IE 48G.01 SP TP

Technology Development Engineering

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Lecture 1: Intro to Technology Development & Methodologies

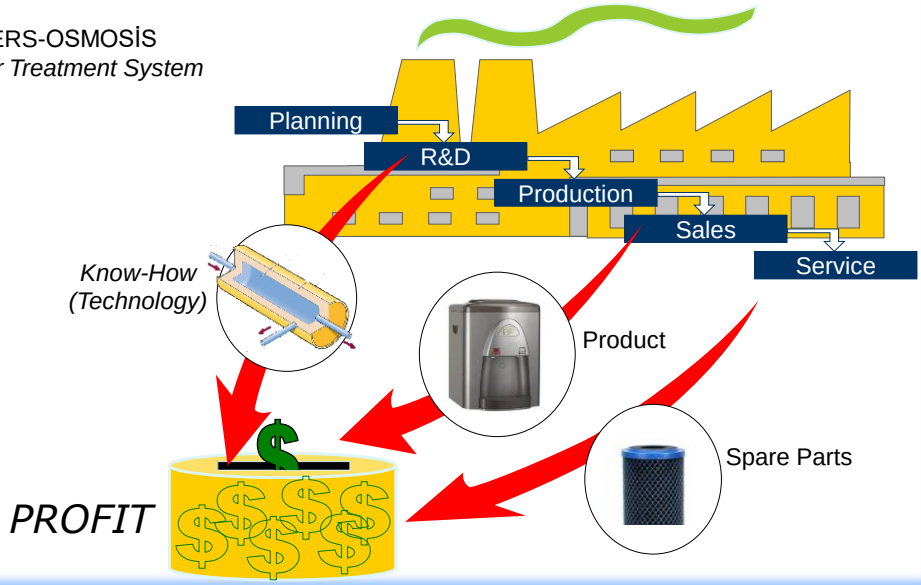
Profit Organizations

- There are many types of organizations.

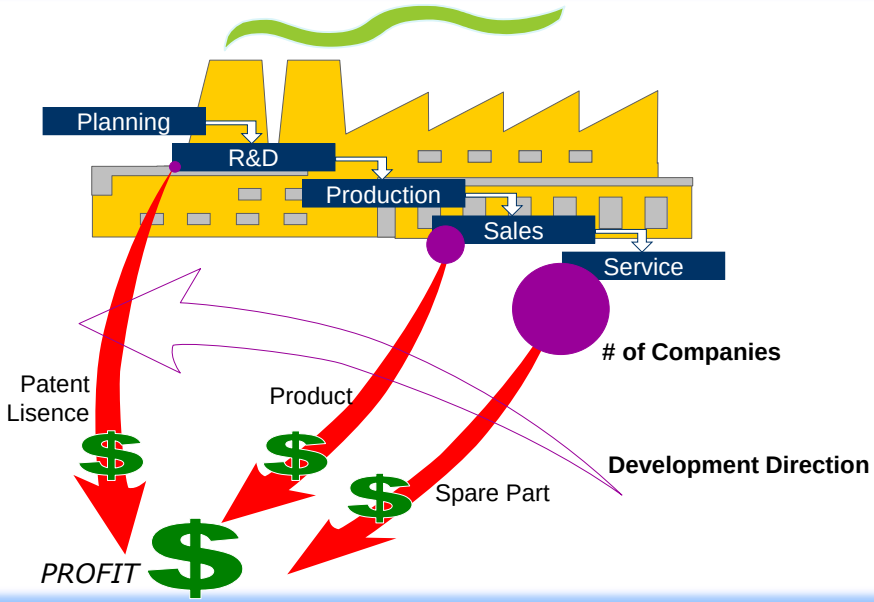
- We will talk about profit-oriented orgs.

Profit Departments in an Org

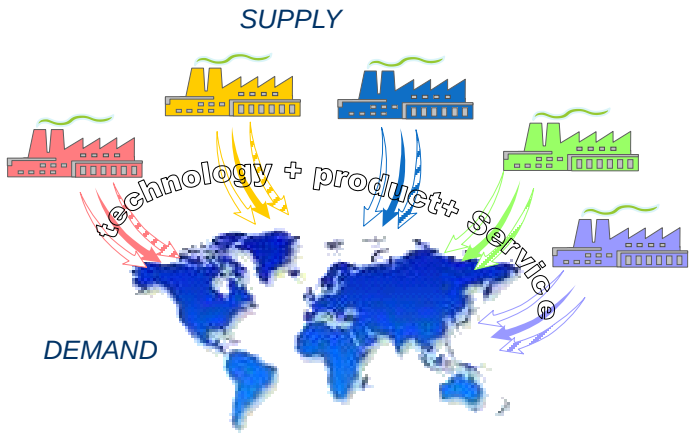
REVERS-OSMOSİS
Water Treatment System



Direction of Development in Industry



Global Competation



COMPETATION IN GLOBAL MARKET

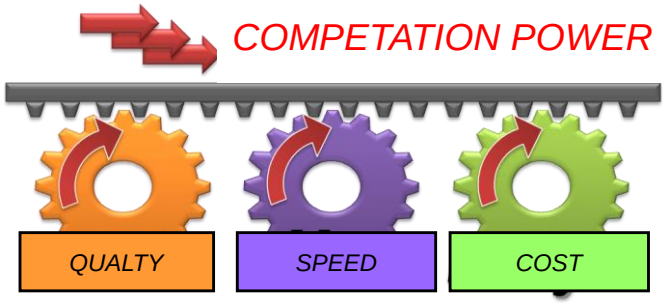
Dimensions of Competation

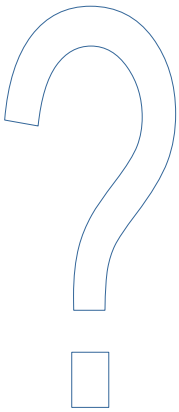
COMPETATION POWER

QUALTY	*SPEED*	*COST*
Performance *Reliability* *Duration/Life* *Service* *Aesthetics* *Extra Properties* *Standards* *Image*	*Market Research* *Planning* *R&D* *Production* *Packaging* *Testing* *Marketing* *Service*	*Retailer Profit* *Warranties* *Distributions* *Factory Profit* *Raw Material* *Infrastructure* *Labor* *Energy*

Improving Competation Power

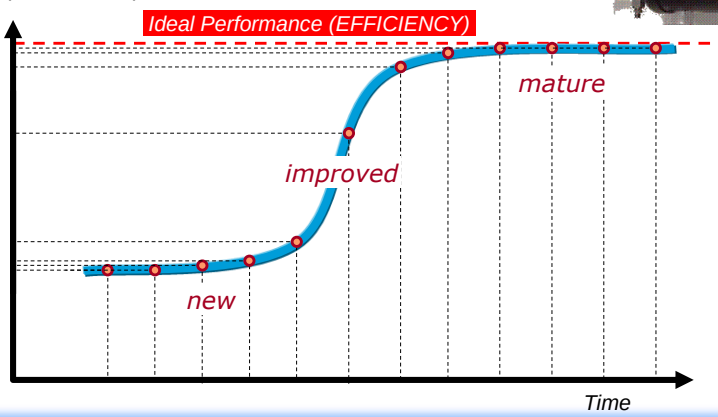
- What should be done to improve “Quality”, “Speed” and decrease “Cost”?





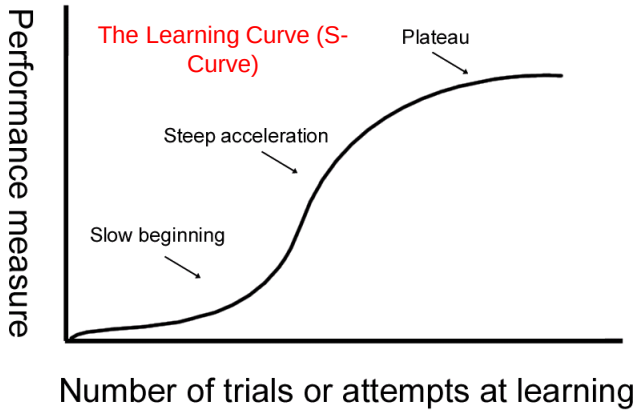
Improvements in Time

- ❑ Improvements on a product follow a natural trend.
- ❑ Improvements can be done gradually in time.

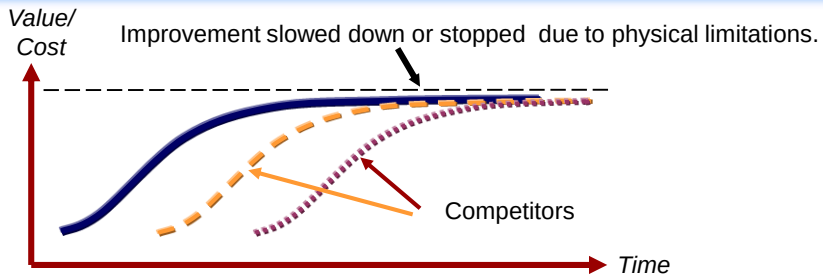


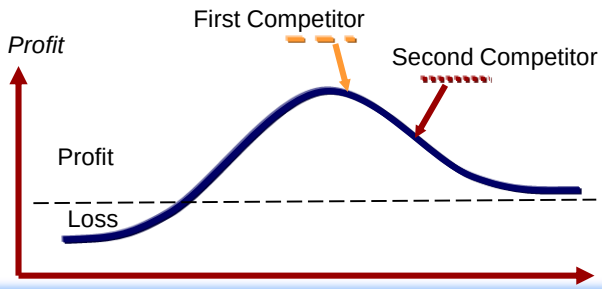
The Learning Curve

- Human learning or cognition commonly follows an S-Shaped Curve as a function of trial or time.

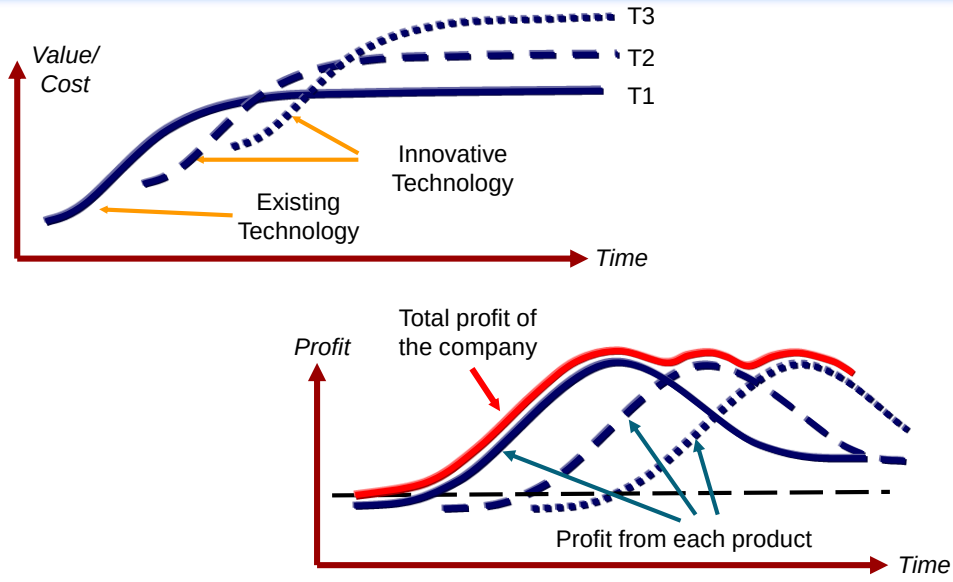


Profit as a Function of Quality and Time



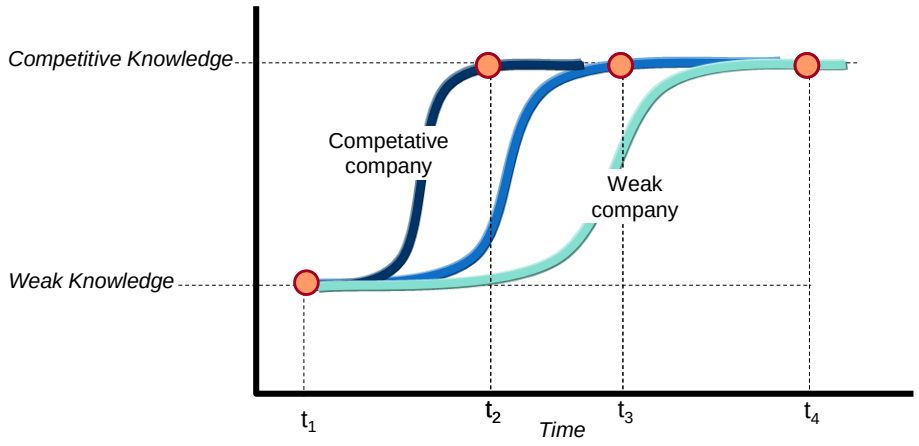


Continuous Profit through Using New Technologies



Speed on the S-Curve and Competitiveness

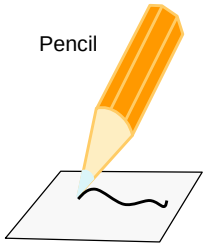
- Growing and developing companies follow the same path (S-Curve).
- Speed on the S-Curve determines the company's repetition in market.



Technology

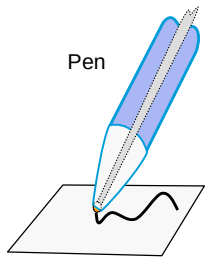
- Technology is making, usage or knowledge of physical or chemical principles or methods in order to solve a question or to perform a specific function.
- *The primary concern during technology development is to make the system work, not to lower the cost!*

Pencil



Physics
F:
L:
M:
G:

Pen



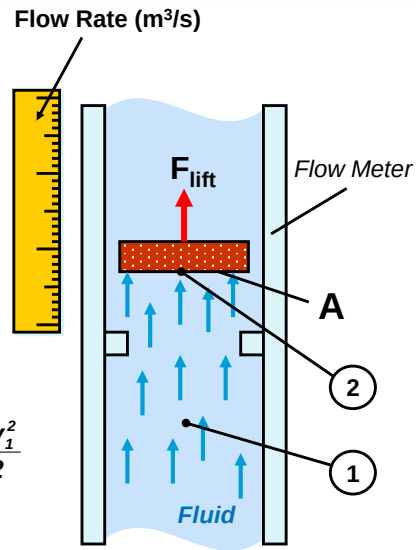
Physics
F:
L:
Gr:
S:
R:
C:

Sample Technology

Bernoulli Equation

$$\frac{\rho v^2}{2} + \rho g h + p = const.$$

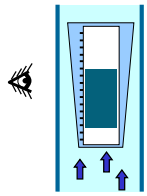
- v = fluid velocity at a point on a streamline
- g = acceleration due to gravity
- h = height of the point on the streamline
- p = pressure at the point on the streamline
- ρ = density of the fluid at all points on the streamline



$$\frac{\rho v_1^2}{2} + \rho g h_1 + p_1 = \frac{\rho v_2^2}{2} + \rho g h_2 + p_2 \Rightarrow p_2 = \frac{\rho v_1^2}{2}$$

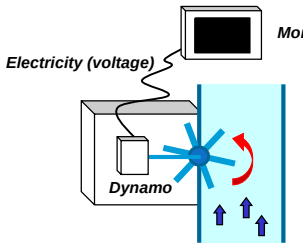
$$F_{lift} = A \times p_2 = A\frac{\rho v_1^2}{2}$$

Energy Transformation Samples



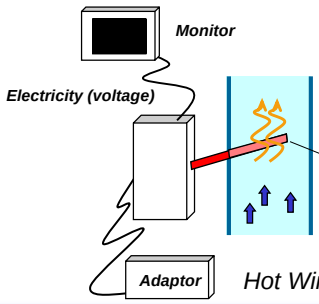
$\frac{1}{2} mV^2 \rightarrow PA \rightarrow F$

Tapered Tube Flowmeter



$\frac{1}{2} mv^2=1/2I\omega^2=V*I=W$

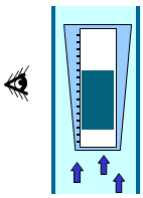
Paddle Wheel Flowmeter



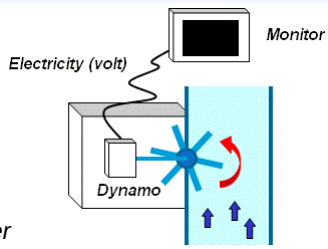
$Ah(\Delta T)=V*I=W$

Hot Wire Flowmeter

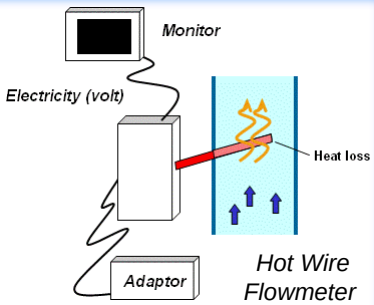
Sample Technologies and Products



Tapered Tube Flowmeter (Steam Flow)

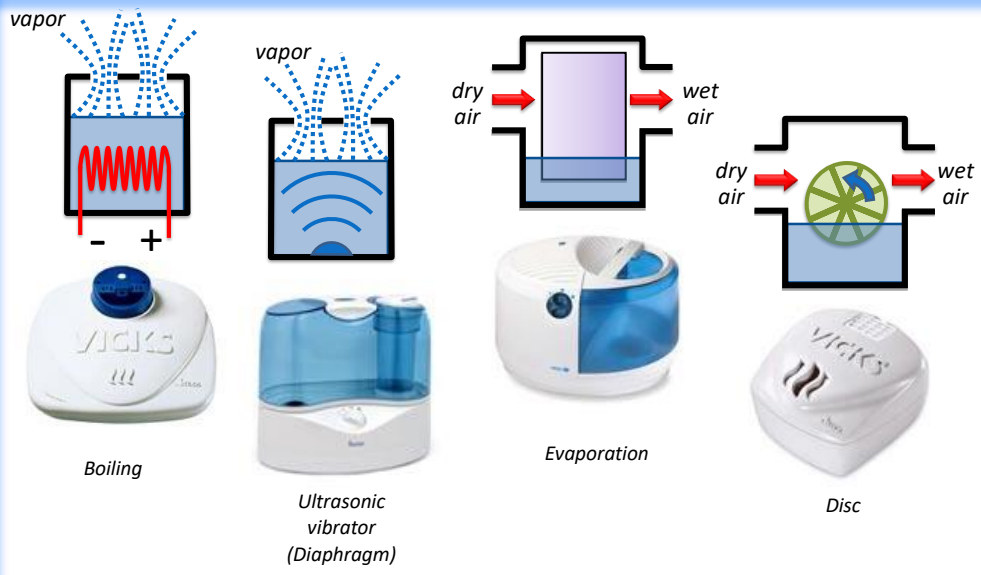


Paddle Wheel Flowmeter (Liquid Flow)



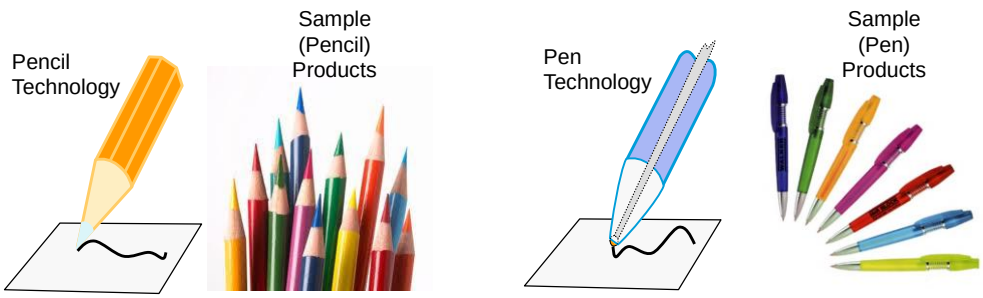
Hot Wire Flowmeter (Air Flow)

Sample Physical Working Principles: Humidifier



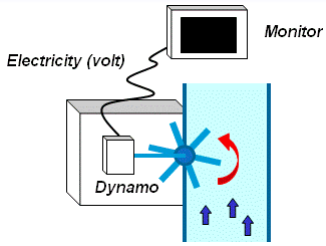
Product

- Product is an item ideally satisfying or responding to market needs or wants (such as high quality, low cost etc) by utilizing a technology (physical working principles).
- *The cost is one of the major concerns in a product (in contrary to technology)!*



Sample Technology and Products: Flow Meter

Technology: Paddle Wheel

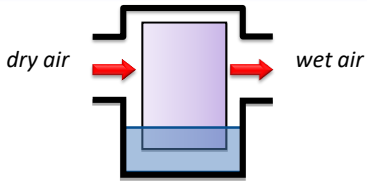


Commercial Product Samples

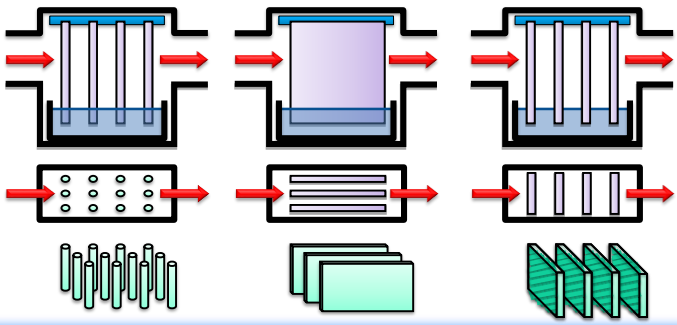


Sample Technology and Products: Humidifier

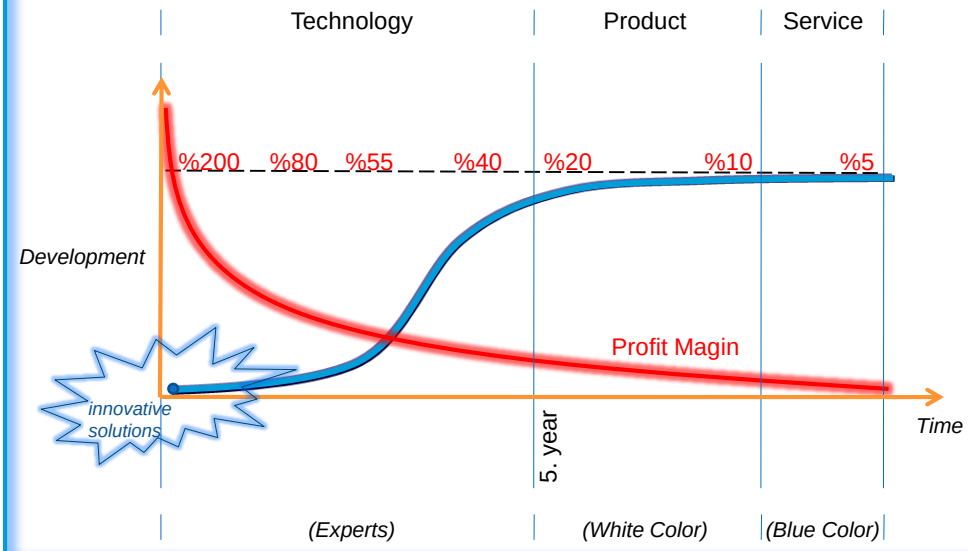
Technology: Evaporation



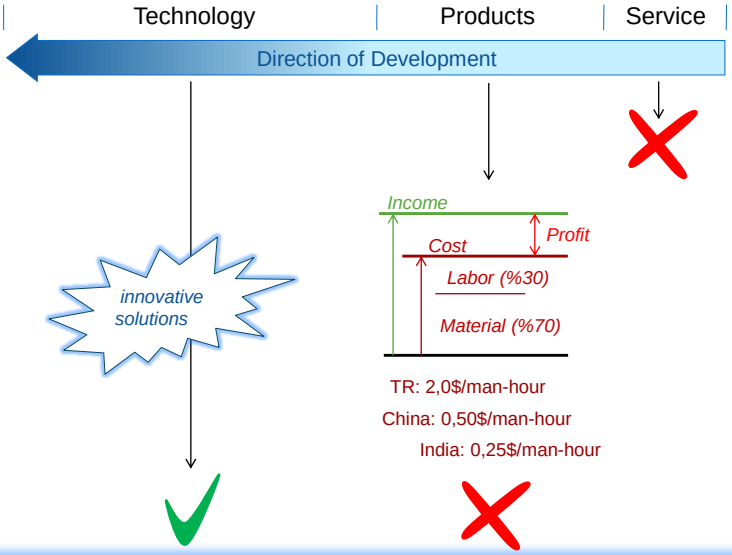
Commercial Product Samples



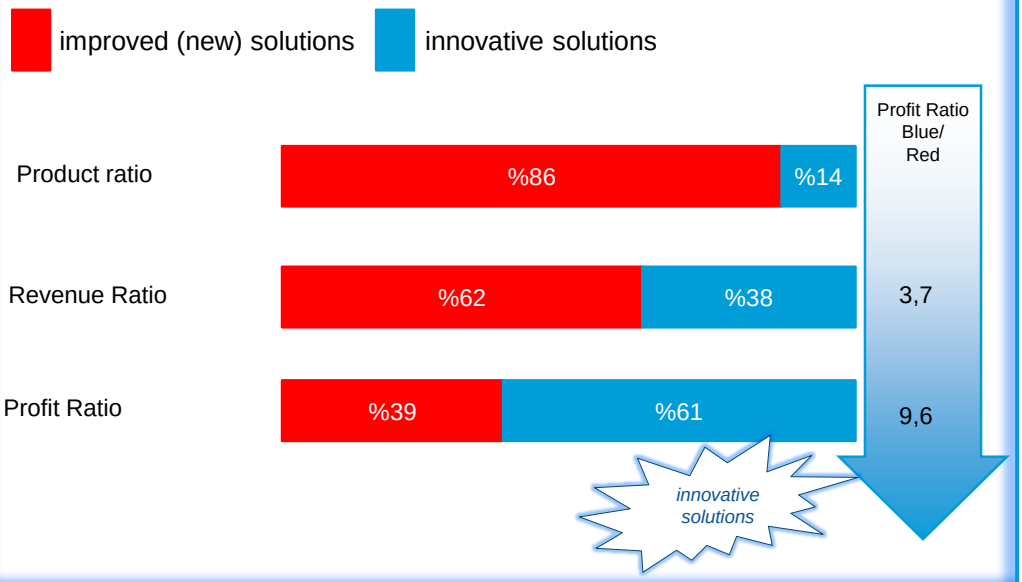
Company Capabilities and Profit Margins



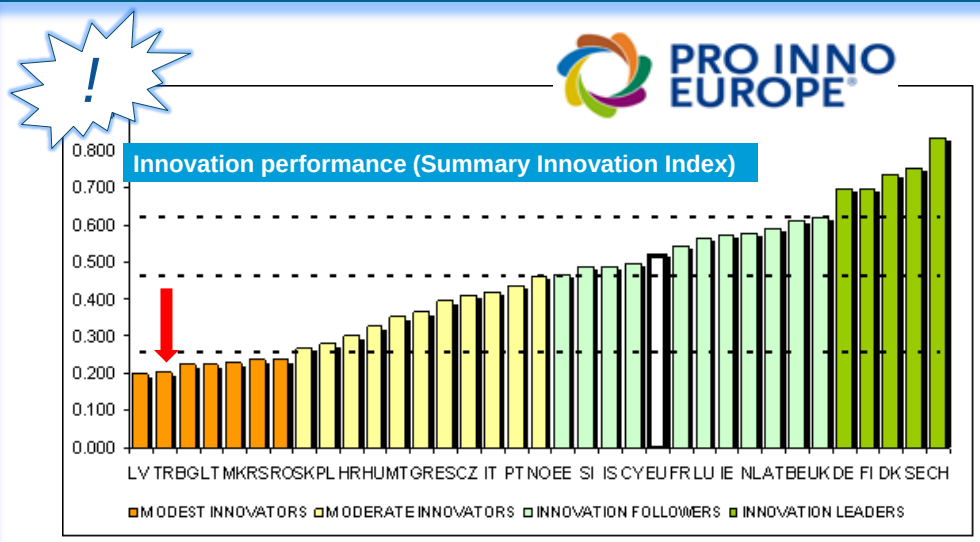
Investing into Future



Comparison of Competitor Companies

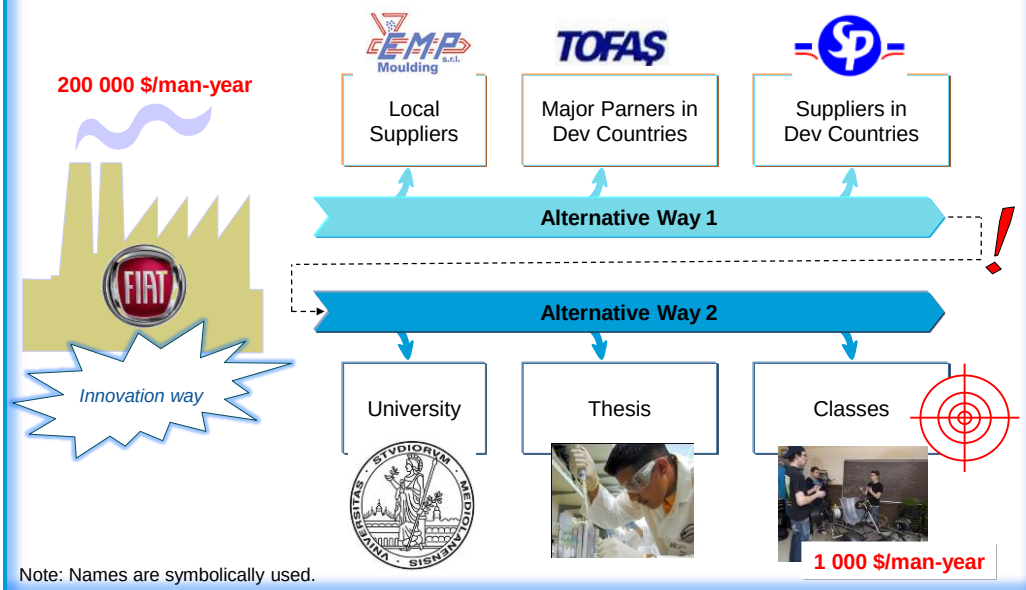


Position in Commercilization of Ideas



Is TR doing something wrong?

Idea/Innovation Sources of Companies



Note: Names are symbolically used.

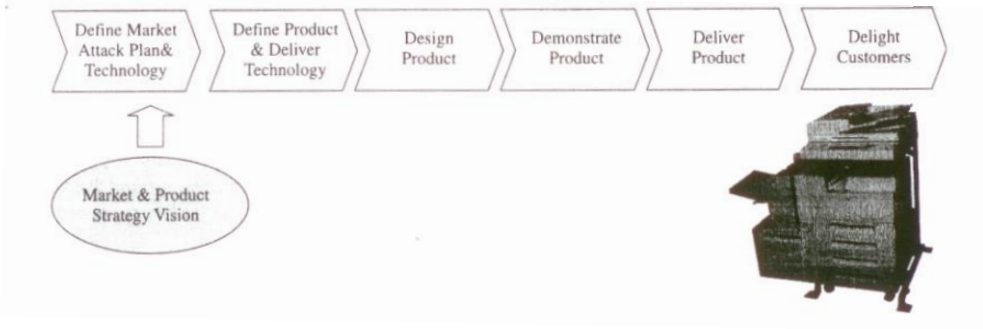
The Purpose

❑ The purpose of this course is to give chance the students to develop innovative solutions or technology ideas for products of their choices.

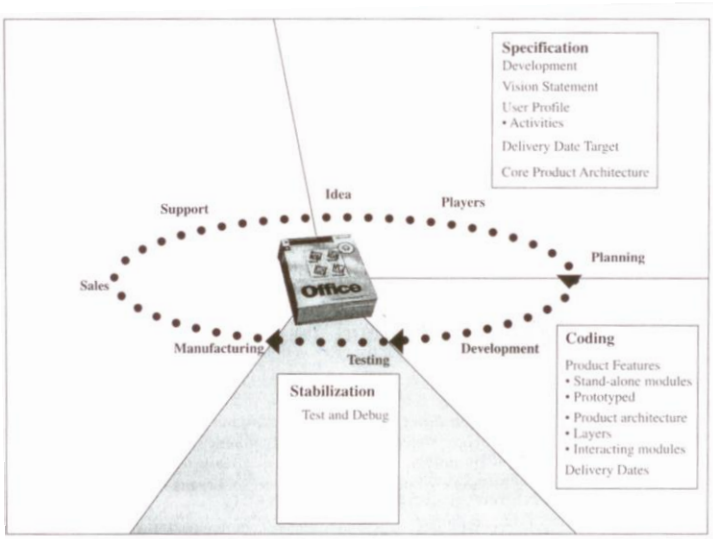



❑ Each group of students will take a product, understand its functions, identify technological solutions (physical working principles) that are in use, and develop an alternative (if possible superior) solution.

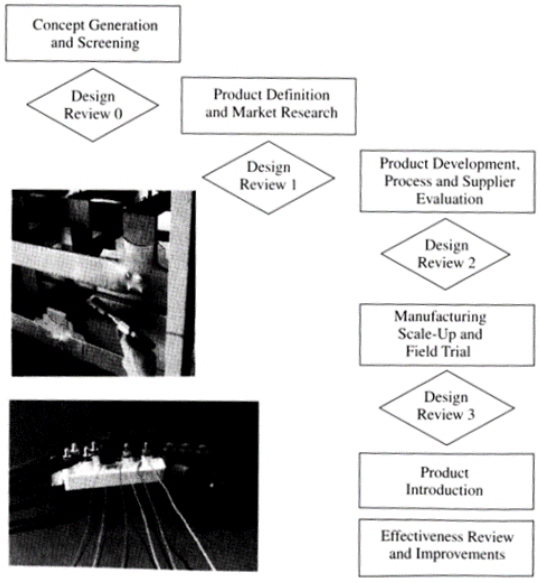
Xerox Product Design Process



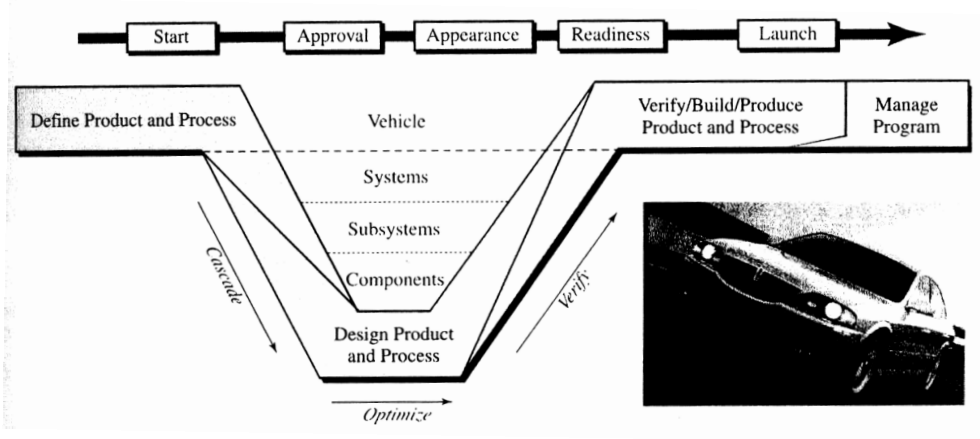
IBM Product Development Process



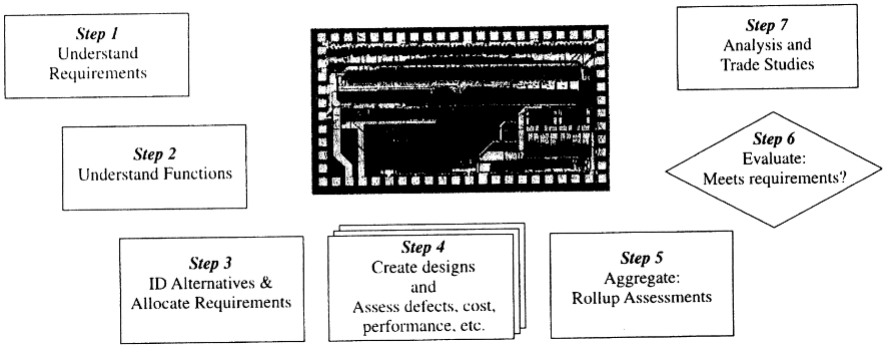
Raychem Product Design Process



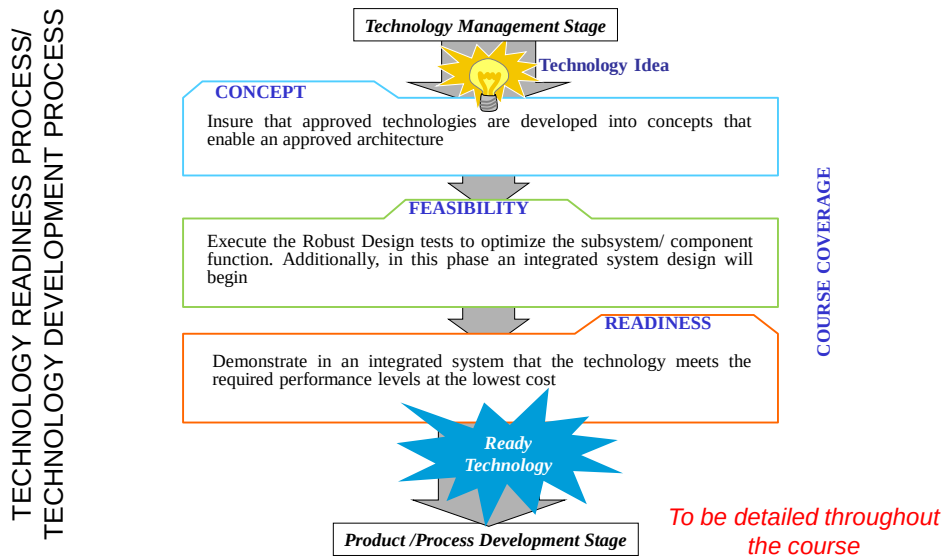
Ford Product Development Process



Raytheon Product Development Process



Our Approach in Technology Development



To be detailed throughout the course

Homework #1

1) Study sample (mostly used) physical or chemical working principles in products or processes in practice. (Try to find at least 5 principles).

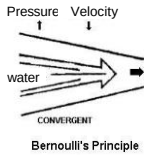
For example: Bernoulli Equation (characterizes liquid or gas flow in pipes)

2) Take sample products, identify some functions, and identify corresponding working principles behind them. (try to find at least 5 product functions and principles).

For example: Nozzle – Conditioning fluid flow (increasing velocity) – Bernoulli Principle

Shower head 

Nozzle 



Bernoulli's Principle