a Nobel Prize by demonstrating that technology and its management was the factor that increased each country's output differentially and in every case at a rate faster than just the combination of labor and capital predicted by earlier economic theory (Solow 1956).
2. Technology and Innovation are effected by and effect strategy at the firm, country policy and cluster levels (Ansoff & Stewart 1969, Friar and Horwitch, 1984).
3. Managers are uncomfortable with technology and innovation being important strategic factors (Christensen 2009).
4. You cannot manage what you cannot measure and you cannot measure or manage what you cannot define.
 - Specifically in MOTI there is exceptional misuse of basic terms such as innovation, technology, technology change, and product causing confusion at every level (Yanez et al. 2010).

5. Organizational design is directly affected by the technology product paradigm generic classification the firm utilizes (Wood 1956).
6. Change is the single largest opportunity agent in business and technology is the biggest change agent in the world - past, present and future (Almost everybody since Adam Smith 1776).
7. The process and product innovation sequence is different in each of the generic technology product categories. This causes effective management practice to be radically different in these differing categories (Abernathy and Utterback 1988, Barris 1994, Linton et al. 2003).
8. An exceptional opportunity might not be an exceptional opportunity for you or a given firm due to the training and experience in differing technology product categorization streams and innovation processes of those that are considering the opportunity (Fusfeld 1978, Linton et al. 2010).
9. Recognizing technology based opportunity is a pathway to business venturing (Schumpeter 1942).
10. Technology change effects all service product and physical product businesses (Rosenbloom 1978, Kirchhoff et al. 2013).
11. Technology learning curves are one of the most important physical and service product strategic tools and are sensitive to a firm's technology history (Wright 1938, Foster 1986, Linton et al. 2002).
12. The potential strategic impact of a technology is defined by its continuum from sustaining to potentially disruptive (Christensen 2004, Kirchhoff et al. 2001).
13. Individual firms have a preferred innovation pathway which is linked to the disruptive or sustaining nature of the technologies they employ and the firm's penchant for market pull versus technology push innovation strategies (Marquis 1969,).
14. Product commercialization strategies are exceptionally different for products that do not require substantial customer change to use them versus those products that do require substantial customer behavioral change (Kirchhoff et al. 2004).
15. Managing R&D is a task designed to reinvent the corporation and start new firms and cannot be managed by ROI based metrics alone (Mechlin and Berg 1980).
16. Managing Technology's effect on internal and industrial value chains creates business opportunity (Linton et al 2010).
17. Technology change alters the dynamics of the five forces which govern industry profit potential (Porter 1980, Berg et al. 2009).

These 17 Newton's Laws of MOT are but a few of the basic knowledge areas in the field others include technology forecasting, technology road mapping, technology project management, and many more that you will have to embrace as a professional. They can be developed through the embrace of and MOTI concentration. In our eight classes together you will be introduced to some of these

concepts with the goal to help you become the exceptional manager that will be both vertically and horizontally mobile.

III. Course Requirements (Evaluation)

General


Students will be evaluated based on a combination of written cases, simulation and firm analysis, presentations to the class and the firms and quizzes. This is a “hand’s on” or experiential course learning experience. The companies are involved in your evaluation process.

Requirements

You will be graded on participation, group presentations, group written analysis and a quiz.

Evaluation Policy

Your final grade is based on your performance in the following six areas with the following point distributions:

20%	1 group written Case assignments (Wii discussion only, Vasa or Novozymes)	
25%	New Mexico “Real Company Case”	
10%	2 individual quizzes on Abundance & cases	
20%	Simulation: Country Manager	
10%	Country Manager for 2 Presentations	
10%	Group Presentation for New Mexico Firm, Vasa or Novozymes	
5%	Participation	

Major breaks in ranked total scores will determine the cutoffs between letter grades.

Students with Special Needs: If you are a qualified person with disabilities who might need appropriate academic adjustments, please communicate with me as soon as possible so that we may make appropriate arrangements to meet your needs in a timely manner. Frequently, we will need to coordinate accommodating activities with other offices on campus.

Written effort format

A. 2 Case Written Analysis

All members of the student groups should prepare the analysis of the case assigned in the syllabus. Both case projects need to be submitted and act as preparation for the firm based project. The case write ups are no more than 8 pages typed, (1.5 spaced times roman). These are group project that emphasize at least three MOT concepts or tools. Desired write-up structure: use headings

B. 1 Real Firm activity

All members of the student groups should prepare the analysis of the case assigned in the syllabus. Both case projects need to be submitted and act as preparation for the firm based project. For the real case format at least pages typed, (1.5 spaced times roman). These are group project that emphasize at least three MOT concepts or tools. Desired write-up structure: use headings and provide appendices

1. PROBLEM STATEMENT: *Primary/Sub-Problems*

In the problem statement, pick an issue that is a central theme presented by the firm officers.

There is usually more than one; state them, and then choose one problem that will guide your case write-up. (1 to 2 sentences)

2. SHORT SUMMARY OF THE FACTS: *Usually only a paragraph*

State the facts from firm handouts and website that are relevant to your problem statement. This section should build on the first.

3. ANALYSIS OF THE FACTS: *Utilize the tools to go beyond the stated facts (5 to 7 pages)*

State why you use the tools you do. Utilize the tools presented in this course that are specific to the firm's issue. Organize the facts relevant to the case. The analysis should point toward the alternatives and recommendations that follow. This is the "meat" of the case study and should be your longest section. Please show all tool analysis with the appropriate diagrams, graphs, etc.

4. ALTERNATIVES: *A range of possible ways/methods to resolve the identified problem (1 to 2 pages)*

Each company faces a decision point. You, as an analyst, must put yourself in the situation as the decision maker or staff analyst and come up with reasonable alternatives (3 perhaps) the firm could pursue.

5. RECOMMENDATIONS/SOLUTIONS: *Selection of an alternative and the underlying rationale (1 page)*

Your recommendations should be a solution to the firm's indicated problem. The facts and your analysis should support your recommendations.

Note: Maintain a consistent theme in the write up. This real life management problem does not have complete information. Make reasonable stated assumptions and speculate. Be consistent and cogent. Further prepare all analysis using the tools and show your work in an appendix.



B. PRESENTATIONS

Each group will be required to prepare each case or firm analysis and present it to your fellow executives. The firm analysis will include the presentation to the firm executives. The presentation should be a maximum of **fifteen minutes plus 5 minutes for questions be innovative in presenting.**

C. Simulation

D. Class participation

If you show up 50%, if you then respond to relevant questions 75%, If you are proactive in effort your cases applying the tools 100%. No class grade in the first week. We drop you lowest grade.

Tentative Course Outline

The exact nature of each class session is often difficult to predict. So, please expect some changes as we move through the course based on the interest and varied abilities of our executives as well as our ability to cover the material. Any revisions will be posted on the UNM Learn.edu.

The first session will be dedicated to introducing the class and providing the basis for our learning to develop. We do this to gain a common understanding of the terminology. Some of the terms like product and technology have widely disparate meanings. Managers and or technologist may have some un-learning to do. The classes notes will be on the mgt. 711 in UNM learn. However these notes are only a skeleton meant for you to enter input material during the lecture and discussion portions of the classes. Remember this is an Executive mentored learning class so interact

Read assignments before coming to class



Class 1 – Friday January 8th 2016 (1 PM to 6 PM)

Introduction, Objectives, Style, etc.

Tools and Notes, Class 1,

Readings to be completed before the first day:

- **From Abundance**
Part one: Perspective of Abundance chapters 1 through 3 (approximately 35 pages)
- **From: Strategic Management of Technology and Innovation**
Chapter 1 (2007) (pages 1- 8)
- **Outside reading: From UNM Learn**
From Bench to Business (2003) (3 pages)
- **Case:**
“Wii Encore?” (10 pages text no need to read endnotes and cites)

Class Presentations by Professors

We provide a brief introduction to the basic language around competitive advantage and technology management.

- 1) Technology, product, technology change & Innovation definitions
- 2) Physical product and Service product differentiation
- 3) Manufacturing and Service product technology paradigms generic categories
- 4) Process versus product innovation in the generic product technology paradigm categories
- 5) Sustaining and disruptive

Video Clips 2

- **Abundance is our future: Peter Diamandis**
(http://www.ted.com/talks/peter_diamandis_abundance_is_our_future) (2012)
- **Innovation and Spaghetti: Malcom Gladwell**
(http://www.ted.com/index.php/talks/malcolm_gladwell_on_spaghetti_sauce.html) (2007)

In class tools and definitional cartoons

Technology categories

Sustaining, disruptive, continuous, discontinuous

Introduction to Country Manager

Short discussion on “Wii encore?”



Class 2 – Saturday January 23rd 2016 (8AM to 1 PM)

Material Due

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- *In Class quiz on Wii Encore & Abundance (5 minutes multiple choice)*

Readings to be completed for this class

- **From Abundance**
Part 1 & Part 2 Exponential technologies Chapter 4 and 5 (pp 27-59 approximately 32 pages)
- **From: Strategic Management of Technology and Innovation**
Reading 1-3 the Core competence of a Corporation pp. 66-77 (11 pages)
- **Outside reading: from UNM learn**
Strategy Technology Firm Fit Audit (In UNM Learn) (2011) (14 pages)
The Anatomy of Successful Innovations (Marquis) (In UNM Learn) (1969) (8 pages)
Corporate Imagination and Expeditionary Marketing (Hamel & Prahalad) (1991)
- **Country Manager Reading**
Country Manager Student Manual, Country Manager Case

Class presentation by Professors

- 1) Marquis Model and the anatomy of successful innovation

Video clip 1, 2& 3

- Hans Rosling and Ola Rosling: How not to be ignorant about the world
(http://www.ted.com/talks/hans_and_ola_rosling_how_not_to_be_ignorant_about_the_world)
- Ray Kurzweil: How Technology's Accelerating Power Will Transform Us (2005)
http://www.ted.com/talks/ray_kurzweil_on_how_technology_will_transform_us?language=en

In class tools and definitional cartoons

Definitions
Core competence,
Basic cycles
Expeditionary marketing

Mentorship and Discussion

- Wii Encore?
- Country Manager

Discussion of Team Technologies Companies

Introduction and selection of Team technologies and Joe Ortiz companies by teams



Class 3 – Saturday February 6th 2015 (8 AM to 1PM)

Material due

711 spring 2016

- No material due

Readings to be completed for this class

- **From Abundance**
Part 2 Exponential technologies & part 3 building the basis of the pyramid Chapter 6 and 7 (pp 59-85 approximately 26 pages)
- **From: Strategic Management of Technology and Innovation**
Reading III-8 Notes on lead user research (799- 806) (7 pages) (2008)
- **Outside reading: from UNM learn**
LEAD USERS: a source of Novel products (14 pages) (1988) (alternative to reading III-8)
Technology Market Matrix (6 pages) (2014)
- **New Case:**
“The Fate of the Vasa,” HBS 605-026

Class Presentation by Professors

- 1) Core Competence/Core Capability
- 2) Strategic technology Firm Fit Audit
- 3) Expeditionary Marketing

Video Clips 1, 2& 3

- **Craig Venter: Watch me unveil "synthetic life"**
http://www.ted.com/talks/craig_venter_unveils_synthetic_life
- **Juan Enriquez shares mindboggling science**
http://www.ted.com/talks/lang/eng/juan_enriquez_shares_mindboggling_new`science.html
- **Vasa (Wasa) Ship history**
<https://www.youtube.com/watch?v=7Ow7Bk-PmCU>

In class tools and definitional cartoons

STFFA
Expeditionary Marketing

Mentorship activities

- Country Manager Simulation
- Vasa Case

Discussion of Team Technologies and Joe Ortiz Companies



Class 4 – Friday February 19th 2016 (1 PM to 6 PM)

Material due

- *Country manager midterm presentation (10 minute max)*

Readings to be completed for this class

- **From Abundance**
Part 3 building the basis of the pyramid Chapter 8 and 9 (pp 85-119 approximately 34 pages)

- **From: Strategic Management of Technology and Innovation**
 Reading II-7 Crossing the chasm and beyond (429- 435) (6 pages) (2008)
 Reading II-3 Exploring the limits of technology S curve (278-283) (5 pages)

Class Presentations by Professors

- Crossing the Chasm
- Technology Market Matrix
- Lead user

Video clips 1, 2, & 3

- **Peter Thum Ethos Water**
<https://www.youtube.com/watch?v=r-p89BYgCHg>
- **Feeding 9 billion Jason Clay**
<https://www.youtube.com/watch?v=uEa3FRm-ynE>
- **Vertical Farming Explained, D. Despommier**
<https://www.youtube.com/watch?v=b1wQ2LXeF-k>

Mentorship activities

- Country manager
- Vasa Case

Discussion of Team Technologies Companies



Class 5 – Friday March 4th 2016 (1PM to 6PM)

Material due

- *Written case on Vasa*
- *Presentation of Vasa (2nd 1/2 of class for those who chose Vasa)*

Readings to be completed for this class

- **From Abundance**
 Part 4 Forces of Abundance Ch. 10 & 12 (pp. 119-132 & pp. 140-155 approximately 28 pages)
- **Outside reading: from UNM learn**
 Porters Five Forces
- **New Case**
 Novozymes

Class Presentations by Professors

- Porter's five forces
- Technology Life cycle

Video clips 1, 2, & 3

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- **We are Makers**
<http://vimeo.com/66162292>
- **Defining the Maker Movement**
<http://www.latimes.com/business/technology/la-defining-the-maker-movement-20141111-premiumvideo.html>
- **2012 Tata Nano: From Bollywood to Hollywood - Jay Leno's Garage**
<https://www.youtube.com/watch?v=NGEwG62Q1UQ>

Mentorship activities

- Country Manager
- Novozymes

Discussion of Team technologies Companies



Class 6 – Friday March 18th 2016 (1 PM to 6 PM)

Materials Due

- *In class Quiz on Novozymes & Abundance (5 minutes multiple choice)*
- *Written Novozymes case due (1/2 of the class)*
- *Presentations for those who chose to present on Novozymes*

Readings to be completed for this class

From Abundance

Part 5 Peak of the Pyramid Ch. 13 & 15 (pp. 155-174 & pp. 189-205 approximately 28 pages)

Class Presentations Professors

Review

Video clips 1 & 2

- **Missing Link to Renewable Energy**
https://www.ted.com/talks/donald_sadoway_the_missing_link_to_renewable_energy
- **Daniel Kraft: Medicine's future? There's an app for that**
http://www.ted.com/talks/daniel_kraft_medicine_s_future

Mentorship activities

- Country Manager
- Team technologies
- Novozymes

Discussion of Team technologies/ Joe Ortiz Companies



Class 7- Saturday April 2nd 2016 (8 AM to 1PM)**Material due**

- *Last written case analysis on Team technologies / Joe Ortiz companies due*
- **Class Presentations by Executives**
 - *Class presentation on to Team Technologies / Joe Ortiz executive group*

Mentorship activities

- *Country Manager*
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Class 8 –Friday April 15th 2016 (1 PM to 6 PM)**Material due****Country Manager Presentations (15 minutes plus 5 minute discussion)**

- *Final Country Manager runs due*
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Code of Conduct: Please switch off your phones when in class (I am sometimes the worst offender). Surfing the web or playing games on computers during class is in general frowned upon. Please remember this is an experiential learning based class and class participation is critical. Please see your student handbook for the definition of plagiarism that we use. Keep your presentations to the agreed upon lengths. In general, be respectful to others.