# Elements and dynamics of technology transfer of scientific research outputs


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# University vs. Industry Research - Differences

- Perception traditionally has been that industry research is “sullied” by commercial goals
- Academic research is “pure” scientific inquiry
- Not a completely inaccurate description
- Although motivated by different end goals, similar processes and methodology

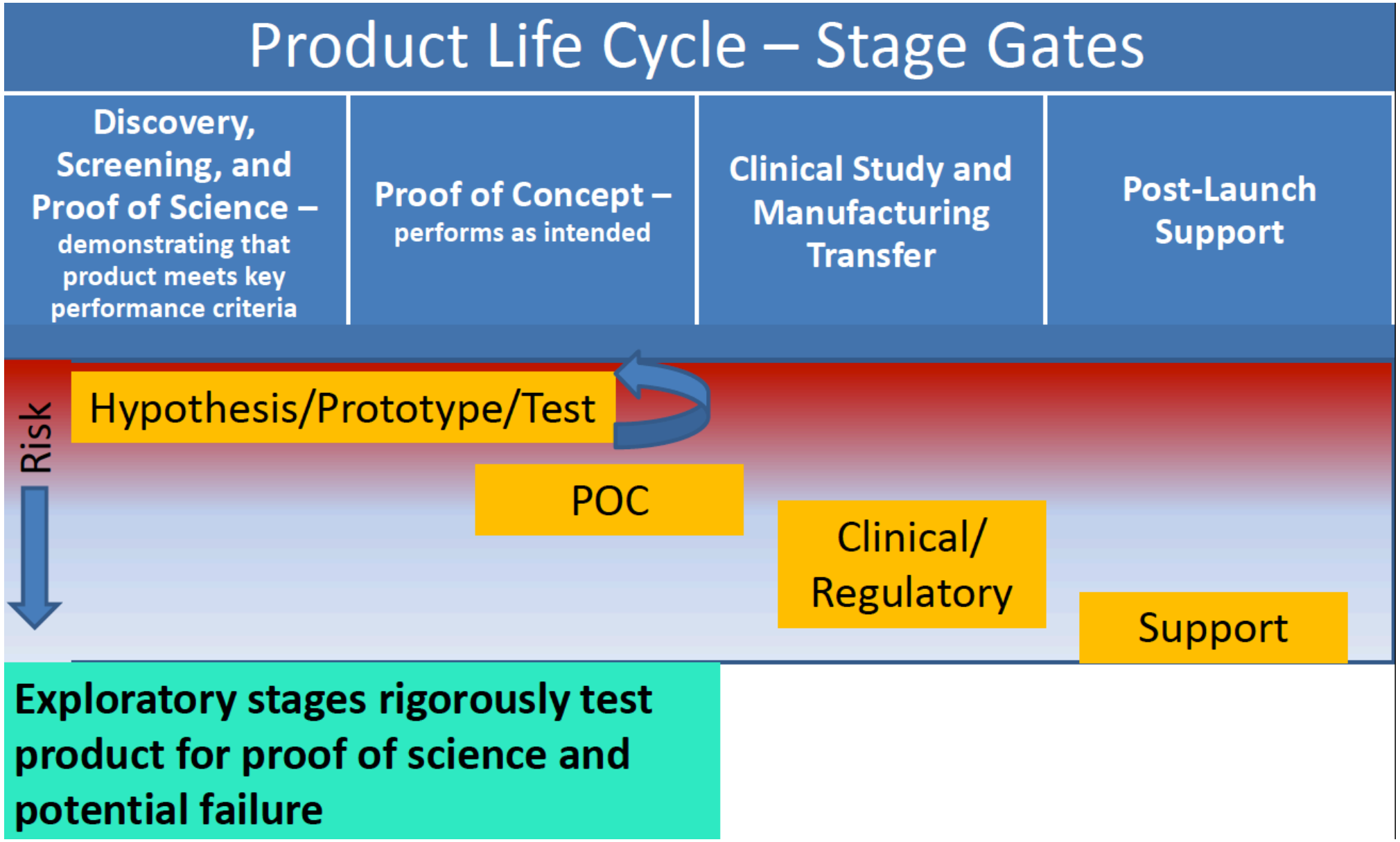
# University vs. Industry Research - Differences

- Academic research is … academic
  - The chief responsibility of a university is to produce and disseminate new knowledge. New knowledge is created through research. Research is based on primary and secondary sources, often together with original data collected via research "instruments" to produce new knowledge on a particular topic – University of Tampere, Department of Translational Studies
  - Focus on basic science - causes, effects, and the nature of things
  - Goal is to publish and share knowledge for others to build on
  - Peer review is very important
  - Personal goals may include academic advancement, peer acceptance, and sponsored funding

# University vs. Industry Research - Differences

- Industry research is focused on commercial opportunities
  - Basic research is the starting point
  - Focus on applied science – answer and solutions to specific problems
  - Scientific inquiry is focused on solving a commercial problem
  - Goal is to solve problem in a commercially viable fashion before other companies
  - Greater secrecy
  - Corporate goals instead of personal goals
  - Government review instead of peer review

# Industry Process - Example



# University vs. Industry Research – Commonalities

- Applied research relies on basic research as a starting point
  - Most applied and translational research requires a starting point based on basic research
  - Build on mutual expertise
- Same rigorous process
  - No scientific shortcuts

# University and Industry: two diverse cultures

**University culture**

Research to educate, break ground, provide service (economic development)

Pace is slower

Mission = basic and applied research

Technology transfer activities are companion to applied research mission

**Industry culture**

Mission toward research / R&D / commercialization

Quick-paced

Solve problems - develop new products - profit

Maintain control of science to explore full potential of discovery (initially)

Direct and indirect economic impact

# Potential Opportunities

- If Industry and Academia are so different, why bother?
  - Basic research may be linked to commercial opportunities
  - Commercial success can lead to addition research
  - Expertise may be needed by industry: more basic research is being outsourced
  - Industry can bring resources to the table that may be unavailable otherwise
    - Funding
    - Proprietary materials
    - Other expertise

# How does one engage with Industry?

- What does the researcher bring to the table
  - Understand the research, the lab, and your institution's expertise
  - Is there specialized equipment?
  - What is the current direction of the research?
  - What is industry's?
  - How could industry use the researcher's expertise and facilities?
  - How does it potentially relate to an industry need?
  - What would be the next steps?  How much would it cost?
  - Steps beyond that?

# Packaging The Technology – The Summary

- Have to develop a brief summary of the technology, that includes the following:
  - Description
  - Explanation of relevancy
  - Stage of development
  - Stage of protection
- Incude a brief bio of the inventors, a description of the lab, and description of the research
- A picture is worth a thousand words

# What is Technology Transfer?

- Technology transfer is a term used to describe a formal transfer of rights to use and commercialize new discoveries and innovations resulting from scientific research to another party.
- Universities typically transfer technology through protecting (using patents and copyrights), then licensing new innovations.
- Bayh-Dole Act – encourages technology transfer
- Benefits:
  - Leads to new products and services that improve our quality of life.
  - Adds billions of dollars to the U.S. economy
  - Supports hundreds of thousands of jobs.
  - Creates new businesses, industries and markets.

# What Technology Transfer is about?

- Technology Transfer is a contact sport… **it is about building relationships**
- Technology Transfer programs are expensive
  - **It takes 10 to 15 years for an office to generate enough revenue to off-set their expenses**
  - One “winner” may make enough money to pay for an office…but most technologies do not generate significant income
- Technology Transfer programs do more than commercialize technology
  - Build relationships with the business community
  - Build relationships with the financial (Venture Capital) community
  - Improve community awareness of institutional research activity
  - Provides institutional participation in economic development
  - Educate Faculty and Students about intellectual property, market research and commercializing innovative technology
- **Technology Transfer is a long-term process**
  - **From the time a patent is filed until revenue is coming to the institution can be 10+ years**

# University missions

1. Teaching activity and transmission of knowledge across generations;

2. Scientific research activities to meet social welfare needs;

## The third mission → Technology transfer

3. Direct involvement of the university in activities aimed at promoting the application of research results so that these results can have the maximum impact on the economy and society:

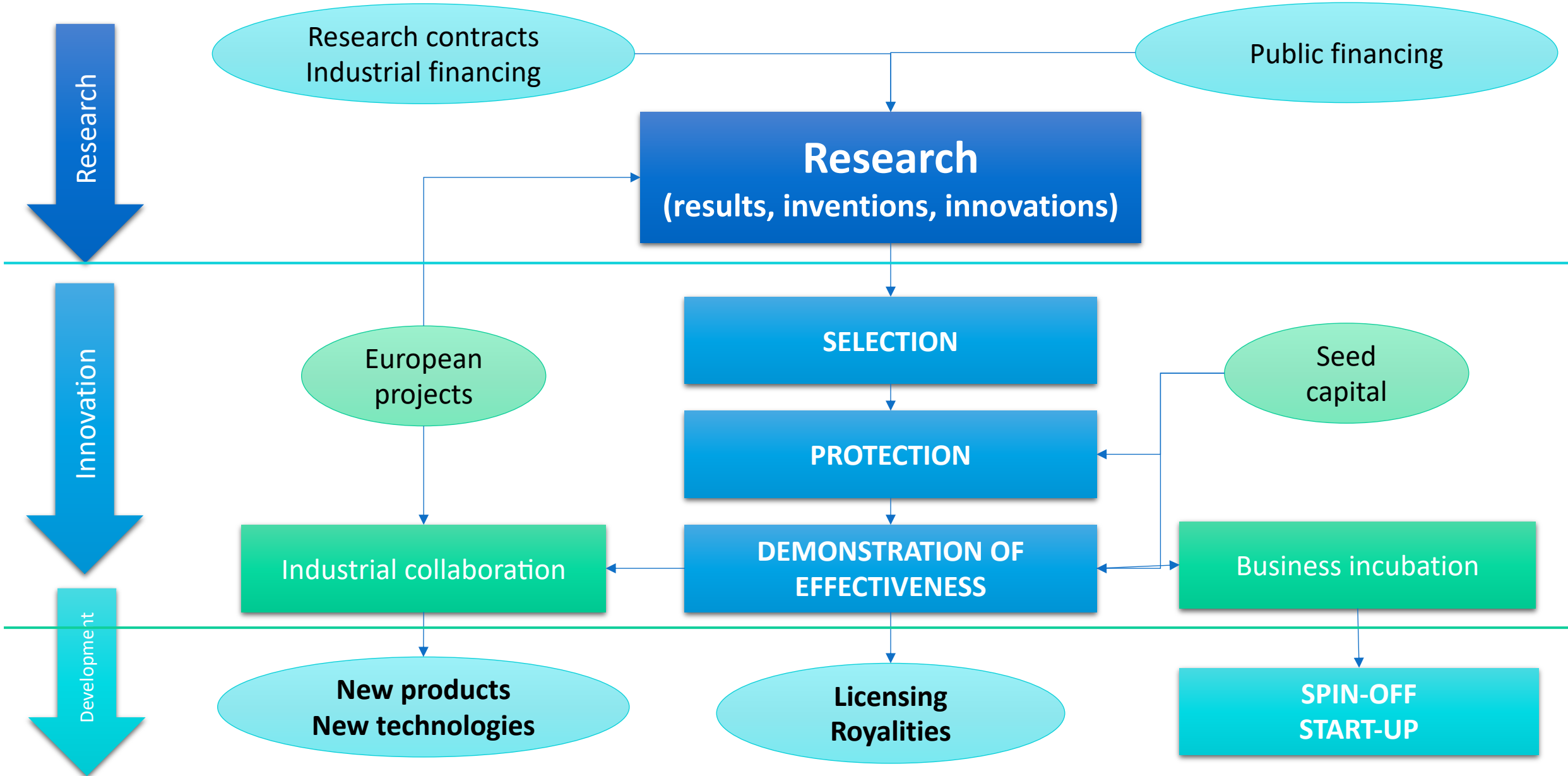
- Collaboration with companies;
- Valorization of intellectual property through patents;
- Promotion of companies that use research results (university spin-offs).

# The new Fourth University Mission

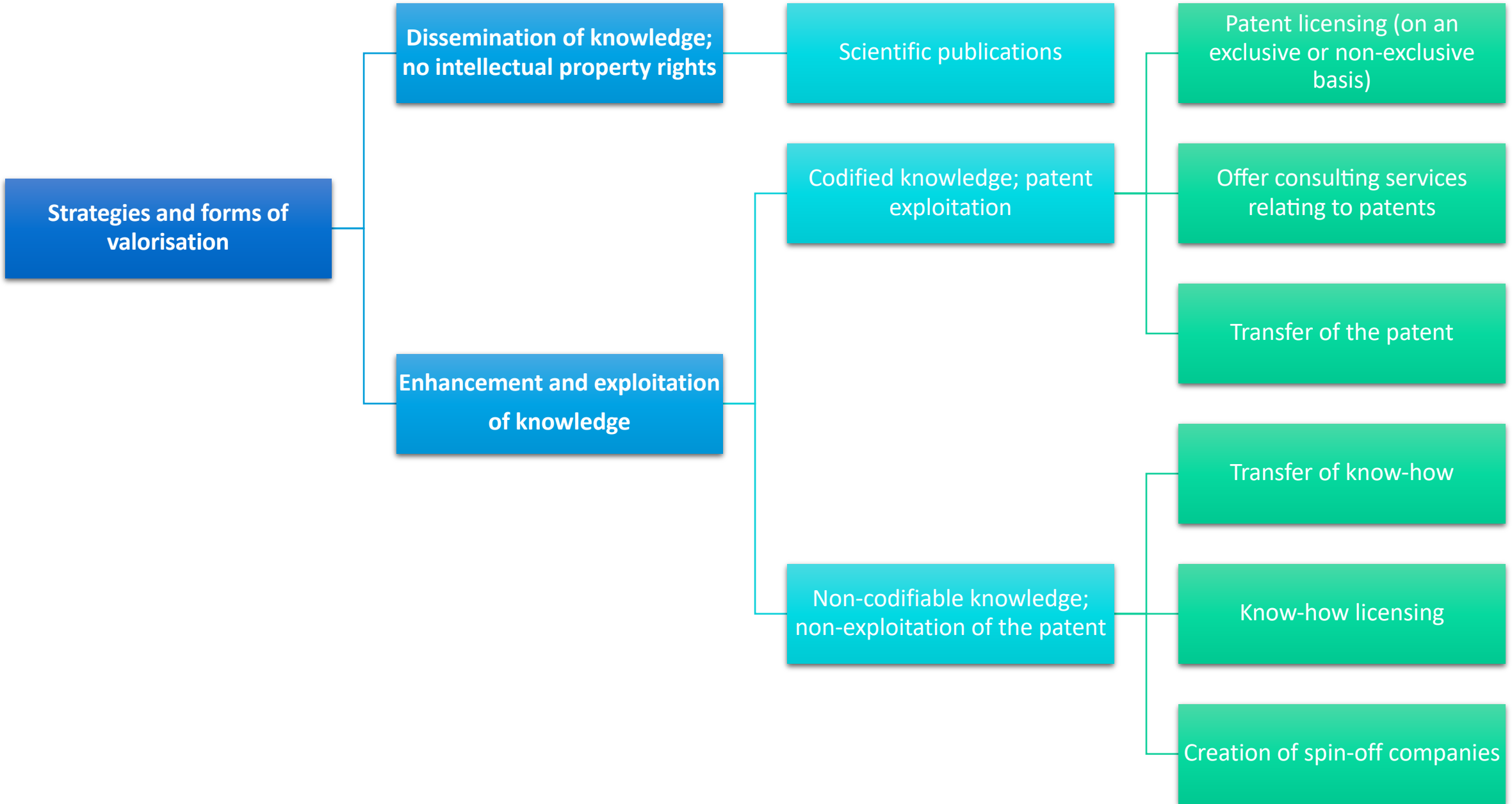
**University involvement in local socio-economic development, with a particular focus on the role to be reserved for placement services in the growth process**
(Krets & Creso, 2013; Boffo & Gagliardi, 2015)

- **Connect young students and graduates to the world of work;**
- **University as engine of economic development of the territories;**
- **Ability to transfer the results of research conducted in favor of the development of the territory, of the culture of entrepreneurship, employment and welfare of citizens;**
- **Involvement of different local, public and private stakeholders.**

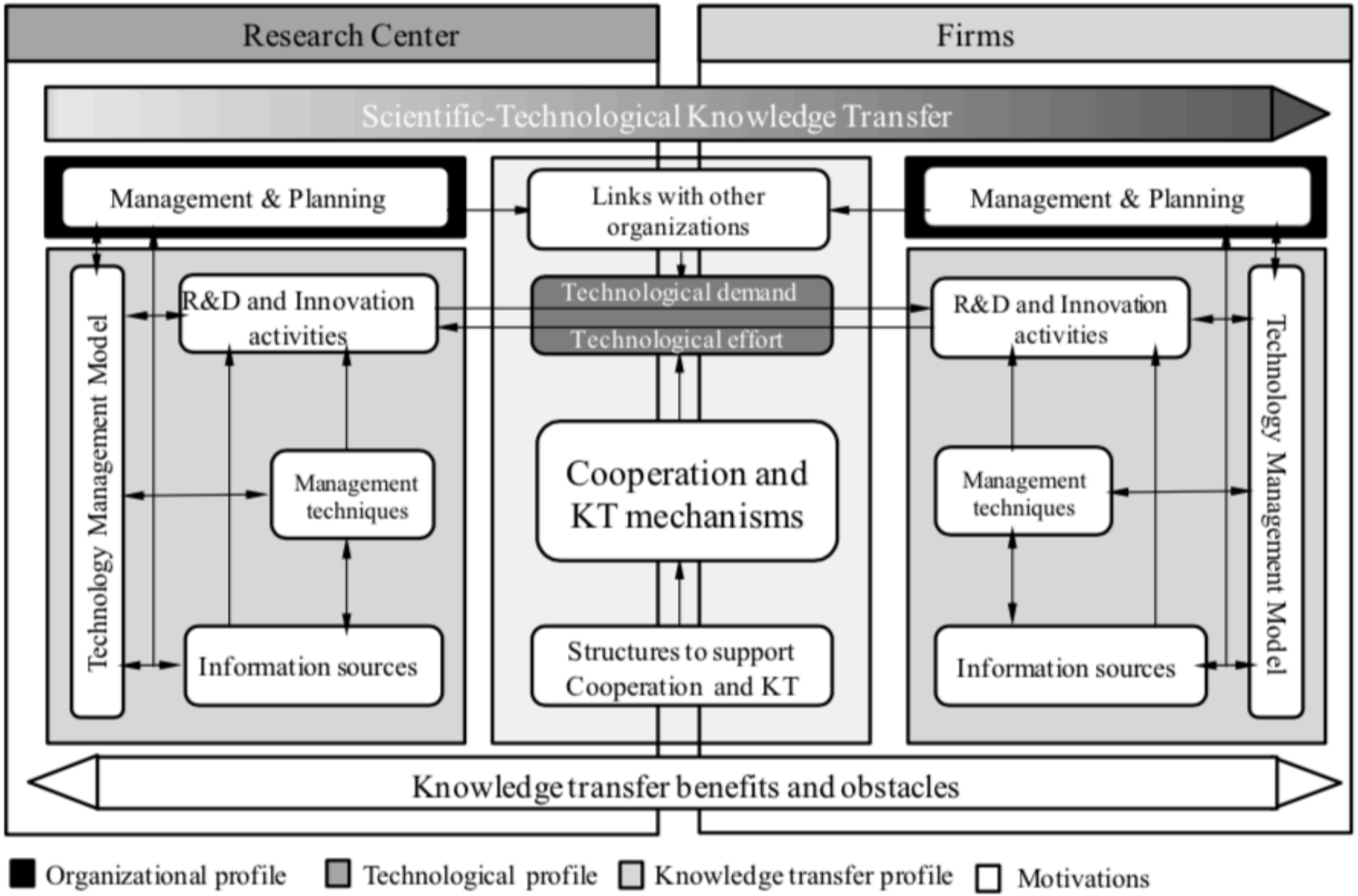
# Basic model of valorisation of university research and technology transfer (1° approach) (Piccaluga, 2013)



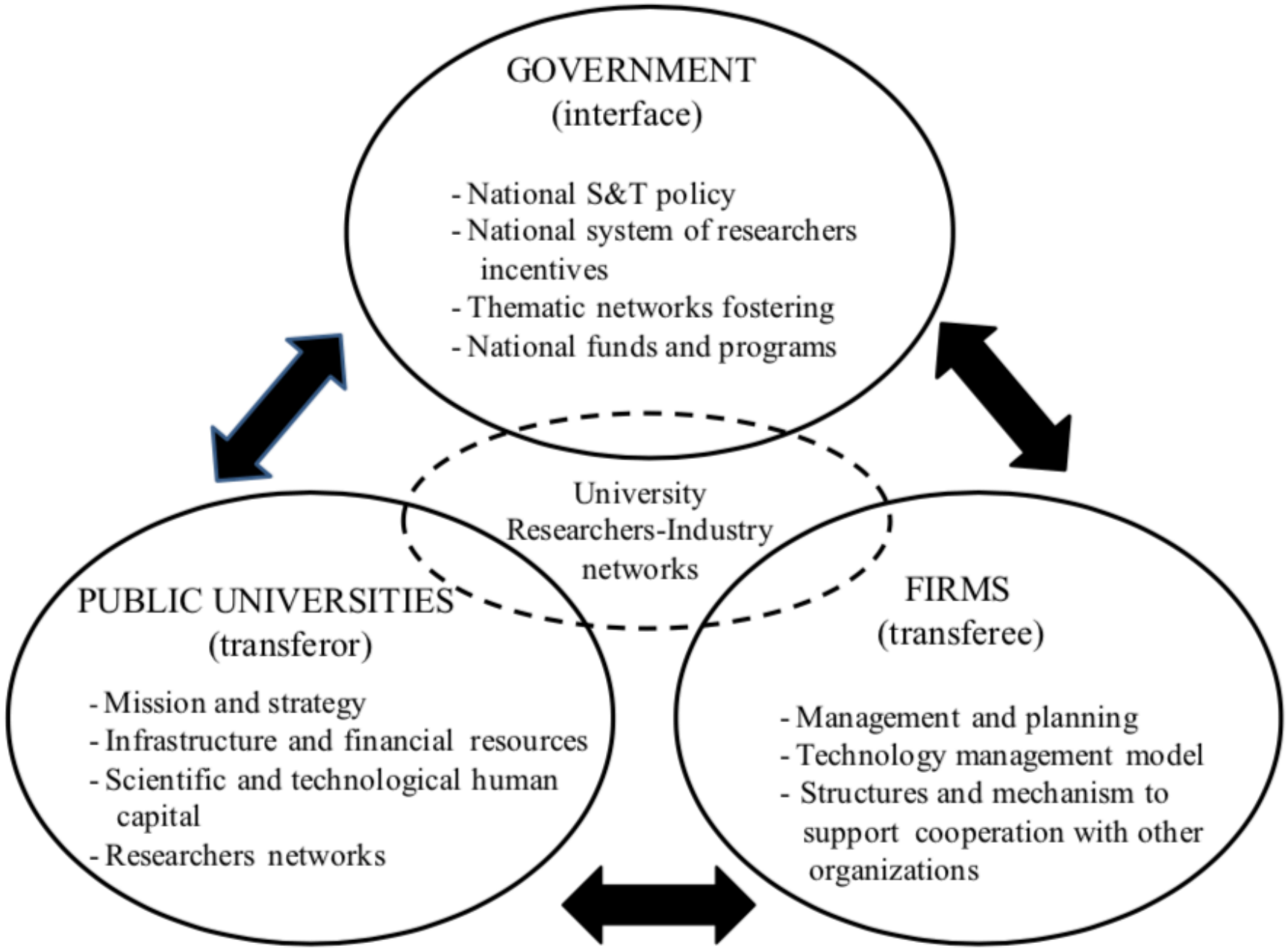
# Basic model of valorisation of university research and technology transfer (2° approach) (Piccaluga, 2015)



# Scientific-Technological Knowledge Transfer Model (Feria and Hidalgo, 2011)



# Technology transfer model for universities based on university researcher–industry networks (Necoechea-Mondragón et al., 2013)

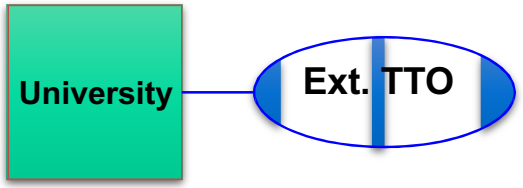


# Technology Transfer Office organizational approaches

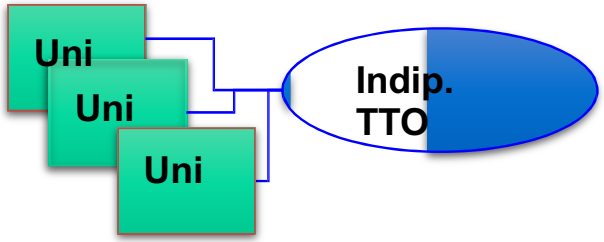
(Piccaluga, 2015; Siegel et al., 2003; Macho-Stadler et al., 2007)

**In-house TTO**

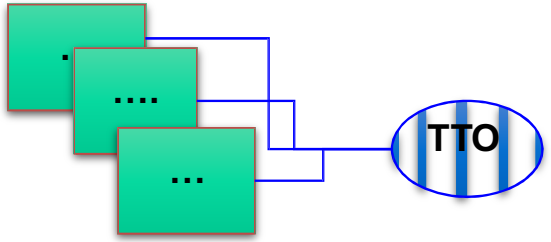

**External TTO controlled by the institution**




**Indipendent external TTO**

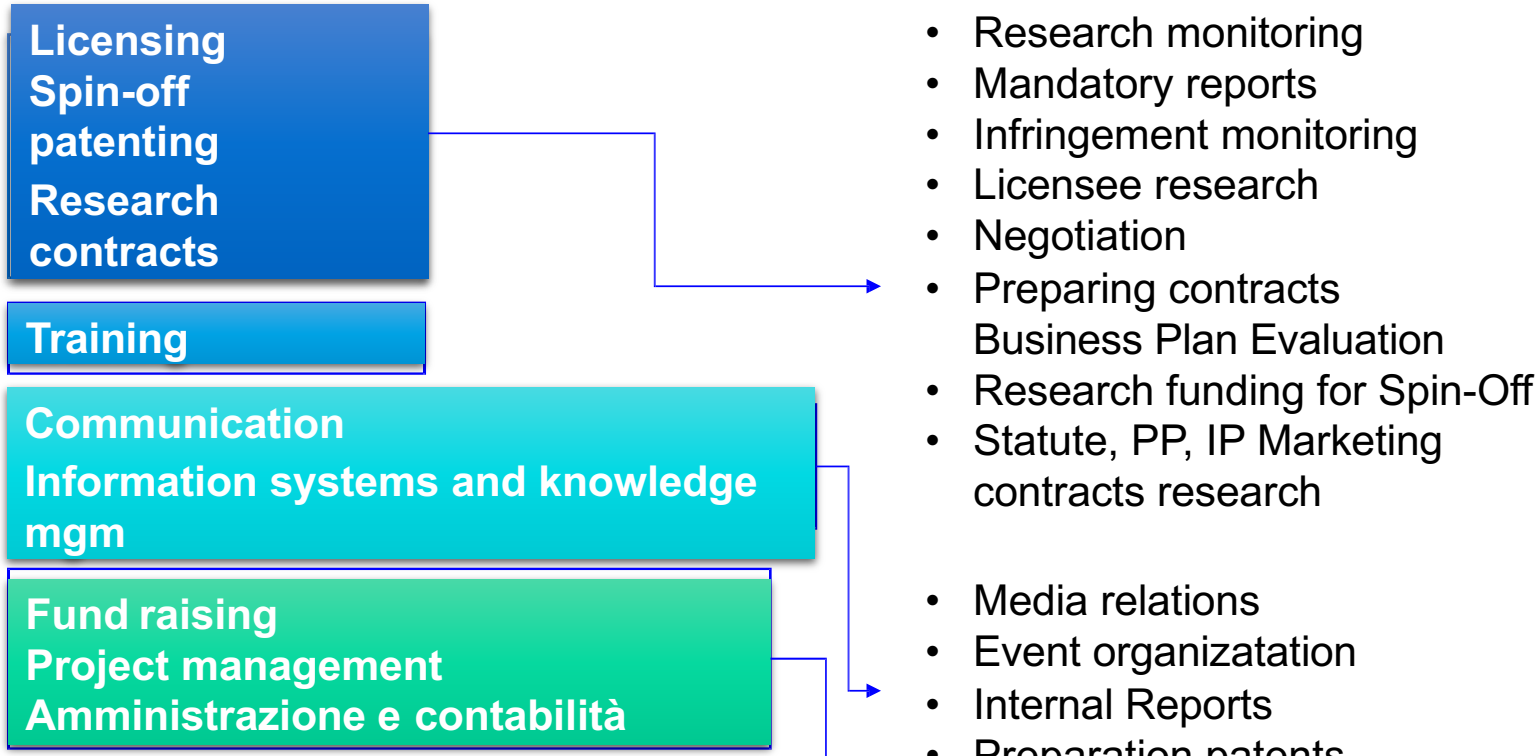



**TTO "network" (more institutions, more offices, etc.)**



# Specific activity of a Technology Transfer Office

## (Debackere & Veugelers, 2005; O'shea et al., 2005; Fitzgerald & Cunningham, 2016)



# How Do Universities Commercialize Their Technologies?

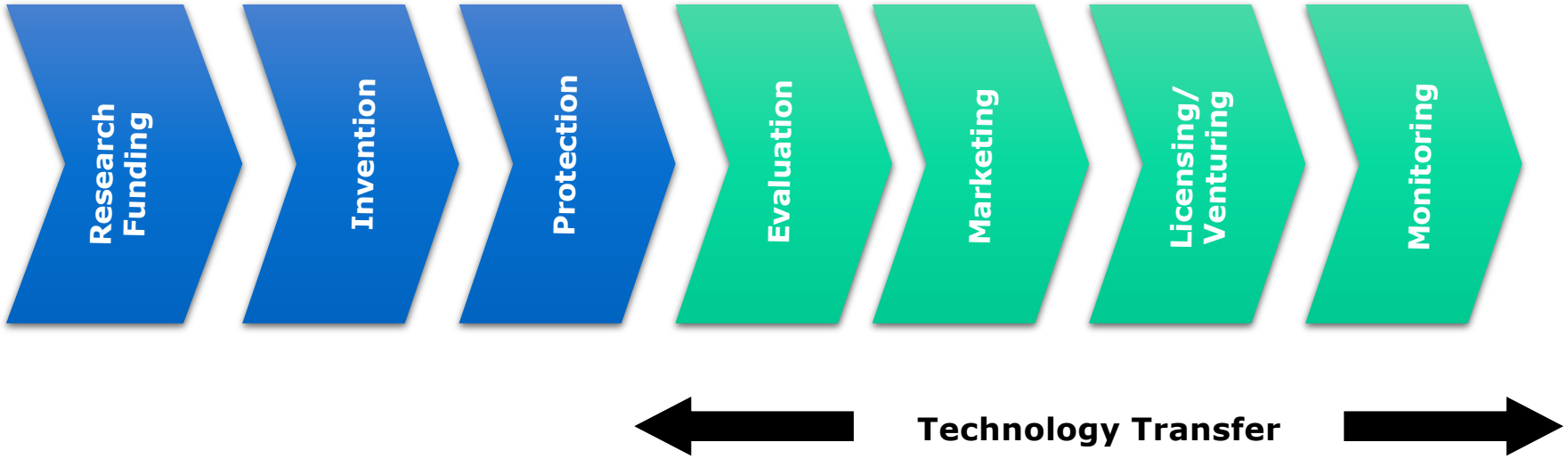
**Ways to transfer**

- License
- Sell
- Spin Out
- Give it away

**Identify potential commercial partners**

Research Sponsor
Contact by Licensee
Marketing
Attending Industry Events

# What are the Stages of Tech Transfer?



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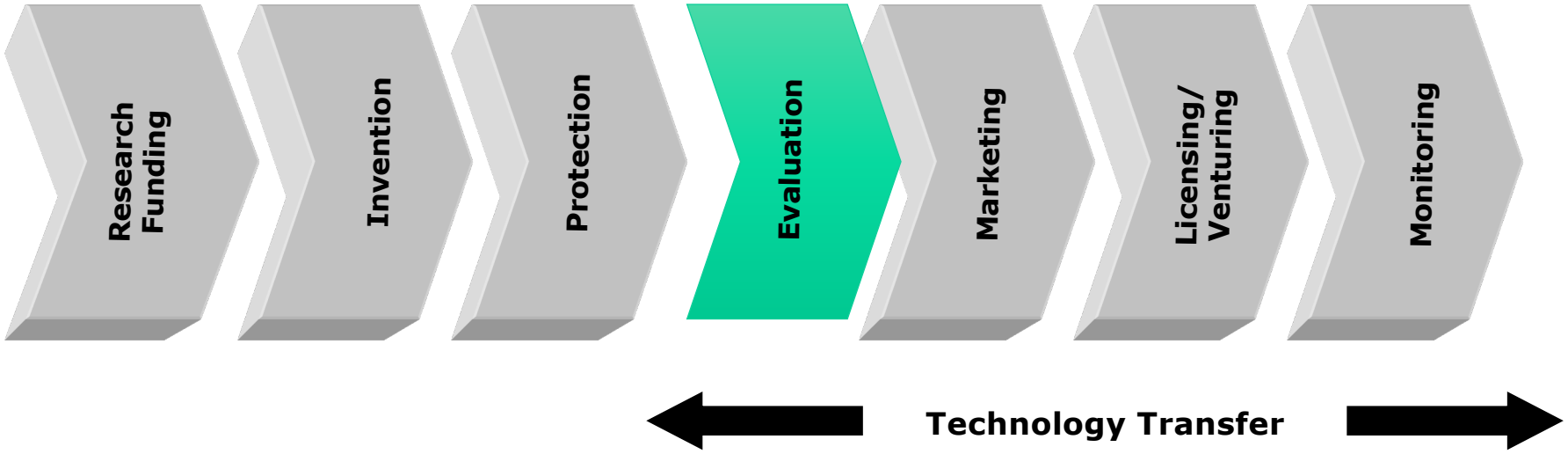

# Evaluation

- **Technologies that are disclosed need to be evaluated for commercial potential**
  - What is the commercial potential?
  - What problem does the technology solve?
  - How is the technology an improvement over the state of the art?
  - What are the economic issues?
  - Cost of commercialization vs. Economic benefit
  - Economic vs. social benefit
- **Not every disclosure has commercial potential**

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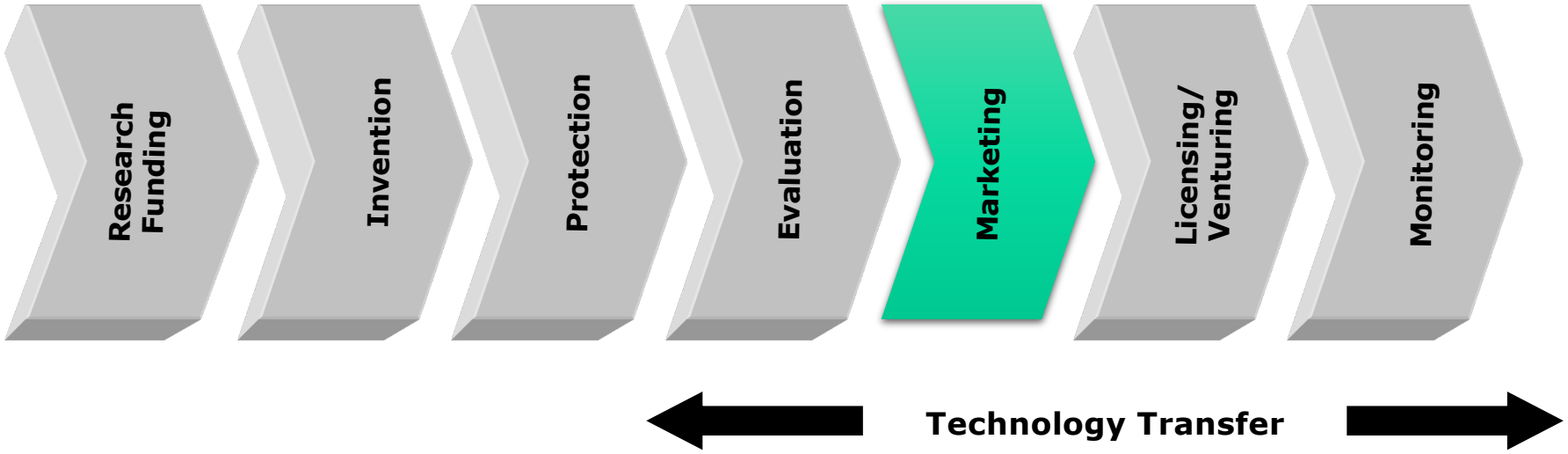

# Marketing

- **Means of marketing**
  - Existing relationships
  - Direct Marketing
  - Websites
  - Industry Meetings
- **Information provided**
  - Confidential v. Non-confidential

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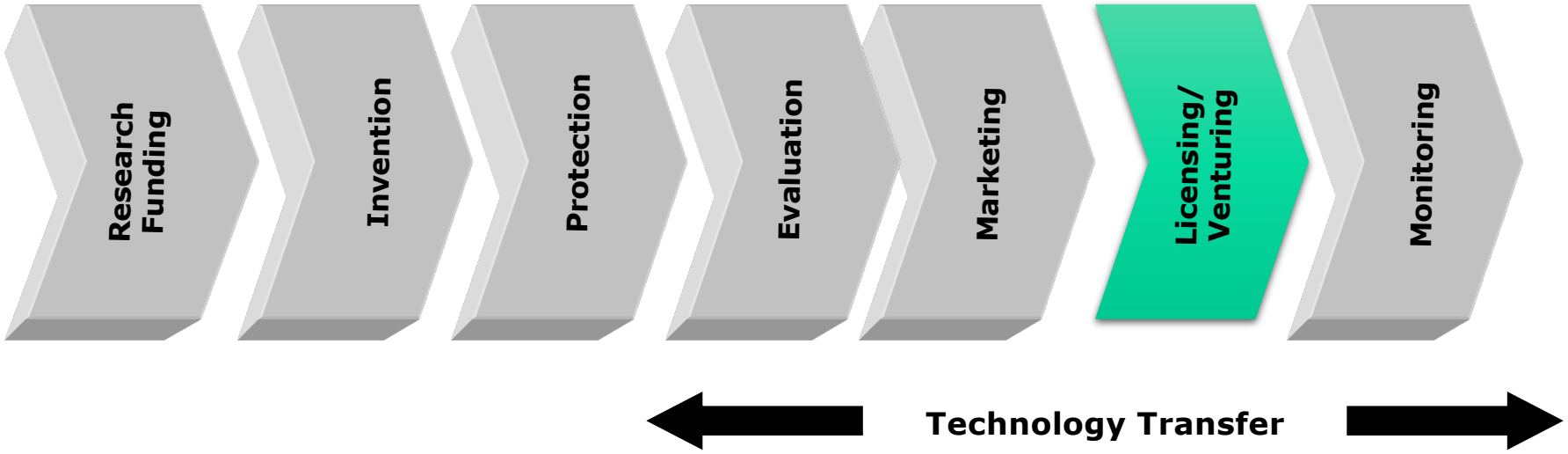

# Forms of Technology Transfer

- **How can rights be transferred?**
  - Sale of IP rights
  - License of IP Rights
  - License of Know-How
- **License agreements are the most common way to transfer rights**
- **“Spin Out”**
  - Start up company’s still need a license

# Overview of Licensing Agreements

- **Contract transferring IP rights to third party**
- **Important sections:**
  - Grant – What is being transferred?
  - Territory
  - Royalties & Milestones
  - Return of Rights
  - Research Rights
  - Publishing Rights
- **Sponsored Research**

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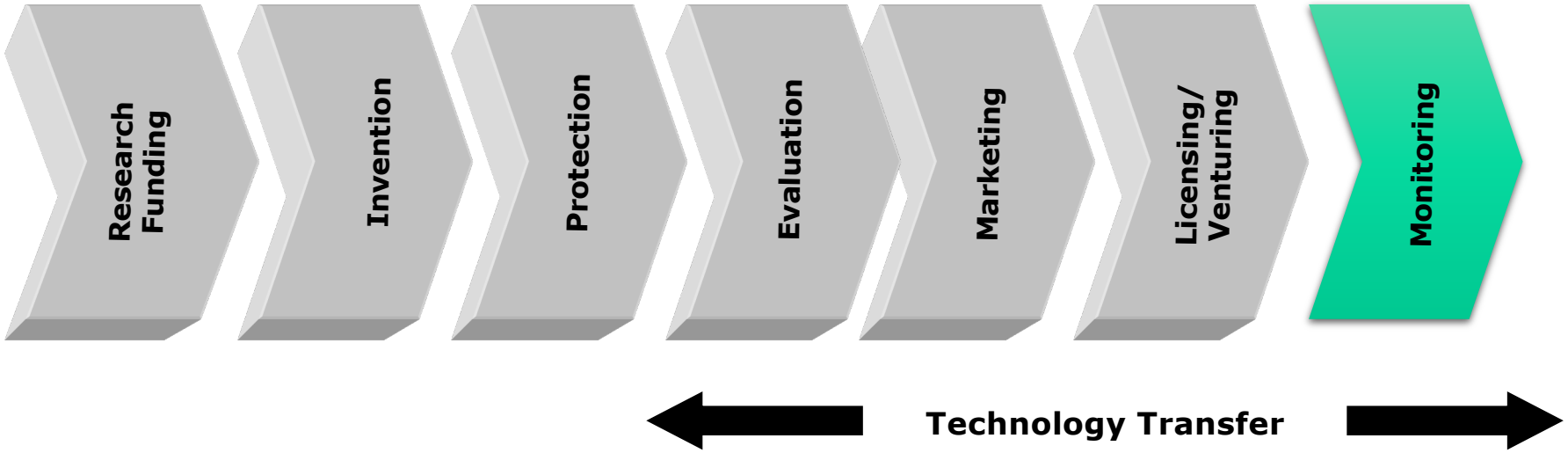

# Monitoring

- **Make sure that licensee is complying terms of agreement**
- **Make sure that third parties are complying with IP**
- **Need strong audit clause**