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Approaches to tackle the research-business gap
Technology audit principles.
Practical support mechanisms

Did you know?

According to the GE Global Innovation Barometer 2013:

- 91% of business leaders consider innovation a top strategic priority, but there is no consensus on the path to innovation
- Incremental product/service innovation is the "workhorse" of competitiveness and success (79%), but business model innovation is appearing on the horizon (52%)
- The top 3 factors facilitating innovation are perceived to be:
  - Market savviness and customer understanding (60%)
  - Innovativeness of own personnel (43%)
  - Ability to develop new technologies (42%)
- 87% appreciate the potential of collaborations in fostering innovation
- Businesses are loosing confidence in governments and HEIs for supporting innovation, but are trusting the general public
- How can governments support innovation?
  - Educate students to become entrepreneurs and to understand the current needs of businesses
  - Reduce bureaucracy and stimulate access and use of dedicated funds
  - Improve IP related legislation and institutions

2

Current policy

- **Due to the ever increasing need to innovate, the European Union has adopted an Innovation Policy (2014) whose main focus is on:**

    - Actively monitoring the innovation performance and of the uptake of innovation in the EU and member states – by this, the EU openly admits that innovation performance is an important catalyst of economic, industrial and social growth. Thus, innovation is considered a strategic element in the development of the Union;
    - Encouraging the commercialization of innovation through the development of specialized policies;
    - Stimulating the uptake of advanced manufacturing technologies to the end of modernizing the EU infrastructure and also establishing premises for performance and productivity in the manufacturing industries.
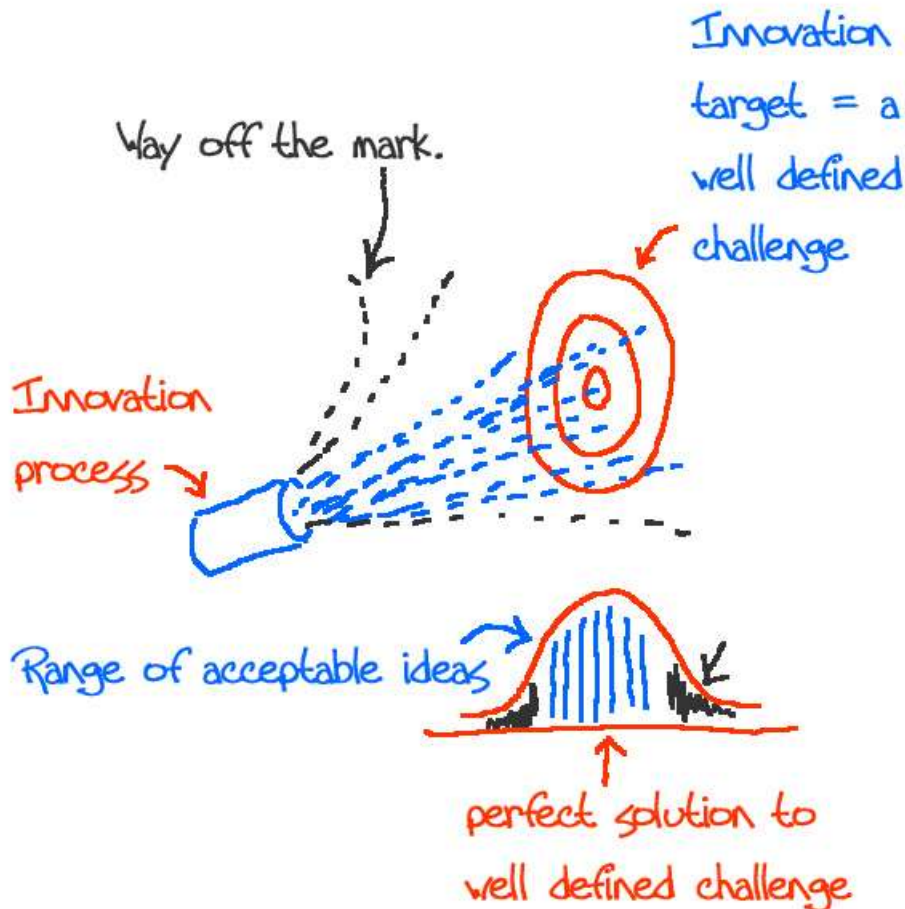
Effect of innovative new firms

- **Encouraging and supporting new firms in coming to the market and capitalizing on their innovative product ideas can have important consequences for the development of a given region, beyond the benefits of the actual product**
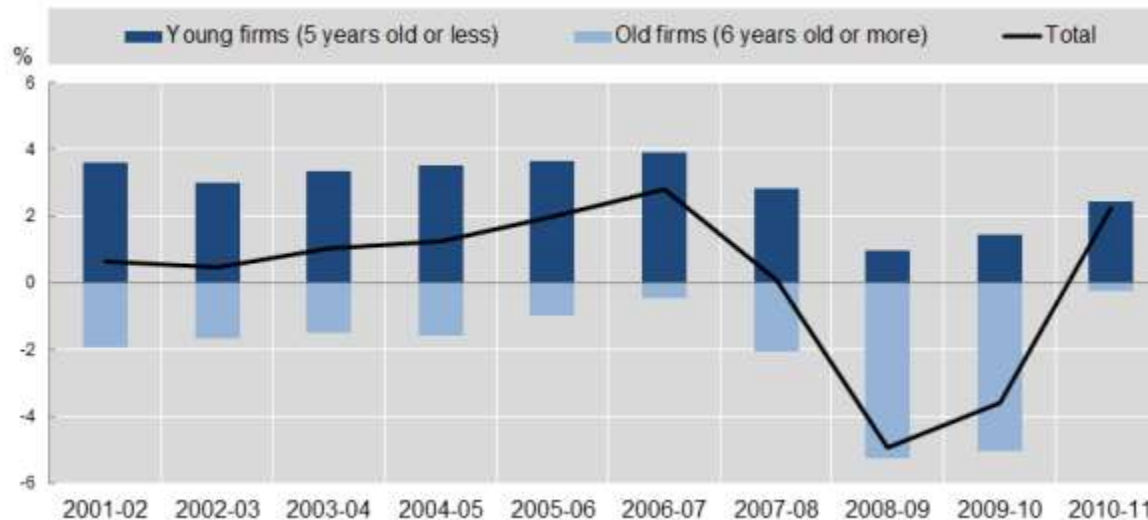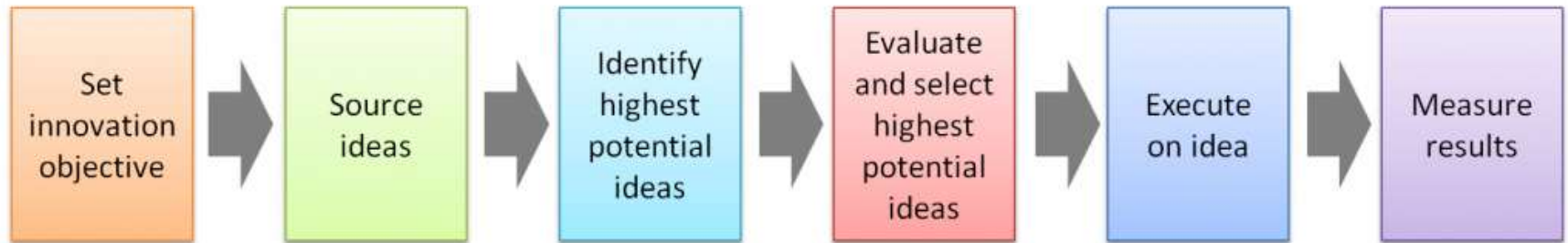

Source: OECD, 2013. Innovation: Support for young firms would boost job creation

The need for innovation

- New value creation
- Technological advancement
- Organizational evolution
- Societal advancement
- Market regulation
- Consumer education
- …….

Source: Abott, Susan, 2009. *Can innovation be predictable and reliable or not?*

The innovation process


```
Set              Source      Identify        Evaluate        Execute      Measure
innovation  →    ideas   →   highest    →    and select  →   on idea  →   results
objective                    potential       highest
                             ideas           potential
                                             ideas
```
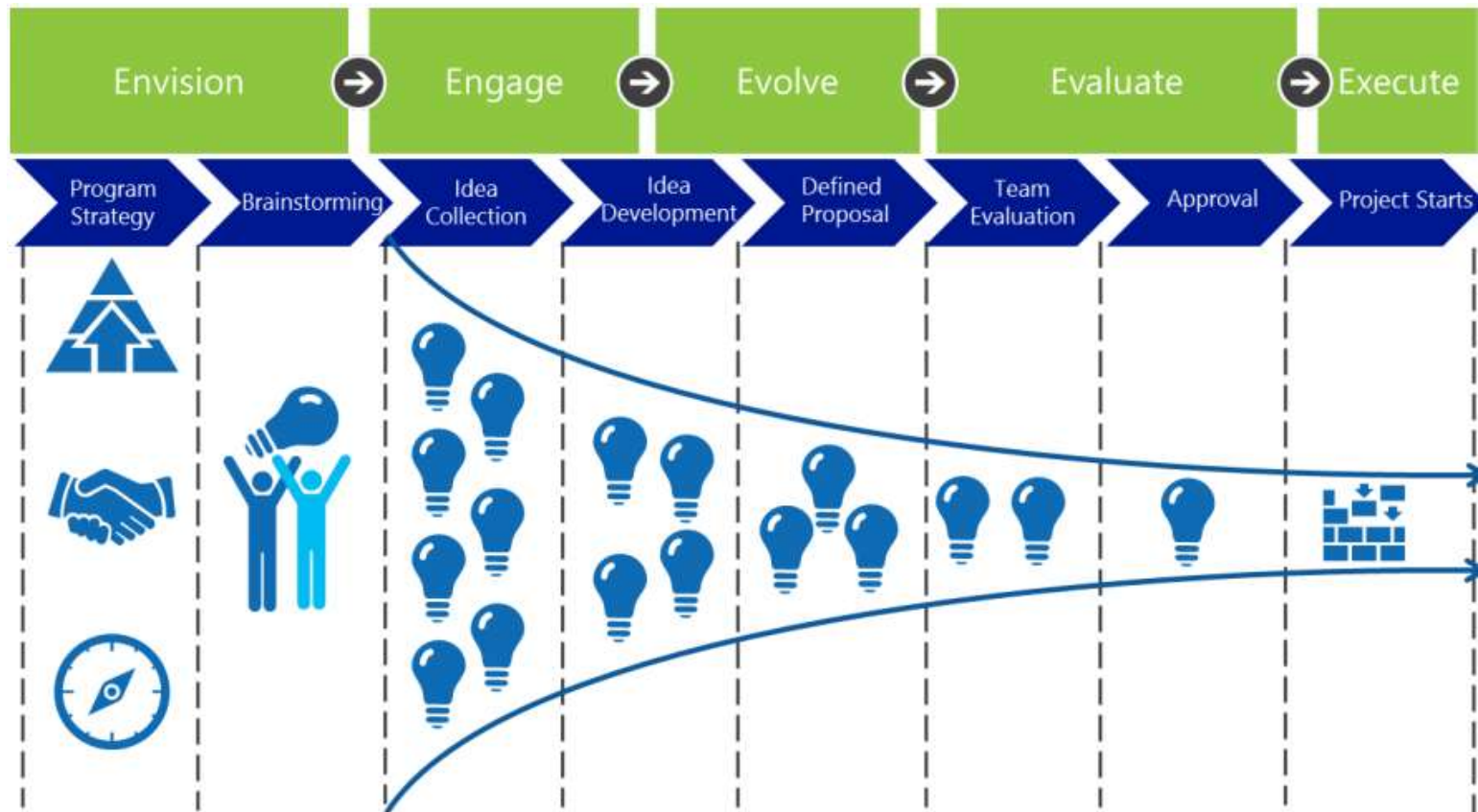
Source: Carpenter, Hutch, 2010. *Model for Employee Innovation: Amazon Prime Case Study*

**Innovation objectives** could be (J. Schumpeter, 1912):

- Creating a new product
- Introducing a new fabrication method
- Entering a new market – creating a new market
- Utilizing a new raw material
- A new type of organizational management

The innovation process – Microsoft model
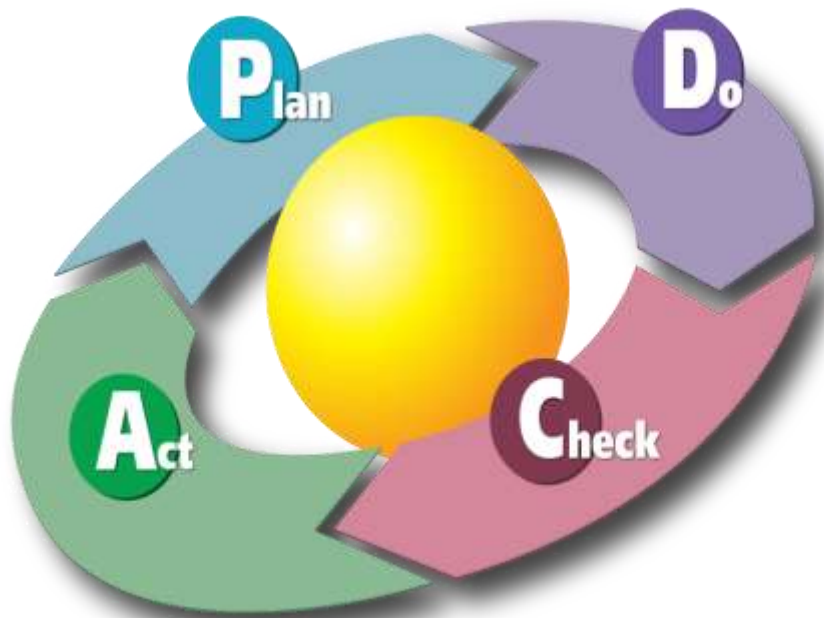

Source: Microsoft Corporation, 2013. *Best Practices for Innovation: Microsoft's Innovation Management Framework.*

The innovation process
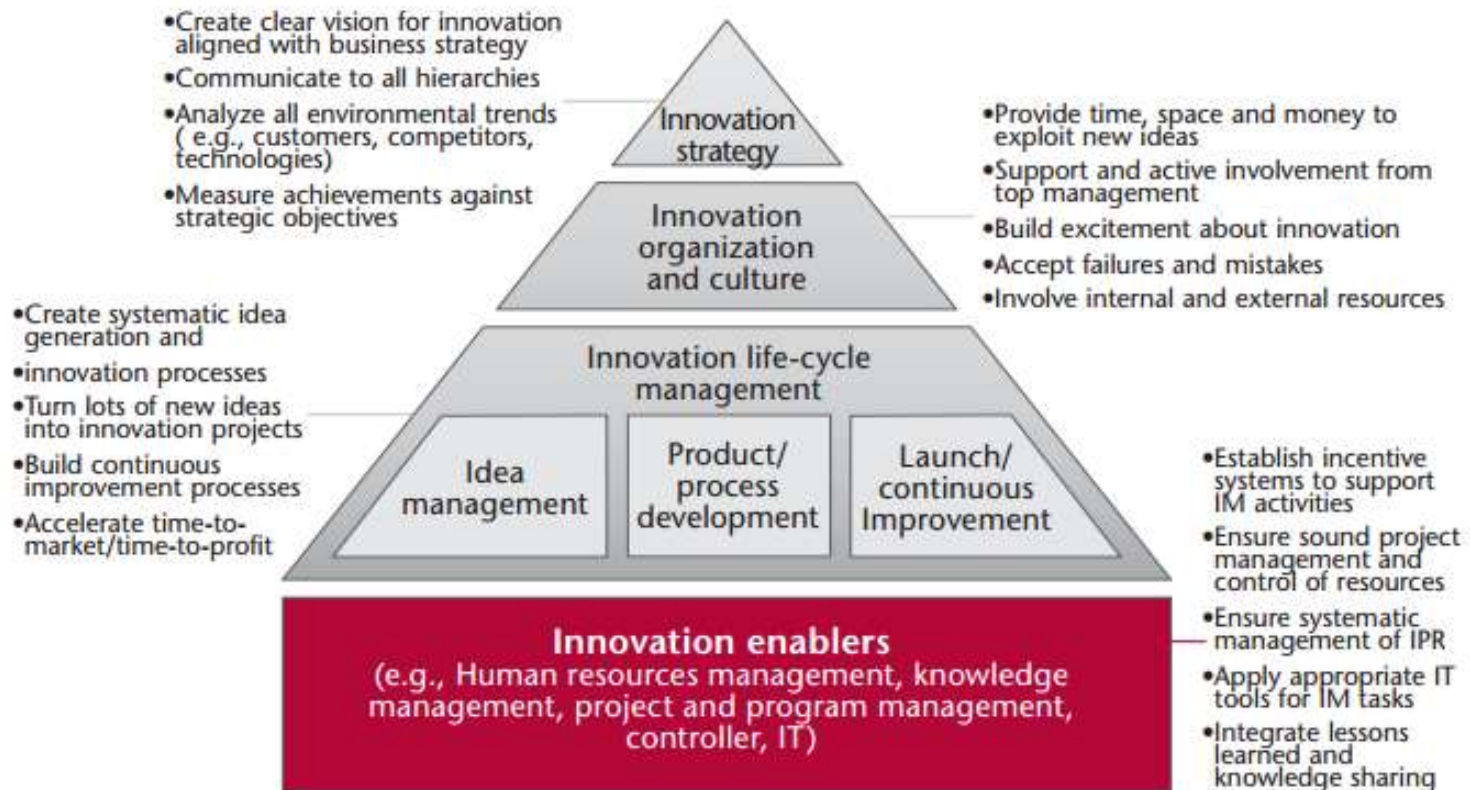
Source: IMP3rove European Coordination Team, 2006. *European Innovation Management Landscape*

Innovation vs. improvement
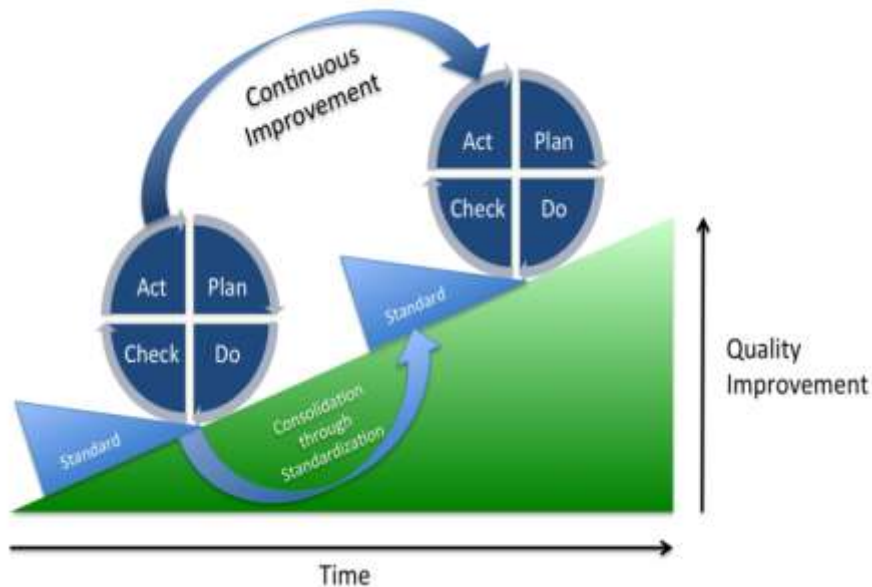

Source: Wikipedia, 2006

Plan - what to do, where to do it, who is going to do it, how, with what means, when

Do - depletion of the planned steps, as described in the plan stage

Check - the evolution of the project or activity is evaluated

Act - corrective actions are put into place, after being analyzed and planned in the check stage

Innovation vs. improvement

Source: Wikipedia, 2006

- The **continuous improvement** of products, processes and systems must be viewed as an individual objective for each member of the organization;
- Periodic evaluations and results need to be compared against **excellence criteria** previously established in order to identify gaps and consequently improvement opportunities;
- **The organization** needs to formulate its objectives and measures in such a way as to encourage and promote improvement.

Innovation vs. improvement

- Improvement (be it of system, process or product) is not only a way of doing business: it must place itself inside the **company culture** as an operational philosophy. Continuous improvement is the basis of a successful organization and the continuous improvement process approach consists the minimum **baseline for a competitive innovation management system**;

- Continuous improvement sets the base for a company culture where **problems are discussed and not avoided**. One of the most important sources of ideas, thus innovation, are problems and malfunctions. It is absolutely necessary for an organization to set in place the mechanisms for detecting, analyzing and correcting them and the continuous improvement approach is the best and simplest way to do so;

- Many of the innovations constantly appearing on the market **are not the disruptive kind**. They may just be seen as improvements of established models. An iterative approach as presented in the figure above can be used as a model in approaching this type of innovation. With **incremental improvements** on a certain flawed or not good enough characteristic, improvements can be achieved.

The innovation cycle
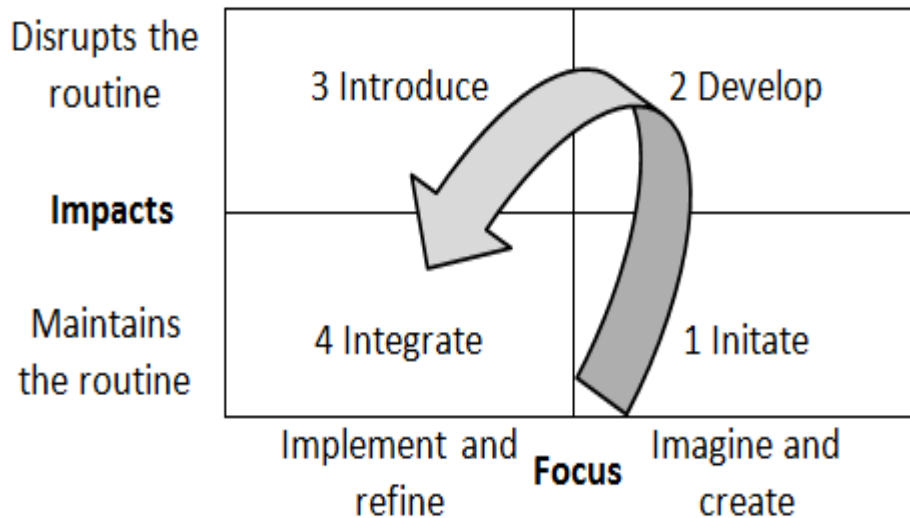
Source: Hiam, Alexander, 2010. *Business Innovation for Dummies*

- The **initiation** implies a relatively low impact of the innovation inside the organizational structure with a high focus on creativity.
- The **development** stage involves a transition towards a higher impact and a gradual increase of creative input. It should stabilize the project stage, to standardize it for preparing an introduction into the organization structure.
- **Introduction** is the stage where the organization is faced with the innovation and must commit to it.
- The **integration** stage is meant to allow the organization to integrate the innovation, to make it "its own". This is the stage when innovation transits towards normal business practice: it is no longer an innovation, a novel process or element but an integrative part of the organization.

New product launch – P&G model

- **Discovery** – is related to the research activity. An idea is formulated and basic guidelines are given in order to differentiate the product;
- **Design** – the prototyping stage where the product is described in detail and a commercial model is developed to assess the feasibility of the idea. Also the production technology needs to be described, as well as the resources implied by the process;
- **Qualify** – the product needs to be validated on the market through analyses of potential and risk. The feasibility of the product needs to be determined and a decision needs to arise whether to launch or not;
- **Ready** – after the market validation a final optimization needs to be made according to market feedback. The product is being prepared for launching with all the connecting processes such as production setup, logistics. The planning of the launch;
- **Launch** – is the so called "zero series", a pilot series that is meant to be a test for all the product lifecycle. The series needs to be produced, distributed, sold and customer feedback needs to be received. This stage should give a final calibration feedback in order to bring the product to full market maturity;
- **Leverage** – the final product is being unrolled as a fully marketable product and it is consequently studied for optimizations such as product management, cost cutting, efficiency, etc.

Source: Hiam, Alexander, 2010. *Business Innovation for Dummies*

Ensuring innovation success

1. Competitive advantage: Your innovation should provide a unique competitive position for the enterprise in the marketplace;

2. Business alignment: The differentiating factors of your innovation should be conceptualized around the key strategic focus of the enterprise and its goals;

3. Customers: Knowing the customers who will benefit from your innovation is paramount;

4. Execution: Identifying resources, processes, risks, partners and suppliers and the ecosystem in the market for succeeding in the innovation is equally important;

5. Business value: Assessing the value (monetary, market size, etc.) of the innovation and how the idea will bring that value into the organization is a critical underlying factor in selecting which idea to pursue.

Innovation challenges

- **Finding an idea**

- **Developing a solution**

- **Sponsorship and funding**

- **Reproduction**

- **Reaching potential customers**

- **Beating competitors**

- **Timing**

- **Keeping the lights on**

Source: Berkun, Scott, 2010. *The Myths of Innovation*

Types of support

Source: Welsh Government, 2013. *Business innovation*

Support can be in the form of:

- Funding (project calls, vouchers, incentive schemes, tax deductions)
- Knowledge and know-how (consultancy, direct assistance, written or online materials, feedback on iniatiatives)
- People and skills (support agencies, collaborations, sectoral projects and programs)
- Policy instruments implemented into legislation and institutions
- Commercialization opportunities
- Technical tools to improve effectiveness and efficiency of the process

Strategic approach examples

EU: Innovation driven entrepreneurship in a lifecycle approach

Finland: Entrepreneurship, Demand orientation, Research infrastructures, Public data, Poles of excellence, Human resources

Austria: Education System Reforms, Knowledge Based Society, Corporate Research, Governance, Financial Base

Ireland: Enterprise Commercialisation Fund, Intellectual Property Assistance, Pilot Business Partners, Campus Incubation, Centres for Science, Engineering & Technology Programme, trategic Research Clusters, Innovation Partnerships, Innovation Vouchers

USA: National Innovation Foundation

17

WIPO Road-map for for establishing Technology & Innovation Support Centers

I. Background

1. Why:

- a. To allow users to benefit effectively from increased accessibility offered by internet searches (including search tools such keyword, truncation, classification, etc. tools) through direct personal (face-to-face) assistance;

- b. To strengthen the local technological base (by building up local know-how);

- c. To increase technology transfer (e.g. by investigating the possibilities of licensing, joint ventures, etc.);

- d. To assist local users to create, protect, own and manage their

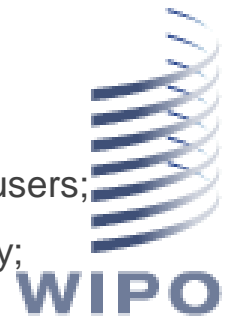- intellectual property rights;

Source: WIPO, 2011

WIPO Road-map for for establishing Technology & Innovation Support Centers

2. What:

- a. Technology searches

  - i. patent searches;

  - ii. non-patent (scientific and technical literature) searches;

- b. A broader range of services to users (not only patent and nonpatent information), including:

  - i. advice on the whole innovation process, from conception of an idea to the

    commercialization of the product based on this idea;

  - ii. the process of protecting innovation e.g. using patents;

3. Where:

- a. Technology and Innovation Support Centers should be strategically located close to users;

- b. The centers should also, if appropriate, be spread out throughout the national territory;

Source: WIPO, 2011

WIPO Road-map for for establishing Technology & Innovation Support Centers

4. For whom: Assistance particularly to non-specialist and increasingly broad spectrum of users:

- a. Individual inventors

- b. Small and medium enterprises

- c. Industry

- d. Researchers in technology centers and universities

- e. Academia (ranging from schools to universities),

- f. IP professionals, etc.;

II. How: Practical steps

1. **Initial Needs Assessments**

2. **Service Level Agreement (SLA)**

3. **Training**

4. **Technology and Innovation Support Center Services**

5. **Technology and Innovation Support Center Networks**

6. **Awareness raising**

Source: WIPO, 2011

Innovation vouchers

- Quick financing instrument mainly aimed at SMEs

- Small value, usually below 15.000 euros, oriented towards creative start-ups

- Require limited and simplified documentation to obtain

- The are sought after by companies and used by them to pay research providers for research and innovation services

- They encourage the development of the market for innovation services

- They encourage competition among providers

ADVANTAGES:	DISADVANTAGES:
Focused on the solutions Easy to obtain and manage Can be targeted depending on priorities	Small value Continuity gaps Not clearly individualized from other funding types

21

Open innovation

- "Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology" (Wikipedia, 2015)
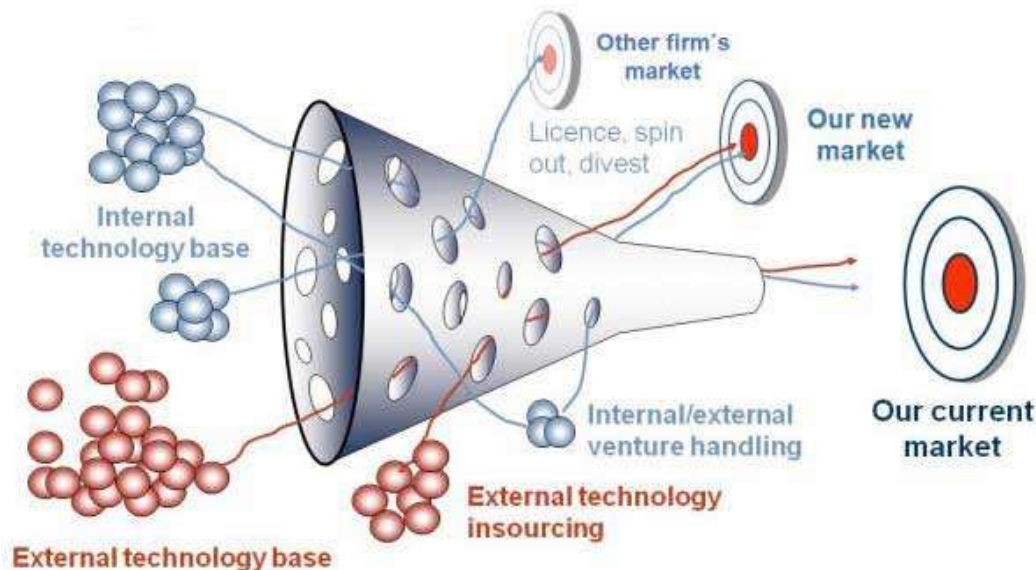
Stolen with pride from Prof Henry Chesbrough UC Berkeley, Open Innovation: Renewing Growth from Industrial R&D, 10th Annual Innovation Convergence, Minneapolis Sept 27, 2004

- **Open innovation provides a more flexbile interaction with the market and a better valuation of all knowledge within an industry**
- **Structure and jurisdiction becomes less important, and ideas and results get to be in the focus**
- **People and companies are more fluidly linked in activities, time and results**

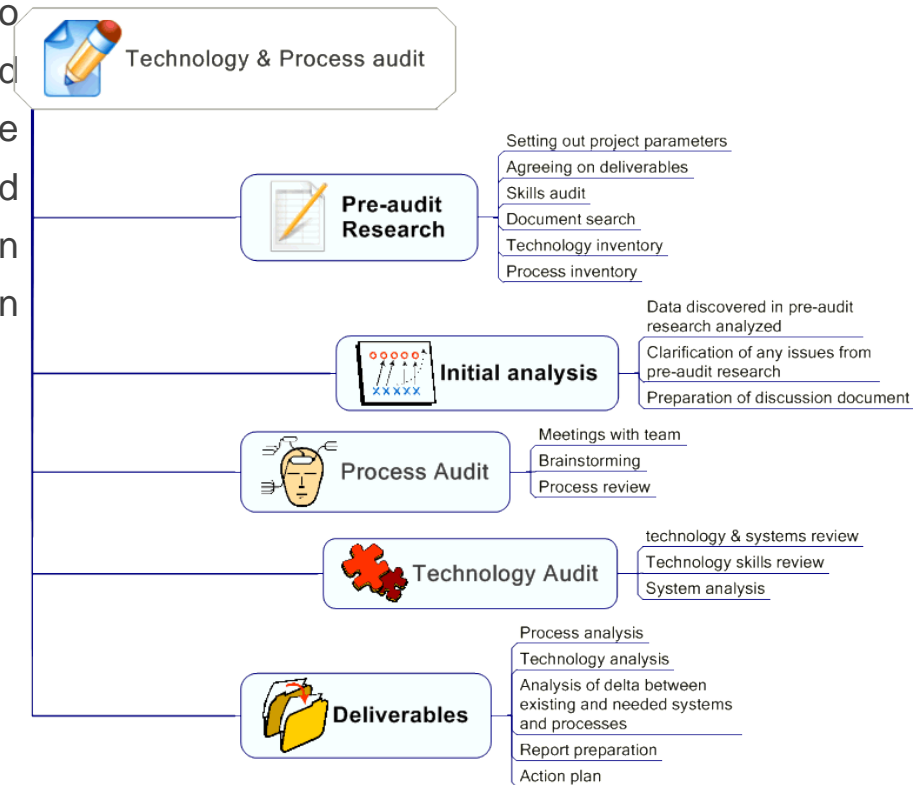Source: Knops, Remo, 2012. *What is open innovation?*

22

Technology audit

- **What?** An thorough investigation of underlying corporate systems that contribute to successful generation, maturation and commercialization of innovative ideas

- **Why?** In order to provide a structured outlook on the gap between current practices and the ones necessary to achieve the desired success

- **When?** As often as necessary considering the evolutions encountered on the market or generated internally by the management of the company

- **Where?** In all locations, within all processes, with a special focus on the requirements engineering, design and development and market feedback stages

- **With whom?** All personnel of the company can be involved in a full fledged audit designed to diagnose innovation capability at product, process and organization level

- **How?** Using structured questionnaires, interviews, processing company data, analyzing market data, by using benchmarking, etc.

Technology audit

- **According to Innovationlabs.com**, the innovation audit should be used by a company to gain an understanding of what it is doing well and what it is doing poorly, in order to improve performances. It goes beyond technologies and processes and addresses procedures, human resources, management issues and even corporate culture:

  - Alignment of Strategy & Innovation
  - Innovation Portfolio Management
  - Research Process Assessment
  - Innovation Development
  - Alignment with Sales
  - Innovation Metrics & Rewards
  - Infrastructure Assessment

Technology & Process audit

Pre-audit Research
- Setting out project parameters
- Agreeing on deliverables
- Skills audit
- Document search
- Technology inventory
- Process inventory

Initial analysis
- Data discovered in pre-audit research analyzed
- Clarification of any issues from pre-audit research
- Preparation of discussion document

Process Audit
- Meetings with team
- Brainstorming
- Process review

Technology Audit
- technology & systems review
- Technology skills review
- System analysis

Deliverables
- Process analysis
- Technology analysis
- Analysis of delta between existing and needed systems and processes
- Report preparation
- Action plan

Source: Translation Management Global, 2015. *Technology and Process Audit*

Source: Innovationlabs.com, 2015. *The Innovation Audit*

Technology audit – InnoRegio model

STEPS FOLLOWED FOR TECHNOLOGY AUDITS

1	Desire / wish of firm to carry out technology audit ♦ Firm may be enticed through promotional campaign from projects such as Innoregio or RIS type programs
2	Selection of intermediary organization / expert to carry out the technology audit
3	First contact / visit of expert to firm ♦ Discussion on procedure / benefits of technology audit ♦ Presentation of steps
4	Preparatory work by expert on collecting basic information on ♦ The firm ♦ The sector
5	General short diagnosis Company interview with questionnaire (example questionnaire with contents in the annex), normally with the General Manager aiming at ♦ Collecting general company data

Source: InnoRegion project, V. Kelesidis, 2000. *Technology audit*

Technology audit – InnoRegio model

	♦ Shaping company technology profile ♦ Performing a SWOT analysis ♦ Identifying technological areas for further analysis
6	Data analysis by expert - report on first diagnosis (example report with the contents in the annex)
7	Presentation of first diagnosis report to General Manager and company management ♦ Discussion, verification of findings ♦ Finalization on the subjects for further analysis with / without additional experts (specialists). Further analysis may cover issues, such as: Production operations, R&D, Quality, Product Development, Human Resources Management, etc.
8	Additional visits / interviews to department heads, as chosen in step 7. These visits may be done either by the generalist, the specialist or jointly ♦ The advisors may have their own methodology, but typical areas that should be covered in the above mentioned departments are described in 3.2
9	Final report of the technology audit, compiled by the experts, which should cover: ♦ Subjects analysed ♦ Methodology used ♦ Problem areas identified ♦ Solutions proposed by the expert(s) ♦ Steps to be taken for implementing the solutions (**action plan**)
10	Presentation of report by expert(s) to company management aiming at: ♦ Discussing issues identified ♦ Discussing solutions proposed / identifying alternative solutions ♦ Discussing / finalizing action plan ♦ Setting up a monitoring system for plan implementation with / without the aid of the experts

Source: InnoRegion project,
V. Kelesidis, 2000. *Technology audit*