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HEIn4.0

Research Collaboration involving HEIs and Industry R&D contracts

Industry 4.0 Challenges

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The aim of this seminar is to present the different types of Research Collaboration between industry and HEIs and to discuss the challenges, issues and opportunities of the industry 4.0, under this scope.

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R&D - Fundamental Beliefs

- Technological innovation is one of the main drivers of economic growth;
- Interdisciplinary collaboration is essential to solving important problems;
- Universities are a center of technological innovation par excellence, stimulated and financed by a European policy that promotes the knowledge economy;
- The search for fundamental science can be done within the walls of HEIs, but its translation in to applied reality requires a broader ecosystem.

PORTO POLYTECHNIC'S MISSION

The mission of P.PORTO is to create and further knowledge, science, technology and culture, and to provide students with technical, scientific, artistic and transverse skills that articulate knowledge and action, so as to become the agent of transformation at home and abroad, and through intervention contribute to the wise development of society.



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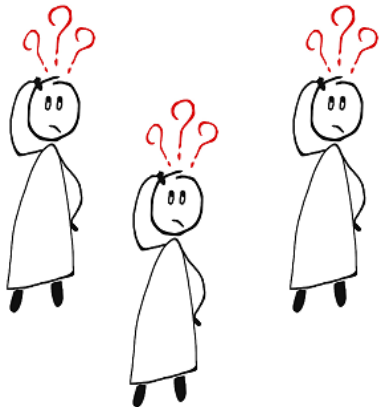


Different Point of View: Knowledge Creation vs. Problem Solving

HEI's RESEARCH

Federal grants

Corporate
Sponsored
Research



The University is about
Knowledge Creation and
Education

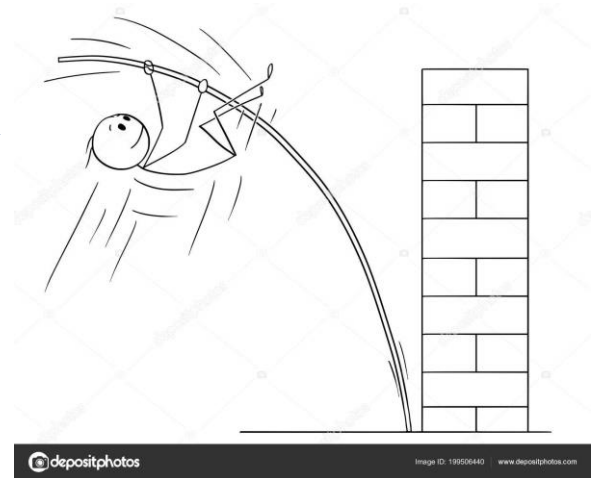
The Industry is
about products,
services, business
relations and profit

INDUSTRY

Clients

Partners

Investors



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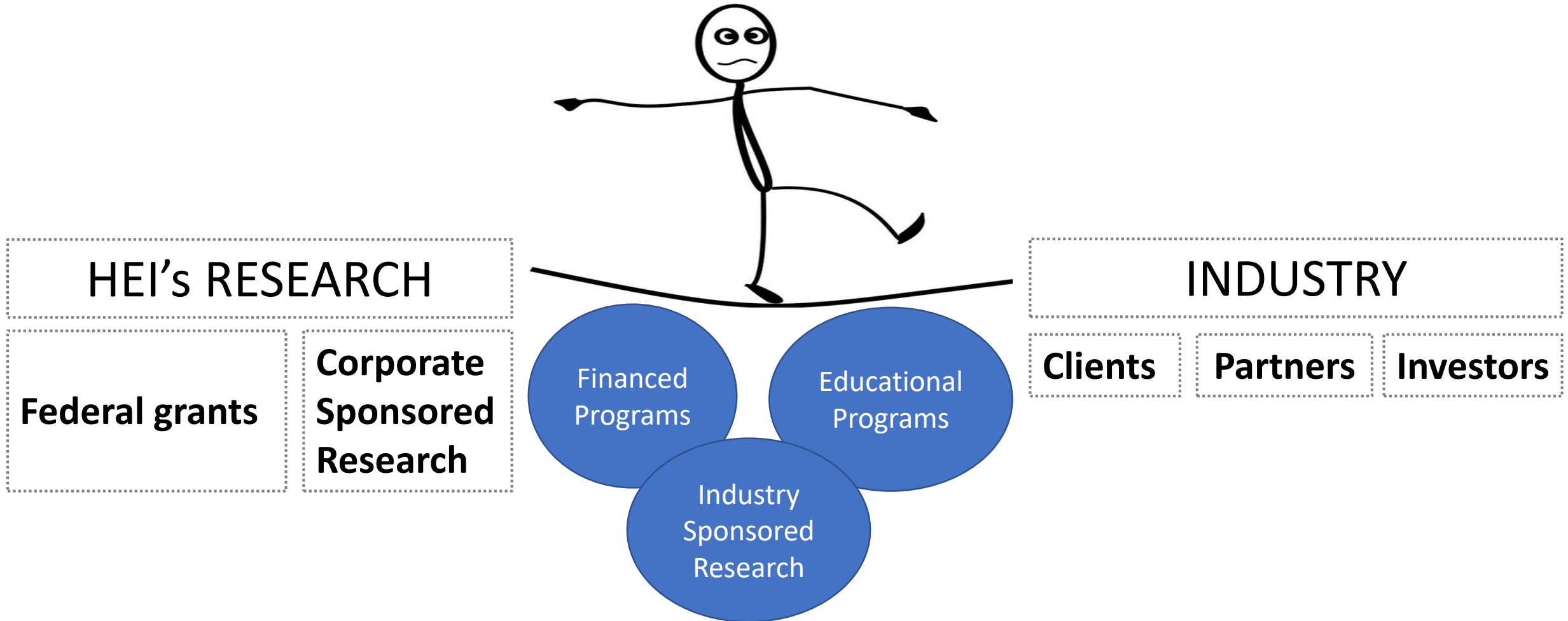
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Mission of HEIs Technology Transfer

To enhance the impact of university
research by transferring intellectual
property in order to solve
commercially important problems for
society



Managing Risk While Closing the GAP



Collaboration HEIs – Industry: Best Practices

- Make connections early
- Establish point contacts and clear lines of responsibility for the relationship
- Contact regularly
- Think broadly and openly
- Engage at a peer level
- Work with students
- Bring challenging problems
- Make the work truly collaborative
- Involve a TLO



Typical Benefits Companies Receives

- Monitor emerging/disruptive technologies
- Discover new technologies to strengthen existing businesses
- Validate or invalidate key investment decisions/ new product development
- Solve short term technical problems
- Identify new industry partners
- Use faculty for consulting/ advice
- Participate in new industry standards setting
- Train employees
- Recruit new employees



Industry-Sponsored Research (Major Points)

- Who sets the research agenda?
- What to charge (does industry pay “full cost” including overhead?)
- Publication rules
- Who owns the IP? (faculty, university, company?)
- What IP rights does the company get (if not ownership)

Type of Relationship

- What is supposed we do:
 - Fundamental, publishable academic research of interest to the company sponsor
- What is supposed we don't do:
 - “Testing” or “Work for Hire”
 - “Problem solving” for product development
 - Consulting (It's done privately without use of university facilities)
 - Classified or secret research at the university
 - Renting of laboratory space or facilities

Rules of engagement

- Investigator writes proposal—agrees with sponsor on scope: Work Statement (usually quite brief) and budget
- Sponsor pays “full cost”:
 - Equipment;
 - New human resources;
 - Consumables;
 - A percentage of professors time;

Intellectual Property

- Porto Polytechnic owns all inventions by its employees or students made under the grant:
 - Main rule (hardly rare we can negotiate some exception);
 - Jointly owned with sponsor if a co-inventor is a sponsor employee.
- Sponsor gets:
 - Free non-exclusive license to practice inventions
 - Option to negotiate for a royalty-bearing exclusive license

Publication

- All research must be publishable;
- Sponsor gets 30-60 day right of review prior to publication but only for:
 - Identification of confidential information **originating from sponsor** (may ask for removal);
 - Identification on patentable inventions (may request for filing of patent prior to publication, but not undue delay for filing)

Educational Programs

- Formal graduation programs
- Non-formal graduation programs



Type of Relationship

- What is supposed we do:
 - Develop a theoretical solution to a proposed challenge (formal graduation program);
 - Develop a prototype to a proposed challenge (non-formal graduation program).
- What is supposed we don't do:
 - “Testing” or “Work for Hire”;
 - Consulting (It's done privately without use of university facilities);
 - Classified or secret research at the university;
 - Renting of laboratory space or facilities;

Intellectual Property

- Porto Polytechnic owns all inventions by its students made during the program (formal / non formal graduation program);
- Industry gets:
 - Non-exclusive, royalty free license to practice inventions (non formal graduation program);
 - Option to negotiate for a non-exclusive, royalty-bearing license (formal graduation program)

NOTE – in the non formal graduation program, the industry shall pay, in case of use of the inventions, a comprehensive inventors fee, the amount of which shall be agreed in each individual case.

Publication

- All research must be publishable;
- Sponsor gets 30-60 day right of review prior to publication but only for:
 - Identification of confidential information **originating from sponsor** (may ask for removal);
 - Identification on patentable inventions (may request for filing of patent prior to publication, but not undue delay for filing)

Financed Programs

- Type of Relationship – usually consortium;
- Rules of engagement:
 - Investigator writes proposal in cooperation with the industry representative
 - The budget is defined by the program guidelines
- Intellectual Property: defined by the program guidelines
- Publication Rules: defined by the program guidelines

Industry 4.0

A better understanding of the skills needed to working and implementing Industry 4.0 is necessary to create the change, benefit from it and democratize knowledge among the future workforce. The idea behind this work is for people to learn to work with, and complement, the new technology using the most important factor: the human competencies that cannot be replaced.

Industry 4.0: state of the art

Challenges identified:

Challenge 1: Lack of preparation on how to prepare for future work;

Challenge 2: Lack of skilled labor;

Challenge 3: Lack of vision about technology;

Industry 4.0: state of the art

Engineering Skills

source: Male, Buch, & Champman, 2010; Sackey & Bester, 2016

- Advanced Data Analysis (big data)
- New man-machine interfaces
- Digital to physical transfer technologies, such as 3D printing
- Advanced simulation and virtual fabrication
- Integrated quality control / management systems for products and closed-loop processes
- Data and network communication and systems automation
- Real-time inventory and logistics optimization systems
- Artificial intelligence
- Robotics
- Programming Skills



Industry 4.0: state of the art

Management skills

source: Fu, Ding, Wang & Wang, 2018; Gray, 2016; Kilpi, 2016; Lee, Kusbit, Metsky & Dabbish 2015; Zhang, Ding, Zou, Qin & Fu, 2017

- Awareness of technology
- Change management and Strategy
- Digital to physical transfer technologies, such as 3D printing (production additive)
- New talent management strategies (setting up “smart” teams)
- Organizational and Knowledge Structures
- The role of managers as facilitators
- Processes enabled

Industry 4.0: state of the art

Design and Innovation

source: Laudante, 2017; Morrar, Arman, & Mousa, 2017; Petrelli 2017

- Understanding the impact of technology
- Human-robot interaction and user interfaces
- Technology-enabled product and service design
- Ergonomic solutions enabled for technology and user experience



Industry 4.0. ...

...The challenge continues

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Thank You !!!

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