S2S Science 2 Society

Policy Brief

How policy makers can facilitate the open approach to innovation

Editorial

Science2Society is an EU-funded project that aims to boost innovation efficiency across Europe. To improve the output of innovative processes, Science2Society analyses business creation, the use of knowledge in creating solutions, products and applications generating value from academic and scientific research. Science2Society brings together practitioners and system experts, including universities, industries and research & technology organisations. Through this interaction, the project makes available a wealth of experiences and practices which can help improve the performance of innovation processes, introducing the principles of open innovation.

Content

Our Purpose

Open Innovation (OI) is an effective way to 'innovate innovation', guiding enterprises, universities and research organisations to improved approaches and increased performance. The Science2Society project has experimented and practically applied OI concepts to seven interaction mechanisms, demonstrating their empirical implementation and their sustainability. The result are seven S2S service blueprints. The S2S pilots have also demonstrated that policy makers have a role and responsibility to put in place framework conditions, which facilitate the open approach to innovation and improve the process output. The guidelines in this document will support policy makers in their decision-making process, provide suggestions for action action and make innovators aware of policy instances.

The Seven Pilots

- **Pilot 1:** Co-creation
- **Pilot 2:** Co-location
- **Pilot 3:** Collaborative R&D and Innovation
- **Pilot 4:** Intersectoral Staff Mobility
- **Pilot 5:** Big Research Data Transfer
- **Pilot 6:** University Knowledge Transfer
- **Pilot 7:** Open Innovation Marketplace

What are the Principles of Innovation Processes?

- Innovation is an engine of competitiveness, entrepreneurialism, economic growth and job creation, as well as a means to tackle socio-economic challenges.
- Innovation is the outcome of a journey whereby new ideas are turned into products, services or processes ready for adoption and diffusion.
- It is useful to underline that innovation of the S2S pilots focuses on every possible aspect of the process, not only the creation of technical knowledge and the reengineering of technical processes, but also all surrounding areas, such as finance, marketing, sales, human resources, etc.
- The innovation process is a multi-stage, non-linear process consisting of multiple knowledge transfer steps and involving a wide variety of actors.
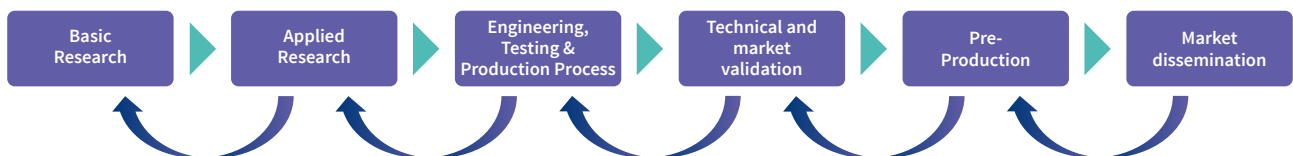

Figure 1: Innovation process

Innovation is made up of several stages from basic research to market dissemination. Each stage is an attempt to coordinate different knowledge components. The coordination must be successful at every stage for innovation to progress. Otherwise it stalls, or a new combination of knowledge components must be tested.

Knowledge flows between actors depend on their learning and absorptive capacity and are directly influenced by the overall framework in which they occur (including rules and regulations in force).

- Since the innovation process is inherently a systemic phenomenon, its outcomes depend on the well-functioning of specific functions within a given framework, which is itself subject to the presence of the appropriate actors, infrastructures, networks, institutions and capabilities.

Innovation systems include market and non-market players (including research organisations, universities, industry, public administrations, users, citizens etc.), which influence the direction and speed of knowledge flows between them. To varying degrees, these actors contribute to the achievement of the following functions: entrepreneurial activities; knowledge development and exchange; direction of research and innovation efforts; formation of markets; mobilisation of resources; and counteracting resistance to change.

Policymakers, as keepers of the common good and supporters of societal values, have a strong interest in stimulating innovation to make it pervasive and more effective. Innovation has the capability of generating positive impacts on knowledge directly; on economic and social issues such as entrepreneurialism, economic growth and job creation; as well as on wider societal issues such as environmental sustainability, welfare and personal wellbeing.

Open Innovation:
What is it and what are its main trends?

Open Innovation is a very specific approach to the configuration of the innovation process, matching outside-in and inside-out knowledge flows to connect with the organisation's external innovation ecosystem. It stimulates internal innovation processes, while simultaneously accelerating the external exploitation of the resultant knowledge.

The figure below provides a simple representation of the Open Innovation funnel. The innovating body normally bases on one single integrated internal science and technology base; however, it can reach out to several potential external science and technology bases which the ecosystem can make available.
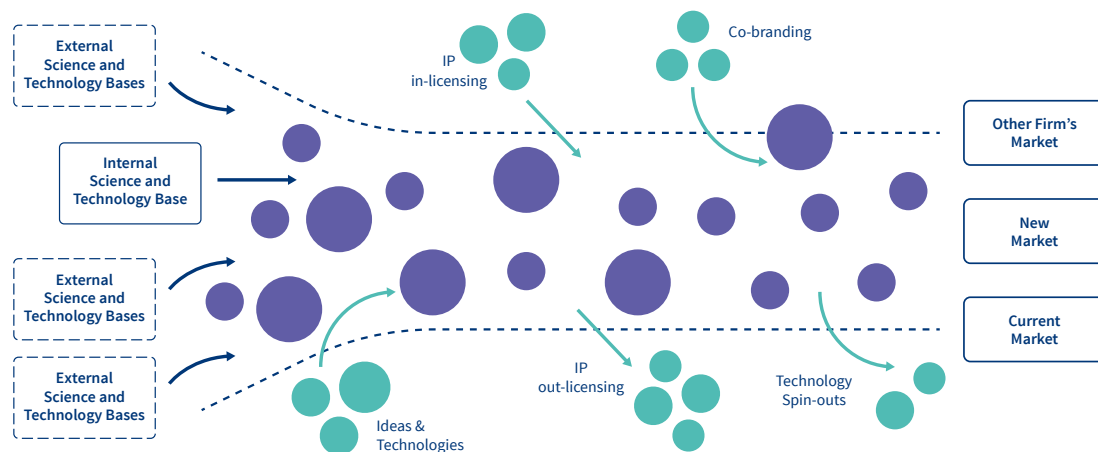

Figure 2: Concept of Open Innovation; based on Chesbrough (2006), format Rangus (2010)

Open Innovation contrasts with the theoretical 'closed' innovation model, in which (vertically) integrated companies try to put in place mechanisms to control their knowledge exchange and innovation processes and to set up procedures and rules to regulate knowledge diffusion and spill-overs. It is justified by the increasing technological complexity and embeddedness of technologies in manufacturing goods (blurring the line between products and services). Because **knowledge is becoming more specialised**, the cost of its production rises, which encourages companies to externalise it.

Open Innovation is a concept coined in 2003 by Henry Chesbrough, yet it describes practices that have been ongoing for long, which relate to the increasing involvement of new and external actors in the internal innovation processes of companies.

The involvement of external actors in companies' innovation processes aims to provide complementary sources of knowledge and therefore the functionality of innovations, i.e. their ability to be adopted, diffused and used.

- Due to the intrinsic characteristics and risks of basic research, it is generally expected that **public organisations** take care and **finance or perform it** directly. In principle, companies have no incentive to engage in it, because of the low appropriability of its outcomes.
- Users are increasingly involved in innovation processes to provide insights into their needs and practices and thereby help the development of innovations with a high uptake potential.
- **Early supplier involvement** in product development explains the **higher competitiveness** of the Japanese automotive industry in the 1980s and 1990s. It reduces development time and associated costs while improving and simplifying the production process.
- The **role of citizens** in innovation processes **has gained** a renewed interest following the emergence of grand challenges, which include Health, demographic change and wellbeing; Food security, sustainable agriculture and forestry; Secure, clean and efficient energy; Smart, green and integrated transport; Climate action, environment, resource efficiency, and particularly in Open Innovation-enabled processes.

Adopting Open Innovation approaches must be based on the recognition that companies are increasingly open towards external sources of knowledge but demonstrate lower commitment to outside-in knowledge transfer actions and strategies, as all pilot assessments confirm. The core missions of higher education institutes and public research organisations include sharing the knowledge they produce via education and training, publication in academic journals and participation in conferences.

Higher education institutes and public research organisations are expected to start embracing a 'third' mission – beyond their education and research activities, i.e. to increase the benefits of science to society. In line with this strategy, intermediaries, such as Technology Transfer Offices (TTOs), and other actions undertaken for the purpose of 'academic entrepreneurship' aim to stimulate further commercialisation of public research findings, sometimes via the establishment of new companies. However, **individual researchers** remain the **main actors** deciding on engagement in Open Innovation activities. They receive little incentive from their organisations' **top management**, who still **focus** almost exclusively on their **education and research missions**. Furthermore, TTOs have often limited resources and capabilities and their activities are restricted to the provision of advice on intellectual property management.

The success of Open Innovation strategies in every type of organisation - be it an enterprise, university or research institution - depends on the presence of appropriate cultures and mindsets; enabling procedures; effective incentives; skills and resources; and, the well-functioning of innovation processes and collaboration for innovation.

The Science2Society project:
what did we pursue and what did we find?

Science2Society developed, investigated and assessed the design and functioning of interaction mechanisms through which higher education institutes, public research organisations, society and industry collaborate. The project has created value through an Open Innovation approach.

As part of Science2Society, seven pilots experimented with different University-industry-society interfacing strategies and methods: **Co-creation** (Pilot 1); **Co-location** (Pilot 2); **Collaborative R&D and Innovation** (Pilot 3); **Intersectoral Staff Mobility** (Pilot 4); **Big Research Data Transfer** (Pilot 5); **University Knowledge Transfer via coaching and training actions** (Pilot 6); and **Open Innovation Marketplace** (Pilot 7). Via surveys, the pilot participants were able to assess their experience-based views and insights on the design and performance of the pilots.

Overall, the participants expressed positive feedback on the pilots they were involved in. However, it appears that some collaboration-enabling factors (e.g. degree of commitment and mutual trust) have not improved as much as expected throughout the course of the project. In any case, the results of the seven pilots and their assessment, as well as the S2S project experience as a whole, are providing a wealth of information to support the ongoing innovation learning process.

The S2S consortium is aware of the need to provide the reader with detailed information on the many elements of the seven pilots, including their step-by-step process, enabling factors, the information emerging from the assessment and the most important conclusions. For this purpose, the reader of this policy brief can take advantage of the set of blueprints that the S2S team has produced and gain a more comprehensive overview of the innovation work completed. The blueprints can be downloaded from the S2S website here: http://science2society.eu/downloads/65.

The lessons from the pilot implementations

- Several of the S2S pilots have developed more than one Open-Innovation-based approach, such as Pilot 2, where Co-location was combined with co-operation and possibly also Intersectoral Staff Mobility. The community-building approach developed in Pilot 7, for example, can be deployed in other pilots, such as 1, 2, 4 and 5.

Therefore, the S2S experience confirms that university-industry-society interaction mechanisms investigated should not be considered as alternatives to one another, among which policymakers would need to select and implement the best one.

- Most of the S2S pilots, and in particular 1, 2, 4, 5, 6 clearly build on tailor-made Open Innovation approaches. The general innovation and Open Innovation approaches have always been turned into bespoke processes.

Therefore, the S2S experience confirms that whichever interaction mechanism is chosen, its design would need to be tailored to the specific characteristics of the Open Innovation projects and the innovating organisation.

- the outcomes of all pilots show that sharing, communicating and mutual understanding are key aspects of innovation processes in general, and open processes in particular. In all the seven pilots, the success of university-industry-society collaboration depends on the effective alignment of objectives and practices of all involved actors. It is also of key importance that their respective functioning has a compatible timeframe with individual strategies and agendas. The analyses clearly showed e.g. for Pilot 5 and 6, that extensive upfront information is a key aspect of success for the knowledge transfer process and the schedule of the innovation path.

- trust, risk management, time-efficient engagement processes and well-developed and effective cooperation were considered essential for all seven pilot teams. The survey-based assessment clearly supports this aspect.

- all pilot organisations, from Pilot 1 to 7, showed openness to knowledge inflows and outflows, the basis to open innovation success, which can be focused further and developed over time.

- a key success factor is an initial commitment by pilot partners. The survey showed that in particular for Pilot 1, Pilot 2, Pilot 4, Pilot 5, and Pilot 6 there are significant margins of improvement as far as this aspect is concerned.

- pilot teams confirmed that good communication was implemented for all pilots, with significant margins of improvement for certain categories of users (enterprises) and types of information (feedback on market innovative impacts). This specifically emerged from the assessment of the teams of Pilot 2, Pilot 3, Pilot 4, Pilot 6.

> **Therefore, the S2S experience confirms that** innovators must commit themselves to collaboration and cooperation for problem-solving. Actions, like teambuilding activities, will greatly facilitate their success.

> **Therefore, the S2S experience confirms that** it is important to have a common understanding of what the goals are, (including the timeline for their achievement) sometimes across large groups of participants. This common understanding relies on using familiar language (avoiding academic jargon and commonplaces where possible) and requires effective communication (preferably face-to-face or assessing the effectiveness of online tools). Intermediaries, like Technology Transfer Offices (TTOs), may also act as facilitators to create linkages between the different categories of actors and to stimulate their mutual understanding.

- All S2S pilot teams confirm that the key success factors for all innovation processes are:
  - people, their skills and motivations
  - flexible framework contracts and tailored agreements for different stakeholder needs (students)
  - embeddedness in each organisation's strategy

> **Therefore, the S2S experience confirms that** the human factor is confirmed as the key success element and needs appropriate consideration from the organisational and individual point of view.

- Pilot 2 has demonstrated its success in facilitating science-industry cooperation through physical co-location, while Pilot 6 has successfully demonstrated the effective on-site cooperation of the academy and research with small and medium-sized enterprises.

> **Therefore the S2S experience confirms that,** university-industry-science interactions could be facilitated by the establishment of dedicated infrastructures, i.e. incubators, physical platforms, and methodological support. However, the operation of these facilities, tools and the subject matter of the collaboration should be the sole responsibility of the innovating participants.

- Pilot 6 in particular, but also Pilots 1, 2, and 4 have demonstrated that creating clear, ad-hoc procedures results in major benefits for the success of the common Open Innovation venture, in particular focusing on: communication and understanding of the process; facilitator knowledge; time-efficient engagement processes; plan for activities and concrete outputs adjusted to the pace of the innovation recipients.

- Individual and organisational behaviour and cooperation attitudes, as well as their consistency with the strategic setup, are considered some of the most important success factors for the seven pilots.

> **Therefore, the S2S experience confirms that** dedicated procedures and models for setting-up the Open Innovations eco-system are most useful for University-industry-society interactions and they should reflect the needs of various stakeholders. Their design must guarantee simplicity, time efficiency and clear decision-making in order to curb transaction costs.

- All seven pilots, and in particular Pilots 1, 2, 4, 5 have shown the importance of clear and flexible framework conditions. These require careful design and management throughout the course of the innovation initiative.

- Success is based on the creation of win-win models for all parties involved.

> **Therefore, the S2S experience confirms that** more than any other innovative approach, Open Innovation requires conducive framework conditions and contractual arrangements. They should provide the necessary legal certainty on which these actors can build and develop their collaboration. The agreements on which the interaction mechanisms are based must define the roles and responsibilities of each participant. Special attention should be paid to intellectual property, as some related strategies focusing exclusively on the protection of rights may be detrimental to knowledge flows and collaboration.

- The overall success of the seven S2S Open innovation pilots, supported by the outcomes and opinions of the project participants, is confirmed: structuring Open Innovation processes benefits from such cooperation arrangements. It is important to maintain high commitment from academics and researchers throughout the initiative, who do not always have the motivation or incentive to be innovative, as their career prospects (primarily) depend on their research and academic performance.

> **Therefore, the S2S experience confirms that** the implementation of University-industry-society interaction mechanisms for Open Innovation should be gradual, so the participants have time to change their culture and adapt their practices and procedures.

How can policy-makers 'make the difference'?

Policymakers can help identify the segments of the innovation process that can be 'opened'. These segments are those that should receive dedicated support, such as capacity building and innovation services delivered by experts, within a well-defined innovation policy framework.

ACTIONS FOR AWARENESS AND EDUCATION
- Prepare guidelines and organise dedicated events to raise awareness among participants of the potential and the challenges of Open Innovation and disseminating good practices. These include 'generic' good practices, such as the design of an Open Innovation strategy, as well as practical organisational measures to develop Open Innovation. Awareness-raising has been particularly beneficial in the cases of Pilot 1, Pilot 3, Pilot 5 and Pilot 6.

> **The S2S results indicate that** general policies and implementation measures can support the diffusion of these strategic approaches and their implementation. Policymakers can play a key role in raising awareness and widening the reach of innovative approaches to new technologies, solutions and markets.

- Establish intermediaries with the mission to provide advisory services, to facilitate and reduce the costs of engagement in Open Innovation activities.

- Launch TTOs as Open Innovation 'facilitators', within the academia.

- Promoting the establishment of dedicated departments in universities will help them develop their orientation towards innovation and provide targeted support to the units and team members engaged in knowledge creation.

> **The S2S results indicate that** the 'facilitation' effect was emphasised by the seven pilots, in particular Pilots 3 and 6 directly, and Pilot 5 indirectly. Intermediary bodies can have a key role in supporting academics, researchers and businesses to better cooperate.

- Launch support actions that target the improvement of skills and capabilities of the individuals and organisations (absorptive capacity skill and 'learning organisation'), promoting the uptake of knowledge.

- Stimulate an 'application' and 'commercialisation'-oriented attitude in those who produce knowledge and disseminate it, mostly non-enterprise innovators.

> **The S2S results indicate that** policymakers can provide significant support to develop the skills and increase the absorptive capacity of all players, as demonstrated particularly in pilots 1, 2, 5 and 6. They can drive a stronger orientation of researchers towards the solution of market issues and a deeper understanding of R&D issues by enterprises.

ACTIONS FOR FINANCIAL INCENTIVES AND FUNDING
- Fund (parts of) the costs for conducting (Open) Innovation activities via 'Open Innovation grants' or financial support for specific activities deemed relevant for Open Innovation activities.

- Provide incentives for higher education institutes to move towards their 'third mission', which consists of increasing the benefits of science to society and therefore in accelerating knowledge transfers.

> **The S2S results indicate that** an extensive case study and survey-based research on Open Innovation (Study on Knowledge Transfer and Open Innovation), carried out by JIIP in parallel to the Science2Society pilot project, has revealed that many small and medium-sized enterprises consider the Open Innovation

approach too burdensome in terms of human and financial resources. Furthermore, another hampering factor that has emerged, is the core focus of researchers and academics on their scientific production and their hesitance to partake in more applied activities.

ACTIONS FOR REGULATIONS AND FRAMEWORK SETTING

- Reinforce framework factors and their implementation and enforcement and the actors' awareness thereof, such as intellectual property right protection, financial support, and the relevant regulatory frameworks.

- Facilitate and support start-ups in Open Innovation ecosystems, also creating infrastructures to host innovators, research facilities, test facilities, power computing, as well as financial instruments and services. They could consist of physical and online platforms helping the relevant actors connect.

The S2S results indicate that the seven pilots have clearly shown that framework conditions, intellectual property rights protection and contractual arrangements are the focus of innovators from academia, research and business. Further external input and support are necessary to help innovators define and agree on the contractual agreements and project designs they need.

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