

**MGT 513**  
**Technology Forecasting and Assessment**  
**Fall 2014**

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**Text Book:** *Forecasting and Management of Technology Roper et al.*

Additional assigned readings listed in syllabus; unless otherwise noted, articles are available online

**Students with Disabilities**

"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."

**Objectives of Technological Forecasting**

- 1) To develop an understanding of the issues of, and methods afforded manager's forecasting the future of sustaining and disruptive technologies

- 2) To gain an understanding of the management arenas that technological forecasting provides value and how it differs from other forms of forecasting
- 3) To provide a clinical approach to understanding technological forecasting and its use in predicting social change
- 4) Change is the single largest opportunity agent in business. Technology is the biggest change agent in the world - past, present and future (Almost everybody since Adam Smith 1776). The more a manager understands technology the better your chances are to be successful.
- 4) Finally I expect us to change the syllabus as we progress. This course will therefore evolve. These changes are usually centered on the interests of the students, the interests of the professor and/or good new material.

### **PREVIOUS COURSE COMPLETIONS, EXPECTATIONS, AND EFFORTS**

- 1) We expect Students to follow the Student code of Conduct found in student Handbook
- 2) We expect Students and Professors to bring an eagerness to learn
- 3) We expect a graduate student effort level as derived from the student Handbook
  - a. The student handbook suggests an undergraduate student expecting a C to work 6 hours outside of class every for every 3 credit course.
  - b. For graduate students professors and students expect more for every three-credit course we expect 9 hours of outside study time for an expectation of a B.
- 4) You must be enrolled in or have completed course 511 or see the professor individually in order to enroll in this course

### **NATURE OF THE COURSE**

Technology has and will continue to play an increasingly important role in the economic competitiveness, industrial survival, and individual firm performance in the 21st century. In addition, it will create fundamental changes to the nature and structure of work in the next century. Many people have emphasized the role of technology to meet the 21<sup>st</sup> century problems, two are exceptionally sanguine to this course:

- 1) M. Chan, Global health diplomacy: negotiating health in the 21st century Director-General of the World Health Organization, Address at the Second High-level Symposium on Global Health Diplomacy, 12/6/2011  
<http://www.who.int/dg/speeches/2008/20081021/en/index.html>.

She stated the five challenges facing the 21<sup>st</sup> century world:

These constraints stem from the largest challenges or problems facing the twenty first century which are: healthcare; energy; the environment (global warming); food, and water. This means that optimal innovations are more highly constrained than ever before. Now an innovation that solves a local expression of a global problem, but simultaneously adversely affects another global problem, is no longer considered optimal and therefore it may not be implemented.

We see this materialize into worldwide action with the Kyoto accords and the Precautionary principal two regulatory efforts currently being championed by the EU.

## 2) Who is calling for new technologies to embrace 21<sup>st</sup> century problems

A statement from former Swedish Prime minister Goran Persson. He extolled the embrace emerging technologies for solving societal problems. Paraphrasing Prime Minister Persson, he stated that he is '*not scared of utilizing new (emerging) technologies to solve 21<sup>st</sup> century problems but is terrified of the continued use of traditional technologies to solve the 21<sup>st</sup> century problems that their use created* (Eijkel et al. 2012).

Managing the selection and development of new technology is a complex process that requires management to use, understand, and integrate many conflicting concepts and strategies. In the best case, the philosophies that managers have to choose from are often misaligned and in the worst case they are conflicting and contradictory.

By the end of the class, the goal will be that the student will have a basic and clear understanding and working knowledge of the concepts and techniques that are used today in technology assessment and forecasting (leading into a coherent and successful process for management of technology). The focus of the course will be to give students the confidence, knowledge and tools necessary to allow them to use the concepts taught in the course to develop and implement solutions to management technology selection and management.

The course is designed to broaden the student's understanding of the *science* as well as the *art* of predicting where R&D is or should be heading and determining how a particular technology (process, product, or service) will fare in the market place.

Four major themes will be used to accomplish the course objectives:

- 1) Assessing technologies: we will examine the technology, the different areas of application towards which it can be applied and the markets in which it will play a role under different market conditions.
- 2) Using different forecasting methods: we will look at different types of forecasts that we can use and their strengths and weaknesses.
- 3) Learning from experts in the technology field: we will investigate the practical aspects that are best brought to you by executives and practitioners.

4) Applying the knowledge gained in the course for working on the deliverables.

## **Summary of Course**

This course examines the methods used in assessing and forecasting scientific and technological advances and assessing their applicability in the commercial world. The course will stress the broad macro-level economic issues such as competition, positioning of the technology in the market and further research to apply the innovation to useable products. The course will be taught as a seminar where the instructor and experts in different technologies will present to you the issues that affect forecasting and assessment. The students can learn through hand-on experience the different methodologies that can be used to arrive at the best technological forecast as well as their strengths and limitations.

## **Conduct of the Course**

We have a number of things to do in 15 sessions:

- 1) Cover the book: All students (and not just the presenter) are encouraged to gain a good level of understanding of (not just reading) the assigned materials before coming to class. In class, we will hit the main points rather than every page and every detail.
- 2) Students will start working on understanding the technology that they are going to work on describing, assessing and forecasting in the semester. The major area which we will research this semester is the “Internet of Thing (IoT) or The internet of Everything (IoE).” Many of you may get jobs which embrace this issue.
- 3) We will listen to invited speakers that can shed light on the issues that you might run into in the use of IoT/E. The more that you are prepared with the work in your area, the better able will these speakers be to help you with your questions. Each speaker will spend as much time as we need during a class period presenting their materials and answering questions.
- 4) We will spend some time discussing the projects on which you will work to satisfy the requirements of the course.

## **COURSE REQUIREMENTS (EVALUATION CRITERIA)**

### **GENERAL**

Students will be evaluated based on a combination of written case assignments, article presentation, quizzes, class preparation and a final project. Grading is a method of providing feedback on how well the student has grasped and applied the concepts covered. This will be accomplished by providing students with meaningful comments on written assignments and by interaction of each student with the rest of the class and the instructors.

## Requirements

You will be graded on participation, a presented article, and a project split into three deliverables. The cases will be a group project and a method for developing it is provided below. Remember to utilize the tools given you in class as the primary grading criteria.



### A. Article Presented By Student groups (20%)

Each group will be required to prepare one of the articles from the readings to be presented in class. Each member of the team is graded individually on the presentation. Don't forget to the three "Tell em's"

### B. CLASS PREPARATION AND PARTICIPATION (10%)

Classroom instruction will be interactive with all students expected to participate. Students are expected to have read the material assigned prior to coming to class. In addition, you should be capable of and willing to participate in classroom discussions through comments, analysis, questioning and building on the contributions of others. Your class participation grade will be based on the frequency but primarily the quality of your contribution to in-class discussions. In general your showing up for class is worth 50%, positive response when interacting 75% and your own initiative of information relating to the class gets you an A for the day.

### C) The Project Project paper ( 30%)

### D) Project Presentation 15%

Selected firms or industry to be developed

Your project is to

- 1) Describe the opportunities presented by IoT/E

- 2) Describe the hurdles presented by IoT/E
- 3) Forecast markets and technology trends for each subgroups

You should build a team (2 or 3 persons per team) to work on one of the following areas:

- 1) IOT/E
- 2) firm or Industry movement based issues

E) Quizzes (25%)

You will be provided 8 quizzes that you can take home and provide for the next week. You only have to hand in 7 of these. These tests are designed to help you with the readings and tools and provide you support on your project

## V. GRADING

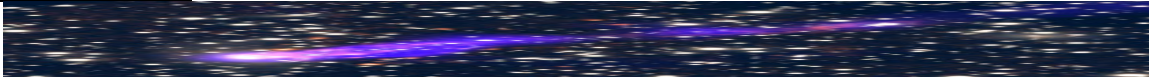
Your final grade will be based on your performance in the following five areas:

- 20% Article Homework
- 25% Weekly take-home quizzes (Do 7 of 8)
- 30% Project Paper
- 15% Project Presentation
- 10% Class Participation

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

## 513 - COURSE OUTLINE

### Class Schedule



Week 1  
August 18<sup>th</sup>

Introduction of Course Syllabus  
Ch. 1 Roper, Introduction to technology and society



Activity: Choose two person groups

Weekly question on being a Business Analyst

- What do you believe are good attributes of a Business Analyst?



Week 2  
August 25<sup>th</sup>

Discussion on Internet of Things /Everything  
Roper Chapters 2      Technological Forecasting



Quiz  
**Handout Quiz 1**

Video: The power of ten

**Article 1:**

Linstone, Harold A., (2011), "Three eras of technology foresight," *Technovation, Volume 31, Issues 2-3, February-March 2011, Pages 69-76*

Find in Libros or the library

Weekly question on being a Business Analyst

- **What is the difference between a functional requirement and a non-functional requirement?**

Week 3  
September 1<sup>st</sup>

Labor day

Holiday

Week 4  
September 8<sup>th</sup>

Roper chapter 3: Managing the Forecasting Project



**Article 2:**

Halal, William E., (2013), Forecasting the technology revolution: Results and learnings from the TechCast Project, Technological Forecasting and Social Change, *Volume 80, Issue 8, October 2013, Pages 1635-1643*

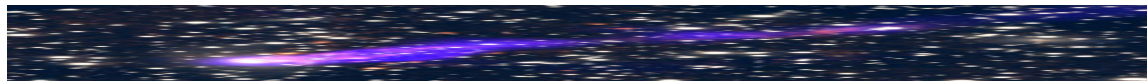
Quiz

**Handout Quiz # 2**

**Hand in Quiz #1**

Weekly question on being a Business Analyst

- **What are the attributes of a good business requirement?**



Week 5

September 15<sup>th</sup>

Roper, Chapters 4 – 5, Exploring gathering and Using information



Quiz

**Handout Quiz # 3**

**Hand in Quiz #2**

**Article 3:**

Berg, D. and Einspruch, N., (2009), Intellectual property in the services sector: Innovation and technology management implications, *Technovation Volume 29, Issue 5, May 2009, Pages 387-393*

Weekly question on being a Business Analyst

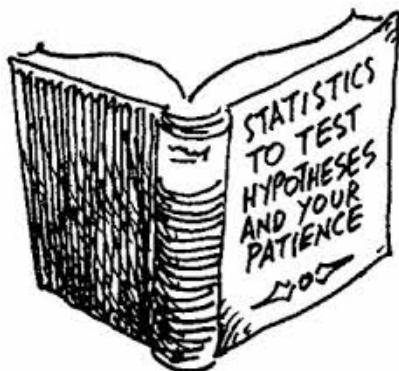
- **What is the purpose of requirements traceability?**





Week 6  
September 22<sup>nd</sup>

Roper, Chapters 6- Methods and Analysis



Quiz

**Handout Quiz # 4**

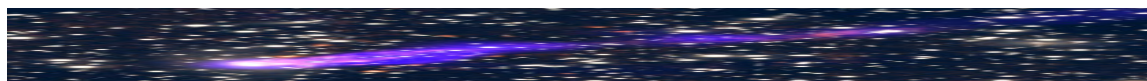
**Hand in Quiz # 3**

**Article 4:**

Chulmo Koo, C., and Chung, N., (2014), Examining the eco-technological knowledge of Smart Green IT adoption behavior: A self-determination perspective, *Technological Forecasting and Social Change*, Volume 88, October 2014, Pages 140-155

Weekly question on being a Business Analyst

- When do you use a RACI or RASCI model?



Week 7  
September 29<sup>th</sup>

Technology Road mapping  
Handout on Technological roadmapping  
Discuss where projects stand



Quiz

**Handout Quiz # 5**

## Hand in Quiz # 4

### Article 5:

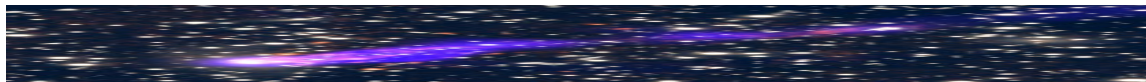
Marie Garcia and Olin Bray, "Fundamentals of Technology Roadmapping" Sandia report 97-0665.

### Article 6:

Tierney, R., Hermina, W. And Walsh S.T. (2012), "The Pharmaceutical Technology Landscape: A new form of technology roadmapping," *Technological Forecasting and Social Change*, Volume 80, Issue 2, February 2013, Pages 194-211

Weekly question on being a Business Analyst

- How do you ensure your business requirements are of a high quality



Week 8

First assignment due

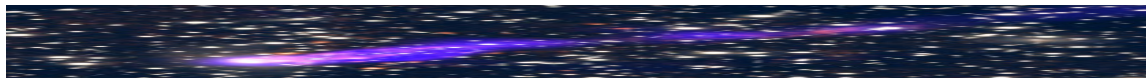


October 6<sup>th</sup>

**due: first assignment on Assessment, Tech Description or technology forecast of industrial or corporate area on which you are working. Presentations in class about these items**

Weekly question on being a Business Analyst

- What is contained within a typical Requirements Management Plan?



Week 9

Roper Chapter 7, Scenario and Focusing

October 13<sup>th</sup>



Quiz

**Handout Quiz # 6**

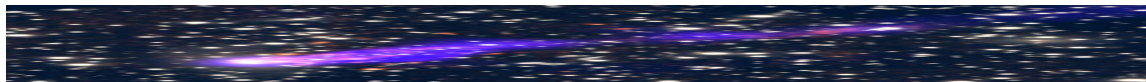
**Hand in Quiz # 5**

**Article 7:**

Miranda, L. C.M., and Lima, C.A.S, On the forecasting of the challenging world future Scenarios, *Technological Forecasting and Social Change*, Volume 78, Issue 8, October 2011, Pages 1445-1470

**Weekly question on being a Business Analyst**

- Describe the phases of the SDLC. Which phases have or could you work in?



Week 10

October 20<sup>th</sup>

Roper, Chapter 8 & 9 Economics and impact assessment



Quiz

**Handout Quiz # 7**

**Hand in Quiz # 6**

**Article 8:**

Han, K., Shin, J., (2014) A systematic way of identifying and forecasting technological reverse salients using QFD, bibliometrics, and trend impact analysis: A carbon nanotube biosensor case, *Technovation*, Volume 34, Issue 9, September 2014, Pages 559-570

### Weekly question on being a Business Analyst

- Describe the difference between a Waterfall based methodology and an Agile methodology?



Week 11 Roper, chapters 10 Cost benefit and Risk  
October 27<sup>th</sup>



Quiz

**Handout Quiz # 8**

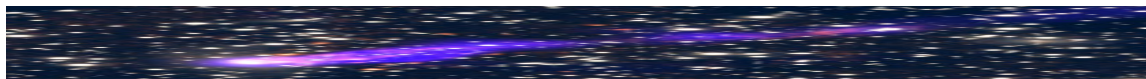
**Hand in Quiz # 7**

### Article 9:

Miorando, R. F., Duarte Ribeiro, J.L., and Cortimiglia, M. N., (2014), An economic–probabilistic model for risk analysis in technological innovation projects, *Technovation*, Volume 34, Issue 8, August 2014, Pages 485-498

### Weekly question on being a Business Analyst

- What is a user story in an Agile context and how is it used?

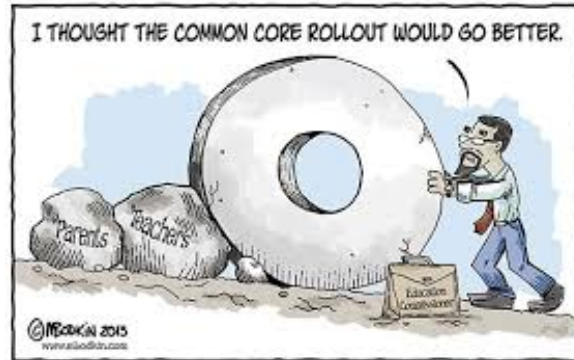


Week 12  
November 3<sup>rd</sup>

**Assignment due: assessment of the technology, its feasibility, what will it do and how can it penetrate the market Presentations**

Week 13  
November 10<sup>th</sup>

Roper, Chapter 11 Implementing Technology



Quiz  
**Hand in Quiz # 8**

**Article 10:**

Shi, X., Fernandes, K., and Chumnumpan, P., (2014), Diffusion of multi-generational high-technology products, *Technovation*, Volume 34, Issue 3, March 2014, Pages 162-176

**Weekly question on being a Business Analyst**

- **What is the difference between a functional specification and a business requirements document? How are they related?**

Week 14

Roper, Chapter 12, Managing the present with Eye on future

November 17<sup>th</sup>

**Article 11:**

Eto, H. (2003), The suitability of technology forecasting/foresight methods for decision systems and strategy: A Japanese view, *Technological Forecasting and Social Change*, Volume 70, Issue 3, March 2003, Pages 231-249

**Article 12:**

Cachia, R., Compañó, R., and Da Costa, O., (2007), Grasping the potential of online social networks for foresight *Technological Forecasting and Social Change*, Volume 74, Issue 8, October 2007, Pages 1179-1203

**Article 13:**

Vecchiato, R. and Roveda, C., (2010), Strategic foresight in corporate organizations: Handling the effect and response uncertainty of technology and social drivers of change, *Technological Forecasting and Social Change*, Volume 77, Issue 9, November 2010, Pages 1527-1539

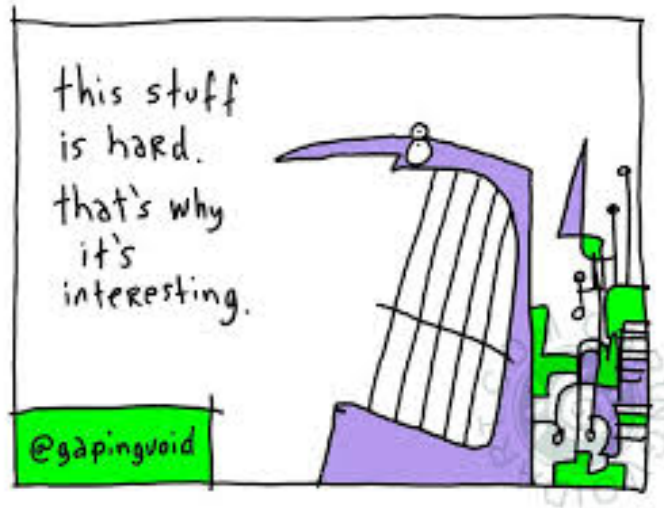
### Weekly question on being a Business Analyst

- Describe an effective way to manage change to requirements within a project.



Week 15  
November 24<sup>th</sup>

Assignment due: Forecast  
Presentations



Week 16  
December 1<sup>st</sup>

Presentations