THEMATIC NOTE 2

# How to Build Innovation Networks

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## SYNOPSIS

The success of spontaneously emerging innovation networks has sparked interest in deliberate efforts to build new networks and strengthen existing ones. This note describes both spontaneous and deliberately created innovation networks, discusses the factors related to success, and offers lessons and guidelines for creating new networks or supporting existing ones. To support the emergence and consolidation of innovation networks, avoid imposing formal organizational arrangements. Promote policies that provide incentives (beyond simple subsidies for participation) and an enabling environment for innovation (especially, creating market and social opportunities for innovation). Consolidate the innovation capabilities of networks through policies that support action-research and decentralized experimentation with centralized learning, the construction of local and distant interactions, and resources for participatory assessment of innovation capabilities. Finally, build capabilities of members of innovation networks by strengthening innovation capabilities in private firms and civil society organizations, building the capacity of actors willing to be catalytic agents, and promoting cultural changes in public institutions that foster their participation in innovation networks.

## BACKGROUND AND CONTEXT FOR INVESTMENT

Innovation networks emerge (and are becoming more prevalent) because no single actor commands all the resources required to innovate at the pace demanded by modern markets (Powell and Grodal 2005). To access the resources and information they lack, actors establish informal collaborations. Innovation networks emerge when the problems or opportunities affecting actors in the innovation system are not clearly defined. This uncertainty prevents effective contracting and structured partnerships, and it forces partners to use flexible approaches to explore potential solutions. Innovation networks can emerge from the deliberate actions of actors, as in Brazil with no-till agriculture (IAP 1), or they can emerge inadvertently as actors perform tasks that require collaboration.

In this module, an innovation network is defined as a diverse group of agents who voluntarily contribute knowledge and other resources (money, equipment, and land, for example) to jointly develop or improve a social or economic process or product. Innovation networks are a special form of organization with a nonhierarchical structure, a collaboration-based culture, consensus-based coordination (because members are free to leave the network at any time), usually no legal personality (especially in their early stages), and often relatively fuzzy objectives (such as improving the management of natural resources). They evolve with market opportunities and the technologies they develop. Different types of actors participate in innovation networks; in fact, membership changes in response to emerging problems and opportunities or the development and diffusion of innovations (IAP 1).

Innovation networks have supported the development of important innovations, both in agriculture and agroindustries, such as no-till agriculture and Chile's wine industry. The networks' flexibility allows groups of actors to minimize transaction costs and minimize risk by adding flexibility.

More than any other feature, it is diversity that characterizes innovation networks. Networks' goals can differ. Some develop technical solutions to specific problems (like the no-till networks), create new business models and new products (like Papa Andina, described in box 1.15), or reduce poverty. Others empower marginalized groups by fostering innovations appropriate to their resources and needs—an example is the International Livestock Research Institute's (ILRI's) innovation platforms to overcome fodder scarcity[1]—or develop improved crop varieties. Network membership can encompass farmers, farmer organizations,

### Box 1.15 The Creation and Consolidation of Papa Andina

Since 1998, Papa Andina has fostered agronomic, technical, and commercial innovations in Andean potato-based food systems to improve farmers' access to more dynamic and lucrative markets. The network, which reaches about 4,000 poor rural households and includes about 30 partners in Bolivia, Ecuador, and Peru, pursues several strategies: increasing demand for native and commercial potato varieties, adding value to potatoes, improving contractual arrangements, and facilitating access to commercial information. Financed by the Swiss Agency for Development and Cooperation and other donors, Papa Andina is hosted by the International Potato Center (CIP).

Based on a participatory method for stimulating agricultural innovation (Rapid Appraisal of Agricultural Knowledge Systems), in 2000 CIP researchers started to enhance innovation through a participatory market chain approach and stakeholder platforms. These efforts bring researchers together with small-scale farmers, agricultural service providers, and market chain actors (including chefs, supermarkets, and potato processors). In each participating country, Papa Andina coordinates its activities with a "strategic partner" that assumes a leadership and coordinating role in market chain innovation: PROINPA Foundation in Bolivia, the INCOPA Project in Peru, and the National Potato Program of INIAP in Ecuador. Although the approaches to developing the networks are common (the participatory market chain approach and stakeholder platforms), different organizational arrangements, involving different partners and interaction patterns, emerged in each project implemented by Papa Andina.

Papa Andina's success resulted largely from the exploration of alternatives to reaching its goal (poverty alleviation), the involvement of different actors in developing and testing innovations, and the continued support of its funders.

*Source:* Author, based on Devaux et al. 2009.
*Note:* CIP = Centro Internacional de la Papa; INCOPA = Innovación, tecnológica y competitividad de la papa en Perú; INIAP = Instituto Nacional Autónomo de Investigaciones Agropecuarias; PROINPA = Promoción e Investigación de Productos Andinos.

private and public firms, researchers, extension agents, government agencies, and donors. Innovation networks differ in their origins and their approaches to developing and diffusing innovations. For example, private firms or farmers catalyzed no-till networks in South America and relied on farmer associations to diffuse the technology; in contrast, a private firm and NGO catalyzed Ghana's no-till network but relied heavily on a PhD student and traditional public extension methods (Ekboir 2002).

Innovation networks differ from farmer organizations in that farmer organizations have a homogeneous membership and more formal, stable relations. Innovation networks differ from value chains in that the latter are more stable, are focused on delivering a product or service, and are coordinated by a central actor (such as a supermarket) that organizes the operation (TN 3).

This thematic note describes strategies to foster the emergence of innovation networks or strengthen existing networks. It discusses the benefits and policy issues involved, particularly the need to strike a balance in how the public and private sector participate. The examples highlight the many forms and operating modes that innovation networks can adopt and the potential problems that can render networks ineffective or dependent on external funding.

## INVESTMENT NEEDED

Because of their informal structure and frequent changes, innovation networks need flexible and sustained support, often from innovation brokers. This flexibility does not fit easily into the usual requirements of publicly funded projects, especially because it is difficult at first to define clear objectives and the steps that will deliver the innovation. In contrast, the private sector has long recognized the special nature of innovation and created flexible approaches to support it, including venture and angel funds and actions to develop capabilities that favor innovation. In recent years, some governments, international donors, and multilateral funding agencies have started to support innovation projects that include financing for innovation networks—either to support the emergence of new networks or to strengthen existing ones.

### Fostering the emergence of innovation networks

Actions to foster the emergence of innovation networks seek to create trust among potential partners, identify common goals, establish the bases of collaboration, and develop innovation capabilities. Few developing countries have programs to foster the emergence of innovation networks; on the other hand, many developed countries support such programs, such as Canada's Agricultural Biorefinery Innovation Network for Green Energy, Fuels, and Chemicals and the Dutch InnovationNetwork.

More specifically, the following investments foster the emergence of innovation networks:

- Financing catalytic agents—innovation brokers, business incubators, NGOs, researchers, extension agents, and groups of farmers—that assemble potential partners. Their remuneration should be linked to measures of the consolidation of the network. The milestones should not be imposed by the financing institution but negotiated between potential partners, funders, and the innovation broker. When the milestones are defined by the funders alone, innovation brokers tend to respond to their interests instead of those of potential network partners. The catalytic agents should be trained in the different methodologies that have been developed to foster the emergence of partnerships (see, for example, Hartwich et al. 2007; USAID 2004).
- Giving small, short-term grants to potential catalytic agents of networks to facilitate interactions with potential partners, such as organizing meetings or establishing electronic platforms for communication.
- Broadening the mandate of research and extension institutions to include promoting innovation networks. Appropriate incentives should be introduced and resources made available.
- Establishing a team to develop capabilities and a monitoring and evaluation system to assess the different methods used to promote innovation networks and catalytic agents.

### Supporting existing innovation networks

Given their voluntary nature, innovation networks survive when they can implement collective action. Support for existing networks should seek to (1) strengthen their ability to assess their strengths and weaknesses and gain access to needed resources; (2) build the capacity of network leaders to steer nonhierarchical organizations; (3) implement strategies to gain access to needed resources; (4) develop capabilities to explore new instruments to develop and foster innovations; and (5) facilitate the implementation of joint activities. Investments can include:

- Resources to consolidate innovation networks, including the implementation of collective action (hire facilitators, build human resources with formal and informal training, and support travel, meetings, communications and communications products, and experimentation).
- Strengthening innovation capabilities of nonpublic actors in the AIS, for example, with consulting services, extension activities, technological interchanges, seminars, and workshops on the dynamics of innovation networks.
- Creating venture funds to finance the development of innovations, similar to those used in the high-tech industries.
- Fostering the transformation of public research and extension institutions so that they can better integrate into innovation networks.
- Building the understanding of the main actors in the AIS, especially senior civil servants, of the dynamics of innovation and the nature of innovation networks.
- The no-till networks in South America are examples of consolidated innovation networks. Initially, they were supported by agrochemical companies that provided funds and expertise; once they matured, the networks were managed by farmers and supported by a large number of companies and farmers (IAP 1).

## POTENTIAL BENEFITS

Innovation networks have many potential benefits:

- They can spur the development of innovations thanks to increased collaboration and coordination among diverse actors in the AIS; more effective identification of organizational, commercial, technical, and institutional opportunities; better exploration of alternative solutions to reach the network's goals; lower cost of searching for technical and commercial information; easier experimentation with alternative solutions; and better development of new ideas and skills.
- More rapid development of social and economic innovations can result in stronger economic growth and more sustainable use of natural resources. Strong networks are particularly necessary for innovation when public organizations, especially research and extension, are weak.
- Human, social, physical, and financial resources are used more effectively for innovation.

- Innovation programs become more efficient as all actors in the AIS, especially governments and donors, expand their innovation capabilities.
- Innovations diffuse faster because the participation of users in the network increases the odds that the results will be useful to farmers and other actors in the AIS.
- Public institutions become more effective when they participate actively in innovation efforts.
- Development is more inclusive when innovations meet the needs of marginalized groups.
- Institutional innovations become more inclusive and effective because marginalized groups gain a stronger influence on the design and implementation of innovation policies.

Box 1.16 illustrates some of the benefits that an innovation network can yield, using the example of local and foreign participation in developing small-scale equipment for no-till agriculture in South Asia.

## POLICY ISSUES

Key policy issues related to the emergence and continued success of innovation networks include their consolidation and sustainability; social considerations (when networks form spontaneously, based on the resources that each actor contributes, the poorest and most marginalized groups may not be included); and the changing roles of public and private actors in the network.

### Sustainability

The sustainability of innovation networks depends on many internal and external factors. Internal factors include the

**Box 1.16 Benefits of Local and Foreign Collaboration to Develop Equipment for No-Till Agriculture in South Asia**

No-till agriculture is thought to offer environmental and economic advantages for rice-wheat production systems in South Asia's Indo-Gangetic Plains. Farmers in Pakistan, India, Nepal, and Bangladesh have rapidly adopted the practices since 2000. No-till approaches used in other parts of the world were tested and modified to suit local conditions by a research consortium led by the International Maize and Wheat Improvement Center (CIMMYT) and the Indian Council on Agricultural Research. The technology did not take hold until researchers and agricultural engineers from abroad began working with local, small-scale manufacturers to design prototype no-till seeders. Particularly important were several exchanges of prototypes between small-scale manufacturers from Bolivia and India. The exchanges were mediated by CIMMYT, which worked in both countries with local artisans and handled the logistics of importing the prototypes. Several modifications were made to the original design, and manufacturers now produce and distribute a wide array of the new seeders. Results of the interaction between local and foreign actors included:

- No-till methods were adopted rapidly in irrigated rice-wheat systems. No-till was used on about 820,000 hectares by 2003–04.
- The number of small factories making no-till equipment grew. By 2003, an estimated 15,700 seeders had been sold in Haryana and Punjab, India.
- Profits for small-scale farmers increased, pollution decreased, and water savings increased. Seasonal savings in diesel for land preparation were estimated in the range of 15–60 liters per hectare, representing a 60–90 percent savings. Water savings in wheat production were estimated at 20–35 percent and profitability increased by 46 percent.
- Local manufacturers gained access to information from different countries in the form of original, nonadapted equipment.
- Equipment was more rapidly adapted to smallholders' conditions.
- Technical and scientific information was generated.
- Networks of farmers, equipment manufacturers, and researchers from international centers and state universities were consolidated.
- The impact of CIMMYT's actions was magnified.
- A market for planting services emerged.

*Source:* Ekboir 2002; World Bank 2006; Laxmi, Erenstein, and Gupta 2007.
*Note:* CIMMYT = Centro Internacional de Mejoramiento de Maíz y Trigo.

presence of effective leadership that works by consensus, the development of collective learning routines and trust, effective governance mechanisms for collective action, and a culture that respects the different partners. Support to sustain innovation networks should help build trust among potential partners and encourage a culture of collaboration. External factors influencing networks' sustainability include the emergence of commercial and technological opportunities, timely access to key inputs (particularly to specialized information and qualified professionals), the general socioeconomic climate, and noninterference from governments.

Because of their voluntary nature and low barriers to exit, innovation networks have no formal hierarchy and operate by consensus. Although some actors have more influence than others, they still have to consider the interests of other partners if they want them to remain in the network. The more focused a network, the better the chances of its consolidation. It is important to remember, however, that motives for joining the network may differ (profit, advancement of science, and so on) and could eventually conflict.

### Social considerations

By definition, marginalized populations (poor households, women, and other groups) have few financial, human, and social resources to contribute to innovation networks (Spielman et al. 2008). Their participation in innovation processes often depends on funds and expertise provided by other actors (often NGOs or donors). Innovation networks can cater to the needs of marginalized populations in two ways: by organizing them to improve their access to markets and their influence on innovation processes and policies, and by developing innovations that address their specific needs.

The impacts of innovation networks on poverty are not easy to identify. For example, no-till practices caused land ownership to become more concentrated in southern Brazil. Many smallholders sold their farms and moved to newly developed areas in central and northern Brazil, where land prices were one-tenth of those in the south. Working on much larger areas, the former smallholders became middle-class farmers. Smallholders who remained in the south also benefited from no-till, but only after other actors formed innovation networks to develop special no-till packages for them (Ekboir 2003).

### The role of public researchers in innovation networks

The participation of public sector researchers is not a condition for successful innovation networks, because most innovations are developed by networks of productive or social agents. Yet researchers are necessary when problems require science-based solutions, such as understanding the changes in soil dynamics induced by conservation practices or managing native forests that have life cycles that may last for over a century. In any event, the incentives and cultures within most public offices in developing countries, including research and extension institutes, hamper their participation in innovation networks. These restrictive environments have not prevented many researchers from making important contributions to innovation networks, however, as illustrated in box 1.17.

### Public and private sector roles

Membership in innovation networks usually is varied and may include partners from the public and private sectors, civil society, and international organizations. Generally, networks formed only by private partners seek to develop products with commercial value. As some of the examples in this thematic note indicate, however, it is not uncommon for private firms to team with public or international research institutes to develop commercial innovations, such as improved plant varieties, or innovations with social content, such as no-till packages for small-scale farmers in southern Brazil (Ekboir 2002). The network partners may have had different interests, but they could still collaborate toward a common goal. For example, the private firms may have wanted to develop a new market, whereas the public partners wanted to achieve social objectives. Private firms may participate in innovation networks without a commercial focus when they have a social responsibility policy. Civil society organizations have also participated in networks to develop innovations that address their members' needs. In a few cases, these organizations were the catalytic agents for innovation networks.

As with other aspects of innovation, the public sector can play several roles in supporting innovation networks. It can provide funds to support innovation activities, implement programs to foster the emergence of networks (particularly by supporting innovation brokers), or provide specialized assets, such as research capabilities. The public sector can offer incentives for private firms to participate in innovation networks, such as tax rebates and matching funds, and it can promote reform in public research and educational institutions so that they can participate more effectively in innovation networks. Some public research institutions have taken steps to foster the emergence of

Box 1.17 The Roles of Individuals and Organizational Culture in the Development of Innovation Networks: A Mexican Example

In the early 1980s, a researcher from Mexico's national agricultural research organization crossbred Zebu cattle with European breeds in his ranch. The neighbors, interested in the new animals, soon organized a group to discuss technology issues, such as breeding techniques and pasture management. Based on experiences in Argentina with AACREA, an organization of farmer groups that conduct on-farm applied research and share the results with one another, a few researchers promoted the creation of similar groups of ranchers in the same region of Mexico. The groups started to exchange information and work on validating technologies. The research organization's authorities strongly objected to these actions, claiming that they were extension activities and thus beyond the mandate for national agricultural research. Researchers responded by meeting on Saturdays to avoid being accused of using their working hours for unauthorized activities. By the late 1990s, the groups—GGAVATTS—had developed and diffused several important innovations in their region. In the early 2000s, the federal authorities acknowledged their performance and mandated that their methodology be used in all publicly supported extension activities. They also decided that GGAVATTs should have priority in accessing support programs. The number of GGAVATTs exploded. Most of the new groups were created by technicians hired to do so, and they did not respond to farmers' goals as the original groups had done. Farmers joined chiefly to gain easier access to public resources. Only a few of the new GGAVATTs improved members' ranching technologies. Most faded away when government support ended.

This experience contains two important lessons for supporting innovation networks. First, innovation networks emerge when different actors find a common interest in exploring ways to improve a product or a process. The spontaneous convergence of interests is difficult, however, and facilitating convergence can greatly accelerate the emergence of networks. Second, facilitation should not be coupled with the disbursement of other subsidies. Otherwise farmers join to receive the subsidies and not because they are truly interested in innovating.

*Source:* Ekboir et al. 2009.
*Note:* AACREA = Asociación Argentina de Consorcios Regionales de Experimentación Agrícola (Argentine Association of Regional Consortiums for Agricultural Experimentation); GGVATTS = Grupos Ganaderos de Validación y Transferencia de Tecnología (Livestock Producer Groups for Technology Validation and Transfer).

innovation networks, but often their approach follows a traditional, linear vision of science.

## LESSONS LEARNED

Experiences with innovation networks that develop spontaneously and those that are developed deliberately offer useful lessons about when networks are most effective, who joins, and what they accomplish. Other lessons relate to how networks can be catalyzed and otherwise motivated, how they can be consolidated, and how they can avoid depending on external funding agencies.

### When are innovation networks effective?

Innovation networks are particularly effective for developing and diffusing technical and commercial innovations that deal with ill-defined or complex issues, like new approaches for natural resource management (such as water catchment in arid regions) or the development of market niches for poor households (TN 3). The problems and the potential solutions that innovation processes will explore are rarely well defined at the beginning. Because of their voluntary nature, innovation networks have the flexibility to adapt to emerging needs and opportunities, but this responsiveness can depend on the availability of flexible funding and on enabling all actors in the AIS (especially public researchers and extension agents) to participate.

### A network's origins greatly influence who joins and how it innovates

Innovation networks can emerge because of the interests of one person—a farmer, a private firm, or a researcher (as in box 1.17)—or because it is part of a research program, like the Ghanaian no-till equipment network (box 1.23 in IAP 1).

It can originate with field staff and then be integrated with an organization's work plan, or it can originate with the top management. When traditional research organizations attempt to create innovation networks, they usually emphasize the use of scientific experimentation. Other partners are sought to contribute complementary scientific capabilities, provide farmers' perspectives, or participate in diffusion. This kind of network includes the scientific network that developed Golden Rice (a more nutritious type of rice)[2] and demand-driven innovation networks in which farmers define the problems and researchers work on solutions (replicating the traditional, linear research pipeline).[3] When farmers, private firms, or NGOs create innovation networks, they emphasize the social and organizational dimensions. They often adapt techniques without the collaboration of scientists. They establish new kinds of organizations to diffuse them (like some of the no-till networks) (Ekboir 2002) or rely on farmer-to-farmer communication. More recently, social scientists in research institutes (such as CIP, ILRI, and Wageningen University) have helped to create innovation networks involving social and agronomic researchers and other actors from the AIS. As all innovation networks mature, the importance and roles of the actors change (see, for example, IAP 1).

The emergence of innovation networks requires two types of partners to collaborate: a catalytic agent and a funder. Committed and innovative catalytic agents are vital to the emergence of innovation networks, because by definition only they can induce other partners to invest time and resources in the network, and they also seek partners to contribute the resources needed by the network (Ekboir et al. 2009). Catalytic agents can have different organizational affiliations. For example, they can belong to an organization willing to start an innovation network in pursuit of its own interests or can be hired by a project as an innovation broker. Regardless of organizational affiliation, to start an innovation network, a catalytic agent must seek partners willing to contribute to the common effort, identify which capabilities the network needs, and look for new partners that can contribute those capabilities until at least one is found. In searching for partners to initiate an innovation network, it is important to focus both on individuals and institutions. Support from top management is of little help if the people who must participate in field activities are not motivated. For example, the first no-till network in Brazil was catalyzed by a researcher from a private firm. Realizing that no-till required new planters, he contacted all the manufacturers in the area until one agreed to participate in the emerging network. He also contacted several public researchers and research institutes until he gathered sufficient expertise in agronomy and soil science. The motivation of these researchers was critical to the network's success (IAP 1).

Funders, on the other hand, provide the resources that allow the catalytic agent to operate. Once the network has emerged, it is essential for it to establish effective links with other networks that can provide information, share experiences, and provide access to critical assets the network lacks. The links are often not provided by the catalytic agent but by other well-connected partners ("central nodes," in the terminology of Social Network Analysis). In addition to these partners (catalytic agents, central nodes, and funders), innovation networks are populated by individuals and organizations. Like any other organization, each innovation network develops its own culture, learning routines, heuristics, and modes of interaction.

### Central nodes facilitate information flows within and between networks

Innovation networks facilitate the exchange of knowledge, abilities, and resources among their members, but effective networks also interact with other networks and sources of information (Ekboir et al. 2009) through a few central nodes.[4] Innovation brokers are particularly prepared to become central nodes. By linking clusters of network actors, the central nodes facilitate flows of information and resources, as exemplified by CIMMYT's role in developing no-till equipment in South Asia, discussed earlier. Securing funding to build these connections has been difficult, because the benefits of innovation networks have been identified so recently.

### Supporting innovation networks without creating dependence

When donors or governments have tried to use innovation networks to distribute resources, the number of formal groups in the networks has surged, but most were less innovative and had weaker internal cohesion than groups formed without the incentive. As a result, most disappeared when the public program ended, as with the Mexican livestock groups described previously. Subsidies to create innovation networks have had similar results; partners did not develop the social capital to keep the network alive once the subsidies ended (TN 1). Supporting networks that already exist or supporting innovation brokers that foster

the creation of social capital among partners are more sustainable alternatives.

### Incentives and structure for innovation networks

Innovation networks are made up of individuals, even if they represent an organization. Their contribution to the collective effort depends on the personal benefits they gain from participation, the incentives offered by their organizations, and their organizations' cultures. It is relatively common for projects in developing countries to start to build a network by signing memoranda of understanding between public and private organizations. The public organizations often have weak accountability and lack the incentives and culture to effectively induce their members to collaborate in external networks (Ekboir et al. 2009). Despite these misaligned incentives, many researchers have participated in innovation networks out of personal interest.

Governance and accountability mechanisms are essential for innovation networks to survive, because one of their major existential threats is opportunistic behavior by members. Governance and accountability mechanisms cannot be imposed, however. All members must see such mechanisms as reasonable and practical. They must be negotiated clearly and with care, with all involved.

Innovation networks should not be pushed to adopt a formal structure. Given the uncertain nature of innovation, formal contracts and intellectual property rights are seldom important for the development of innovations that are a little more complex than incremental improvements (Rycroft and Kash 1999).

## RECOMMENDATIONS FOR PRACTITIONERS

To support the emergence and consolidation of innovation networks, recognize their informal nature. *Avoid imposing formal organizational arrangements, and promote policies that*

- Provide incentives for innovation by creating market opportunities, helping to access crucial inputs (credit is a common need), and facilitating the flow of commercial and technical information.
- Create an environment conducive to innovation. Eliminate excessive bureaucratic requirements for business, develop basic infrastructure, and facilitate the formation of partnerships by, for example, training human resources, supporting exchange visits, holding meetings, and developing communications facilities and material.
- Strengthen analytical capacities in the public sector so that it can provide better support to innovation processes.

Consolidate the innovation capabilities of networks through policies that

- Support action-research projects and decentralized experimentation with centralized learning to identify new instruments to foster innovation networks and diffuse best practices.
- Support the construction of local and distant interactions. When distant ties are missing, create them by linking local networks to international sources of information and resources.
- Provide resources for participatory assessment of innovation capabilities.

Build capabilities of members of innovation networks by

- Providing resources to strengthen innovation capabilities in private firms and civil society organizations. For example, use consulting services, innovation brokers, innovation incubators, extension activities, technological interchanges, and seminars and workshops on the dynamics of innovation networks.
- Building the capacity of actors willing to be catalytic agents through courses and mentoring. These actors may be dedicated organizations that foster the exchange of ideas and shape the public debate on particular topics.
- Promoting a change of mentality, management (including incentives), and culture in public institutions, including research institutes, so that they are more willing to participate in innovation networks.