Why my PhD dissertation is so important?

Why the society is keeping an eye on my invention?
SUMMARY

This talk is about the concept of innovation process and the importance of inventors in the process of economical growth.

Innovation is not science or engineering, and it is not technology; it is about taking ideas and developing them into products and services and bringing them to the marketplace to generate new economic growth.

The innovation is related with invention through a qualitative expression expressed by:

**Innovation = Invention + Commercialization or Implementation.**

Innovation involves risk-taking and we show some of representative cases of innovative companies promoted by Instituto Pedro Nunes.

TOPICS

• Innovation, Invention and Economic Value
• Instituto Pedro Nunes – Learning by Doing
• How can I profit from my PhD?
Innovation, Invention and Economic Value

Ambiguities Associated with Innovation

• Innovation does not come about from Eureka moments. It was preceded by hours of attempting to formalize an idea into an understandable and workable concept.

• Innovation does not occur by following predefined steps.

• Innovation does not occur by watching the clock from nine to six. It requires individual initiative, a sense of imagination to make it happen.
Ambiguities Associated with Innovation

- Innovation is creating new ideas and getting them to work.
- Innovation must be user-focused.
- Innovation is not science or technology.
- Innovation creates economical prosperity rather than knowledge.
- Innovation is turning an idea into a business success.
- Innovation is a change in the economic or social environment.
- Innovation is the exploitation of an invention.
- Exploitation is everything involved in the implementation or commercialization.

All these descriptions could be composed in a qualitative equation:

\[ \text{Innovation} = \text{Invention} + \text{Commercialization or Implementation} \]

Basic Concepts of Innovation

The commercialization/exploitation of the invention is what makes this new invention an innovation.

Innovation occurs in different environments and focuses on:

- Independent innovators
- Organizational innovation
- Technological innovation
- Management innovation
From Idea to Innovation

Raw Ideas

Raw ideas provide no benefit, unless pursued toward some end.

The Universal Industrial Success Curve shows a seven stage segmentation scale of ideas: from 3,000 unwritten ideas, 300 will be formalized in written form that perhaps leading to one success.

(Greg A. Stevens and James Burley, “3000 Raw Ideas = 1 Commercial Success!” Research Technology Management, May-June 1997)

From Idea to Innovation

Concept

Transforming an idea into a concept becomes an iterative process.

This transformation is not solely about technology or marketing, but rather about the business that will arise from the concept.

This transformation from idea to concept includes:

• Describing the deliverables clearly
• Identifying the internal and external resources
• Understanding the limitations of the organization’s infrastructure
• Assessing the organizational competencies and capabilities
• Managing interfaces
From Idea to Innovation

Invention

It can be defined from different perspectives (manager, academic, or an economist).

We discover what before existed, though to us unknown; we invent what did not exist before.

(Robert A. Burgelman, Modesto Maidique, and Steven C. Wheelwright, Strategic Management of Technology and Innovation, (Chicago: Irwin, 1966))

The invention process covers all efforts aimed at creating new ideas and getting them to work.

(Edward B. Roberts, Generating Technological Innovation (New York: Oxford University press, 1987))

Every invention is (a) a new combination of (b) preexisting knowledge which (c) satisfies some want.

(Jacob Schmookler, Invention and Economic Growth (Cambridge; Harvard University Press, 1966))

How Innovation Takes Place

Innovation occurs through a two-stage process:

• **Stage 1** - the effort to convert the idea into a workable concept.

• **Stage 2** - the activities focusing on the work related to commercialization or implementation.
How Innovation Takes Place

Creative Process

• Innovation does not develop new theories, and it does not search for the unknown.
• Innovation involves a “put-it-all-together” competence, where the knowns are reconfigured or architected in some new configuration.

Innovation

• Creates value
• Behaves as a chaotic process
• Converts an invention to a business
• Depends on a random interactive learning process
• Lives in the marketplace
• Is something new — never done before

How Innovation Takes Place

• Recognizing opportunities is the critical issue in innovation.

• Innovation as an internal propriety activity inside the organization.

• Open innovation allows organizations an opportunity to capitalize on the intellectual property and experience of customers, suppliers and the academic community.
From Idea To Market

A organization that pursues innovation requires that:

• Stress the importance of people
• Promote lifelong learning
• Pursue excellence
• Identify the critical mass
• Promote teamwork
• Build trust
• Insist on integrity
• Insist on accountability

Develop a Organizations’ Culture that Promotes Innovation
Common Obstacles to Innovation

Internal Obstacles to Innovation
- Unsupportive culture and climate
- Limited funding for investment
- Process immaturity
- Insufficient access to information

External Obstacles to Innovation
- Government and other legal restrictions
- Economic uncertainty
- Inadequate enabling technologies
- Workforce issues externally manipulated

What to Avoid
- Do not promote the discussion of new ideas
- Penalize the risk takers
- Manage solely by the numbers
- Interpret policies and practices to the letter of the law
- Micro-manage
- Limit resources
- Eliminate dissonance
- Limit divergent thinking
Status of Innovation

• Talent and culture are the most important drivers of innovation.
• Seventy percent of executives see innovation as the growth driver.

• Little emphasis is placed on breakthrough innovation, focusing primarily on product or service development.
• A third of senior executives say that innovation is part of the leadership function but an equal number reports their organizations govern innovation in an ad hoc manner.

• Politician, executives and managers have been talking about innovation. The question is, do these people understand what innovation involves?

Instituto Pedro Nunes – Learning by Doing
INSTITUTO PEDRO NUNES
Creation: 1991 (paper) 1995 (building)

Juridical Form: Non-profit Association

Associates/Stakeholders (34):
- Coimbra University, Polytechnical Institute, City Council
- Enterprises (national and local)
- Industrial Associations (national and local)
- State Laboratories (national)
- R&D Laboratories (national and local)
- Other Entities (national and local)

IPN’s Environment

University
- 715 years old
- Tradition in Law and Medicine
- 23,000 Students

Faculty of Science & Technology
- 8,000 undergraduates
- 1,000 post-graduates
- 650 teaching & research staff

Coimbra & its Business Environment
- 140,000 inhabitants
- “University” town
- Emerging cluster of Tech-based industries
- Excellence in the Health Sector
IPN’s MISSION & ACTIVITIES

Promotion of Innovation and Technology Transfer
(interface between the scientific and technological system and the productive sector)

How?

- RTD laboratories
- Business incubator
- Training department

RTD projects in consortia
Technology and knowledge transfer
Innovative solutions development

Specialised training courses
Conferences
Seminars

Promotion and support of tech-based & advanced services start-ups

IPN’s Labs

- LABGEO – Geotechnical Laboratory
- LABPHARM – Laboratory for Pharmaceutical Sciences
- LAS - Laboratory for Automation and Systems
- LEC - Laboratory for Electroanalysis and Corrosion
- LED&MAT - Laboratory for Wear, Testing and Materials
- LIS - Laboratory for Informatics and Systems
### IPN: Main interactions within IPN and with its environment

- University and Research Centers
- Private and Public organizations
- Intellectual Property Office
- Training Department

### INCUBATION AT IPN: THE PROCESS

1. Idea Assessment
2. Idea Incubation (Virt. Inc. Start)
3. Business Planning
4. BP evaluation
5. Legal Constitution
6. Incubation (3-4 years)
7. Follow-up (Virt. Inc.)
Business Incubator

Services

Business Planning
- Feasibility Study
- Technological assessment
- BP writing

Space and logistics
- 12.5 m² – 25 m² – 30 m² – 50 m²
- Furniture, Internet, tel., fax, mailbox, meeting rooms, etc.

IPR and legal services
- Tech. Transfer contracts
- Consortium contracts
- Patents, brands, etc.

Access to financing
- National and European grants
- Bank loans, VCs, Business Angels, etc.

Training
- Technologies
- Management

Access to Knowledge
- Coimbra University
- Nat. & Intern. Networks with Universities & R&D Institutes

Access to specialised consultancy
- Management, HHRR, quality, innovation, etc.

General Promotion & Business networking
- Nat. & Intern. Projects, matching events, fairs, etc.

Virtual Incubation
- Start
- Follow-up

Supports innovative and tech based companies with qualified rooms, administrative support, consultancy and common equipments.

DISTRIBUTION OF COMPANIES INSTALLED, BY SECTOR OF ACTIVITY
Enterprises that are generated by R&D projects or other academic activities. Spin-offs are seen as a desirable result of lab’s activities. > 60% of the companies in the incubator are spin-offs (mainly UC & IPN)

### Business Incubator

#### SPIN-OFFS

EVOLUTION OF THE NUMBER OF SPIN-OFF COMPANIES

- Spin-off companies
- Others

### Business Incubator

#### Stimulating the creation of SPIN-OFF companies

- Business Plan competitions (first years) in cooperation with UC (Fac. Science and Tech. + Fac. Economy);
- IPN entrepreneurship training courses (1 or 2 per year);
- Presentations on the Incubator services and success stories to UC’s students and researchers;
- IPN Research teams are stimulated to spin-off;
- IPN online application form (door is always open!);
- UC-GATS training course for Hi-Tech/Hi Growth Firms creation – NCSU model;

IPN gives support to:

- Applications to the National Innovation Agency’s program NEOTEC (IPN has currently 5 projects being supported by this program)
- Applications to the recently created IAPMEI’s program FINICIA (provides seed capital for PMEs)
The concept of Virtual Incubation

Motivated essentially by lack of space, Need to keep contact with companies after incubation.

- Exists in two versions:
  Virtual Incubation Start: addressed to new projects.
  Virtual Incubation Follow-up: for former incubatees.

- Some basic services and conditions + specialised paid services;

- Flexible and no time restrictions (contracts renewable every 3 months);

- Monthly fee;

- IPN’s Information System allows virtual incubatees to easily access to some services:
  - to book meeting or training rooms;
  - to receive news and other mailing-list services;
  - to upload their own news and events in the IPN’s web page;
  - keeping close contacts with IPN’s environment and easy access to knowledge;
  - to fill their synthetic annual financial report.

Virtual Incubation – Results (May 2006)

19 Companies/Projects in Virtual Incubation Start
9 Companies in Virtual Incubation Follow-UP
12 Spin-offs
### Virtual Incubation – Results (May 2006)

Other results...

- Reinforces the good image of the Incubator;
- Reaches some entrepreneurs projects in cities around Coimbra;
- Creates critical mass to hire new staff and develop more paid services;
- Specialised services contribute decisively to the self sustainability (40-60K€ /year);
- Important pool of projects ready to enter in the New Incubation Centre;
- Clients are very satisfied for being branded as “IPN companies”.

### Business Incubator Global Data

**Business and Employment – 2005 (Physical Incubation)**

- **Incubator’s staff**: 4
- **Incubation Area**: 650 m²
- **Companies installed the Incubator**: 14
- **Aggregated Turnover**: 5 M €
- **N.º of Employees in the Incubated Companies**: > 40
### Business Incubator


<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>N.º of Companies</td>
<td>73</td>
<td>19 Virtual Inc</td>
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<tr>
<td>N.º of Companies operating</td>
<td>61</td>
<td>&gt; 80%</td>
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<td>Annual turnover of Comp. operating</td>
<td>30 M€</td>
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<tr>
<td>N.º of Employees</td>
<td>350-400</td>
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### Business Incubator

**Some Success Stories**

**Electrónica**
- **1998**: Spin-off from UC-IPN
  - 3 PhD students
  - SW Development
  - Aerospace industry & Telecommunications
  - Staff: > 150
  - POR, USA, UK
  - Turnover: 9 M€
  - Market: Global

**Critical**
- **1999**: Spin-off from UC
  - 4 UC researchers
  - Microelectronics
  - Staff: > 40
  - POR
  - Turnover: # M€
  - Market: Europe

**Crioestaminal**
- **2003**: Spin-off from UC
  - 5 UC students
  - Biotec – Stem Cells
  - Cryopreservation & Biomolecular Biology
  - Staff: 15
  - POR
  - Turnover: # M€
  - Market: POR.
Idea and Business Incubator

Start Operation: 2006
Total building area: 2800 m²
Total Incubation area: 1700 m²
Incubation Rooms: 50
Areas: 19, 28, 33, 38, 56, 66 m²
Other facilities:
- Meeting room (2-3)
- Videoconference room (1)
- Informatics room
- Dressing rooms
- Bar / Cafeteria

Focus:
Tech based and innovative companies.
Capability to host small pre-industrial projects with laboratorial needs.
IPN Incubadora
Services

- Physical space
  (installation, administrative support, communications, etc.)
- Access to finance
  (Public fundings, Banks, Business Angels, Risk Capital)
- Training
  (IPN’s training, training “made-to-measure”, rooms facilities)
- IP management
  (Patents, tech transfer agreements, Trademarks info)
- Access to scientific knowledge
  (Coimbra University and other R&D organizations)
- Management support
  (business development, general accounting, fiscal planning, etc)
- Business plans
  (technological viability, economical viability, Training process)
- Physical Incubation
  - Start
  - Follow-up
- Global Networking
  (International projects, Events “matching”)

Incubadora de Empresas
Facts and numbers

INCUBADORA DE EMPRESAS IPN 1996 - 2008

- Total firms supported > 120
- % of firms in activity > 80%
- Anual turnover (2008) > 60 M€
- Job creation > 1,100
PÓLO II OF COIMBRA UNIVERSITY AND ITS SURROUNDING AREA

Concentration of Technological Infrastructures (Higher Education, RTD, Technology Transfer)

Business Incubator

Future Location for the definitive installation of Knowledge-Based Companies

Other related project – Coimbra Technopole

The southern part of Pólo II Campus
Preview of Technopole location

Do Saber ao Negócio, o Caminho Certo

Instituição de Pesquisa e Desenvolvimento Tecnológico
Transferência de Tecnologia
Formação de Empresas
Inovação
Proteção de Propriedade Intelectual
Atuação na Regulação de Mercado
Inovação em Processos e Serviços Noveis
Inovação em Soluções de Software e de Serviços Aplicados

Contacto: 219 710 900
How can I profit from my PhD?
Idea – Concept – Invention

Idea First!

Concept + Business Model = Innovation
Persons+ Business Model = Spin-Off

IPN Incubator – First 3 Years
Graduated Company – A New Start-Up Company!

Critical Move is a new company determined to develop, produce and deliver innovative, flexible, clean, safe, economical and technologically advanced mobility solutions that answer to current and future urban transport challenges.

Our vision

To be the global reference in the area of intelligent transport systems.

Contact Us

In order to contact us, please fill in the form below. Critical Move will contact you shortly.

Name: *

Email: *

Company: *

Message: *

Attach a file:
Cybermove Story

- Started in 2001 (with a EU FP5 project)
- Several publications in international scientific journals
- 5 pilot tests in real field

We intend to do a Technology Transfer process with the technology already developed and continue the research to improve the actual solution.

Current State (Movie)
O círculo virtuoso dos spin-offs

1. Universidade & IPN Labs & ...
2. Networking
3. PI
4. Transferência de Tecnologia
5. Acesso a Financiamento

- Entrepreneurs
- Researchers
- Students
- Tech-based Firms
- PI
- Projectos de I&D T

Promotion and Support of Start-ups
How can I profit from PhD? - Network GAPI 2.0

Objectivos GAPI 2.0

Mission:
Promotion of added value on knowledge generated by companies, research institutions, universities by supporting protection of property rights using Portuguese “Sistema de Propriedade Industrial”.

Target User:
• Companies with business model based on knowledge and Innovation;
• High tech start-up company
• Entrepreneurs;
• Universities and Research Institutions.
SUMMARY

• The concept of innovation process and the importance of inventors in the process of economical growth.

• Innovation is not science or engineering, and it is not technology; it is about taking ideas and developing them into products and services and bringing them to the marketplace to generate new economic growth.

• The innovation is related with invention through a qualitative expression expressed by:

  Innovation = Invention + Commercialization or Implementation.

• Innovation involves risk-taking and we shown some of representative cases from Instituto Pedro Nunes.
SUMMARY

This talk was about the concept of innovation process and the importance of inventors in the process of economical growth. Innovation is not science or engineering, and it is not technology; it is about taking ideas and developing them into products and services and bringing them to the marketplace to generate new economic growth.

Innovation does not develop new theories, and it does not search for the unknown. Innovation involves a “put-it-all-together” competence, where the known are reconfigured or architected in some new configuration. The innovation is related with invention through a qualitative expression expressed by:

Innovation = Invention + Commercialization or Implementation.

Invention is the act of genius in creating a new concept for a potentially useful new device or service.

Ideas lead to concepts and to inventions. Inventions may or may not involve some revolutionary discovery. In most cases, inventions provide for creating new combinations of what is already known into a new architecture. Innovation is differentiated from idea, concept and invention, since it involves execution, i.e., commercialization, or implementation. Innovation involves risk-taking and in this talk we will show some of representative cases of innovative companies promoted by Instituto Pedro Nunes.

References

• Gaynor, Innovation by Design.
• Gaynor, Innovation by Design, p. 4.
• Jacob Schmookler, Invention and Economic Growth (Cambridge: Harvard University Press, 1966)
• Jacques Bughin, Michael Chui, and Brad Johnson, “The Next Step in Innovation,”