

RiHEI

Innovation commercialization and regional impact via RRI and young citizen science

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FACULTY OF MANAGEMENT University of Lodz

TUM int TUM International GmbH The University Company

MARTIN-LUTHER UNIVERSITÄT HALLE-WITTENBERG

KUTAISI INTERNATIONAL UNIVERSITY



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Introduction

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01 Introduction to innovation management and commercialization in HEI

02 Academic entrepreneurship and scientific projects marketization

03 Legal aspects of knowledge commercialization

04 Funding with impact investing perspective

05 RRI and young citizen science

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Aim of the toolkit

The toolkit aims to provide knowledge, strategies and guidance to HEIs to trigger university-industry collaboration in key areas such as:

- Innovation process characteristics;
- The complexity of commercialization processes in HEIs;
- University commercialization strategies;
- Academic entrepreneurship and start-up foundation;
- Legal aspects of commercialization in HEIs;
- Funding of innovation with special attention to impact investing;
- RRI concept, its complexity and potential for regional growth;
- Young scientists' engagement.

Learning outcomes

- to learn about the fundamentals of innovation and innovation processes in higher educational institutions;
- to gain the ability to find the proper strategy for commercializing a research project;
- to understand the idea and scope of academic entrepreneurship;
- to learn about the characteristics of start-ups and spin-offs in the university environment;
- to acquire competence in designing dedicated intellectual property protection for a project;
- to gain competence in finding an investor;
- to understand the idea of impact investing;
- to acquire knowledge in the field of Responsible Research and Innovation (RRI);
- to gain competence in how to implement the RRI concept in a university.



UNIT 1

Introduction to innovation management and commercialization in HEI



CONTENTS

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01 Innovation– definition(s)

02 Types of innovation

03 Commercialization of knowledge on HEIs

04 Commercialization strategies

05 Intellectual property valuation and evaluation

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Definition by J. Schumpeter

Innovation is:

- The introduction of a new good - that is one with which consumers have yet to become familiar- or of a new quality of a good.
- The introduction of a new method of production.
- The opening of a new market, that is a market into which the particular branch of manufacture of the country in question has yet to enter, whether or not this market has existed before.
- The conquest of a new source of raw materials or half-manufactured goods.
- The carrying out of the new organization of any industry.

Joseph Schumpeter was one of the most influential economists of the 20th century. Schumpeter identified innovation as the critical dimension of economic change

Innovation by Oslo Manual

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).

Innovation activities include all developmental, financial and commercial activities undertaken by a firm that are intended to result in an innovation for the firm.

Types of innovation by object

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.

business innovation – a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm.



Types of innovation – novelty and impacts

Incremental innovations – Significantly different from the firm's previous products or business processes but still improvements of existing ones.

Substantial innovations, also called semi-radical, are those which lead to considerable improvements but are not the result of essentially new technologies or approaches.

Disruptive or radical innovations – totally new products/services (new to the world). Present a considerable change in basic technologies and methods, or revolutionary ideas that could create new markets. These changes are discontinuous and frequently cause significant disruption, leading to changes in industry leadership.



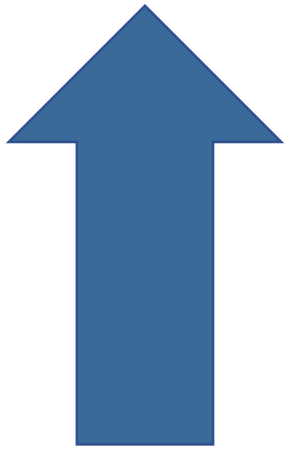
Innovation - level of novelty

Innovation new to the world

Innovation new to the country

Innovation new to the region

Innovation new to the firm





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Disruptive technology

Concept:

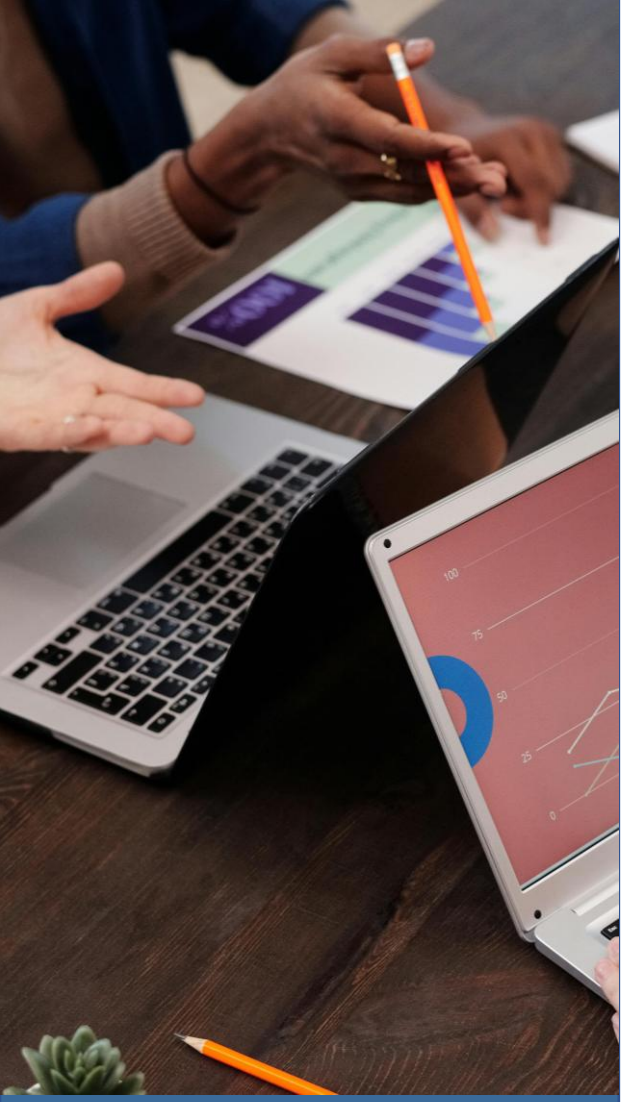
- Technological innovation, product, or service that eventually overturns the existing dominant technology or product in the market.

Mechanisms of disruptive technology:

- Disruptive innovations introduce a new value proposition
  - Low-end disruption: initially attracts low-end customers, moves into more upscale markets over time as the technology improves;
    - Example: 3D-Printed Real Estate
  - New-market disruption: occur when existing products limit the number of potential consumers.
    - Examples: personal computers, smartphones

Changes that are not innovations

- Routine changes or updates
- Simple capital replacement or extension
- Minor aesthetic changes,
- Custom production
- Advertised concept, prototype or model of a product that does not yet exist
- Outputs of creative and professional service firms,
- Extension of the range of products handled or offered to customers
- Mergers or the acquisition of other firms
- Ceasing to use a business process, ceasing to outsource a business process, or withdrawing a product from the market
- A change due to externally determined factor prices
- A formulation of a new corporate or managerial strategy



Intellectual property commercialization in HEI

IP commercialization is the process of creating economic value by converting knowledge, discoveries and inventions into new or significantly improved products and services.

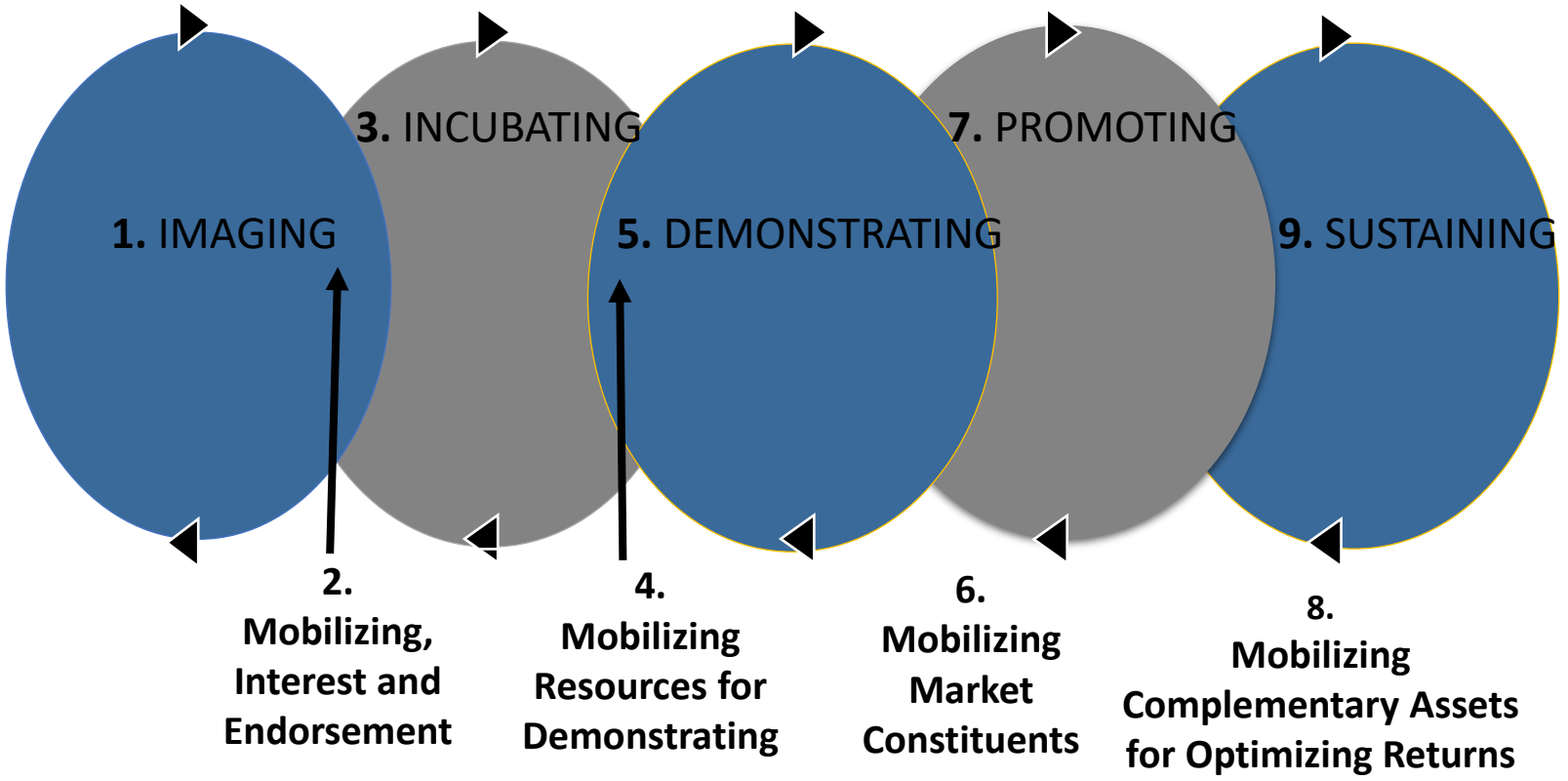
•The intellectual property commercialization approach may vary across universities or research institutions, yet typically follows these steps:

1. Presenting the invention or discovery to Technology Transfer Offices (TTOs), often through invention disclosure forms.
2. Conducting an evaluation to determine the technical merit, IP status, and market potential of the invention – serving as the basis for deciding on its protection and commercialization viability.
3. Securing protection through intellectual property rights or other suitable means.
4. Developing a business case and commercial plan.
5. Implementing IP marketing strategies.
6. Engaging in licensing agreements, commonly the primary method for technology transfer.
7. Creating a product development roadmap.
8. Facilitating market outreach and commercialization efforts.

RiHEI

Source: WIPO.inc

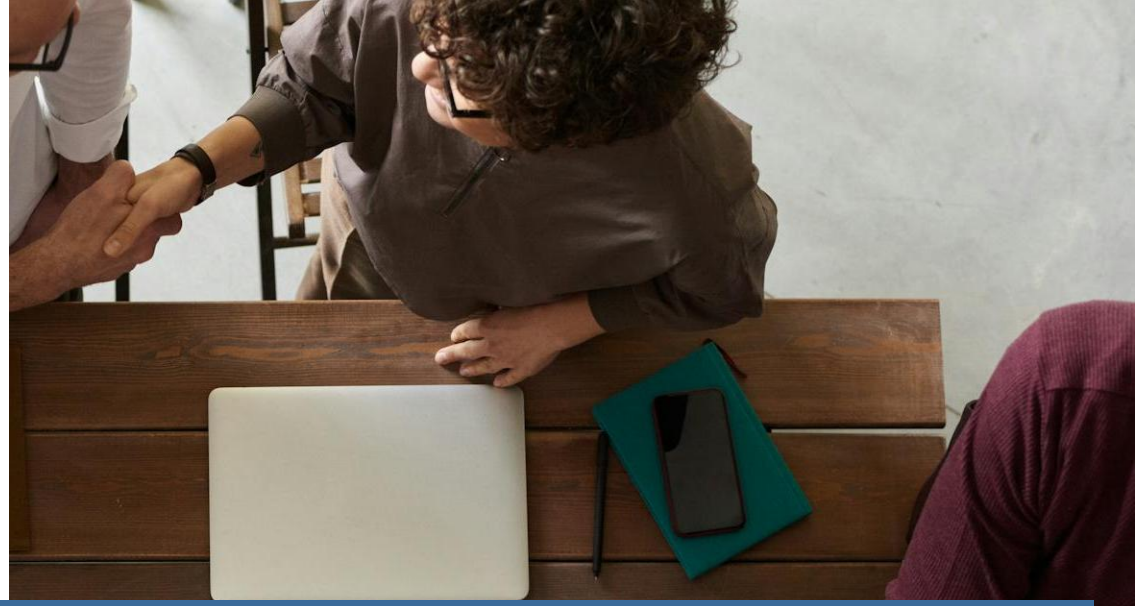
Jolly Model of Commercialization Process



Step-by-Step Guide for Setting Up Collaborative Innovation Projects



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The commercialization strategies





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Start-up creation

The focus of the start up must on outside to help of an investor to gain a foothold in the market .

Without customers, there is no revenue and the business will fail.

The venture requires financial foresight - especially planning for the cash flow and capital needs as the venture grows.

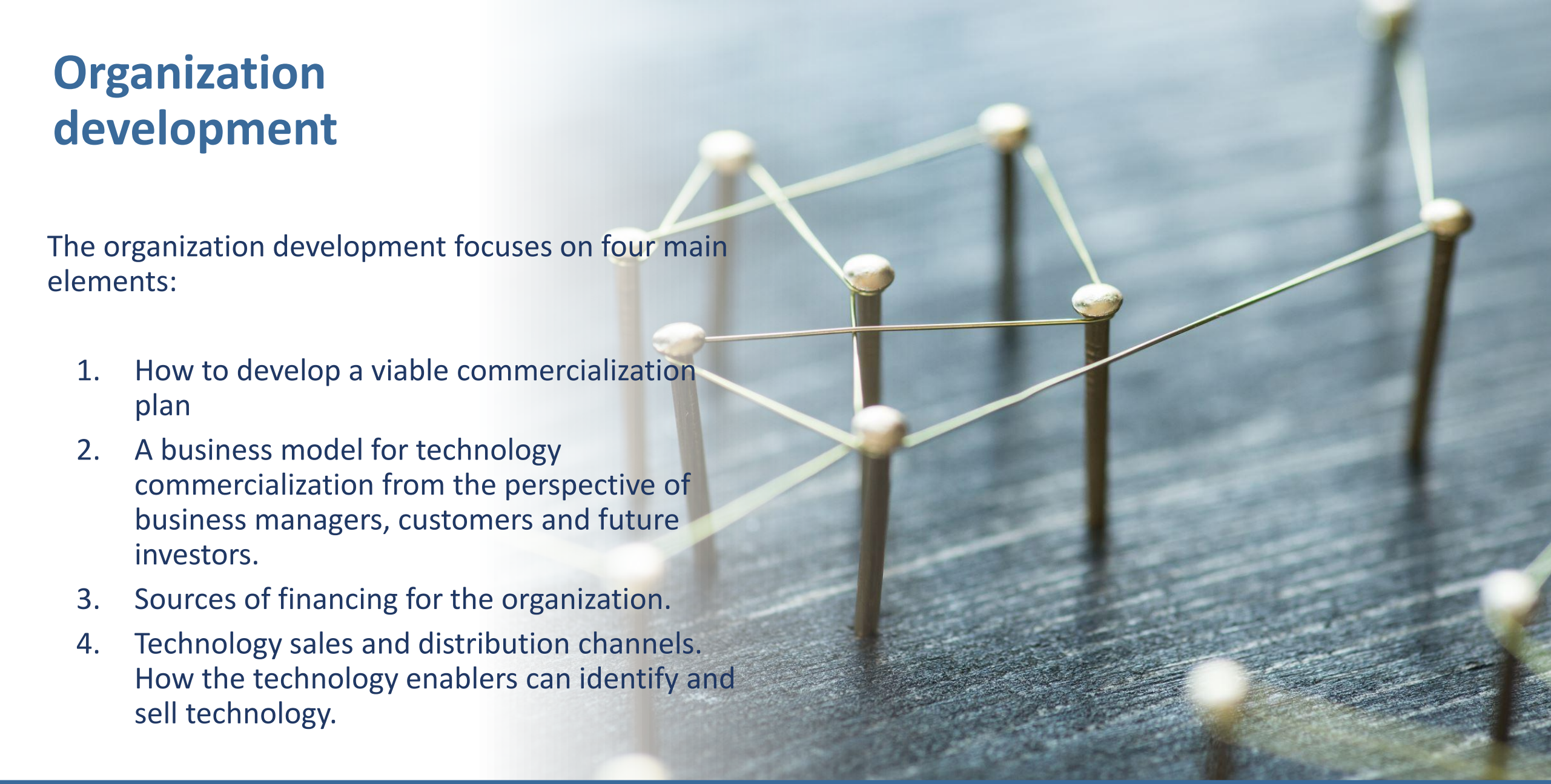
The most important issue is not the revenue growth but the cash flow management to support the growth.

Licensing

Technology licensing is an arrangement in which the licensor's know-how, patents, trademarks, services, copyrights, trade secrets, or other intellectual property may be sold or made available to a licensee for royalties, lump sum royalty, royalty that is based on volume of production or income, or a combination of compensation methods.



Organization development



The organization development focuses on four main elements:

1. How to develop a viable commercialization plan
2. A business model for technology commercialization from the perspective of business managers, customers and future investors.
3. Sources of financing for the organization.
4. Technology sales and distribution channels. How the technology enablers can identify and sell technology.

Science and business cooperation

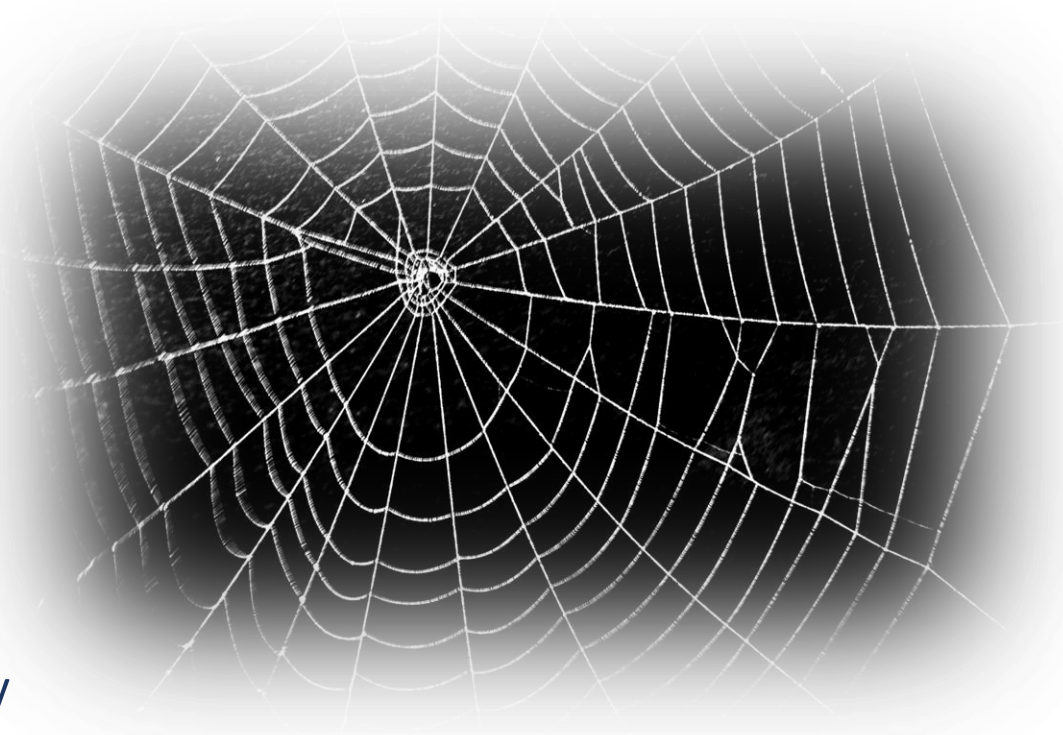


By establishing collaboration strategy, market players tend to develop market tools to withstand competition on others having the access to better partners, resources or intellectual property.

The organization collaboration brings an additional element of challenging task. It includes theoretical concerns and methodological practice focused on:

- institutional support for collaboration,
- perception of tasks,
- methods of working together,
- information technology,
- communication and research procedures.

Startegic alliances



One of the goals of strategic alliances is to cut down the risk involved in market operations.
Business models for developing technology are very risky. By discussing a variety of forms of business alliances and cooperation that fit the expected market activities, it is possible to create a competitive advantage for new a project.
Alliances endeavor to improve the commercialization and technology implementation process.

IP evaluation and valuation

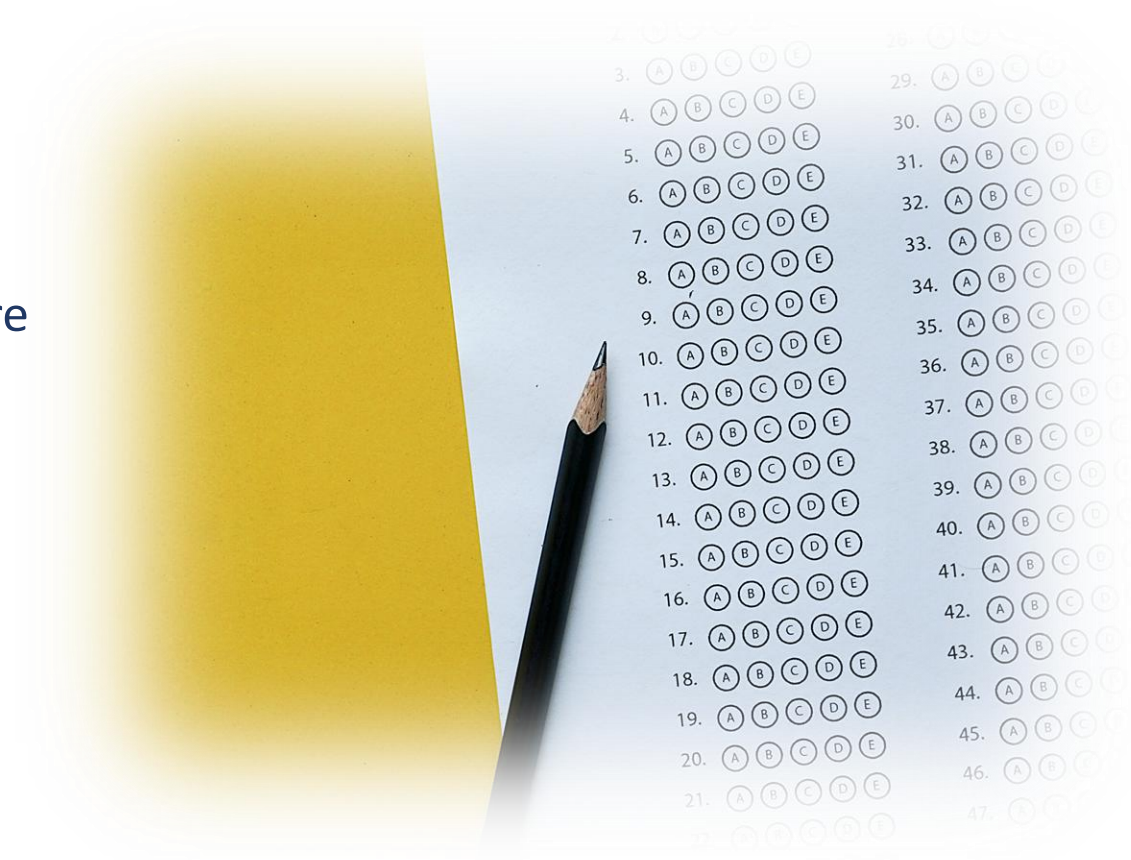
Knowledge created within HEI needs an assessment.

Evaluation of IP is a process of estimating the value of the technology based on its technical advantages (how well and innovatively it solves the problem), market applicability (whether there is a market need), and the level of “freedom of operation” for industry partners (whether there are similar protected inventions and potential danger of IP infringement).

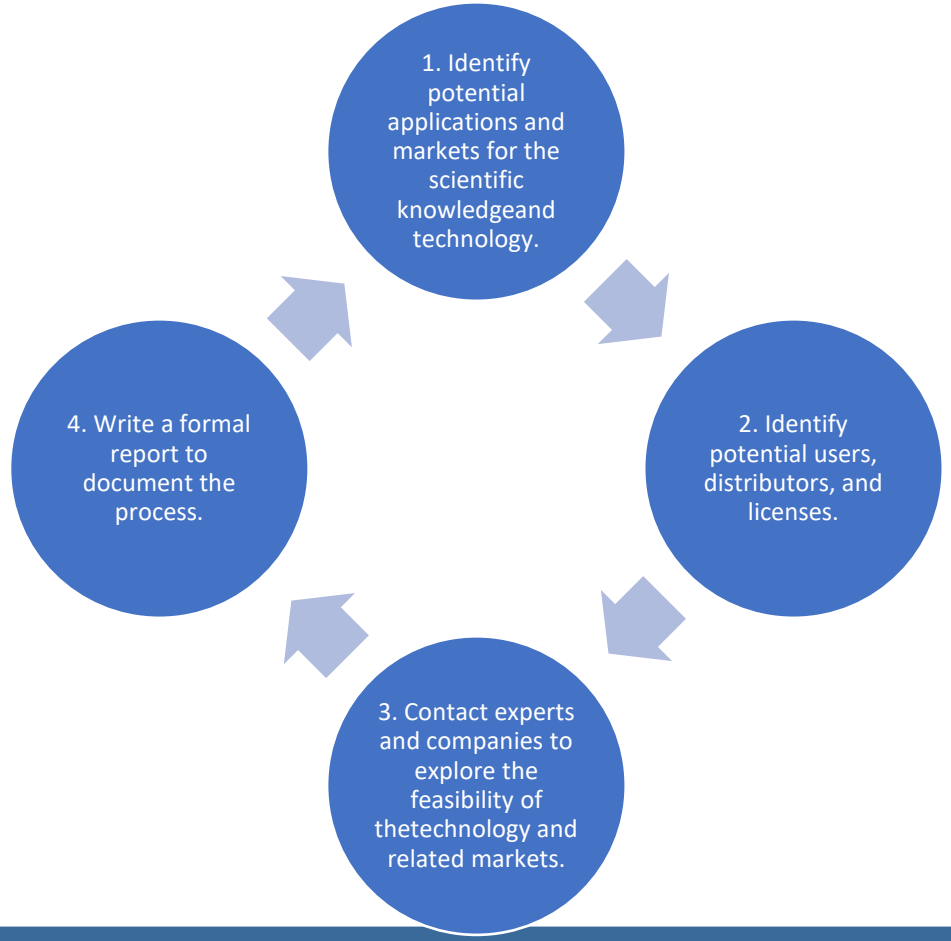
Valuation of IP is a projection of the potential value that the technology may generate in the specific market and context, taking into consideration the risk and changing value of the money over time.

Economic value assessment criteria

- ✓ Market potential
- ✓ Competitive organization and technologies
- ✓ Human resources and laboratories infrastructure
- ✓ IP protection possibilities
- ✓ The stage of development
- ✓ Commercialization scenarios
- ✓ Financial resources available
- ✓ Market interest
- ✓ Entrance barier
- ✓ Market development



Commercialization Quicklook Methodology



The IC2 Institute at the University of Texas at Austin describes Quicklook as a method for conducting technology market assessments that offer early insights into potential commercial interest in new technologies originating from universities or research labs.

Quicklook involves conducting around 40 to 60 hours of research to assess the commercial readiness and viability of a technology. Developed in the 1980s at NASA's Mid-Continent Technology Center, Quicklook was designed to evaluate the commercial potential of U.S. space technologies post the conclusion of the U.S. space program.

The benefit of using the Quicklook methodology is the ability for an organization or researcher to swiftly gauge the commercial prospects of a technology.

However, a drawback of the Quicklook approach is that due to its rapid nature, it may lead to a higher possibility of making errors in judgment.

Step-by-Step Guide for Setting Up Collaborative Innovation Projects





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UNIT 2
Academic entrepreneurship and scientific projects marketization



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01 What is academic entrepreneurship

02 Entrepreneurial university

03 Enabling academic entrepreneurship

04 Scientific knowledge on the market

05 Academic spin-offs

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Academic entrepreneurship

Entrepreneurship - seeking market opportunities and turning them into practice

Entrepreneurship understood as the search for opportunities, is a daily feature of university work

- looking for opportunities for new research, new publications, study trips, etc.
- seeking opportunities for research grants, guest lectures, new courses, etc.

Entrepreneurship with a business dimension is not a matter of course in academic work - looking for an opportunity and seizing the opportunity to create a business is not obvious to the academic sphere

The significance of academic entrepreneurship

The search for opportunities to apply scientific knowledge beyond the university - in particular through the implementation of knowledge into innovations - new/improved services or new/improved processes – foster the economic and social development of modern societies

Dimensions of entrepreneurship in an academic setting

Entrepreneurial university - a university that has the capacity to innovate, recognize and create opportunities, as well as working as a team, taking risks and responding to challenges (Buruck Klein, Pereira, 2020)

Entrepreneurial university staff - are individuals employed by universities, who seek new opportunities and possibilities to put research results and scientific knowledge into practice. They use identifying market opportunities, assessing technological feasibility, securing funding, overcoming regulatory hurdles and are directed to successfully bring innovations to market.

Entrepreneurial students - individuals who engage in entrepreneurial activities while still pursuing their education, aiming to create businesses and opportunities rather than solely seeking employment (Smith, 2023)

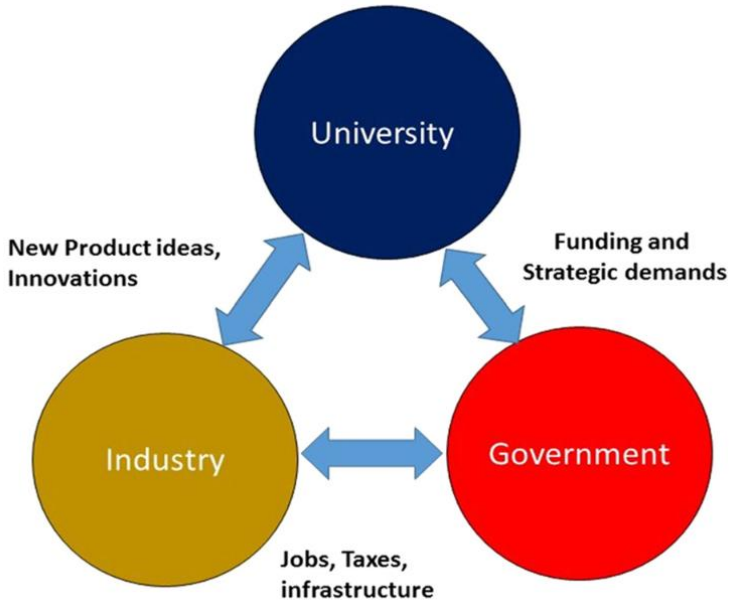
Organisational level

Employees level

Students level

Entrepreneurial university as partner in social and economical development

Triple/quadruple helix concept



Source: https://academic-accelerator.com/encyclopedia/triple-helix-model-of-innovation

The entrepreneurial university is a valuable partner in cooperation with the environment

It enriches partners in the economic environment by providing valuable scientific input applicable in various spheres of practical life – industry & business, public sector and civil society.



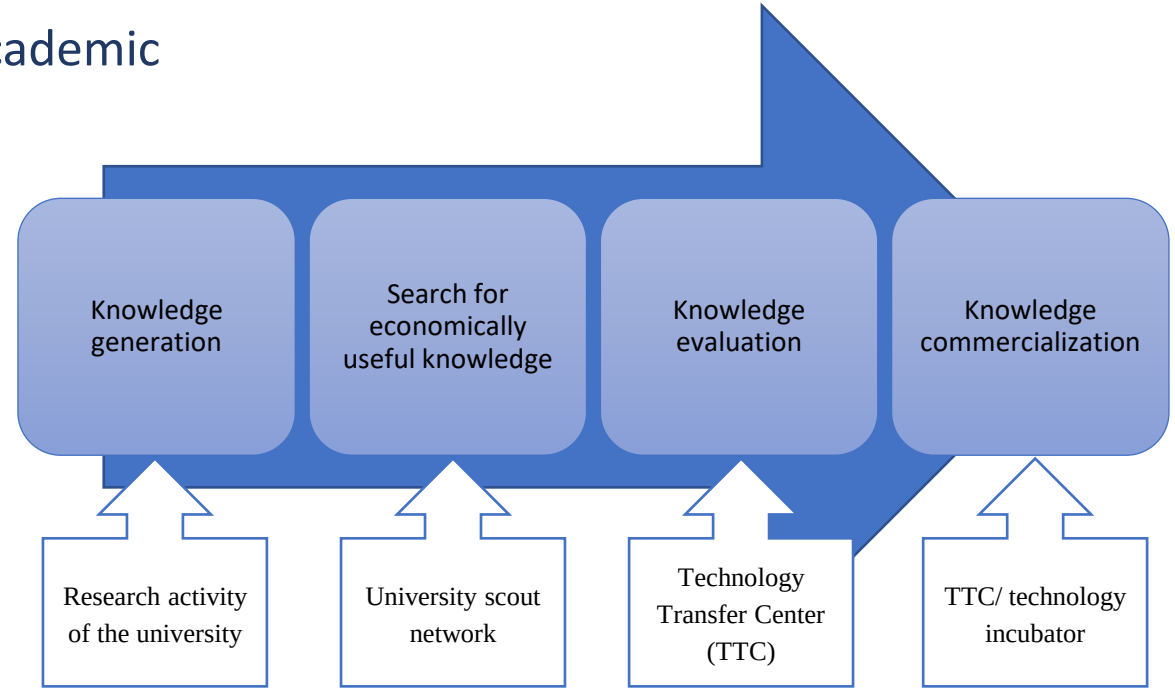
Institutional environment of academic entrepreneurship at university

Main university departments supporting academic entrepreneurship activities:

- Technology transfer office
- Technology scouting
- Academic incubator

and also

- University IP office
- Refctors/deans represantatives
- Knowledge shops
- others

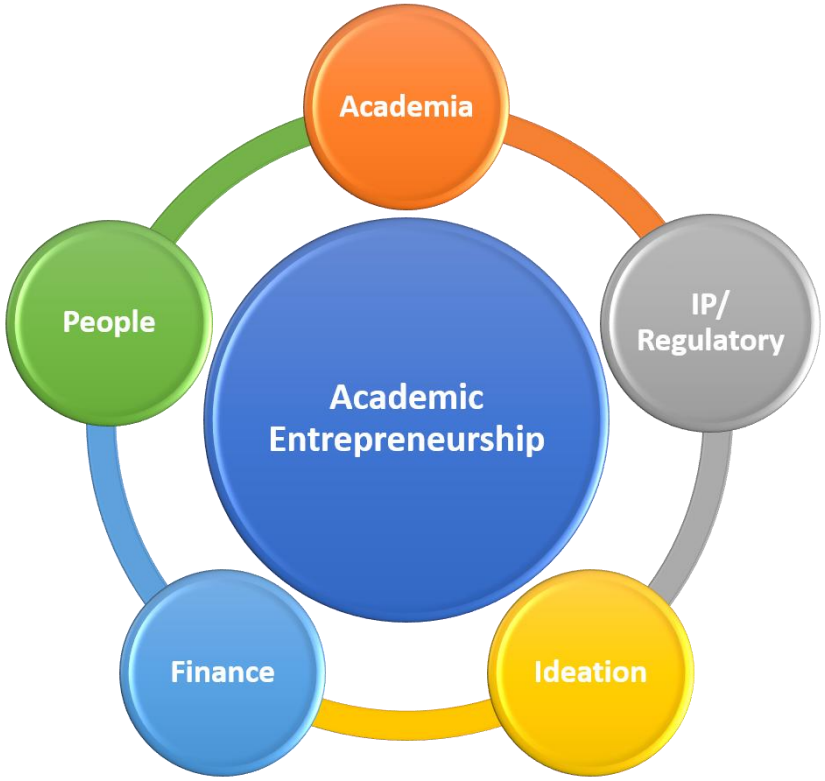


Source: Wiśniewska, Głodek, Trzmielak 2015

Enabling academic entrepreneurship - factors

Academic entrepreneurship is not a single event, but rather a continues process comprised of a series of events. It is rather a bundle of various experiences and events like (D'este, Mahdi, Neely):

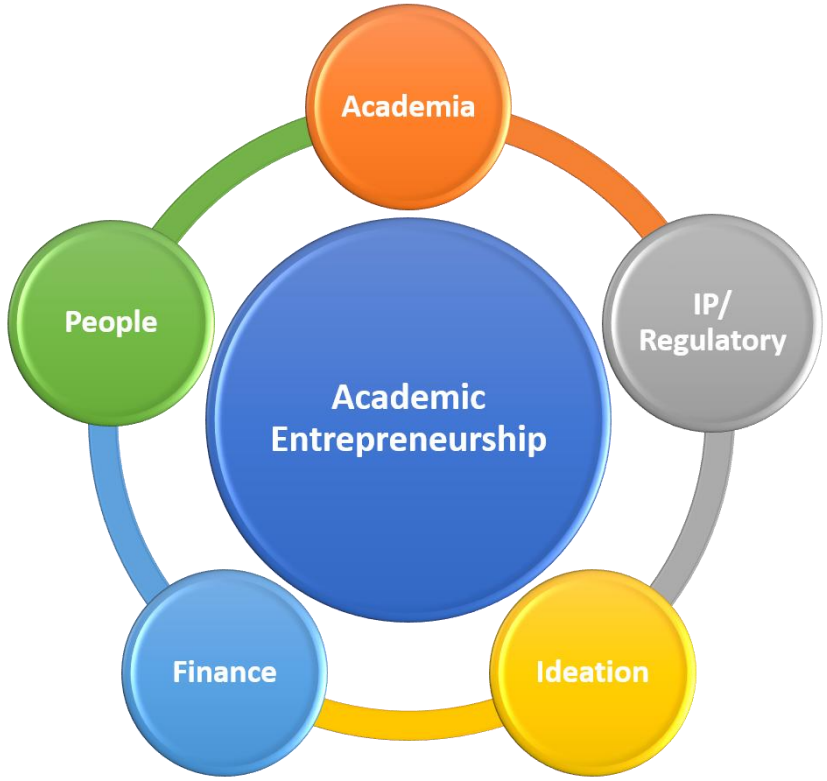
- Experience in collaborative research with industry
- Exposure to previous entrepreneurial opportunities
- Range of ties to external academic research networks
- Integration of multiple fields of research
- Quality of academic research



Enabling academic entrepreneurship

Experience in collaborative research with industry

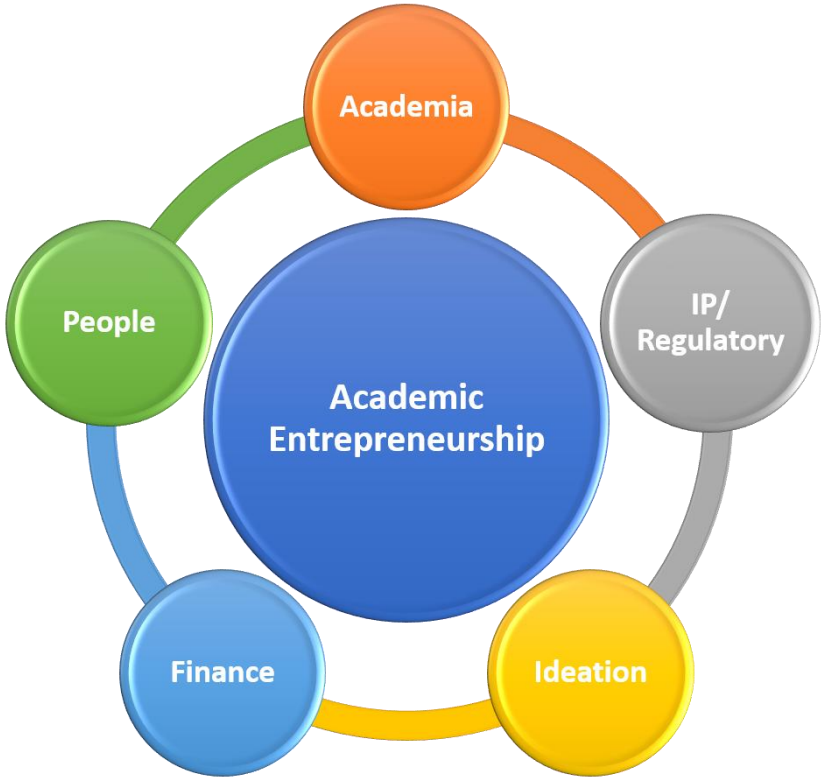
- Transferring information from previous experience to a current entrepreneurship
- Existing of academic-industry linkages: mutual teams of researchers, committees, etc.
- Established tradition in collaborative research with companies
- Existing information links between universities and business
- High level of interactions e.g. scientific conferences with participations from business, business-scientific forum, mutual committees
- Mutual awareness to exploit commercial potential of scientific research
- Entrepreneurial skills among academic researchers e.g. previous business experience



Enabling academic entrepreneurship

Range of ties to external academic research networks

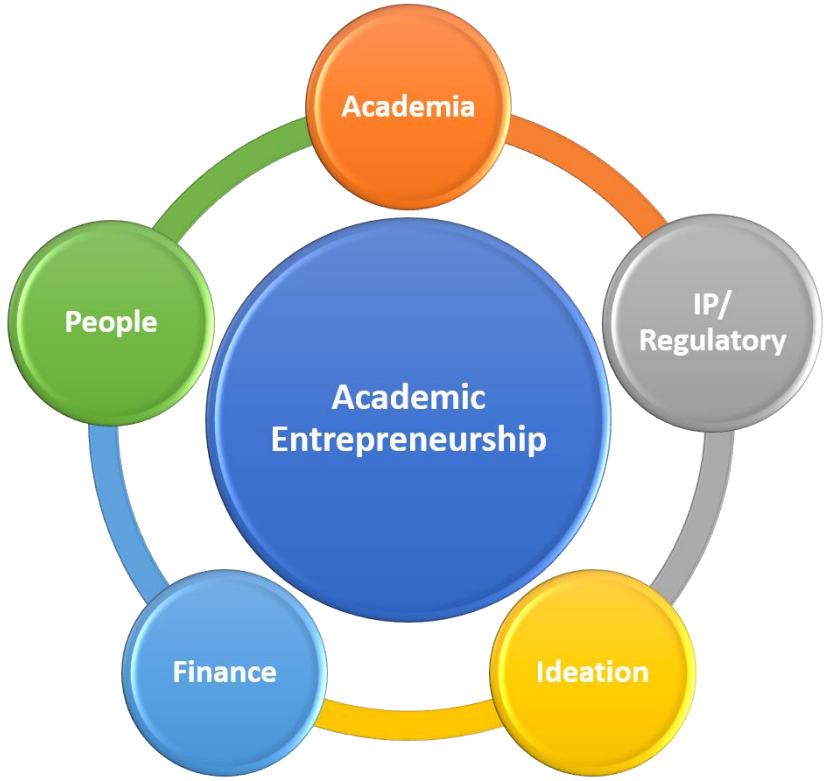
- Access to complementary expertise
- Access to extra infrastructure, equipment
- Boosting the opportunity to recognise anilities of academic researchers
- Enhance of entrepreneurial capabilities
- Increase among academics propensity to be an entrepreneur
- Mobilisation of social resources required to obtain objective perspective
- Enhance cross-fertilisation among disciplines
- Enrichment the research perspectives and methodology of research to identify new technological breakthroughs



Enabling academic entrepreneurship

Integration of multiple fields of research

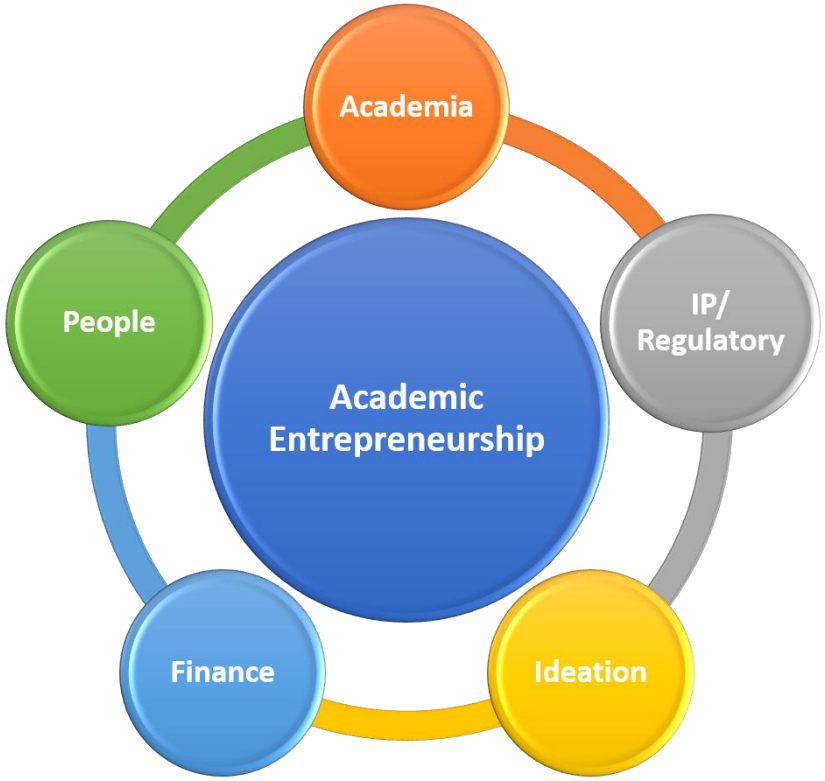
- Wide range of varied skills (technical and social)
- Boundary spanning approach
- Multiplace academic teams with varied methodological perspectives
- Platform of knowledge exchange
- Mutual interdisciplinary projects triggers innovative approach and commercial value



Enabling academic entrepreneurship

Quality of academic research

- The best scientists enjoy access to high value knowledge
- The best research leads to a stronger capacity to identify high value entrepreneurial solutions
- Activity in research generally connects with patenting and potential entrepreneurial products



Can scientific knowledge create business opportunities?

The results of scientific research include research findings, scientific discoveries, new ideas and even inventions

- They are usually published in research reports, scientific articles, monographs

Do they have economic/business value?

The challenge is to apply the research results in economic practice:
within e.g.

- a new/improved product,
- a new/improved service, or,
- new/improved business process…

this is only possible for some inventions!

Scientific invention and economic value

A scientific invention has no significant economic value to the economy if it cannot beused in economic practice.

If so, the invention in itself has no economic value

> Innovation and invention are two different things in economic and sociological terms.
>
> J. Schumpeter

Exploring practical ways to use scientific knowledge and academic entrepreneurship

The economic value of an invention (and scientific knowledge more broadly) is built by, among other things:

- Identifying opportunities for its use in practice,
- Building conditions conducive to its use,
- Identifying the benefits, and the beneficiaries of those benefits.



Indication of the possibility and manner of using the invention in solving a problem relevant to individuals, companies, institutions, etc.

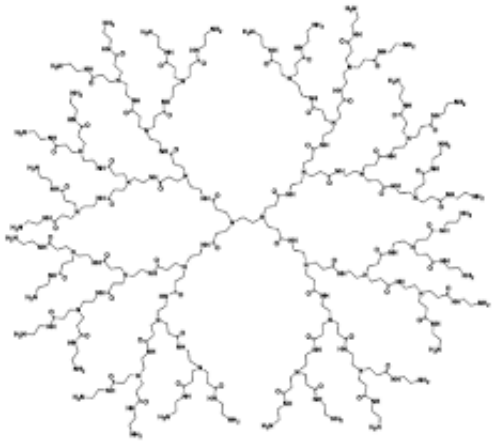
Academic entrepreneurship is about search for creation economic (and others) value out of scientific research

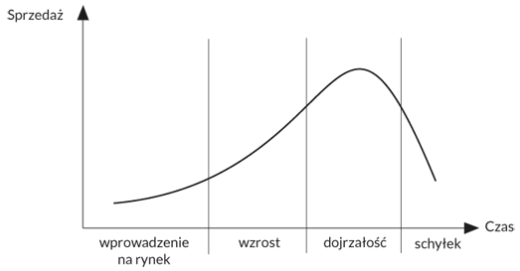
Exploring practical ways to use scientific knowledge is not an easy task…

Case of dendrimers

Dendrimers - nanoparticles whose structure resembles a tree with an exuberant branching crown the name dendrimer, derived from the Greek dendron-tree, meros-part.

The first dendrimers were synthesised in 1978.





Economic value is not stable…

Between 2011 and 2015, one type of dendrimer was found to have apoptosis-inducing properties in leukaemic cells - an important application was identified.

- A number of tests and studies were carried out and a company was created to pursue this.
- The company is now in liquidation and activities in this direction have been abandoned

Spin-off as a form of academic entrepreneurship

Academic spin-offs are now/young companies that transform scientific inventions developed from university research into market offer. They are developed with researchers as entrepreneurs and often with the support/participation of universities.

What are famous academic spin offs?

- **Google Inc.**
- **Genetech Inc.**
- **Lycos Inc.**

- **etc.**

Academic spin-offs - the birth of a legend

Massachusetts Institute of Technology

- 1991 - E.B. Roberts, Entrepreneurs in high technology: Lessons from MIT and beyond, Oxford University Press, New York.
- 2004 - S. Shane, Academic Entrepreneurship. University Spinoffs and Wealth Creation, Edward Elgar, Cheltenham–Northampton

Louis Pasteur University

- 2005 - N. Carayol, M. Matt, Does research organization influence academic production? Laboratory level evidence from a large European university, „Research Policy" 2004, no. 33, s. 1081–1102.

K.U. Leuven

- 2005 - K. Debackere, R. Veugelers, The role of academic technology transfer organisations in improving industry science links, „Research Policy", 2005, no. 34, s. 321–342.

What are famous academic spin offs?

- **Google Inc.**
- **Genetech Inc.**
- **Lycos Inc.**

- **etc.**

Academic spin-offs - a clash with everyday reality

The reality of ‘non-elite’ universities

- M. Wright, B. Clarysse, P. Mostar, A. Lockett, Academic Entrepreneurship in Europe, Edward Elgar, Cheltenham–Northampton 2007.
- P. Migliorini, Ch. Serarols, A. Bikfalvi, Overcoming Critical Junctures in Spin-off Companies from Non-elite Universities: Evidence from Catalonia, [w:] D. Smallbone, J. Leitão, M. Raposo, F. Welter (red.), The Theory and Practice of Entrepreneurship. Frontiers in European Entrepreneurship Research, Edward Elgar Publishing, Cheltenham 2010.

Creation of spin offs as a form of commercialisation for a small part of academic knowledge

Not only spin off

Diverse forms of commercialisation of scientific knowledge

Intellectual property based tools

- Spin off
- Join venture
- Licensing
- IP property sale

„Soft" tools – knowledge based

- Analytical projects with external partners
- Expertises
- Learning projects with external partners
- Consultancy
- Commercial publications

Success metrics

The commercialization of knowledge from universities that can be measured at the institutional level

1. **Number of Patents:** The number of patents (1) applied for and (2) granted to university researchers.
2. **Derived Revenue:** Income generated from patents, licenses, and technologies commercialized from the university.
3. **Number of Spin-offs and Start-ups:** The number of businesses created based on university research.
4. **Technology Licensing:** The number of licensing agreements for technologies developed by the university and the revenue generated from them.
5. **Collaboration with Industry:** The number of research projects conducted in partnership with companies and the number of agreements related to joint research.
6. **Graduate Employment:** The percentage of graduates employed in the industrial sector, especially in fields related to their studies.
7. **Participation in Business Incubators:** The number of projects or individuals utilizing incubators at the university.
8. **Research Activity:** External funding secured for applied research and development of innovative technologies.



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UNIT 3
Legal aspects of knowledge commercialization



CONTENTS

RiHEI

01 Intellectual property (IP) and IP rights

02 Patenting

03 Licensing

04 Non-Disclosure Agreements

05 Trade secrets

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Intellectual property

Intellectual property (broad view)

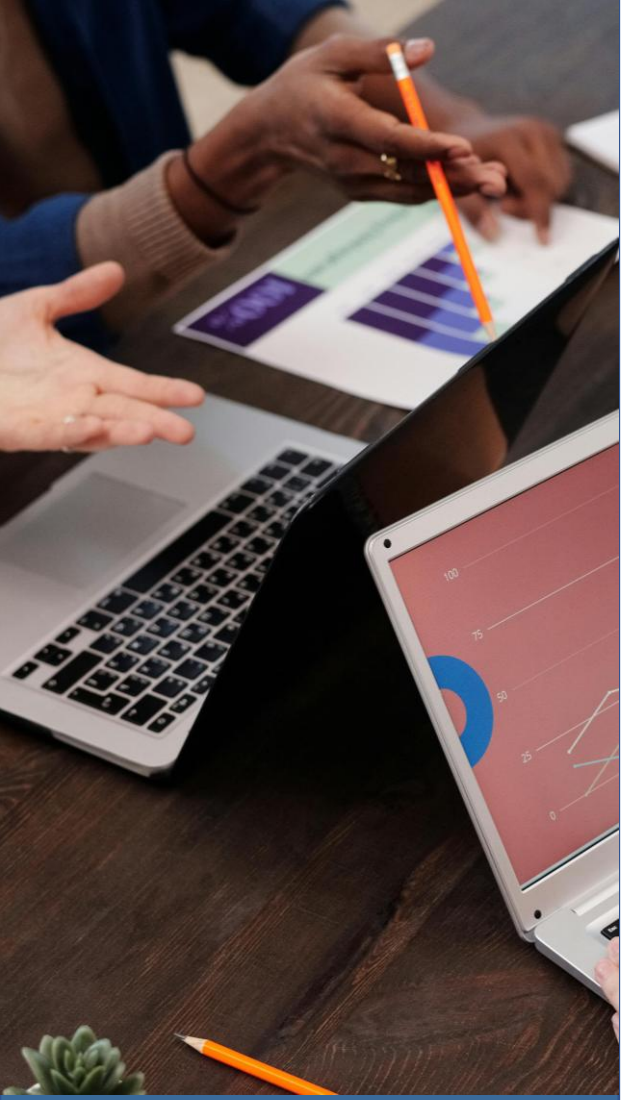
- the legal rights that result from intellectual activity in the industrial, scientific, literary and artistic fields.

Main reasons for the protection of intellectual property:

- to give statutory expression to the moral and economic rights of creators in their creations and the rights of the public in access to those creations,

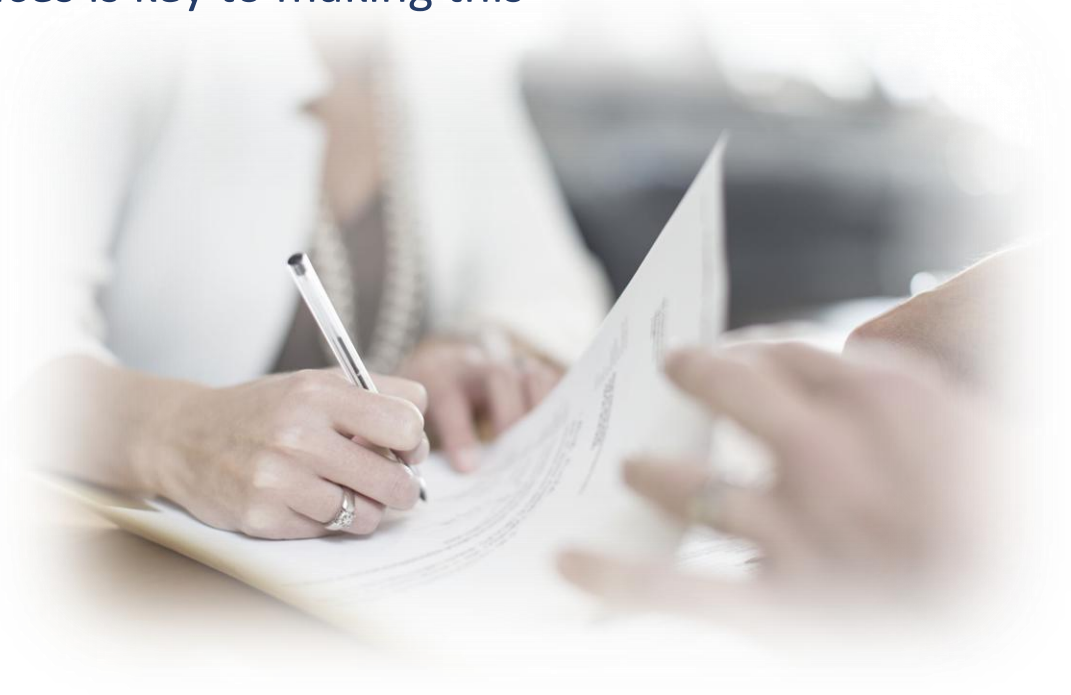
- to promote, creativity and the dissemination and application of its results and to encourage fair trading which would contribute to economic and social development.

Source: WIPO (2004) WIPO Intellectual Property Handbook: Policy, Law and Use



Aims of intellectual property regulations

Intellectual property rights encourage creativity and innovation by providing incentives for creators and inventors, and by facilitating the sharing of knowledge. The provision of robust legal frameworks and effective enforcement mechanisms is therefore crucial to safeguard IP and foster innovation. Strengthening IP protection in response to technological advances while considering international best practices is key to making this possible.

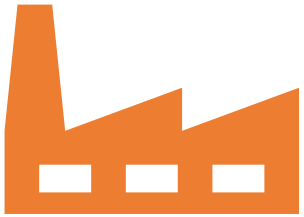


Source: WIPO inc.

What is protected by IP rights?

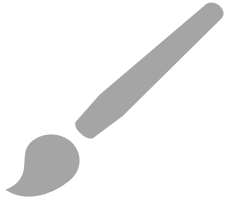
- literary, artistic and scientific works;
- performances of performing artists, phonograms and broadcasts;
- inventions in all fields of human endeavor;
- scientific discoveries;
- industrial designs;
- trademarks, service marks, and commercial names and designations;
- protection against unfair competition; and
- “all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields”.

Industrial property rights



Patents for inventions, industrial designs (aesthetic creations related to the appearance of industrial products), trademarks, service marks, layout-designs of integrated circuits, commercial names and designations, geographical indications and protection against unfair competition.

Copyrights



Copyright relates to literary and artistic creations, such as books, music, paintings and sculptures, films and technology-based works (such as computer programs and electronic databases).

"Industrial property shall be understood in the broadest sense and shall apply not only to industry and commerce proper, but likewise to agricultural and extractive industries and to all manufactured or natural products, for example, wines, grain, tobacco leaf, fruit, cattle, minerals, mineral waters, beer, flowers, and flour."
Paris Convention – *Article 1(3)*



PATENT

- A patent is a legal title that can be granted for any invention with a technical character provided that it is new, involves an ‘inventive step’, and is susceptible to industrial application.
- A patent can cover how things work, what they do, what they are made of and hov they are made.
- Anybody can apply for a patent.
- It gives the owner the right to prevent others from making, using or selling the invention without permission.
- Inventions can be protected in Europe either by national patents, granted by the competent national IP authorities (patent offices) in EU countries or by European patents granted centrally by the European Patent Office (EPO).
- Applicants seeking worldwide patent protection may use either the services of the national IP authorities or the EPO, under the Patent Cooperation Treaty (PCT).
- In general terms, an international patent application has the effect of a national patent application (and certain regional patent applications) in or for all PCT Contracting States.



RiHEI

Conditions of patentability

Patentable subject matter. The invention must fall within the scope of patentable subject matter as defined by national law. This varies from one country to another. Many countries exclude from patentability such subject matter as scientific theories, mathematical methods, plant or animal varieties, discoveries of natural substances, methods for medical treatment (as opposed to medical products), and any invention where prevention of commercial exploitation is necessary to protect public order, morality or public health.

Industrial applicability (utility). The invention must be of practical use, or capable of some kind of industrial application.

Novelty. The invention must show some new characteristic that is not known in the body of existing knowledge (referred to as prior art) in its technical field.

Inventive step (non-obviousness). The invention must show an inventive step that could not be deduced by a person with average knowledge of the technical field.

Disclosure of the invention. The invention must be disclosed in a clear and complete manner in the patent application to be carried out by a person skilled in the art (a person conversant in the field of technology concerned).

Licensing

- Intellectual property can be bought, sold or licensed.
- A license is an agreement between you as the IP right owner (licensor) and another party (licensee). It grants them permission to do something that would be an infringement of the rights without the license.
- A royalty is a payment made by the licensee to IP right owner, the licensor
- IP can be “licensed-out” or “licensed-in”. You can “license-out” to another company in return for a fee. You can “license-in” if you want to use another company’s IP to develop your own business and products.



Licencing - Royalty Agreements

- The seller gets a payment that is typically a percentage of sales
- Royalties is the most common form of deal
- Seller shares the risk of market development but also shares in potential upsides
- Income is dependent on the company not just the technology
- The terms are negotiable



BASIC TYPES OF LICENSES

Exclusive license

The broadest scope of license that can be granted is an exclusive license. An exclusive license excludes the use of the property right licensed to everyone but the licensee. After granting an exclusive license, the licensor is also often (but not always) excluded from continuing to use the licensed products within the territory of exclusivity. The licensor retains ownership but licenses away everything else.

Sole license

A sole license, once granted, prevents the licensor from licensing the rights to anyone else. The licensor retains the right to use the licensed products.



BASIC TYPES OF LICENSES

Non-exclusive license

A non-exclusive license can be granted as often by the licensor to as many licensees as desired. Most commercial software licensed today is licensed on a non-exclusive basis.

Territorial limitations

It is common to restrict the territory that a license agreement covers, particularly in the area of intellectual property licenses where different distribution partners may be granted exclusivity for their regions.

When not to grant or take a license?

If you can commercialize your own IP, you might be better off doing it yourself;

You should be wary of licensing your IP to companies who might lessen the value of the IP;

The IP to be licensed may be too weak – if a competitor could work round it and take away market share, it may not be worth investing in a license

The prospective licensor may want to charge royalties that are too high and may restrict the growth of the business;

A royalty is a payment to an owner for the use of patents. A royalty payment is made to the legal owner of the patent by those who wish to make use of it to generate revenue. Royalties are designed to compensate the owner for the asset's use, and they are legally binding

Non-Disclosure Agreements (NDA) in IP

- The most important agreements in the case of IP protection rights are Non-Disclosure Agreements (NDA).
- An NDA, also known as a confidentiality agreement (CA), confidential disclosure agreement (CDA), proprietary information agreement (PIA), or secrecy agreement (SA), is a legal contract between at least two parties that outlines confidential material, knowledge, or information that the parties wish to share with one another for certain purposes, but wish to restrict access to or by third parties.

  Use NDAs to keep your invention a secret when talking to others.

What is a Trade Secret?

Any confidential business information which provides an enterprise a competitive edge may be considered a trade secret. Trade secrets encompass manufacturing or industrial secrets and commercial secrets.

The unauthorized use of such information by persons other than the holder is regarded as an unfair practice and a violation of the trade secret.

How are Trade Secrets Protected?

In contrast to patents, trade secrets are protected without registration, that is, trade secret acts are protected without any procedural formalities.

Consequently, a trade secret can be protected for an unlimited period of time. For these reasons, the protection of trade secrets is particularly attractive for SMEs.

General standards of trade secrets

The information must be secret.

It must have commercial value because it is a secret.

It must have been subject to reasonable steps by the rightful holder of the information to keep it secret (e.g., through confidentiality agreements).



- **The Case of Coca Cola**

  The formula for Coca-Cola is one of the go-to examples of a trade secret. And it is due to the ease of its reverse engineering.
  If one of the principles of your “formula“ could be replaced with another, but due to processing it is complicated to decompose it into prime factors, reconsider patenting because you must reveal the secrets during this procedure.



- **The Case of Kentucky Fried Chicken**

Famous KFC’s “Secret Recipe of 11 Herbs and Spices” is nearly as renowned as their former ad slogan “finger lickin’ good.”

It’s kept under lock and key in a Louisville, Ky., safe. One company blends part of the spice recipe, and another company mixes the rest so that neither party has the entire recipe.



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UNIT 4
Funding with impact investing perspective



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RiHEI

01 Innovative project stages and sources of funding

02 Debt and equity financing

03 Business angels and VC funds

04 Finding a proper investor

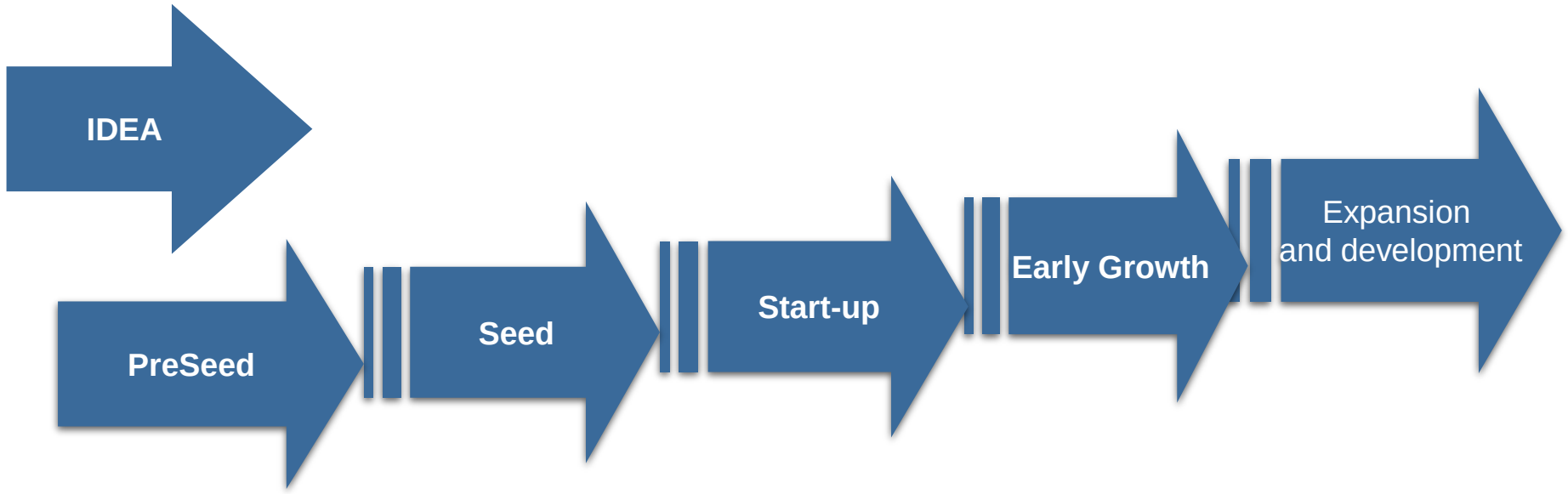
05 Impact investing

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Project Number: 101125355 (ERASMUS-EDU-2023-CBHE)

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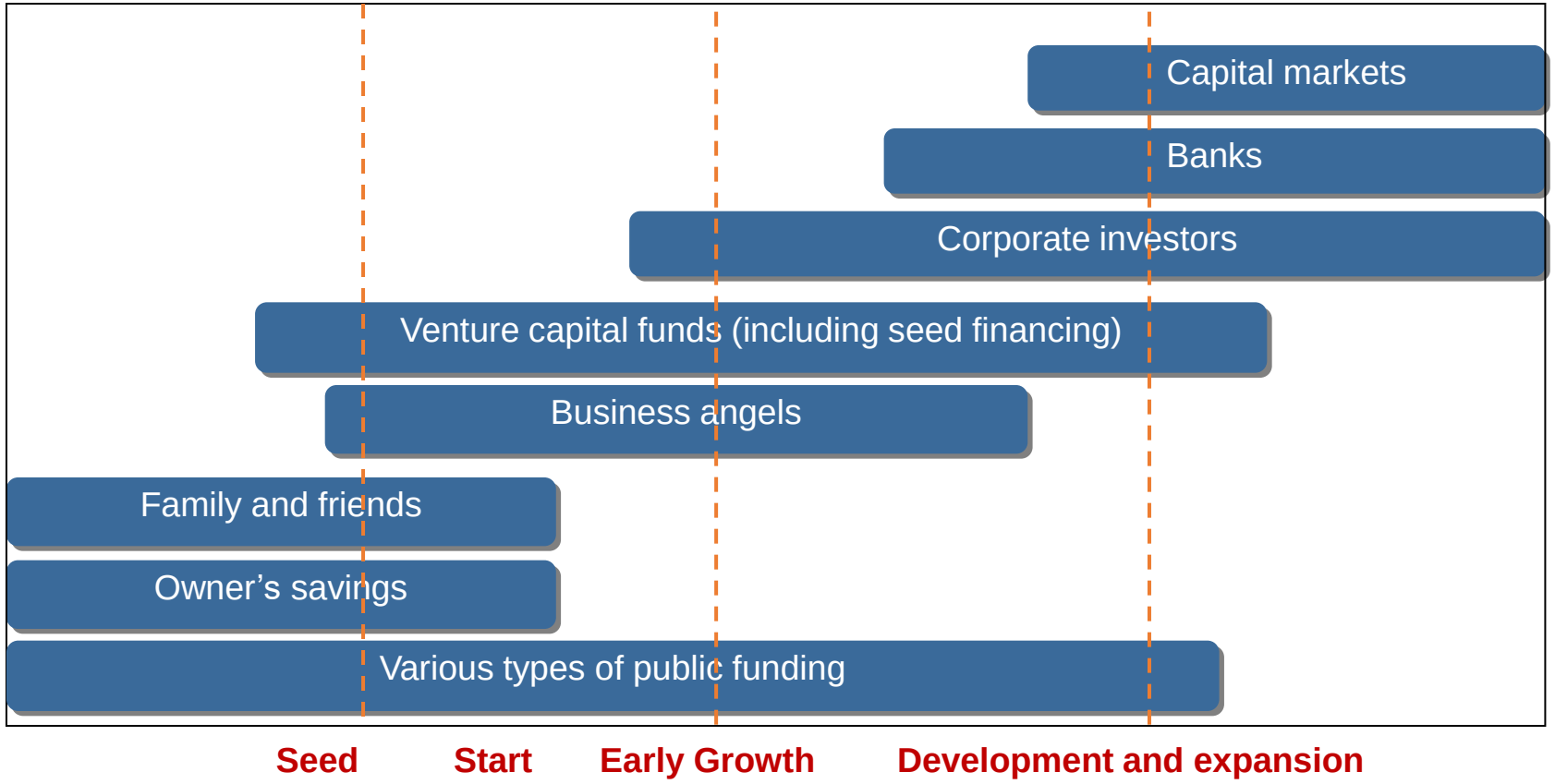
The stages of innovative project development



Stage features

• No incomes, no technology, no product • Focus on achieving certain intermediate milestones	• No incomes • Focus on final tech. develop. /prototype • Development of business model	• Emerging company • Prototype developed • Initial sales	• Product is developed and sold • Focus is on the market share and effectiveness	• Market expansion • Expanding company - organisational growth

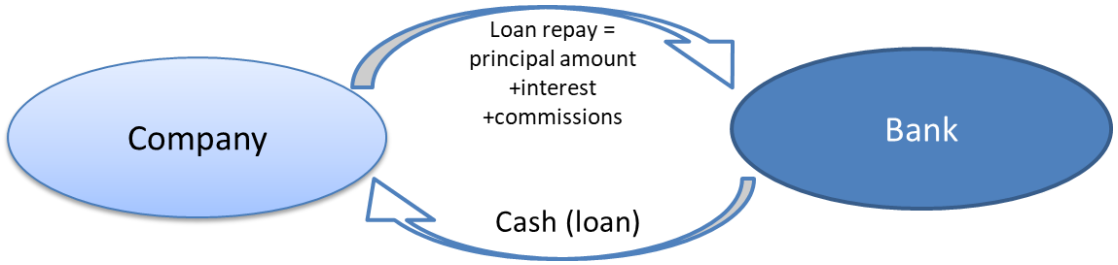
Project stages and sources of funding



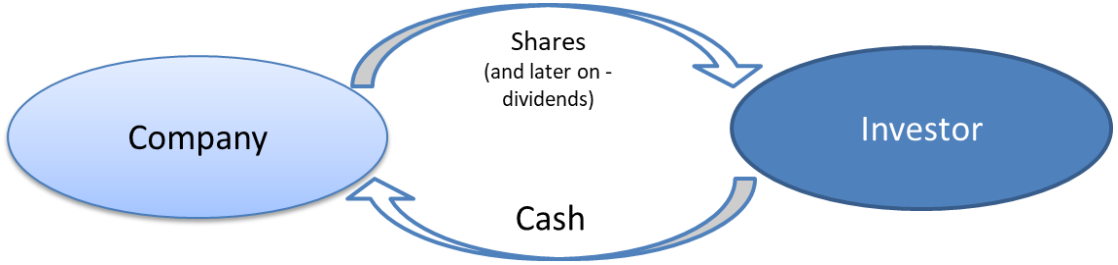
Dept and equity financing

Debt financing	Equity financing
Needs to be repaid to the lender	Does not need to be repaid – stays with the company
The cost of the debt is mainly related to interest	Different types of investors available – more flexibility
Banks as the main source of debt	Part of the ownership of the company is transferred to an external investor

Debt financing



Equity financing



Business angels

Business angels (BA) are private, informal investors who invest part of their financial resources in new, promising, innovative projects. They invest private funds (usually the amount of 200,000 € to approx. 2 million). Investments are usually targeted at the early stages of business life. They often do not intend to publicly disclose their investment activities. In many BAs cases are people with professional experience related to business - entrepreneurs (various industries), managers, lawyers, etc. They have the potential to advise on building a business and are oriented to the success of the venture. One of the easiest ways to contact a BA is through business angel networks. At the European level, information about local/regional BAs networks is provided by EBAN (European Business Angel Network, http://www.eban.org/). Have a look at the website to get more details on business angels.

Venture capital (VC) funds

Venture capital (VC) funds are private equity investment vehicles that seek to invest in firms with high-risk/high-return profiles, based on a company's size, assets, and stage of product development. Venture capital funds differ from other investment funds in that they focus on a specific type of early-stage investment. All firms receiving venture capital investments with high-growth potential are risky and have a long investment horizon. Venture capital funds take a more active role in their investments by providing guidance and often holding a board seat. Venture capital funds have portfolio returns that resemble a barbell approach to investing. Many VC funds make small investments in a wide variety of young companies, assuming that at least part of them will achieve high growth and reward the fund with a comparatively large payout at the end. An effective way to get information on VC is to contact local innovation support organizations (e.g. technology transfer centers). At the European level, information about national/regional VC funds is provided by Invest Europe (http://www.investeurope.eu). Have a look at the website to get more details on venture capital.



RiHEI

Investor – a perfect match

- What is the sectoral focus of the investor?
- What is the preferred investment size of the investor?
- Is any other assistance possible from the investor's side? What is the investor's experience in assistance provision for start-ups?
- What about a second/third round of investment? What is the investment capacity of the investor?
- What is the existing portfolio of the investor? Is there a sectoral match?

Potential investors and their preferences

Type of investor	Characteristics and investor's preferences
Bank	• Institutional investor; • Invest external capital; • Aim for a low rate of return and low risk; • Collateral is required.
Family, friends and founders	• Individual investor; • Invest own capital; • Low profit requirements; • They invest in their friend's idea – personal relationships at stake; • Passive investors – one investment usually.
Business Angels	• Individual investor; • Invest own capital; • Business and (sometimes) sectoral experience; • Active investors – usually a broad portfolio of investments; • Invest in a specific entrepreneur (personal choice).
Venture capital funds and seed funds	• Institutional investor; • Invest external capital; • Active investors – a broad portfolio of investments; • Invests in specific businesses (aligned with funds' strategy).
Capital markets	• Start-up companies are too small and too risky to enter regular capital markets
"Parallel" capital markets	• e.g.: First North (Nasdaq), NewConnect (Warsaw Stock Exchange), AIM (London Stock Exchange), Alternext (Euronext); • An alternative route for small- and mid-sized companies; • Fewer formal obligations and much lower capital requirements; • Provide capital but they also greatly increase the credibility and the visibility of the business.

Interacting with investors

Innovative projects

Come with:
- new product ideas
- technologies

Needs:
- money for development of the company and products
- sectoral and business develop. expertise



Investors

Come with:
- money
- sectoral expertise/ management knowledge

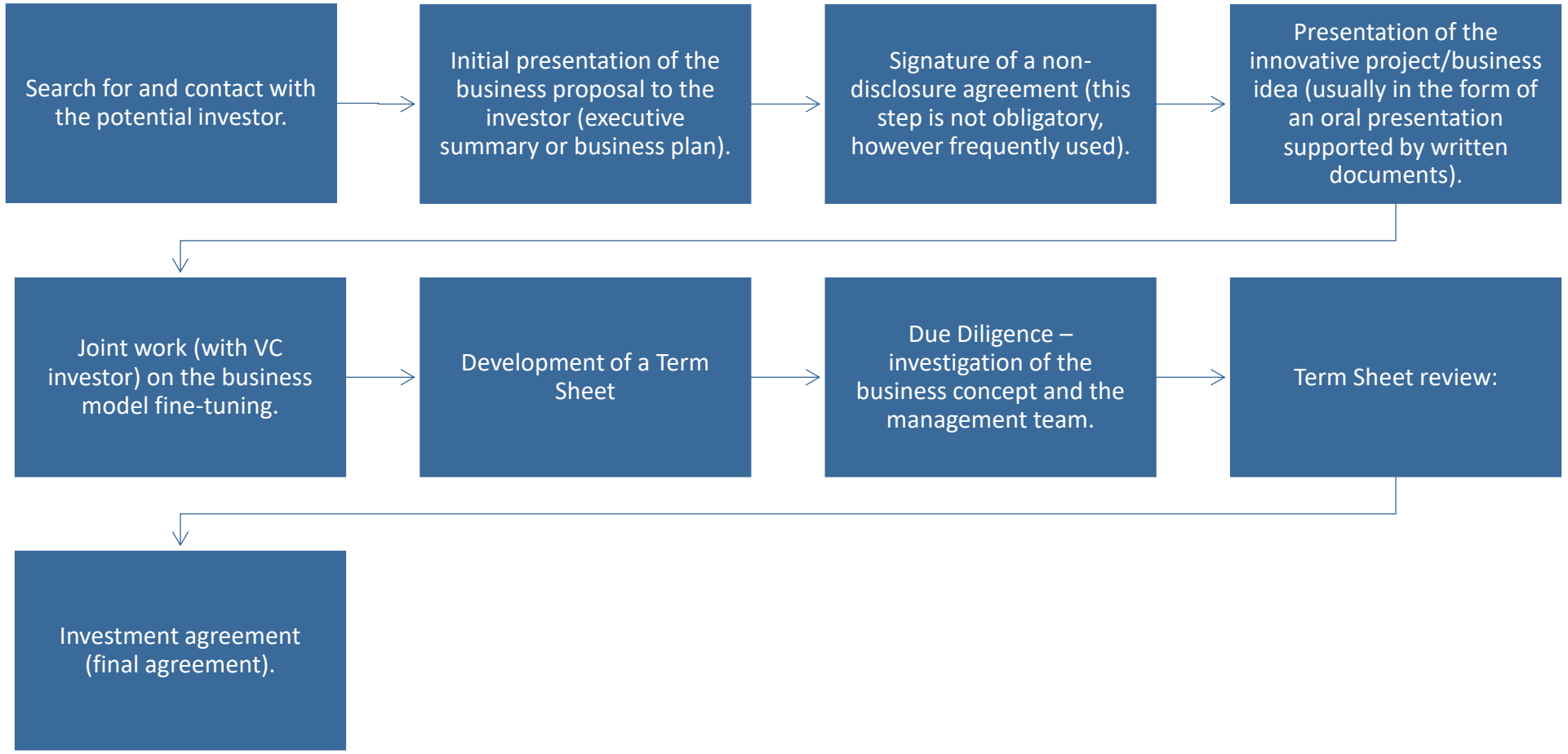
Needs:
- new business ideas
- business proposal with development potential



Common mistakes

- Excessive optimism, but also, conversely, lack of confidence;
- Lack of a clear commercialization strategy;
- Lack of a clear business model;
- Insufficient market potential:
  - Niche projects, located in markets with low value and limited growth potential;
- The underestimation of costs and/or overestimation of expected revenue;
- Lack of reliable documentation supporting the project;
- Concealment of information about the state of the project/company;
- Failure to indicate essential risks associated with the project;
- Unreasonable valuation of the business resulting in significant differences in valuation between the inventor and the potential investor;
- The inventor's lack of conviction to "give" part of the ownership to the investor.

Venture capital investment as a process



Risks of venture capital funding

Risks of venture capital funding	Explanation
Loss of control	Venture capital could be characterised as financing on steroids, with a large injection of cash and professional – and possibly aggressive – investors. It is likely that venture capital partners will want to be involved in most aspects of the project. The size of their stake could determine how much influence they have in shaping the company's direction.
Minority ownership status	Depending on the size of the venture capital investment in the company, which could be more than 50%, the inventor can lose management control over the project or business.
Forced Management	Typically venture capital funding comes with a few strings attached. First, investors will require a stake in equity. Second, may want to add management and possibly, remove some key managers currently in place. The forced management changes may come under the request of bringing in a more experienced hand.
Limited Decision-Making Abilities	This risk factor is directly connected with the above mentioned. When operating a startup, the owner may have a very clear vision of where the organisation should be in one, three, or five years. With venture capital funding, it may be required to compromise on the set goals. It may be even required to have regular meetings with the investor before making larger decisions.
Funding Problems	Venture capitalists often move large sums of money, the capital exchange can take time and business owners must consider it and work around delays. Additionally, it may be required to met certain milestones (agreed in the investment agreement) before releasing funding. For example, an investor may want to see consistent monthly sales before allowing access to the agreed-upon funds.

Source: Advantages vs Disadvantages of Venture Capital, https://www.thehartford.com/business-insurance/strategy/business-financing/venture-capital; Disadvantages of Venture Capital Funding, https://www.finsmes.com/2019/07/disadvantages-of-venture-capital-funding.html

Understanding impact investors

- As there is a spectrum of enterprises, there is a spectrum of impact investors.
- The European Venture Philanthropy Association (EVPA) distinguishes
  a) investing FOR impact which means investing with a primary focus on the impact of the underlying asset from
  b) investing WITH impact where the investor is also looking at the financial returns (not only the impact).



Understanding impact investors

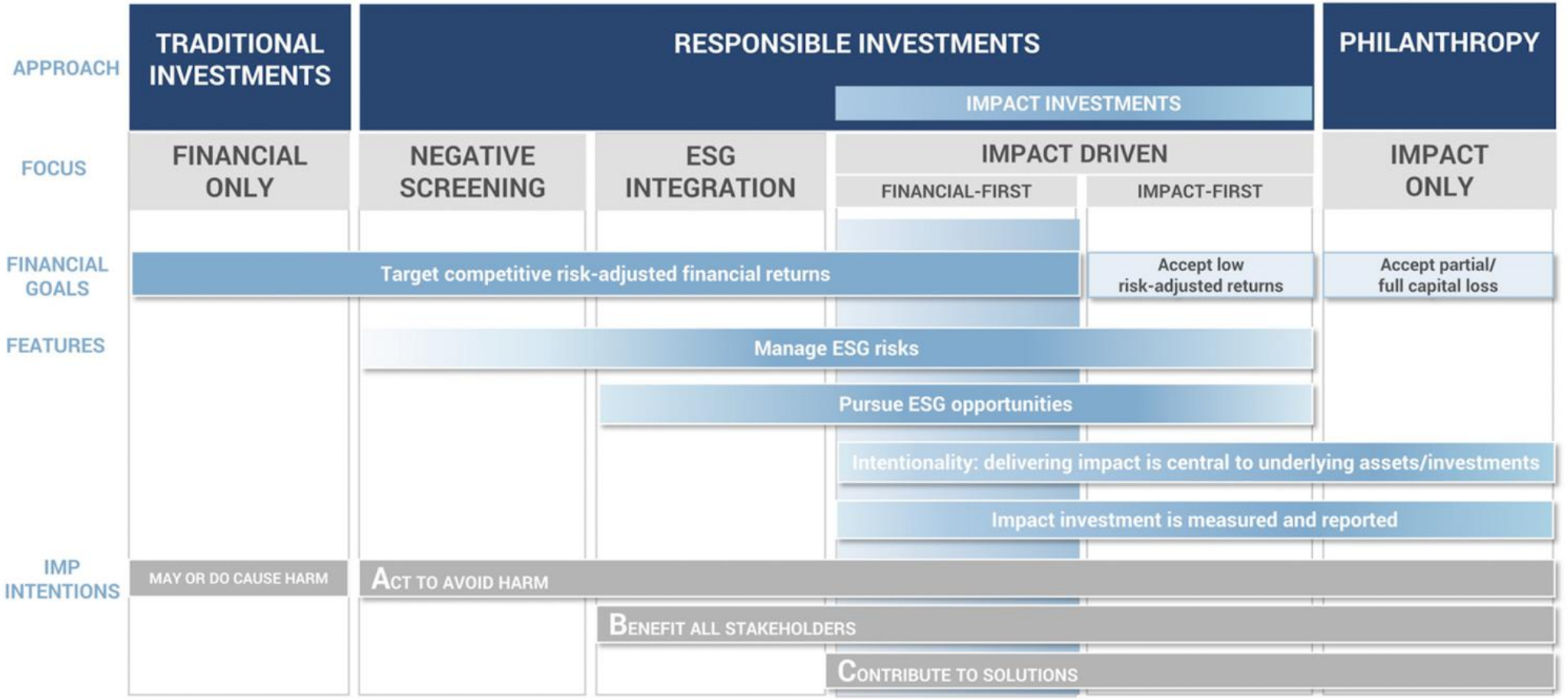
- Venture philanthropy (VP) is a high-engagement and long-term approach whereby an investor for impact supports a social purpose organization (SPO) to help it maximize its social impact. VP not only invests in social entrepreneurs but also in charities and NGOs. They are not motivated by financial returns.

- For a broader overview of the spectrum of capital, take a look at the next slide.

- When starting to fundraise, it is important to understand what type of impact investors you are looking at. Do your own due diligence so you know if the investor you are talking to puts an emphasis on impact, profits, or both equally. This will help you shape your message.

- Impact investors could also have a special appetite for e.g. climate solutions, tech for good, women entrepreneurs…Try to find out in advance if the impact investor you want to talk to has its own preferences.

Spectrum of capital (Phenix Capital)



Source: Adapted from Bridges Fund Management (2014), PRI (2013), RIAA (2019), UK NAB (2017), Impact Management Project (IMP) (2018)

Finding impact investors

- Several networks exist where you can look for impact investors. First you need to understand where you sit in the investment readiness spectrum.

- As an early stage start-up you might want to look at impact business angels or incubation/acceleration programs with an investing arm or early-stage impact funds.
- If you have a hybrid business model with for profit activities and not for profit you can also look at foundations and venture philanthropists.

- You can start by asking your local/national business angel network and look for impact business angels.

Finding impact investors

- Toniic is the global community of impact investors: find out if there is one or several in your region. You can also refer to the EVPA directory.
- If you are a woman entrepreneur, you can look at gender-smart investors (investors embedding gender factor in their investment process for better economic, environmental and social outcomes).
  Project SAGE 4.0 which tracks Venture Capital, Private Equity and Private Debt with a gender-lens.

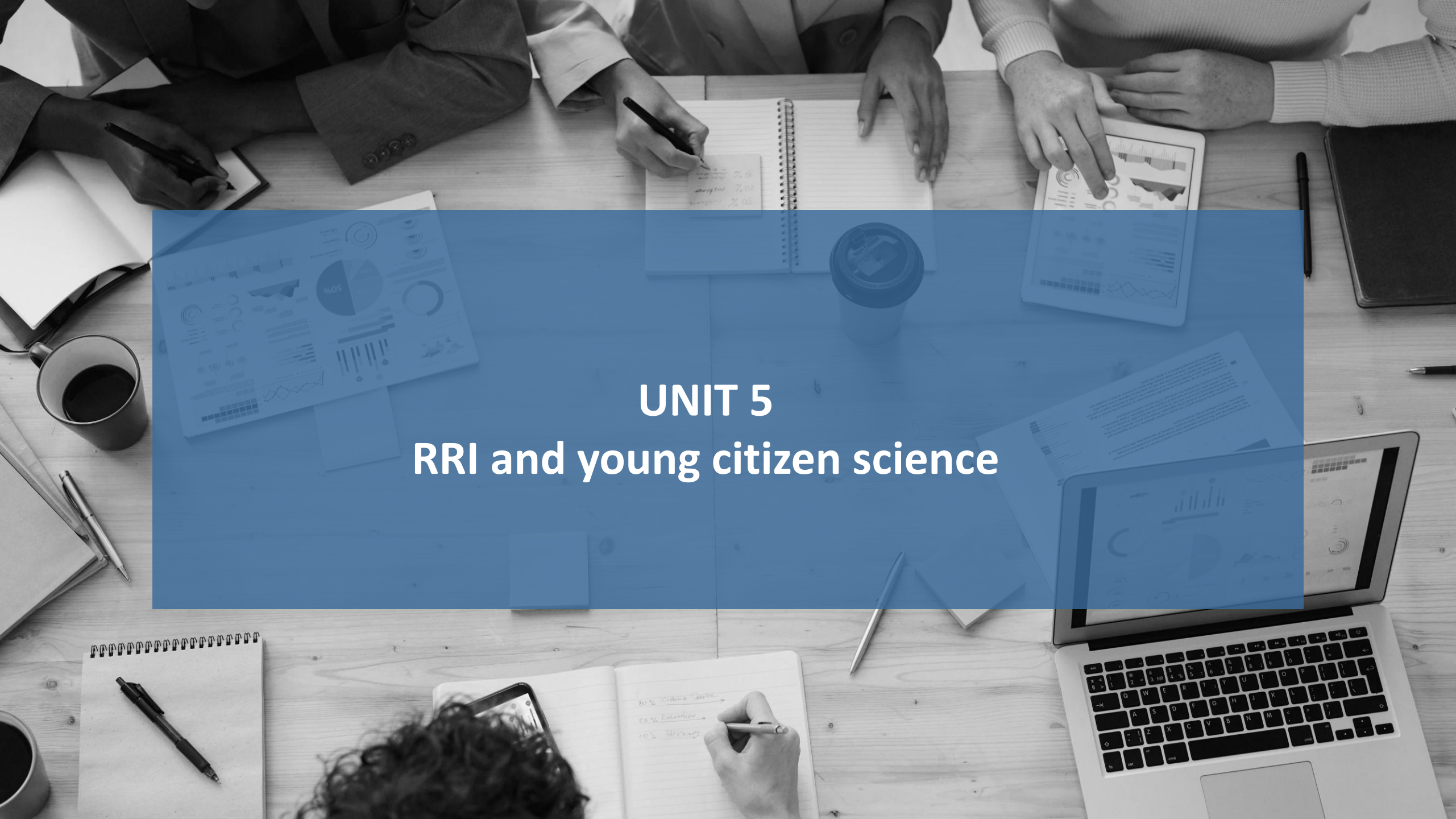
- Database of dealroom.co shows more than 70 European VC funds – identified as impact investors.
  Their portfolio exceeds 1500 companies.



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UNIT 5
RRI and young citizen science



CONTENTS

RiHEI

01 The concept of RRI

02 RRI principles

03 RRI process requirements

04 RRI outcomes and indicators

05 Embedding RRI in HEIs strategies

06 Young citizens science

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RRI concept

Responsible Research and Innovation (RRI) is a concept that gained particular visibility over the last decade in the European Union (EU)

Responsible Research and Innovation (RRI) is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on:

1. the (ethical) acceptability,
2. sustainability, and,
3. societal desirability

of the innovation process and its marketable products.

This is to to allow a proper embedding of scientific and technological advances in our society.

Policy Keys and Actors of Responsible Research Innovation

Over the last decades, many efforts have tried to reduce the distance between science and society, leading to a European-wide approach in Horizon 2020 called Responsible Research and Innovation (RRI).

RRI seeks to bring issues related to research and innovation into the open, anticipate their consequences, and involve society in discussing how science and technology can help create the kind of world and society we desire for generations to come.

Principles of Responsible Research and Innovation

The European Commission has provided more concrete normative orientations in the form of six policy keys that RRI should foster:

1. **Ethics:** focuses on one hand, on research integrity and on the other hand, on science and society
2. **Gender Equality**: is about promoting gender-balanced teams, ensuring gender balance in decision-making bodies, and always considering the gender dimension in Research and Innovation (R&I)
3. **Governance**: arrangements that lead to acceptable and desirable futures have to be robust and adaptable to the unpredictable development of R&I; be familiar enough to align with existing practices in R&I; share responsibility and accountability among all actors; and provide governance instruments actually to foster this shared responsibility.
4. **Open access**: addresses issues of accessibility to and ownership of scientific information. Free and early access to scientific work might improve the quality of scientific research and facilitate fast innovation, constructive collaborations among peers, and productive dialogue with civil society.
5. **Public engagement**: fosters R&I processes that are collaborative and multi-actor: all societal actors work together during the whole process to align its outcomes to society's values, needs, and expectations.
6. **Science Education**: focuses on enhancing the current education process to better equip citizens with the necessary knowledge and skills so they can participate in R&I debates; and in-creasing the number of researchers.

RRI principles

Actors aiming at RRI commit themselves to the following principles:

- **Transparency**: by engaging in open innovation, reflecting on and openly disclosing the purposes and potential implications of innovations, as well as the associated uncertainties.
- **Participation & Inclusion**: by involving people of a broad diversity and different backgrounds on eye-level (inclusive innovation processes) and considering their needs.
- **Governance**: by capacity building for Responsible Innovation, fostering the links between innovation and Sustainability Management and implementing gender equality.
- **Anticipation**: by assessing risks and wider impacts (risk management and due diligence), considering ethical limitations, welcoming early warnings of negative impacts and mitigating harms.
- **Sustainability**: by orientating innovation towards Planet, People and Profit (triple bottom line) and increasing shared value (for the company and for society).

RRI aims to create a society where R&I practices strive towards sustainable, ethically acceptable, and socially desirable outcomes.

RRI does so in such a way that the responsibility for our future is shared by all people and institutions affected by and involved in R&I.

RRI Process Requirements

RRI-Tools (https://rri-tools.eu/), developed a framework to support in a dynamic, iterative manner, the RRI outcomes to find solutions for the societal challenges formulated by the European Commission.

RRI Process Requirements developed by RRI-Tools

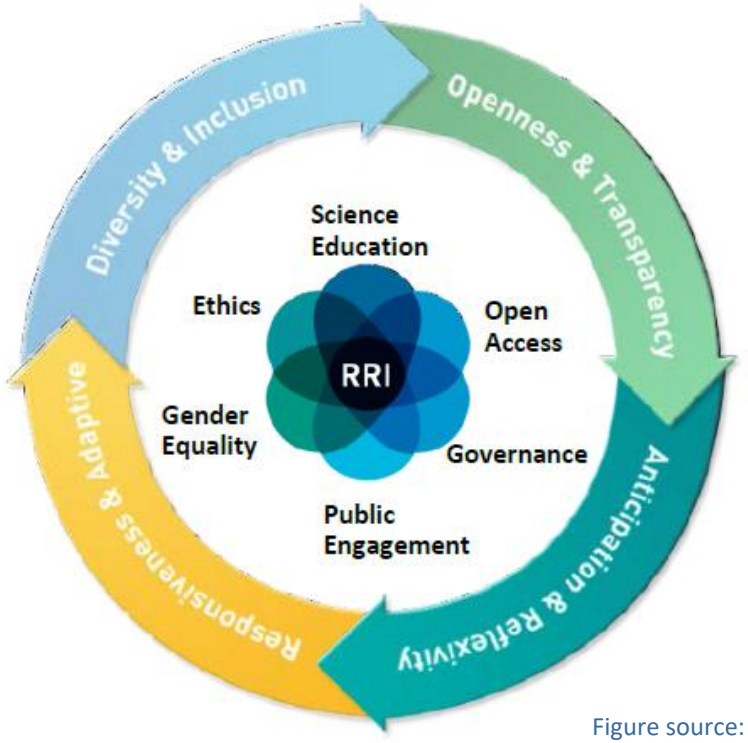


Figure source: (Kupper et al., 2015)

The Four RRI Process Requirements developed by RRI-Tools

Diversity and inclusion
Diverse and inclusive RRI processes should call for the involvement of a wide range of stakeholders in the early development of science and technology, both for normative democratic reasons and to broaden and diversify the sources of expertise, disciplines and perspectives. In this respect, inclusive practices should lead to diverse practices. In reverse, diverse practices are more likely to be inclusive.

Anticipation and reflexivity
Anticipation both concerns understanding how the present dynamics of research and innovation practices shape the future, and envisioning the future. Thus, one enables oneself to act on future challenges. In order to act adequately and be open to changes in direction, also reflexivity is required. This reflexivity implies learning about the definitions of the problem(s) at issue, commitments, practices, and individual and institutional values, assumptions and routines.

Openness and transparency
Openness and transparency are conditions for accountability, liability and thus the responsibility. This is an important aspect for publics to establish trust in science and politics. However, more openness does not automatically lead to more trust: information has to be tailored to stakeholders' needs to make sense to them.

Responsiveness and adaptive change
Responsiveness means responding to emerging knowledge, perspectives, views and norms. Responsiveness is a condition for adaptive change. RRI requires a capacity to change or shape existing routines of thought and behavior and the overarching organizational structures and systems in response to changing circumstances, new insights and stakeholder and public values.

RRI Outcomes and Relevant KPIs

Adopting RRI is meant to aim the following outcomes:

1. Learning outcomes	2. R&I outcomes	3. Solutions to societal challenges
1a Engaged publics	2a Ethically acceptable	3a Health, demographic change, and wellbeing;
1b Responsible actors	2b Sustainable	3b Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bio-economy;
1c Responsible institutions	2c Socially desirable	3c Secure, clean, and efficient energy;
		3d Smart, green, and integrated transport;
		3e Climate action, environment, resource efficiency, and raw materials;
		3f Europe in a changing world - inclusive, innovative, and reflective societies;
		3g Secure societies - protecting freedom and security of Europe and its citizens.

Source: Kupper et al. 2015

RRI is about anticipating future outcomes of research and innovation processes.

It is hard, if not impossible, to specify these outcomes in advance of the development of actual R&I practices.

The various approaches to RRI Key Performance Indicators (1)

(1) The PRISMA-Project RRI KPIs - a practical guideline for RRI created under Horizon 2020

Key Performance Indicators for Monitoring RRI could help align RRI activities with key business drivers and processes, stimulate the continuous improvement of RRI "performances", and allow consideration of RRI aspects in regular sustainability reporting at the organization level.

	Item	RRI KPIs	Examples of quantitative parameters to measure KPIs
Anticipation & Reflection / Inclusiveness	1	Awareness of moral values	- Nr. of training sessions/meetings per year to learn and reflect on moral values connected to innovation strategy and core business
	2	Awareness of ethical issues of innovations	- Nr. of training sessions/meetings per year aiming to reflect on integration of social and ethical values into specific R&I/R&D projects
	3	Does the company embed moral values in its innovations?	- RRI principles formally integrated into the company's mission and vision (e.g. ethical code of conduct)
			- Nr. of R&I/R&D projects per year where moral values are actively and included into innovation strategies and technological design
	4	Does the company (actively) anticipate social effects of its innovations?	- Nr. of R&I/R&D projects per year where internal/external stakeholders were involved from the early stages in product development
			- Nr. of consultancy initiatives with other innovators and external advisors to discuss and identify social impacts of R&I/R&D projects
			- Nr. of stakeholder engagement initiatives organized per year by the company
	5	Stakeholder engagement	- Nr. of R&I/R&D projects per year where active stakeholder engagement is foreseen into R&I/R&D plans
			- Nr. of R&I/R&D projects per year where engagement with end-users has been performed
	6	Gender Diversity	- Percentage of men and women involved in R&I/R&D function/teams in the company

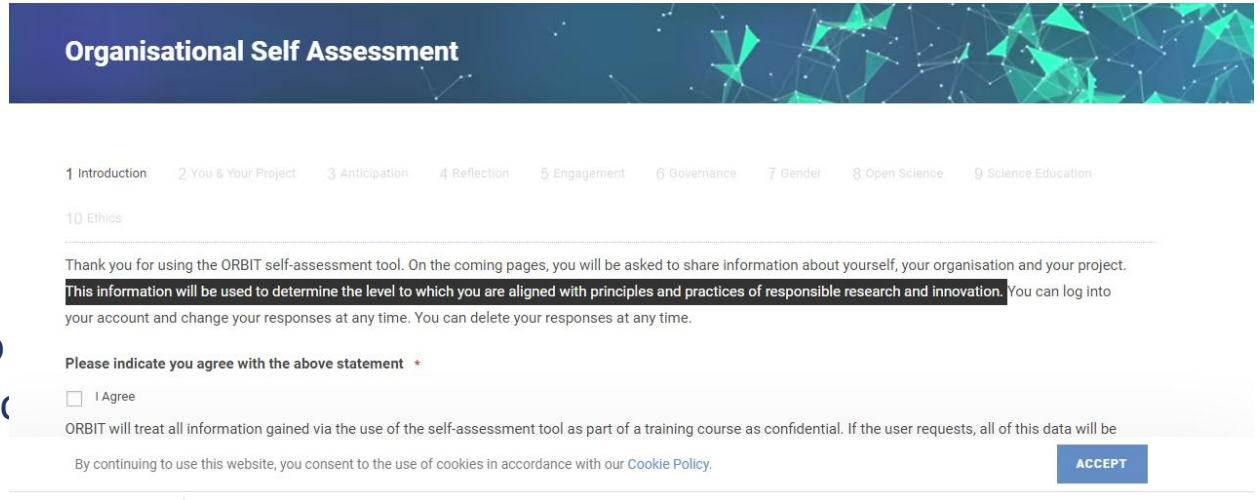
Responsiveness	7	Transparency and accountability about RRI-relevant choices	- Formal communication strategy established at company level to ensure most relevant RRI choices are explained in key company documents and/or the website
			- Nr. of patents per year aiming to integrate non-financial values
			- Nr. of open access publications
			- Nr. of events or webpages or channels in social media (or similar) disseminating project results to the general public
	8	Learning mechanisms to address public and social values in product development	- Nr. of user-centered approaches per year formally integrated into the company innovation model (e.g. user-centered design, co-creation)
			- Nr. of user experience tools per year carried-out to respond (new) societal demands and developments
	9	Capacity to align to societal goals	- Nr. of R&I/R&D projects per year addressing socially/ethically-oriented products/services
	10	Active monitoring of RRI impacts	- Percentage of R&I/R&D projects per year that apply impact analysis strategies (e.g. risk management, ethical/social impact analysis, etc.)
			- Formal external auditing procedures (at least yearly basis) in place to monitor non-financial values of the company

The various approaches to RRI Key Performance Indicators (1)

(2) ORBIT Self-Assessment Tool

The ORBIT self-assessment tool is implemented in the form of an online survey, consisting of 10 main sections: introduction, your project, anticipation, reflection, engagement, governance, gender, open science, science education and ethics (https://www.orbit-rri.org/tools/sat/#gf_81).

The suggested tool is used to determine the level to which you are aligned with principles and practices o responsible research and innovation



Source: https://www.orbit-rri.org/tools/self-assessment-tool-free/

How to embed RRI in HEIs strategies?

- Embedding RRI principles in the innovation strategy of HEIs enables different opportunities but can also present some challenges, especially in the implementation phase.
- The processes should be coordinated delicately to deliver desirable RRI outcomes.

Key points:

1. Raising Awareness on RRI Principles for All Stakeholders

2. A Step-by-step plan for the set-up of a living lab under RRI principles

3. Useful Tools and Methods for RRI-proof living labs

Why do universities should to start with raising awareness on RRI for all stakeholders?

All stakeholders involved in the research and innovation practice become mutually responsive and share responsibility regarding the outcomes and process requirement

How do we support raising awareness?

- Delivering informative and interactive training in a multi-stakeholder setting through
- Lecture-style trainings
- Interactive workshops
- Teamwork
- Mentoring

Is multi-stakeholder always the best option?

No. Stakeholder-specific training can facilitate reaching the common ground when the language or knowledge of different stakeholders is wildly divergent.

How to embed RRI in HEIs strategies

Practical hints

1. **Know your audience:** identifying the expectations, learning styles and learning outcomes of each stakeholder can support the proces.
2. **Learning from errors:** experimental investigations indicate that errorful learning followed by corrective feedback is beneficial to learning.
3. **Promoting reflective learning among the stakeholders:** Reflective learning involves actively monitoring and assessing your knowledge, abilities, and performance during the learning process to improve the process and its associated outcomes.

Self-evaluation tool for HEI – the need

- There is a necessity of developing a self-evaluation tool to evaluate the level of embeddedness of RRI in the HEIs.
- The process must be mastered, and the planning must be made from a self-critical perspective that will support entrepreneurship..

The core factors that make up the RRI vision can be summarized as:

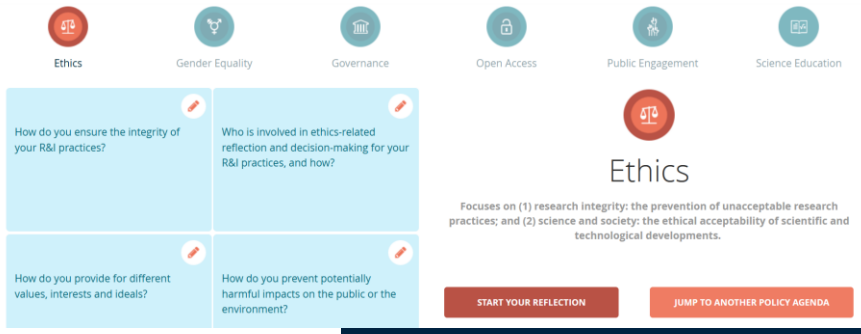
- factors related to cooperation and power,
- factors that ensure the social and moral wellbeing of people and, in doing so, can incorporate future sustainability plans into the process,
- factors based on process improvement, which are compatible with the principle of cooperation for individuals and institutions.

Self-assessment tools are an essential element of the work done within institutions and organizations concerning RRI tools.

A mastery of available self-assessment tools is necessary to explain the development of HEIs and the basic principles they have adopted.

Self-evaluation tool for HEI

Examples of existing RRI related self-evaluation tools



- RRI self reflection tool - https://rri-tools.eu/en/self-reflection-tool



- ORBIT self assessment tool - https://orbit-rri.org/tools/self-assessment-tool/



- Responsible innovation self-check tool - https://innovation-compass.eu/self-check/



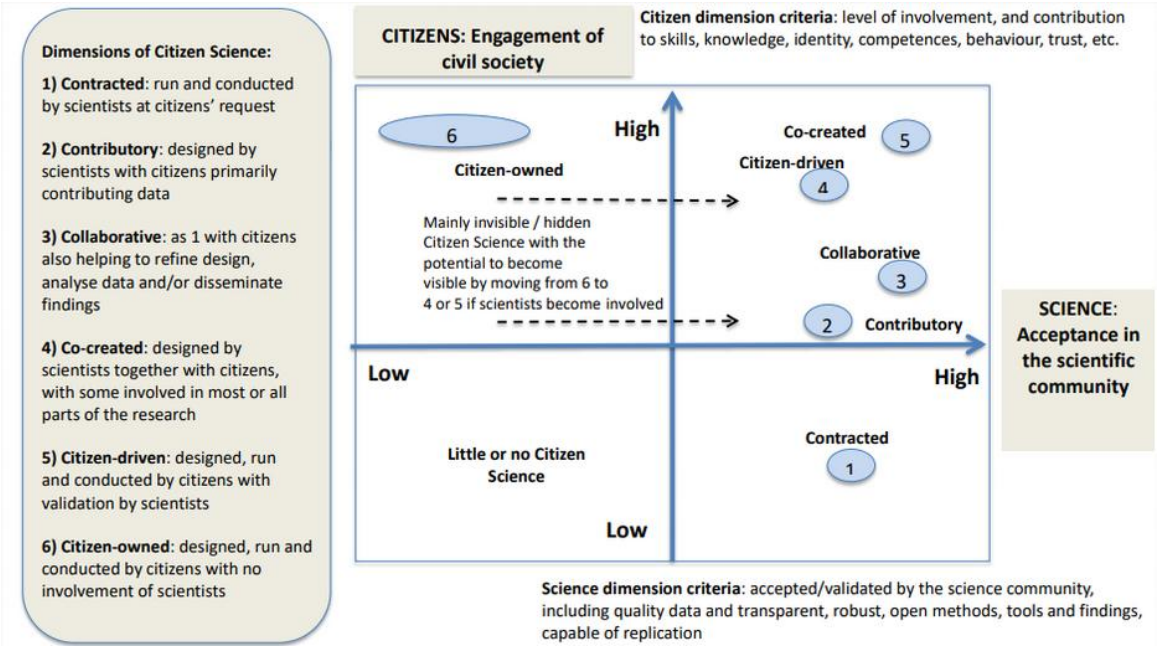
Young Citizens Science

Citizens Science - concept

Citizen science is research conducted with the general public or amateur/non-professional researchers or participants in science, social science and many other disciplines. There are variations in the exact definition of citizen science, and different individuals and organisations have their own interpretations of what citizen science encompasses.

Source: Vohland, ed. (2021)

Citizens Science analytic dimensions



Source: Manzoni et al. (2021)

Youth Citizen Science – challenge for science development

Citizen science includes academics and young researchers creating local living labs, conducting interviews, developing dialogue forums, organising local and national workshops and using an app specifically designed to collect and share everyday experiences of inclusion and exclusion. It also includes a collective evaluation of our impact and how the co-created citizen social science worked in the different cases, and in each case.

Source: https://www.ecsa.ngo/cases/youcount-youth-citizen-science/

Citizen Social Science is defined as involving equal collaboration between citizen groups (co-researchers) that are sharing a social concern and academic researchers. Youth Citizen Social Science involves equal collaboration between young citizen scientists and academic researchers. However, involving young citizen scientists in research processes on an equal basis with academic researchers poses a whole new set of challenges that need to be looked into carefully.

Source: https://www.youcountproject.eu/about-the-project/what-is-youth-citizen-science



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