Slide 1

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ICT Innovation – Spring 2015

**MSc in Computer Science and MEng Telecom. Engineering
EIT Masters ITA, S&P,SDE**

Lecture 01 – Product Design and Development

Prof. Fabio Massacci

Slide 2

Research and Development

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R → **T** → **D**

Basic Research	**Technology Development**	**Product Development**
• Discovery process	• Loosely structured	• Structured methods
• No set timing	• Difficult to plan	• Planned timing
• Unpredictable returns	• Less predictable	• Predictable outcome
• Long term	• Medium term	• Short term

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Slide 3

What makes a successful product

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- **A successful product is based on several features**
  - Features and functions of design process
  - Cost and quality of manufacturing process

Manufacturing: Cost and Quality   **Product Development: Features and Function**

- **Features and Functions can be improved by a good product development process that yields "better" products**
  - Beware that an apparently "better" product might not be truly "better" for the intended customer at the end (latent, or marginal feature might take over)
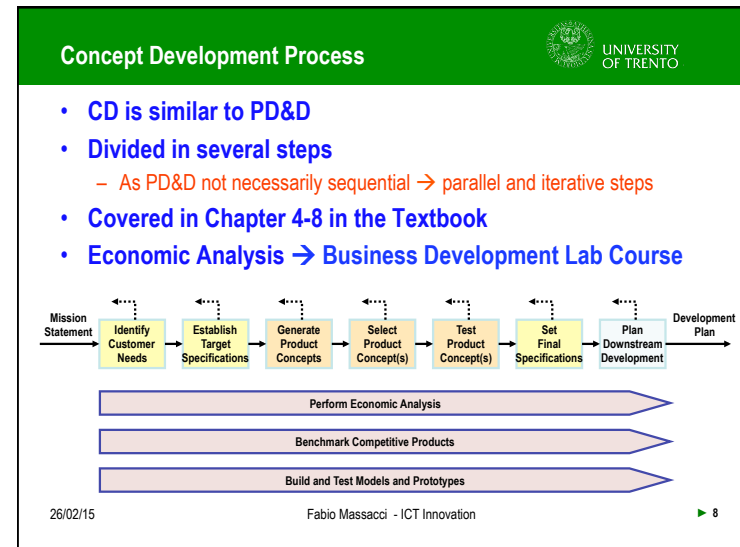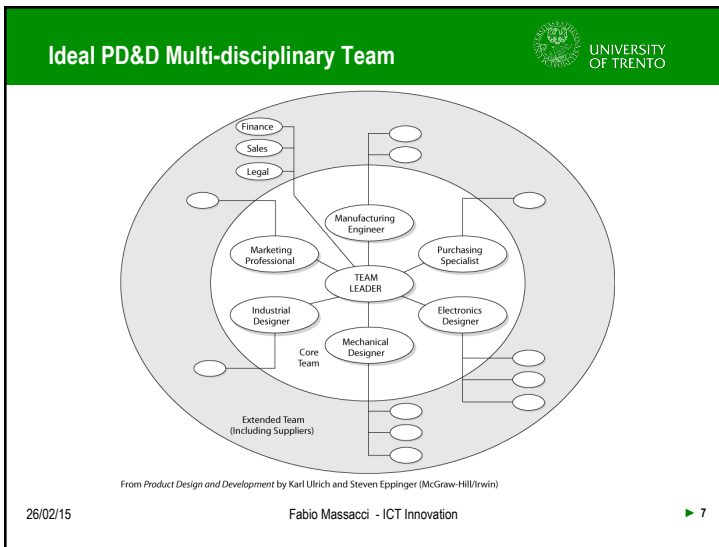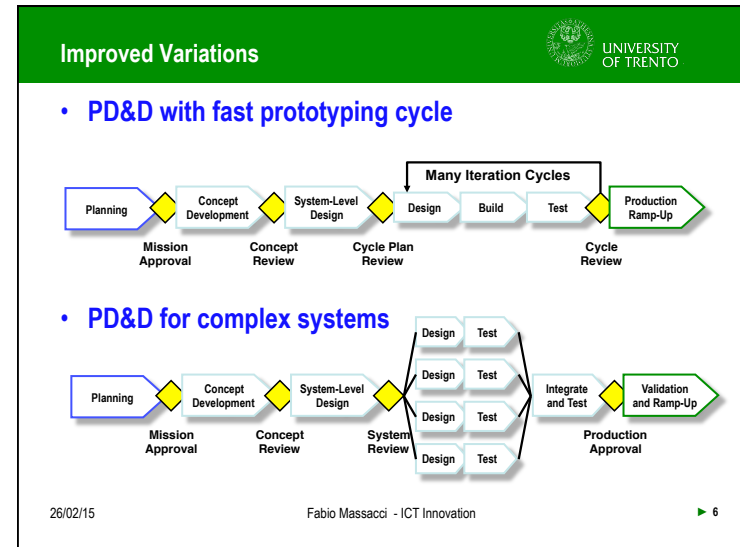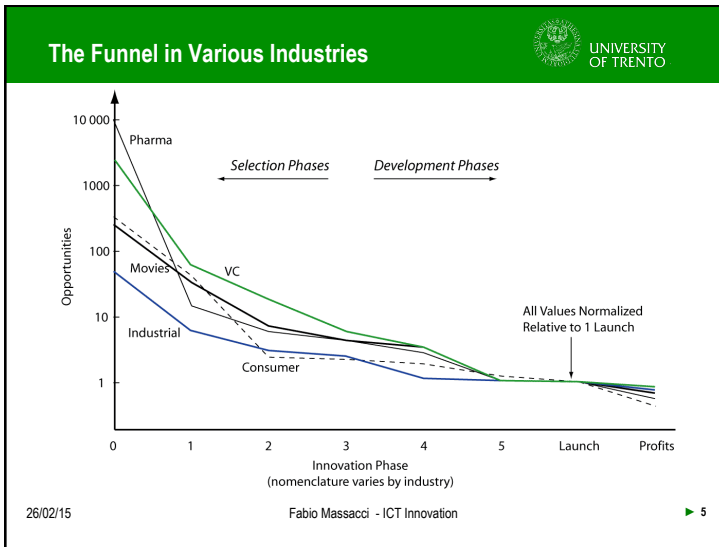
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Slide 4

Ideal PD&D Process

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- **Key Idea → Streamline and improve process trying to make (only) successful products emerge at the end**
- **Eliminate**
  - Concepts that look unpromising (business-wise)
  - Concepts that are unwieldy to design
  - Systems that are complex or expensive to build (well as intended)
  - Systems that are difficult to operate (as intended)
- **At all stages "value" based decision must be made based on**
  - Highest paid individual's opinion or
  - Experiments to check whether intuition is correct → easy for ICT product
    - with 3D printing reasonably easy for small manufactured products

Planning	Concept Development	System-Level Design	Detail Design	Testing and Refinement	Production Ramp-Up
Mission Approval	Concept Review	System Spec Review	Critical Design Review	Production Approval	

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The Funnel in Various Industries

Improved Variations

- **PD&D with fast prototyping cycle**

- **PD&D for complex systems**

Ideal PD&D Multi-disciplinary Team

From *Product Design and Development* by Karl Ulrich and Steven Eppinger (McGraw-Hill/Irwin)

Concept Development Process

- **CD is similar to PD&D**
- **Divided in several steps**
  - As PD&D not necessarily sequential → parallel and iterative steps
- **Covered in Chapter 4-8 in the Textbook**
- **Economic Analysis → Business Development Lab Course**

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Case Studies

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- **VHS vs Betamax**
- **Phonogram vs Gramophone**
- **Mac vs PC**
- **Windows Tablet, iBook, iPad**
- **Qwerty vs Dvorak**

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Textbook

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Product Design and Development
Karl T. Ulrich and Steven D. Eppinger
5th edition, Irwin McGraw-Hill, 2012
1. Introduction
2. Development Processes and Organizations
3. Opportunity Identification
4. Product Planning
5. Identifying Customer Needs
6. Product Specifications
7. Concept Generation
8. Concept Selection
9. Concept Testing
10. Product Architecture
11. Industrial Design
12. Design for Environment
13. Design for Manufacturing
14. Prototyping
15. Robust Design
16. Patents and Intellectual Property
17. Product Development Economics
18. Managing Projects

FIFTH EDITION

Product Design and Development

KARL T. ULRICH • STEVEN D. EPPINGER

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More Readings

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- **S. J. Liebowitz, S. E. Margolis. "Path dependence, lock-in and history. "**
  - http://www.utdallas.edu/~liebowit/paths.html
- **S. J. Liebowitz, S. E. Margolis. "The Fable of the Keys". Journal of Law and Economics , 1990**
  - http://www.utdallas.edu/~liebowit

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