

Knowledge and
innovation management

UniversidadeVigo

FIRST DAY INTRODUCTION

Xosé H. Vázquez

<http://webs.uvigo.es/xhvv>

RULES
OF THE
GAME

1. What is this course about?

- a. Getting acquainted with innovation systems and institutions
- b. Systematizing innovation (Innovation Management)

COURSE LAYOUT

- Introduction: key concepts
- Part I: INSTITUTIONAL AND SYSTEM DYNAMICS OF INNOVATION
 - The role of innovation in economic growth
 - The knowledge economy
 - Ecosystems of innovation
- Part II: DEVELOPING INSIGHTS AND FORMULATING A STRATEGY
 - Competitive intelligence
 - Internal audit
 - Strategy design and control
- Part III: IMPLEMENTING INNOVATION STRATEGIES
 - Developing coherent projects and protecting results
 - Reforming organizational structures
 - Designing control systems and incentives

2. How are lectures organized?

a. Master sessions

- i. Read required readings previously
- ii. Listen and discuss with your teacher

b. Practical sessions

- i. Innovation Plan: you will work with your group and ask the teacher your questions.
- ii. [Simulations: I will be the leader and you will perform some activities as in a real situation.]

3. What kind of evaluation?

i. Master sessions:

i. Problem analysis/writing 20%

ii. Multiple choice test / short questions exam: 30%

ii. Practical sessions:

i. Innovation Plan: 40%

iii. Master and practical sessions:

i. Proactive attitude / debate in class: 10%

Total 100%

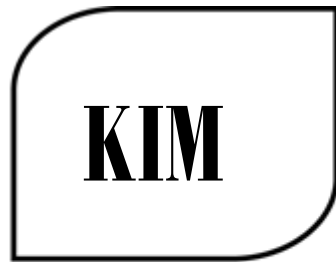
4. Where can you find me?

Office 266, Thursdays before or after class

(otherwise write to xhvv@uvigo.es and get an appointment).

5. Next steps right away?

- i. Register in FAITIC
- ii. Form a group
- iii. Choose an organization to develop its innovation plan



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SESSION 1

“INTRODUCTION”

Xosé H. Vázquez

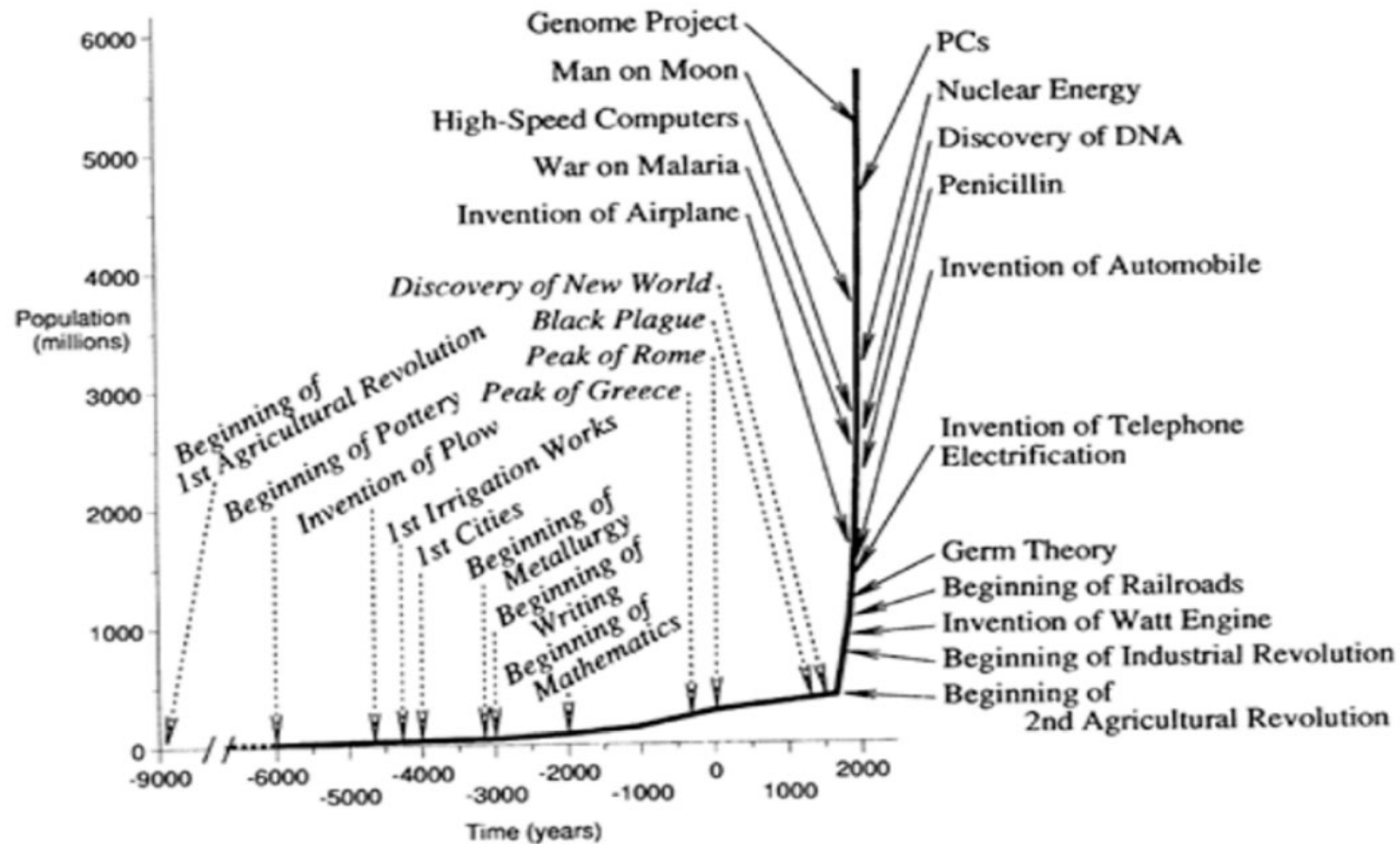
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SESSION CONTENTS

1. **The impact of innovation on society**
2. What is innovation exactly, anyway?
3. What do businesses search for with innovation?
4. What challenges do they face?
 - a) Systematize an innovation funnel
 - b) Discover... but nail it: invention vs. innovation
5. What activities does it involve?
6. Why then innovation management and how?

THE IMPACT OF INNOVATION ON SOCIETY

The growth of world population and some major events in the history of technology



Kurz, Heinz & Schuetz, Marlies & Strohmaier, Rita & Zilian, Stella. (2018). Riding a new wave of innovations. A long-term view at the current process of creative destruction. 44. 545-583.

THE IMPACT OF INNOVATION ON SOCIETY

Benefits

- Enhanced the **production of food**.
- Yielded **medical treatments** and improved **health conditions**.
- Enabled people to **travel and communicate**.
- Enlarged **leisure** options.
- Increased **life expectancy**.



Drawbacks

- Agricultural and fishing technologies have caused **erosion**, elimination of **natural habitats** and **depletion of ocean stocks**.
- Medical technologies have caused **antibiotic-resistant strains** of bacteria and **moral dilemmas**.
- Transport tech. have **spread viruses...**
- Communication tech. have created new **addictions**.
- Productivity has stirred **energy consumption, air and water pollution, traffic congestion...**

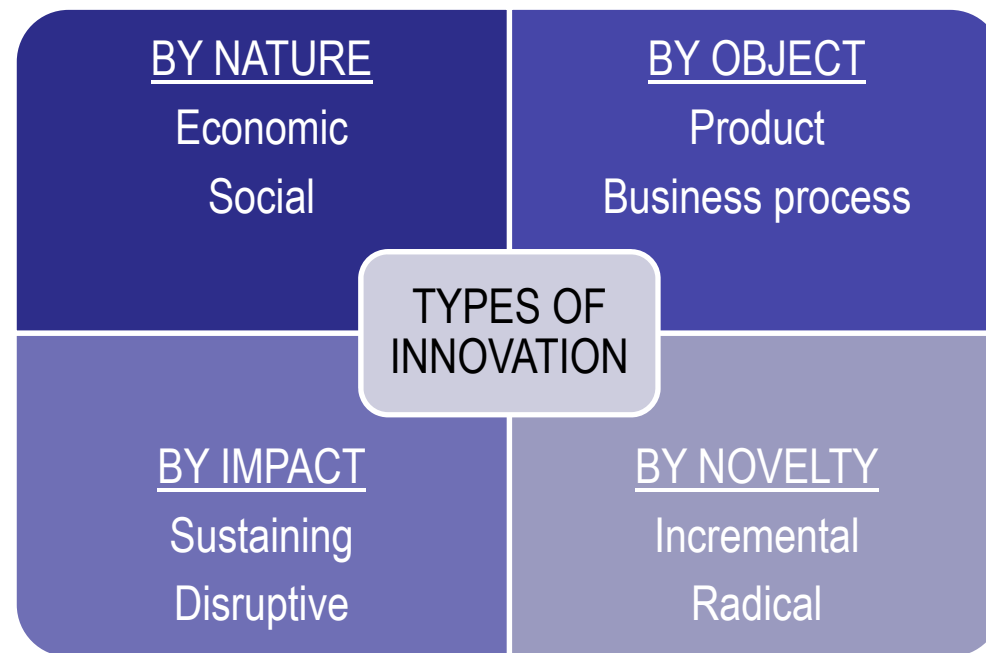
THE IMPACT OF INNOVATION ON SOCIETY

- Technology and innovation are essentially applied knowledge to solve or problems and pursue our goals.
 - But are all problems and goals legitimate? Sometimes technology and innovation are applied hastily, without full consideration of que consequences nor of the alternatives.
 - Can we deliver socially useful, responsible and profitable innovation? If there is a chance, it involves **innovation management**.



WHAT IS INNOVATION EXACTLY, ANYWAY?

- An **innovation** is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).



TYPE OF INNOVATIONS ACCORDING TO THEIR NATURE

- **Social innovation** are new social practices that seek new answers to social problems by
 - Identifying and delivering new services that improve the quality of life of individuals and communities: education, health, environment...
 - Identifying and implementing new labour market integration processes, new competencies, new jobs, and new forms of participation, as diverse elements that each contribute to improving the position of individuals in the workforce.
- Distinct from **economic innovation**:
 - It is not about introducing new types of production or exploiting new markets in themselves.
 - It is about **satisfying new needs not provided for by the market** (even if markets may intervene) or creating new, more satisfactory ways of giving people a place and a role in society.
- It may take place within the public or private sector, but it aims at extending and strengthening civil society.

TYPE OF INNOVATIONS ACCORDING TO THEIR OBJECT

- A **major change** for the definition of business innovation has been the reduction, informed by cognitive testing work, in the complexity of the previous list-based definition of four types of innovations (product, process, organisational and marketing), to **two main types**:
 - A **product innovation** is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market.
 - A **business process innovation** is a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes and that has been brought into use by the firm.

PRODUCT VS. BUSINESS PROCESS INNOVATION (more detailed)

- **Product innovation:** introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics.
- **Process innovation:** implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.
- **Marketing innovation:** implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.
- **Organisational innovation:** implementation of a new organisational method in the firm's business practices, workplace organisation or external relations.

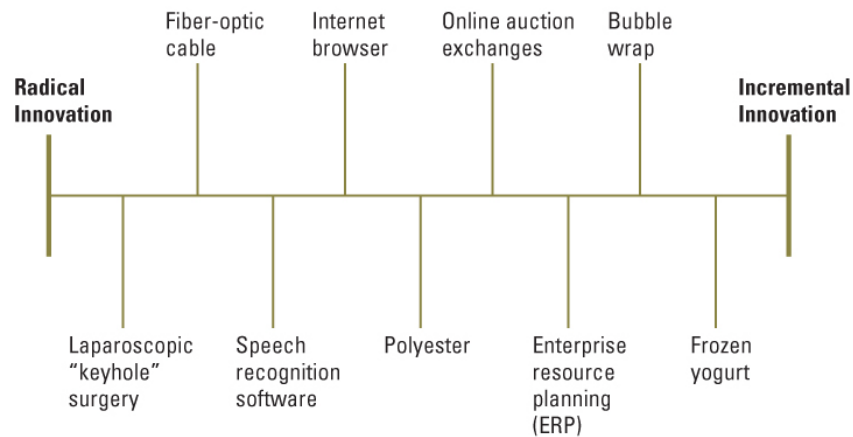
TYPE OF INNOVATIONS ACCORDING TO THE DEGREE OF ECONOMIC IMPACT

- **Sustaining innovations:**
 - Extend sales in an existing market, usually by enabling new products or services to be sold at higher margins.
- **Disruptive innovations:**
 - An innovation that has a significant impact on a market and on the economic activity of firms in that market.
 - These impacts can, for example, change the structure of the market, create new markets, or render existing products obsolete. However, it might not be apparent whether an innovation is disruptive until long after the innovation has been introduced.

TYPE OF INNOVATIONS ACCORDING TO THE DEGREE OF NOVELTY

- **Radical innovation**

- Fundamental changes and breakthroughs
- Evoke major departures from existing practices
- Can be highly disruptive
- Can transform or revolutionize a whole industry



- **Incremental innovation**

- Enhance existing practices
- Small improvements in products and processes
- Evolutionary applications within existing paradigms

WHAT DO BUSINESSES SEARCH FOR? OBJECTIVES OF INNOVATION

- **Competition, demand and markets**

- Replace products being phased out
- Increase range of goods and services
- Develop environment-friendly products
- Increase or maintain market share
- Enter new markets
- Increase visibility or exposure for products
- Reduced time to respond to customer needs

- **Production and delivery**

- Improve quality of goods and services
- Improve flexibility of production or service provision
- Increase capacity of production or service provision
- Reduce unit labour costs
- Reduce consumption of materials and energy
- Reduce product design costs
- Achieve industry technical standards

- Reduce production lead times
- Reduce operating costs for service provision
- Increase efficiency or speed of supplying and/or delivering goods or services
- Improve IT capabilities

- **Workplace organisation**

- Improve communication and interaction among different business activities
- Increase sharing or transferring of knowledge with other organisations
- Increase the ability to adapt to different client demands
- Develop stronger relationships with customers
- Improve working conditions

- **Other**

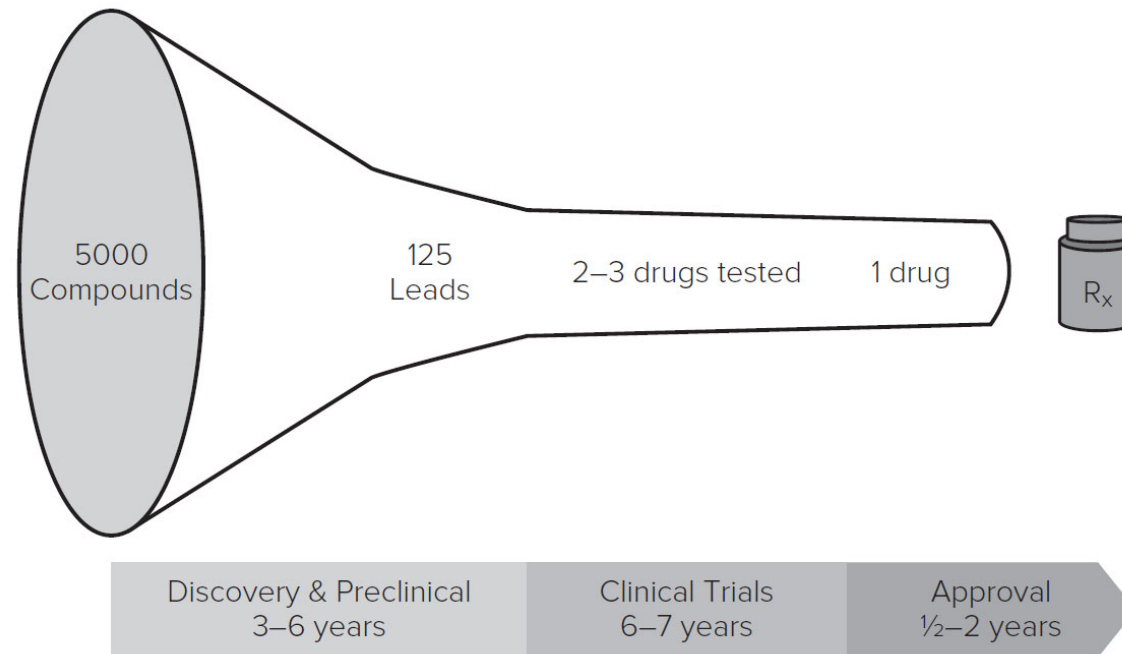
- Reduce environmental impacts or improve health and safety
- Meet regulatory requirements

WHAT DO BUSINESSES SEARCH FOR?

(operational) IMPACTS AND (strategic) OUTCOMES

- **Impacts** of innovations on firm performance range **from effects on sales and market share to changes in productivity and efficiency**. Important impacts at industry and national levels are changes in international competitiveness and in total factor productivity, knowledge spillovers of firm-level innovations, and an increase in the amount of knowledge flowing through networks.
- The **outcomes** of product innovations can be measured by the **percentage of sales derived from new or improved products**.

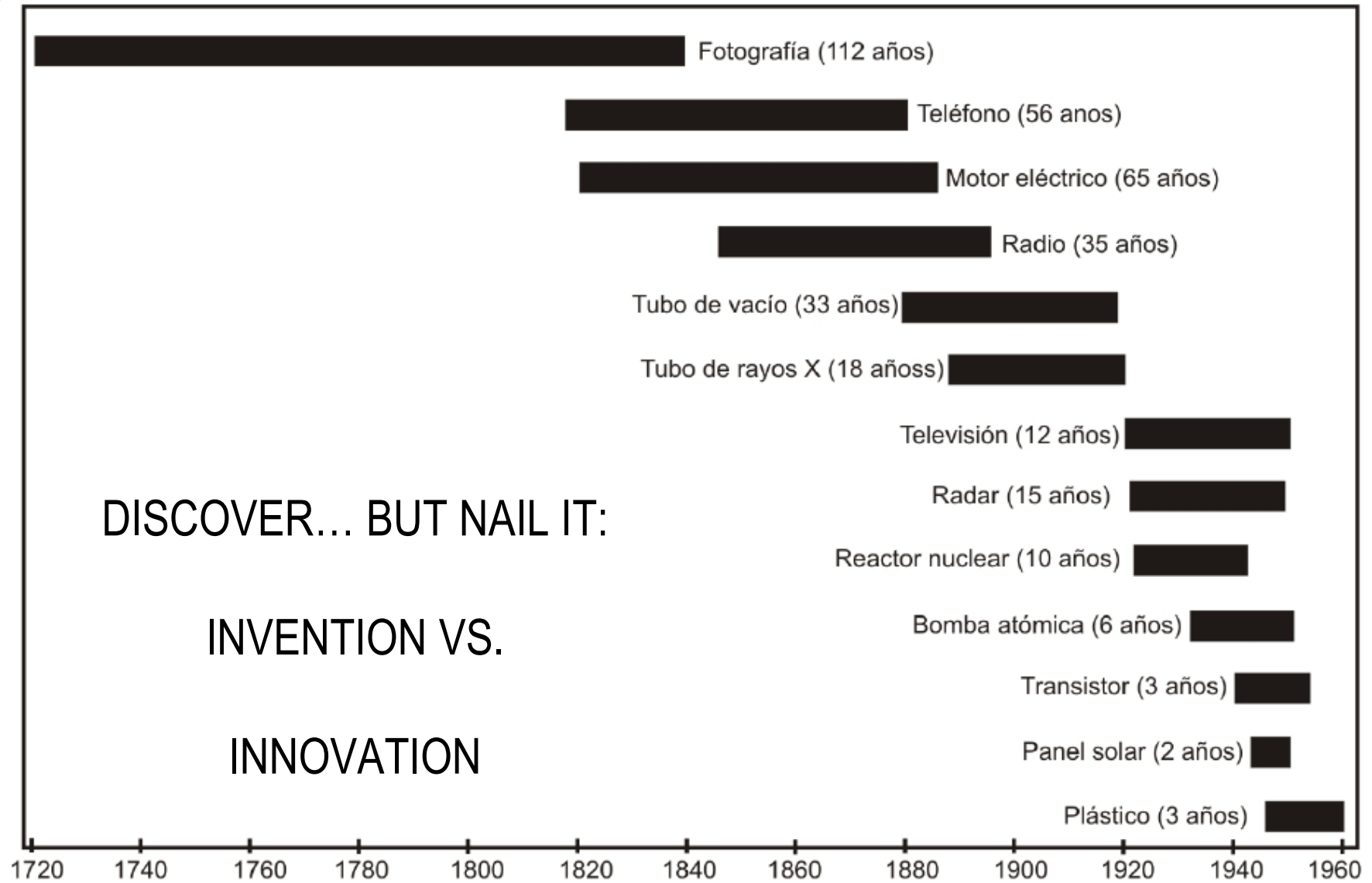
WHAT CHALLENGES DO THEY FACE? CREATE AND SYTEMATIZE AND INNOVATION FUNNEL



DISCOVER... BUT NAIL IT: INVENTION VS. INNOVATION

New concept	Invention	Innovation	
Automatic trawling.....	1904	1939
Pen.....	1888	1946
Cinerama.....	1937	1953
Continuous casting of Steel..	1927	1952
Diesel locomotive.....	1895	1913
Fluorescent lighting.....	1901	1938
Helicopter.....	1904	1936
Insulin.....	1920	1927
Jet engine.....	1928	1941
Tape recorder.....	1898	1937
Penicillin.....	1928	1943
Power steering system.....	1925	1930
Radar.....	1925	1934
Radio.....	1900	1918
Synthetic laundry detergent..	1886	1928
TV.....	1923	1936
Synthetic fiber.....	1941	1955
Titanium.....	1937	1944
Transistor.....	1948	1950
Xerography.....	1937	1950
Zipper.....	1891	1923
Stainless Steel.....	1904	1912

DISCOVER... BUT NAIL IT:
INVENTION VS.
INNOVATION



WHAT ACTIVITIES DOES IT INVOLVE?

- Eight broad types of activities that firms can undertake in pursuit of innovation (Oslo manual, 2018):
 1. research and experimental development (R&D) activities
 2. engineering, design and other creative work activities
 3. marketing and brand equity activities
 4. IP-related activities
 5. employee training activities (only to use or implement innovations)
 6. software development and database activities
 7. activities related to the acquisition or lease of tangible assets
 8. innovation management activities.

WHAT ACTIVITIES DOES IT INVOLVE?

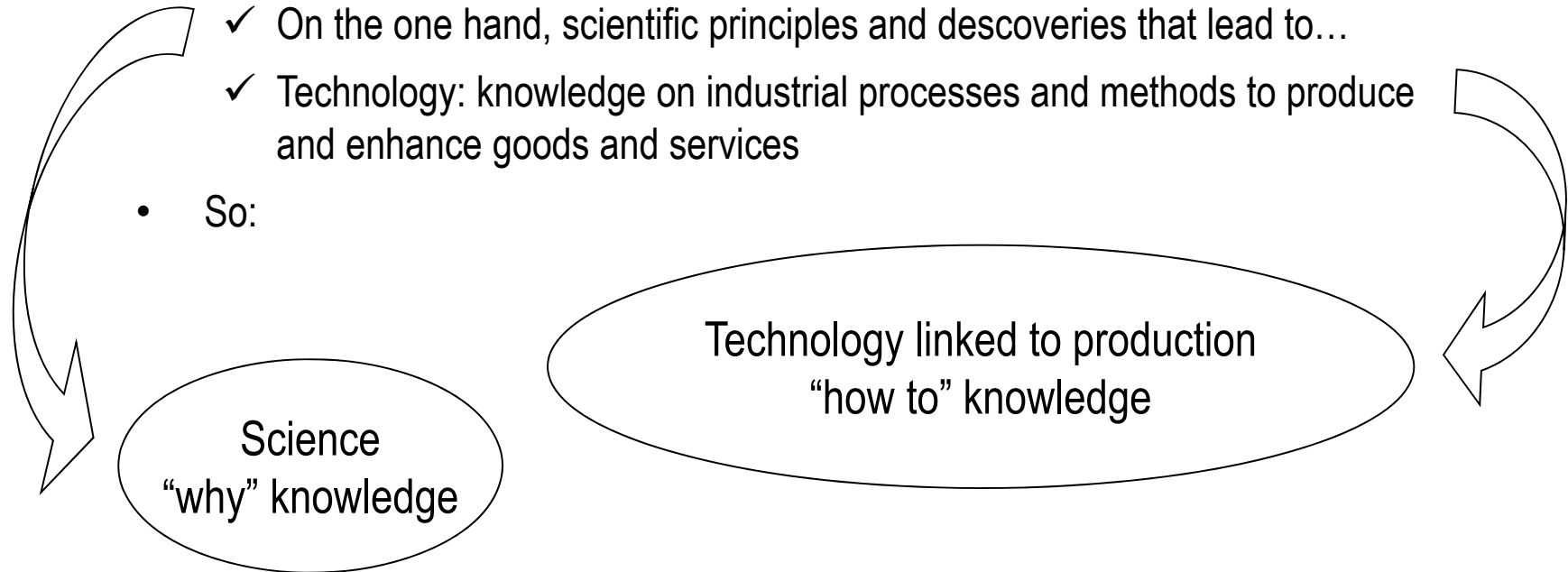
The specific case of R&D

- Research and experimental development (R&D) comprises creative and systematic work undertaken in order to increase the stock of knowledge and to devise new applications of available knowledge. According to the Frascati Manual 2015 definition, R&D activities must meet five criteria: (i) novel; (ii) creative; (iii) address an uncertain outcome; (iv) systematic; and (v) transferable and/or reproducible.
- R&D comprises basic research to advance **science**, as well as applied research and experimental development to produce **technology**.

WHAT ACTIVITIES DOES IT INVOLVE?

SCIENCE AND TECHNOLOGY

- Important to differentiate science from technology:
 - ✓ On the one hand, scientific principles and discoveries that lead to...
 - ✓ Technology: knowledge on industrial processes and methods to produce and enhance goods and services
- So:



- Both components are important, but not all countries find the right balance.
 - ✓ Think about this: which has the highest impact in the short term?

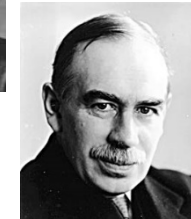
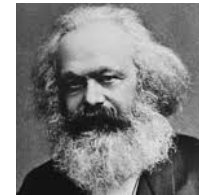
WHAT ACTIVITIES DOES IT INVOLVE?

SCIENCE AND TECHNOLOGY

- One of the multiple possible definitions:
 - ✓ Body of knowledge derived from research or experience, which together with production, marketing and management methods, facilitates the generation of new or enhanced products and services. Technology can therefore be the knowledge of techniques, processes, and the like, or it can be embedded in machines.
- Ergo:
 - ✓ Technology is more than machines or equipment: it is the sum of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation.
 - ✓ Technology influences innovation capacity.

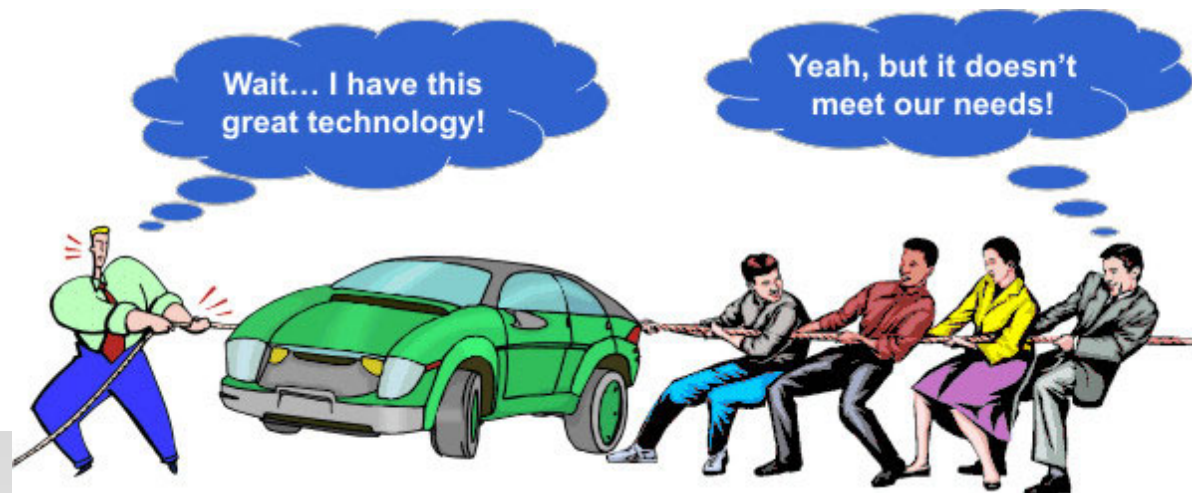
WHY THEN INNOVATION MANAGEMENT AND HOW?

- Change pushes economic and political theories forward (and drives management thinking in particular).
 - a) XVIII and XIX centuries: technology as an exogenous variable: Adam Smith
 - b) XVIII and XIX centuries: technology as an exogenous variable: Karl Marx
 - c) First half of the 20th century: J. Schumpeter
 - d) Mid-1950s: Abramovitz, Solow
 - e) Degrowth theories



WHY THEN INNOVATION MANAGEMENT AND HOW?

- Innovation frameworks have changed: things are more complex and innovation management evolves to tackle this complexity.
 - First generation TECHNOLOGY-PUSH
 - Second generation MARKET-PULL
 - Third generation MIXED MODEL
 - Forth generation INTEGRATED MODEL
 - Fifth generation NETWORK MODEL



WHY THEN INNOVATION MANAGEMENT AND HOW?

- Innovation strategy addresses economic and technological uncertainty.



INNOVATION PROCESS DIAGRAM

