

# Measuring ICT related innovations

By

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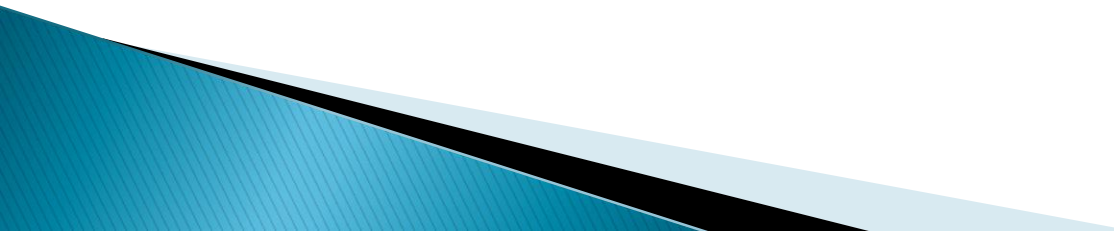
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# Innovation

- How to *define* innovation ?
  - How to *measure* innovation ?
  - How to *explain* innovation ?
  - How to *promote* innovation ?
  - Do *cities* matter ?
  - What role for the *university*
- 

# Defenition of Innovation\*

The design, invention, development and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating **new value** for customers and financial returns for the firm

real

\*Innovation Measurement  
A Report to the Secretary of Commerce  
January 2008





Laplas 



# Innovation – What Is It?

- ▶ Innovation
  - incremental and emergent or radical and revolutionary changes in thinking, products, processes, or organizations.
  - innovation, ideas applied successfully in practice Schumpeter (1934),
- ▶ Innovation translates brainpower into jobs and wealth.
- ▶ Limiting ‘innovation’ measurement to patents in a services, knowledge economy is limiting.
- ▶ Innovation Index is our first attempt to generate an overall picture of a region’s capacity to transform its economy in the global context – especially in rural and other areas not usually thought to be innovation centers

# What is innovation?

## ▶ Innovation is the implementation of:

- New or significantly improved *product* or *process*;
- New *marketing* or *organisational* method.

### *Implementation:*

- A new or improved product is implemented when it is introduced on the *market*;
- New processes, marketing methods or organisational methods are implemented when they are brought into actual use in the *firm's operations*.

# Types of innovation – example

## ► Innovation in a restaurant:

- **Product innovation:** delivery (new service);
- **Process innovation:** new type of oven (new equipment used in the production process);
- **Organisational innovation:** new delivery unit (new organisational unit/model);
- **Marketing innovation:** billposting (new media for promoting the delivery service).



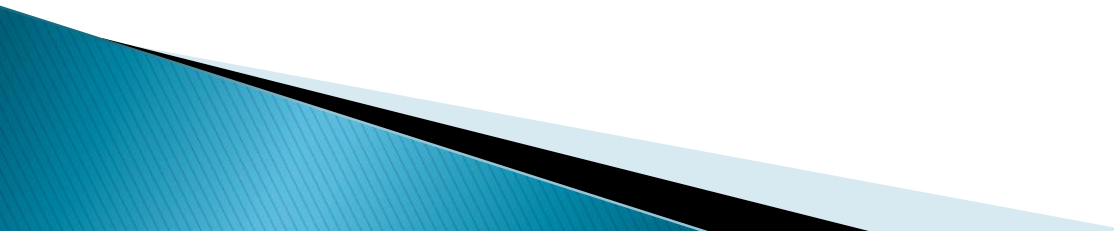
# Slogan of ICT as Enabler

- ▶ In last few years all countries especially those involved in WSIS meetings and forums have developed many indicators which shows the applicability and penetration rate of ICT in targeted countries especially by the ITU and IDI
- ▶ The need to monitor these progress is very important for any happy ending but some new indicators are needed to somehow show how important are these applications in their daily life and especially for their economy.

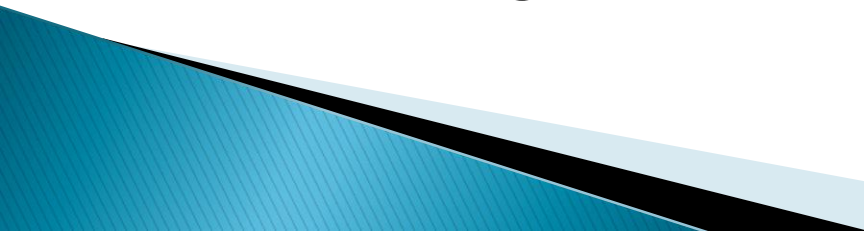
# Innovation as Enabler

- ▶ The role of innovation in economy has been bold recently by many researchers. Beside of selling raw material as starting point of wealth generation, the innovation is the key success factor for economy of developed countries but not promoted by international bodies.
- ▶ For example Patent Registration in USA lasted to more than 100 years ago. But still many undeveloped countries have not established solid and firm organization or prepared required legislations for this matter yet.
- ▶ This immaturity mainly is due to lack of understating of its important

# Innovation as Enabler

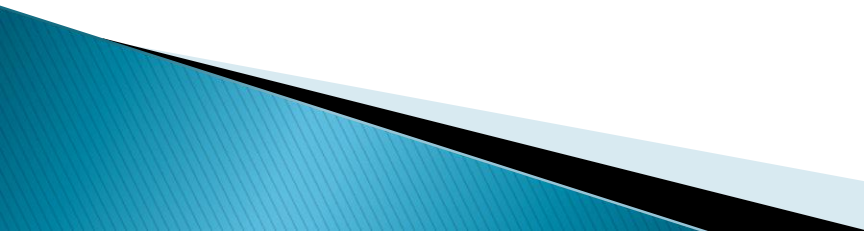
- ▶ The progress rate of knowledge based economy is much higher than energy based economies( human forces, raw material resource).
  - ▶ Therefore emphasis on creation of innovation in all its types should be the focus of these meeting beside of promoting of ICT applications.
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# ICT innovation

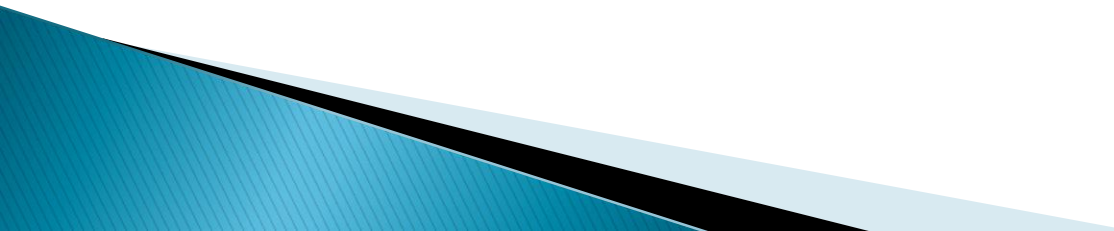
- ▶ The role of ICT in economy would be highlighted through new innovation based services (compared to adopted services from outside) rather than imported unmatched or outdated services or products from developed countries toward opposite side.
  - ▶ The creation of ICT based innovation in undeveloped countries should be managed and leaded based on best adoption of ICT for economy growth of each country.
- 



# Innovation measurement

- ▶ The contribution of innovation in ICT applications and ICT based innovation in economy should be fairly treated locally and globally beside of other factors
  - ▶ All ICT indicators which have been recommended to be measured and promoted is based on ICT applicability (“prove of concept” for ICT).
  - ▶ This phase of embracing of ICT products is very necessary but not enough to be a driver for knowledge based economy.
  - ▶ Promoting and developing the ICT infrastructure in undeveloped countries always not ended to better economy.
  - ▶ In some cases it can increase the level of consumption rather than production
- 

# Innovation Management

- ▶ The main solution to this mentioned problem (consumption rather than production ) is to produce the any new innovation based ICT service and products.
  - ▶ Compared and similar to other technologies that developed countries have invented and mass produced and sold to all undeveloped countries, the ICT products are in the same track.
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# Impact of ICT


- ▶ The undeveloped countries in Africa and Mideast are more vulnerable to same problems “mass consumption rather than involvement in production
- ▶ Borderless production and distribution and consumption of ICT related products make it more harmful for undeveloped countries rather enabling drive force.
- ▶ Fore example in My country still we importing the content, hardware and software in rate of 80– 90 %.

# Impact of ICT

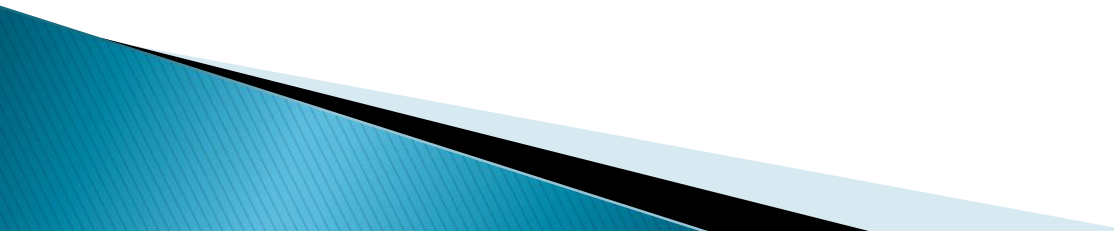
- ▶ In return we exporting our national and personal information at no cost. Even unknowingly we accepted the cost of our private information delivery to some Agents, organization and companies in developed countries (East and West)!! (PRISM, Echelon, ... projects)
- ▶ Therefore the only way to reduce the negative side effects of ICT highly penetration, while enjoying the ICT applicability, is to produce the ICT based services and products and markets which could be exported based on its novelty not only based on total cost ( like low cost of “call centre services” in India or Philippines).



# Innovation in ICT for Economy Growth

- ▶ It should be a new service or products, globally or locally accepted, which can be delivered to whole world at no or low cost.
  - ▶ The need for innovations in ICT should make all ICT enabling projects in-line with innovation rather than only consumption with too many side effects.
  - ▶ The monitoring and measuring the innovation in all area especially ICT need new indices and indicators.
  - ▶ Some times the measurement have been done in under developed country only for purpose of as national prides ( participation in many Scientific Olympiads like Robotic, Software Programming, and so on rather than monitoring it as an enabler factor in their economy .
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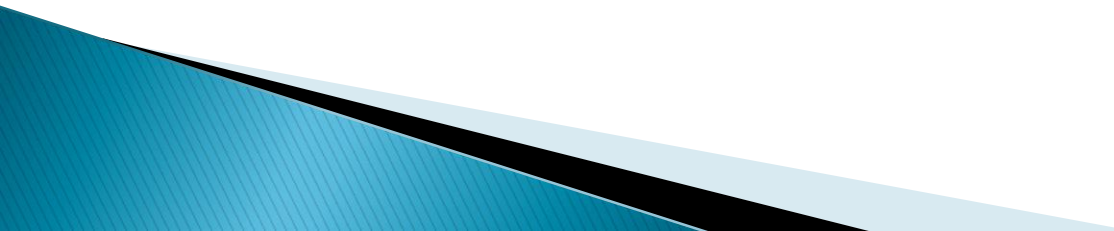
# Some raw indicators

- ▶ Some raw indicators have been developed and randomly monitored by government for several years for many purposes which misleading the impact of ICT innovation in economy.
  - ▶ These indicators are mostly based on statistical facts which can be measured but not giving any sense of importance in leading the innovation.
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# Key factor Innovation Index

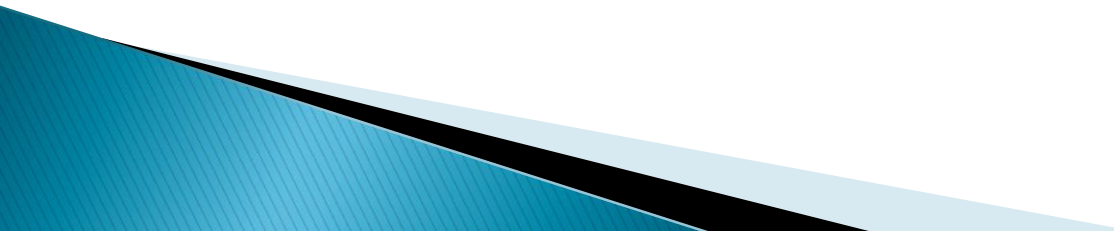
- ▶ Export of high-tech goods
  - ▶ Service exports
  - ▶ Foreign direct investment flows
  - ▶ index innovative activities by identifying those specific factors with the greatest influence on economic growth, while controlling for some non-innovation factors. Interpreting this index is simpler than the portfolio approach because there is only one output measure—economic growth
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# Indicators

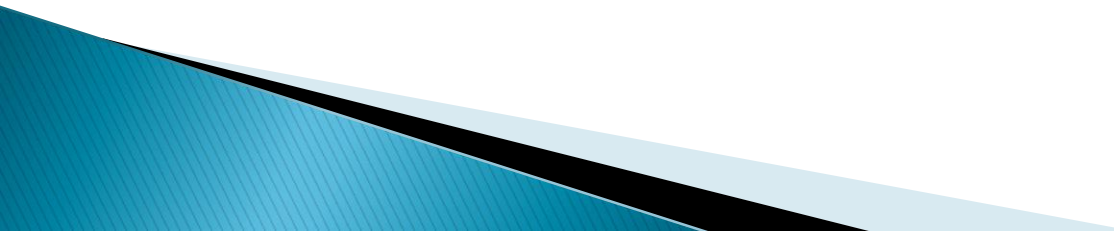
- ▶ The number of startup companies have been registered with new Idea
  - ▶ The number of startup companies have been established (more than one year)
  - ▶ The number of ICT Incubators has been established by Government or Private Sector.
  - ▶ The percentage of students in ICT related majors to number of ICT based companies
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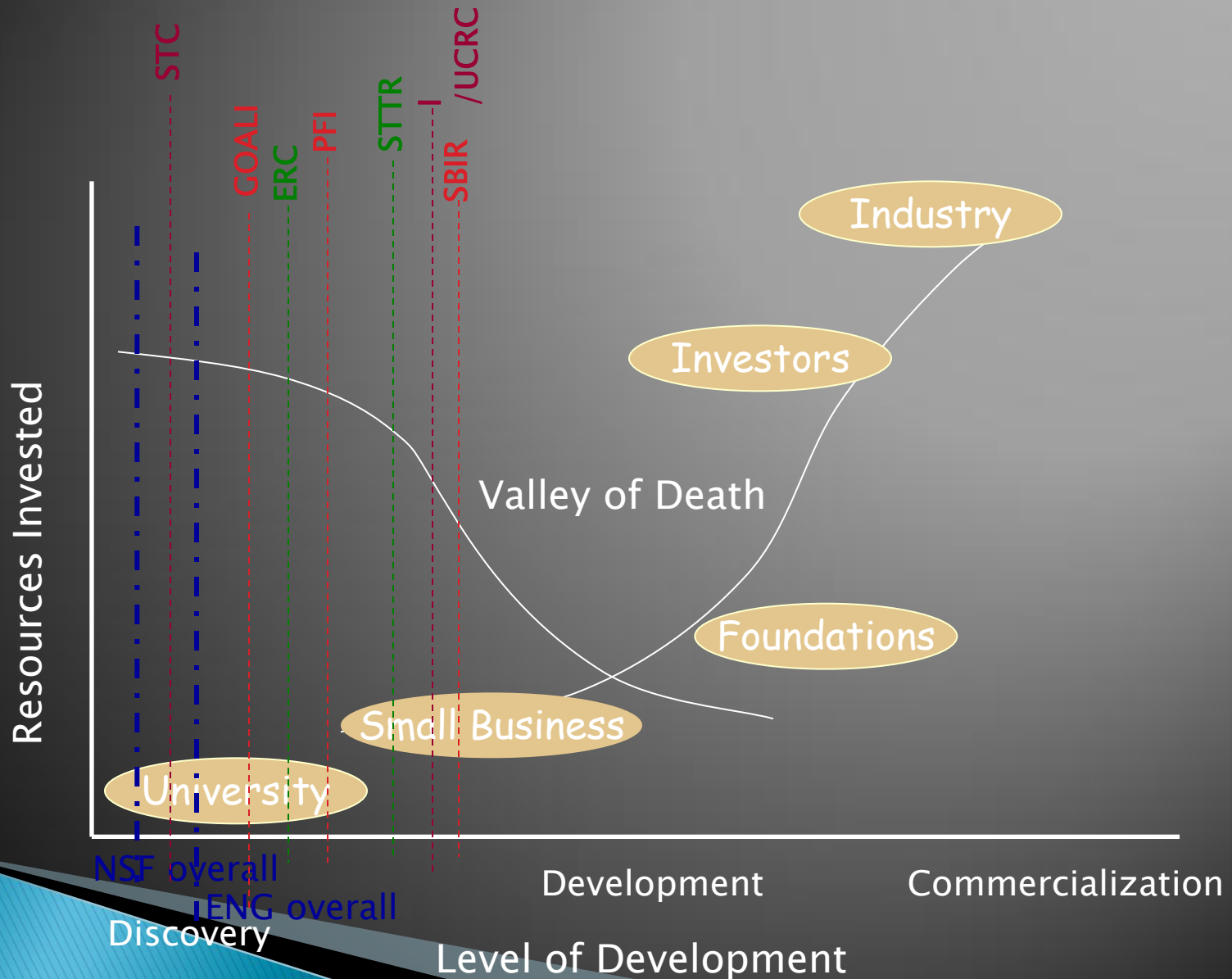
# Indicators

- ▶ Number of Technology Parks and Incubator related to ICT
  - ▶ The percentage of innovation promotion for ICT sector
  - ▶ The percentage of ICT related patents compared to all registered patents
  - ▶ The number of courts for ICT related cases
  - ▶ The number of Law and Legislation for protection of ICT intellectual property.
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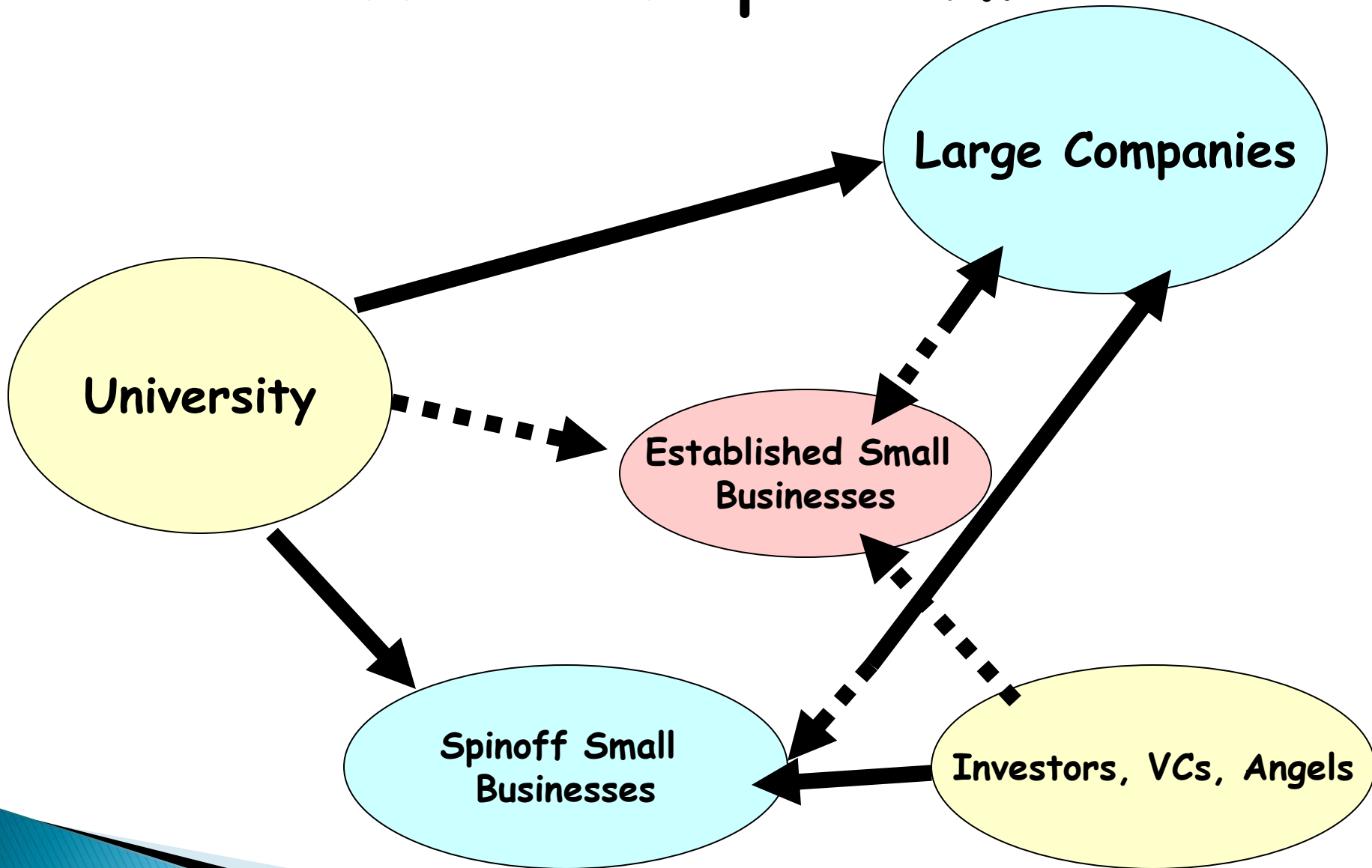
# Challenges

- ▶ What effective indicators to promote rather than monitoring should be adopted
  - ▶ Which process and requirement are needed for measurement (missing and irregular data)
  - ▶ How To incorporate these indicator into planning and budgeting for ICT Innovation.
  
  - ▶ Data confidentiality;
  - ▶ Data reliability.
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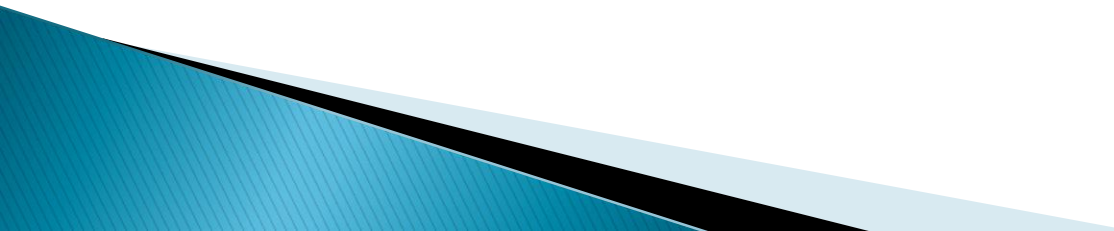
# Filling Gaps in Current Portfolio



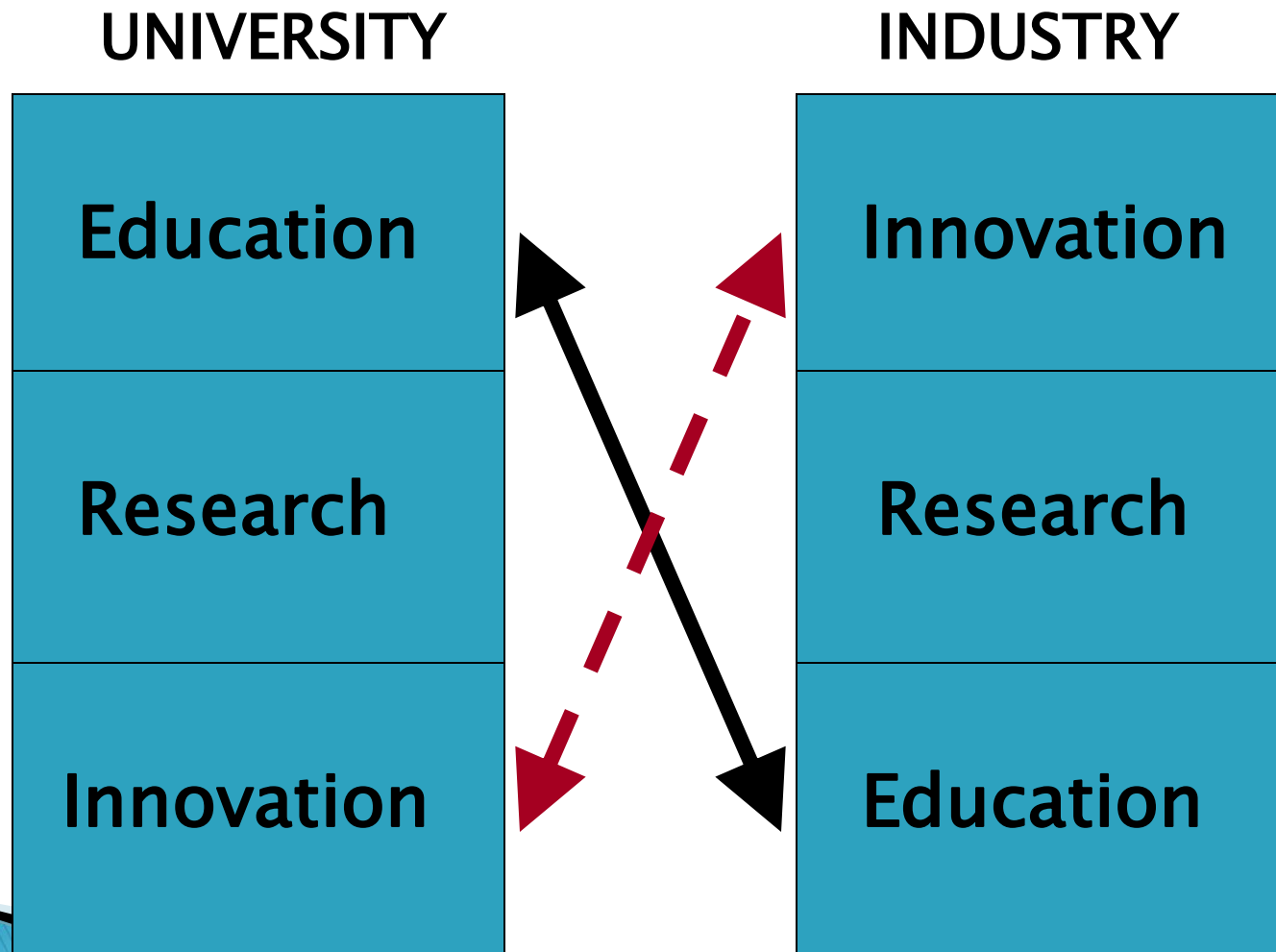
# Innovation Spectrum



# Universities

- ❑ Universities can be one of the actors (even if it is only one of the many producers of research)
  - ❑ Universities provide material, immaterial and institutional elements
  - ❑ Universities must cooperate with the other actors and join trans- territorial networks
  - ❑ Universities, with regard to innovation, must become learning institutions
- 

# University – Industry Priorities





# Innovation indicators – examples <sup>(1)</sup>

- **Product or process innovation:**
  1. % of firms that implemented product innovation
  2. % of firms that implemented process innovation
  3. % of firms that implemented product or process innovation (innovative firms)
  4. % of firms that developed in-house product or process innovation
  5. % of firms that implemented new-to-market product innovation

# Innovation indicators – examples <sup>(2)</sup>

- Product or process innovation:

1. % of firms that implemented product innovation

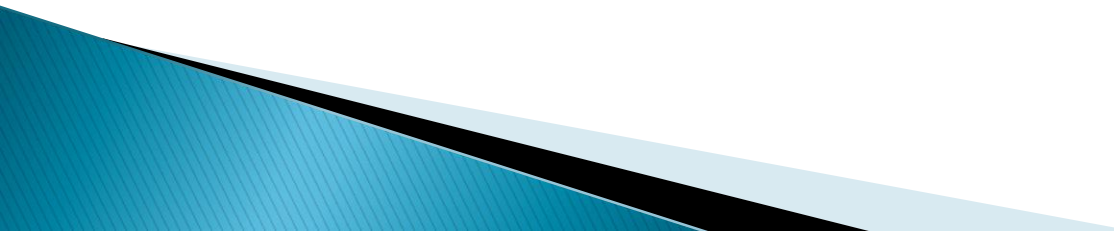
$$(N) = \frac{\text{Number of firms that implemented product innovation (in each economic activity)}}{\text{Total number of firms (in each economic activity)}} * 100$$

(D) = Total number of firms (in each economic activity)

$$(N) = \frac{\text{Number of Manufacturing firms that implemented product innovation}}{\text{Total number of Manufacturing firms}} * 100$$

(D) = Total number of Manufacturing firms

# Innovation indicators – examples <sup>(4)</sup>

- **Marketing or organisational innovation:**
    1. % of firms that implemented marketing innovation
    2. % of firms that implemented organisational innovation
    3. % of firms that implemented marketing or organisational innovation
- 

# Innovation indicators – examples <sup>(5)</sup>

- Marketing or organisational innovation:

3. % of firms that implemented marketing or organisational innovation

$$(N) = \frac{\text{Number of firms that implemented marketing or organisational innovation (in each economic activity)}}{\text{Total number of firms (in each economic activity)}} * 100$$

(D) = Total number of firms (in each economic activity)

$$(N) = \frac{\text{Number of firms in the Electrical machinery industry that implemented marketing or organisational innovation}}{\text{Total number of firms in the Electrical machinery industry}} * 100$$

(D) = Total number of firms in the Electrical machinery industry

# Innovation indicators – examples <sup>(6)</sup>

- **Inputs:**

1. Total expenditures on innovation (as a % of total turnover)
2. Expenditure on innovation by type of expenditure (as a % of total expenditure on innovation)
3. % of firms that performed R&D
4. % of firms that performed R&D on a continuous basis

# Innovation indicators – examples <sup>(7)</sup>

- Inputs:

3. % of firms that performed R&D

$$\begin{aligned} (N) &= \frac{\text{Number of product or process innovation-active firms that performed R\&D (in each economic activity)}}{\text{Total number of product or process innovation-active firms (in each economic activity)}} * 100 \\ (D) &= \end{aligned}$$

$$\begin{aligned} (N) &= \frac{\text{Number of Services product or process innovation-active firms that performed R\&D}}{\text{Total number of Services product or process innovation-active firms}} * 100 \\ (D) &= \end{aligned}$$



# Innovation indicators – examples <sup>(8)</sup>

- **Outputs:**

1. % of turnover from product innovations (as a % of turnover)
2. % of turnover from new-to-market product innovations (as a % of turnover)

# Innovation indicators – examples <sup>(9)</sup>

- **Outputs:**

1. % of turnover from product innovations (as a % of turnover)

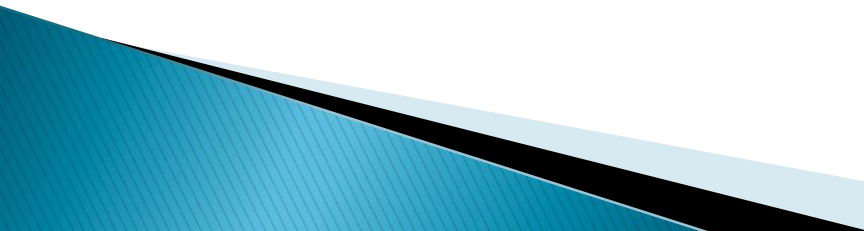
(N) = Turnover from product innovations (in each size class)  
\_\_\_\_\_ \*100

(D) = Total turnover

(N) = Turnover of Small firms from product innovations  
\_\_\_\_\_ \*100

(D) = Total turnover of Small firms

# Innovation indicators – examples (10)

- Key policy–relevant characteristics:
    1. % of firms that were active on international markets
    2. % of firms that co–operated with foreign partners on innovations
    3. % of firms that co–operated with universities or other higher education institutions
    4. % of firms that received public financial support for innovation
    5. % of firms that applied for one or more patents
    6. % of R&D–performing firms that co–operated with other institutions
- 

# Innovation indicators – examples <sup>(11)</sup>

- Key policy–relevant characteristics:

3. % of firms that co-operated with universities or other higher education institutions

(N) =  $\frac{\text{Number of product or process innovation-active firms that co-operated with a specific partner}}{\text{Total number of product or process innovation-active firms}} * 100$

(D) = Total number of product or process innovation-active firms

(N) =  $\frac{\text{Number of product or process innovation-active firms that co-operated with universities or other higher education institutions}}{\text{Total number of product or process innovation-active firms}} * 100$

(D) = Total number of product or process innovation-active firms

# Innovation indicators – examples <sup>(13)</sup>

- Key policy–relevant characteristics:

3. % of R&D–performing firms that co–operated with other institutions

$$(N) = \frac{\text{Number of R\&D-performing firms that co-operated with other institutions}}{\text{Total number of R\&D-performing firms}} * 100$$

$$(D) = \text{Total number of R\&D-performing firms}$$

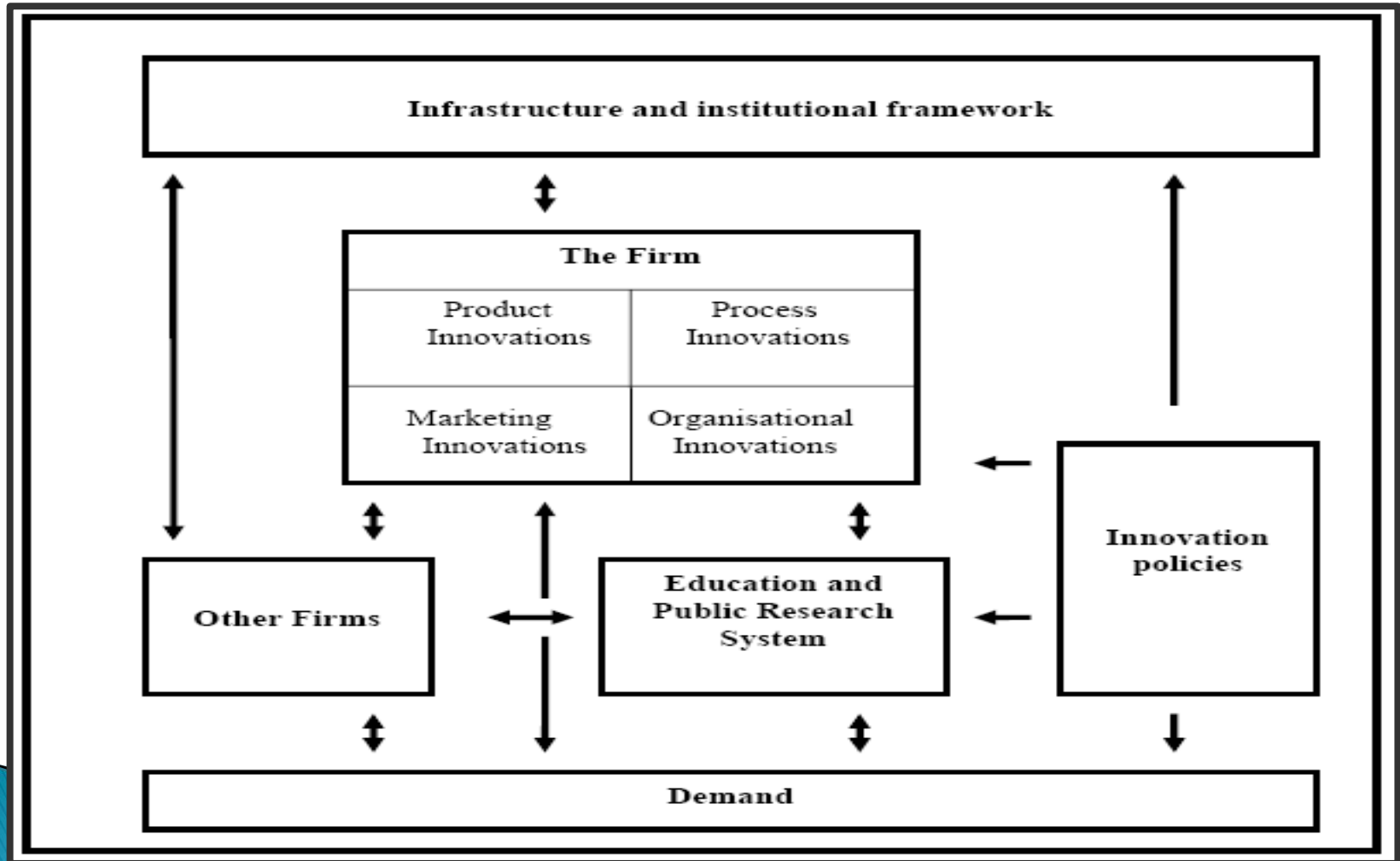
$$(N) = \frac{\text{Number of R\&D-performing firms that co-operated with other institutions}}{\text{Total number of R\&D-performing firms}} * 100$$

$$(D) = \text{Total number of R\&D-performing firms}$$

▶ *Thank you!*



# The innovation measurement framework



# Types of innovation – Product (1)

## ▶ Product Innovation:

- Introduction of a *good or service* that is new or significantly improved with respect to its characteristics or intended uses;
- *New products*: different characteristics or intended uses from previous products;
- *Significantly improvements*: changes in materials, components, and other characteristics that enhance performance.

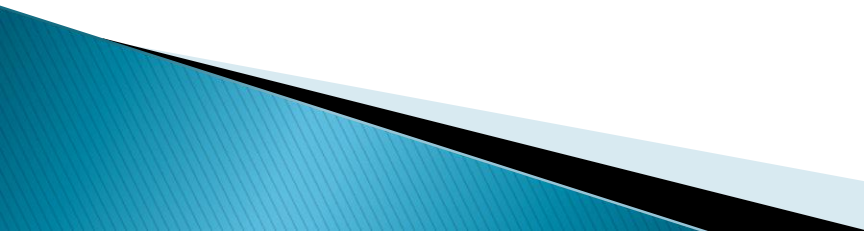
# Types of innovation – Product (2)

## ▶ Product Innovation – examples:

- *New products:*

- The first microprocessors;
- The first digital cameras;
- The first portable MP3 player;

- *Significantly improvements:*

- Introduction of ABS braking, GPS navigational systems, or other subsystem improvements in cars;
  - The use of breathable fabrics in clothing;
  - Improvements in internet banking services, such as greatly improved speed and ease of use.
- 

# Types of innovation – Process <sup>(1)</sup>

## ▶ Process Innovation:

- Implementation of a new or significantly improved *production or delivery method* (changes in techniques, equipment and/or software);
- Intended to: *decrease unit costs of production or delivery, increase quality, or produce or deliver new or significantly improved products.*

# Types of innovation – Process <sup>(2)</sup>

## ▶ Process Innovation – examples:

- Introduction of a bar-coded goods-tracking system;
  - Introduction of GPS tracking devices for transport services;
  - Implementation of computer-assisted design for product development;
  - Implementation of a new reservation system in a travel agency.
- 