Chapter 2
Innovation by Networking and Systemic Innovation

Abstract The chapter explores innovation through the specific lens of systems and networking. It argues for the advantage of innovation coalitions to face the current socio-economical transformations, and presents two main perspectives to understanding networks for innovation: types of networks and strategies for working together. These are both relevant to nuancing a systemic approach to innovation shifting the attention from an internal process governed by a single unit to an external one governed by the interplay of differing actors, and to the approaches and tools useful to trigger this exchange.

2.1 Forms of Economic Exchange and Networked Firms

Currently, one of the most acclaimed perspectives on innovation elaborates on the idea that sophisticated coalition strategies going beyond simple partnerships or alliances are crucial for success and impact (Fagerberg 2005). This is a way to understand networked innovation, intended as the joint effort of different stakeholders that decide to share knowledge and resources to innovate together. On the one side this entails a different way of understanding firms and economic exchange, on the other it stresses the importance of strategies for working together, thus linking coalitions strategies to an emergent idea of systemic innovation that sees the current socio-economical environment in its highly interconnected nature: innovating successfully in such context can only be done by considering the entire system of interdependencies and interactions, while acting both on the overarching system and on its parts (Mulgan 2013).

Networked and systemic innovation is a manifold topic that could be approached from many viewpoints. One of these differentiates three forms of economic exchange to understand innovation processes via the underpinning organisational structures: market, hierarchies, and networks. Walter Powell was the first to propose this taxonomy in a very successful article entitled 'Neither market nor hierarchy: network forms of organization' (1990). Here the scholar examines

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networks both as a different way to understand economic exchange, and as a clearly identifiable subject for scientific inquiry. The neglect and confusion around this idea came from the way former scholars (e.g. Coase 1937; Williamson 1975, 1985) had intended firms up until the beginning of the Nineties. Firms were mainly defined by precise boundaries: outside were competitors, inside were managers trying to take the best decisions to improve economic performance and increase revenues. This tradition was shacked at the beginning of the new century, and reported by Powell as a misconception around the history of economic exchange. The author argues that the overarching interpretation of the market as the foundation of economic transactions is faulty, as this only emerged at the end of the eighteenth century. Before, the economy was based on barter or on exchange of symbolic goods (the early interpretation of money), while markets stood to signal specific places to trade such goods. Only at the end of the eighteenth century the word market is separated from the physical place to become a timeless phenomenon (Agnew 1986). Expanding on this, also firms with clear-cut boundaries are atypical in history:

> The history of modern commerce, whether told by Braudel, Polanyi, Pollard, or Wallerstein, is a story of family businesses, guilds, cartels, and extended trading companies—all enterprises with loose and highly permeable boundaries (Powell 1990: 298).

These types of firms have always derived their strengths from their social and economical links. Reciprocity and collaboration are two fundamental ingredients in their operations, delineating an organizational form driven by assets like trust and reputation that sit on the opposite scale to markets and hierarchies Fig. 2.1.

Markets are driven by personal interests, and are essentially impersonal. They offer incentives by addressing one's personal objectives, wider choice, flexibility, and opportunity, with the overarching value of money and price. They are not suited to learning and equality, because the idea of a perfect market free of prejudices, totally open to exchange, and based on trust hardly manifests. Hierarchies represent the attempt to enlarge the boundaries of a firm for internalizing more resources. Here managers and employees have precise roles and specialized

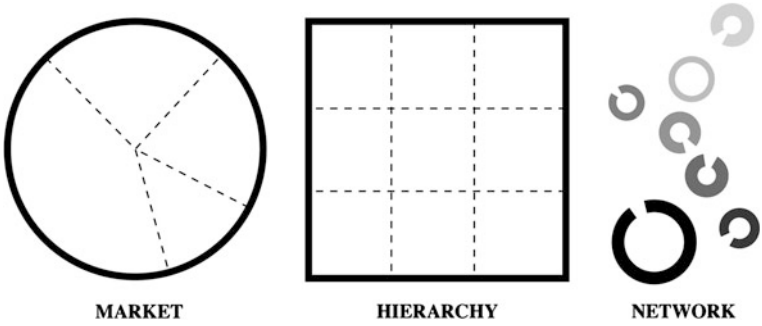


Fig. 2.1 Representation of organisational forms for economic exchange

tasks, making this configuration especially suited to mass production and distribution, and highly reliable for standard quality and industrial reproducibility. Nevertheless, hierarchies are not fit for facing sudden changes in a turbulent economical context, where demand is not standardized but rather fragmented. Networks are founded on relationships that, although more onerous to be created and maintained, allow for complementarity and subdivision of successes and risks. They are based on more intangible elements, such as reputation, friendship, interdependence, and trust, all necessary to achieve successful collaborations. Networks generate mainly qualitative benefits, such as know-how acquisition, absorptive capacity, innovative spirit and culture, in that they are particularly suited to triggering thicker knowledge exchange. Thus they describe an organisational form that is far more flexible and adaptable to turbulent contexts, similar to the symphonic orchestra model described by Drucker (1988) 20 years before. He had envisaged the firm as an ensemble based on shared knowledge and composed largely by specialists that negotiate constantly their performance by receiving and sending feedback to the other components of the same organism and to the audience outside. This is very much in line with Powell's argument, according to which firms cannot prosper only within their boundaries, but have to derive growth from the collaboration with internal and external parties.

2.2 At the Boundaries of Networked/Systemic Innovation

Beyond the difference between markets, hierarchies, and networks, the boundaries of networked innovation are pretty large, and require the brief exploration of few further issues to inform the argument.

Systemic innovation is deeply connected to mechanisms for knowledge generation, transfer, and exchange. Etienne Wenger proposes an interesting perspective in this area with the idea of Communities of Practice (Wenger 1999). This is a theory of learning in which groups are formed spontaneously to exchange tacit and explicit knowledge for mutual help. As wide idea to study learning in organisations, many other scholars have adopted it. Brown and Duguid (2001) for example argue for a situated approach, where communities of practice connect mechanisms for working and innovating. Tsoukas (1992) explains organizations as set of dynamic relationships, in line with Boland and Tenkasi (1995) who read organizations as open systems of knowledge, and Pentland (1995), that talks of a collection of overlapped knowledge systems.

Connected to knowledge exchange and learning in organisations is the idea of absorptive capacities describing the ability of a firm to exploit the results of innovation. Cohen and Levintal (1990) argue that this is based on recognizing the value to external information and assimilating it for commercial ends. This is the result of the cognitive basis as well as of the prior knowledge of the organisation, and it is different from the stock of capital proper of individual members.

Furthermore, Chesbrough (2003, 2006) connects knowledge circulation/exchange and innovation under the idea of open innovation, explaining that knowledge is most beneficial when exchanged and circulated between highly different social circles. The core of this concept pinpoints the necessity to open up the boundaries of firms especially for research and knowledge acquisition, in order to collect as much information as possible from the outside, thus providing a wider base for innovation development. To stress this further, a number of other scholars have argued for democratized innovation (Von Hippel 2005), mass innovation (Leadbeater 2007), the power of crowds (Surowiecki 2004), and other complementary concepts that establish in advanced users one of the most important sources of new ideas. This literature goes back to the eighteenth century with Allen's collective invention (1983) to identify innovation as an essentially systemic, dynamic, and networked process that requires flexibility in skills and learning. This is more likely to happen at the boundaries between mind-sets or at 'the edge of chaos', where creativity is maximised because of the unexpected mixes of diverse understandings, knowledge, personal history and ambitions that help avoid path dependency.

2.3 Strategies for Working Together and Taxonomy of Networks

In the previous paragraph the idea of networked firms and organizations has been explored through the organisational forms of economic exchange, and through the models for learning and exchanging knowledge. However systemic innovation is defined and happens also—and especially—thanks to the ability of working together, both exchanging resources/opportunities, and balancing power and influence. This idea is explored in this paragraph by describing different types of networks, the strategies useful to shape them for systemic change, and the mechanisms to trigger networks to work. To investigate the first point, different definitions of networks will be examined by describing three main types. Further four different strategies useful to classify systemic change will be mapped, as well as three different mechanisms to managing these strategies in a process of progressive learning and engagement for a common purpose.

The Oslo Manual (2005) recognizes three types of networks: (1) knowledge networks as facilitators of exchanges in technology and commercial information, (2) informal networks based on personal contacts and formed during the normal course of business, (3) formal or managed networks organized by business associations, research centres, universities, consultants, institutions with specific purposes. Moreover, it highlights the importance of innovation co-operations to allow companies' access to knowledge and technology they would not be able to use or have on their own. These co-operations are defined through active participation in joint innovation projects, and can take place in many different ways, for example

along supply chains to involve customers and suppliers in developing new products, processes, and services, in productive strategies to create local manufacturing systems, and in many other ways. This subject has been widely investigated, thus providing a wealth of interpretations and naming. For example Powell and Gordal (2005) talk of network of innovators, Miles and Snow (1986) argue for network organisations, Uzzi (1997) describes interfirm networks, Piore and Sabel (1984) identify flexible specialisations, Eccles (1981) talks of quasi-firms, Jones (1997) focus on network governance. The crucial point connecting all perspectives is the passion for the identification of strategies and configurations to work together that could be formal or informal, as long as well different from the bureaucratic structures of a big organisation and from the legal conventions of a market.

In this work networks are defined in line with Amartya Sen's definition of enabling platforms (Sen 2000), and are considered equivalent to a more generic system: enabling platforms are set of different resources at the disposal of people/organisations to help them achieve their goals; systems are mutually interacting set of elements (from objects to people, firms, places) that can be as different as the urban public transport system and the production system of a firm. In this book it is thus argued that **networks, broadly defined, are enabling platforms where members (or participants) share resources to support and influence each other, while mutually interacting to achieve a desired objective**. Depending on the type of network, this can be a personal achievement or a shared goal.

This definition is directly influenced by the broad sociological tradition that considers networks the funding structure of civilization (Park 1924; Simmel 1922), and that describes firms and organizations inevitably embedded in different kinds of social connections because part of the wider society. On this basis, the taxonomy of types of networks can be proposed that distinguishes structures through the nature of relationships.

Personal networks are formed out of direct personal relationships. They are often aimed at the exchange of confidential information with explorative objectives. Grandori and Soda (1995) argue that this type of information has hidden economic values, and that personal connections often tend to become more formal over time. Granovetter (1985) studies personal networks as the main source of collaboration for a firm, arguing that these create a pull of trusted contacts to choose from when needed. More in general, life is full of exemplar situations that help explain advantages and disadvantages of personal networks. A researcher for example needs good personal connections to organize a seminar or the partnership of a successful project proposal. Organising by using personal contacts is almost obvious in any field or job, as this allows direct access to reliable resources in shorter time.

Informal networks are horizontal or symmetrical configurations, where all members participate to an agreed activity for a common objective/belief, while sharing the same level of power and influence. This type of network is closer to the idea of community, in which individuals are grouped together to share practices, history, spaces, and traditions without holding any form of contract or written

agreement. One example of informal networks is Manzini's creative communities (2008), defined as radical innovations in a local system and resulting from the initiative of an individual, who is especially entrepreneurial and succeeds in re-organizing the existing state of things. Creative communities span from systems for sharing space and healthier food, to participative services for obtaining resources and fostering learning. A different example in the same category is Italian industrial districts that, according to Powell (1990) have represented a new form of collaboration at the beginning of the Twentieth century. This is an informal kind of network because it functions as a context, characterized by high density of knowledge producing places (firms and local institutions), and by as many channels to transfer the knowledge (Grandinetti 2005). The typical industrial district is based on trusted contacts and cultural affinities, friends and competitors at the same time, historical and productive traditions, all existing together in a limited geographical area.

Formal networks are asymmetrical or centralized configurations, where a central point exists around which all resources are organized. Here relationships are often regulated by written agreements that specify the nature and the requirements for the exchange, while power and influence are highly concentrated in the hands of few. Many different examples of networks may be entered in this category, from trade unions and territorial associations where high numbers of subjects are gathered under a similar umbrella with rare interchange of resources, to consortia representing the easiest legal form to acknowledge certain agglomerations (Table 2.1).

Table 2.1 Taxonomy of types of networks

	Types of network		
	Personal	Informal	Formal
Definition	Composed by direct personal contacts that participate mainly because of a trusted relationship	Horizontal or symmetrical configurations Members participate for a common objective, sharing the same level of power and influence	Asymmetrical or centralised configurations A central point exists around which all resources are organised
Characteristics of relationship	Direct personal contacts allowing direct access to resources in a short time	Members are grouped to share practices, history, spaces, and traditions with no written agreement	Relationships are regulated by written agreements that specify the nature and the requirements of the exchange
Resources involved	Confidential information is exchanged with explorative objectives and informal learning	Knowledge and skills are mainly exchanged in a space with high density of relationships and exchange channels	Members are gathered under a similar umbrella to exchange specialised services or resources

The taxonomy proposed helps describe the main characteristics of different types of network, thus focusing the most interesting elements for managing and triggering networked innovation. Broadly, this can be both incremental and radical, depending on the objectives of the subject that pursues the change. In the literature, this is also called transformational change and is divided into first-order and second-order (Watzlawick et al. 1974). In the first case, the description refers to adjustments in a given system; in the second case qualitative and more radical modifications are included. None of these is better than the other rather the best advantages for the given system are central. This transformation can be mapped through consideration of the two most important elements in networks that differently balanced can help recognise diverse strategies for systemic change: knowledge and power (or influence). Crossing these, four strategies for first and second order change emerge: emergent, control, distributed, and collaborative (Table 2.2).

Formal networks are especially suited to the top strategies in the diagram, as these entail a high concentration of power in the hands of few. Control is high thus allowing only for desired incremental adjustments, as few actors can trigger knowledge flows and power mechanisms. Usually these situations do not accept disruptive events, and are often destroyed by deeper systemic transformations, as single elements are not free to re-organise themselves. When the advantages of accepting the initial high control and power concentration decline, it is likely that the situation transforms so deeply to no longer be identifiable in the original configuration. Moreover, as part of strategies where power is highly concentrated, a single group, person, or organization holds the influence to trigger change, like in the case of multinationals, a nation state, or a university. More in detail, emergent strategies are comparable to the traditional diffusion of new technologies, when the power to do something is in the hands of few (both because of competencies and resources), and the knowledge on the full

Table 2.2 Strategies for systemic change (adapted from Mulgan 2013)

- POWER +		
	EMERGENT STRATEGIES First order change Richer in power than knowledge Triggered through formal networks	**CONTROL STRATEGIES** First order change High centralisation of both power and knowledge Triggered through formal networks
	DISTRIBUTED STRATEGIES Second order change No centralisation of power or knowledge Triggered through informal networks	**COLLABORATIVE STRATEGIES** Second order change Richer in knowledge than power Triggered through informal networks
	- KNOWLEDGE +	

possibilities of such technology is still to be explored. In this case innovation takes a longer time to happen, as knowledge needs time to evolve into learning and to find the right application and moment for wider diffusion. Control strategies are a version of this, where knowledge has been developed but not shared, like in the case of closed-off research labs in the old version of the big multinational. Both control and emergent strategies can be described as top-down strategies, where those detaining the power to influence society and the marketplace become the leaders and dictate the rules of the game.

Distributed and collaborative strategies are better pursued through informal networks, as they are not underpinned by concentration of power but rather influenced by the level of knowledge and the size of the pool of participants. In this case more disruptive events are possible, because resources are balanced between a broader range of actors. This means that the network is more capable of changing shape without loosing its identity. Re-organisation of resources is possible also relying on further links while serendipity is higher, and knowledge exchange is supported by the horizontal distribution of power. These strategies underpin mainly bottom-up change and innovations lead by culture and behaviour. For example, distributed strategies are largely rooted in the society and are the manifestation of public demand. In this case a phenomenon is made relevant not because of the emergent knowledge of the field, but because of the rapid diffusion and adoption by citizens. This is the case of 3D printers or online manufacturing platforms and services that, although still requiring exploration and comprehension are capturing the curiosity of the public and offering possibilities for the renovation of productive systems. Collaborative strategies are an evolution of this, where knowledge is evolved into learning, and systemic change is understood and sought through innovation coalitions. In this case, the elements of the system are apparent through their interactions and interconnectedness, and require more complex strategies for tackling change that cannot be carried out from one single actor independently. Collaborative strategies are more structured than distributed ones, because in the last anyone can take the lead and propose actions, as long as the majority of participants subscribe to it. Collaborative strategies are exemplified by firms looking for new allies to develop a new line of products or by an institution looking for the collaboration of citizens for regeneration, by communities reinventing old ways to do things or by cities reimagining their organizational system to be more sustainable. Collaborative strategies are useful to improve and regenerate something, to scope outer inspiration or to reinvent old behaviours.

Finally, three different mechanisms can be described for managing these strategies through processes of progressive learning and engagement in a common purpose. This generates further understanding around how diverse actors (people, companies, institutions) can create coalitions and alliances, while showing focal points/activities for triggering innovation through networking. Three governance strategies for working together are described: coordination, cooperation, and collaboration. Often these terms are confused and not properly differentiated, although understanding them is fundamental to pinpoint the characteristics of systemic innovation. However the differentiation proposed is not intended as a

scale for improvement, where the next strategy is better than the previous one. Each is appropriate to different objectives and in different contexts, and each is suited when a common purpose is shared, mechanisms for mutual learning are in place, and mutual accountability of results is clear.

Coordination is the basic act of organizing people and things to make them work together for a common goal. Normally this is intended as a managerial function aimed at interlinking activities and people properly. Coordination entails mainly exchange of information to alter activities in a way that is suitable to a goal, thus recognizing a common purpose and a mutual benefit. Finally, coordination implies changing the behaviour of each party involved, in order to work according to other parts.

Cooperation is not only about working together, but also about acting together in harmony toward a common higher end to which each participant dedicates his actions. The sum of all activities is far greater than the single ones, and is often achieved by components that—although appearing independent—work together creating a greater system with global properties. This is resembled in the cooperation of the inner workings in a human being, or by the socio-economical and productive elements of a nation. Cities can also be looked at as cooperating systems, where each independent individual or institution contributes to create a wider system that singles could not have achieved on their own. Cooperation is also usually intended as the opposite to competition, where single parts act to overcome one another, whether cooperation encompasses exchange of information, mutual alteration of activities, and resources sharing.

Collaboration goes beyond working and acting together, and means engaging and participating actively in a recursive process with a common aim. This is underpinned by a profound collective determination to reach something or to change a situation, and develops through sharing knowledge, exchanging skills, risks, and opportunities. Collaboration means to alter activities one another, as well as to empower members through capacities enhancement. This idea highlights the main difference with the other two strategies, and means that participants are deeply involved and ready to share and learn even by revolutionizing their initial status. Moreover, empowerment means taking active ownership of collective results, progressively moving away from a relationship of dependency (Table 2.3).

The exploration proposed underlines how to create and pursue a strategy for innovation it is no longer sufficient to position correctly the offer system of a firm. Rather it is necessary to deal with disaggregated matrices creating greater fluidity and flexibility in organizational forms: as Normann and Ramirez stated more than 10 years ago (1993), the organization is not pre-existing but it is the first objective of innovation strategies. In the current need for change to exit the crisis, firms and organizations at large need to become more creative, which in Poincaré's terms means learning to join pre-existing elements in new and relevant combinations. This means also reinventing their value through involving all interested actors for its

Table 2.3 Characteristics of governance strategies for working together

	Governance strategies for working together		
	Coordination	Cooperation	Collaboration
Definition	Organising to work together for a common goal	Acting together in harmony toward a common higher end	Engaging and empowering one another in a recursive process with common aims
Characteristics of relationships	A managerial function interlinks people and activities	Individual components work together in a greater system with global properties	Collective determination to reach something or change a situation propels sharing
Triggers for working together	Exchange of information, common purpose, and mutual Benefit	Exchange of information, alteration of activities, and Sharing of resources	Exchange of information, alteration of activities, sharing of resources, Empowerment of participants

co-production. In this view, a strategy for innovation consists also of re-organizing roles and relationships in a network through using the appropriate governance strategy for working together, adopting the best option for systemic change, and choosing the most relevant type of network.

> To put it another way, successful companies conceive of strategy as systematic social innovation: the continuous design and redesign of complex business systems (Normann and Ramirez 1993: 66).

2.4 Triggering Innovation Coalitions—by Design

The last paragraph in this chapter is dedicated to introducing the mechanisms useful to trigger strategies for working together and to stimulate virtuous cycles of systemic innovations. Here one of the main references is to knowledge exchange, as a basic component in any collaborative process capable of enhancing/using relationships as strategic asset. Many practical examples of toolkits are emerging that try to suggest simple tools and approaches through which companies and organisations can diagnose their state-of-the-art situation, and plan new development. For example, the Business Survival Toolkit (www.business-survival-toolkit.co.uk) demonstrates a series of tools businesses can use directly to plan, adapt and grow more flexibly. This is an effort aimed at creating a comprehensive approach, although the tools proposed appear as a collection of existing techniques adapted to a simpler language. Another example is Ketso (www.ketso.com) a hands-on kit for creative engagement aimed more directly at communities. This offers a structure to running workshops that wants to help institutions talk to the wider public, and leverage on people's ideas for improving and implementing

social solutions. IDEO has also developed a series of toolkits for creative engagement and knowledge exchange, from Method Cards that help inspire design (www.ideo.com/work/method-cards), to the richer 'Human-Centred Design Toolkit' (www.ideo.com/work/human-centered-design-toolkit) as a free innovation guide to inspire new design solutions in the developing world.

Besides the perspective of practitioners, less is being said from an academic point of view, where Cruickshank et al. (2012), and Mortati (2012, 2011) are pioneering the field through investigating the relevant literature and testing hands-on tools and techniques directly with businesses, and other social actors. This is producing processes, tools and approaches to help and stimulate the exchange of ideas, resources, and opinions between people, firms, and institutions while envisioning participative and collaborative systemic solutions. This experimentation is very promising in terms of stimulating social actors to look at their current situation differently, while introducing the importance of engaging with creativity to fully understand the potential and the opportunities lying behind a criticality.

In this context, design is a great candidate for triggering strategies to work together, as a planning and problem setting/solving activity capable of proposing the disruptive points of view that allow a system to evolve, or else to innovate. By using facilitation and visualization techniques, design can investigate differently everyday phenomena, and create scenarios of desirable futures and unexpected strategies. In 1987 Horst Rittel (Rittel 1987) had already stated that the knowledge useful in design covers almost every aspect of human life. He argued that the main intent of a designer is to intervene on the course of human actions through a plan, contrary to researchers in the sciences, where the aim is to manipulate nature through trial and error processes and achieve a generalized conclusion. Rittel asserts that design is *plan making* and *situation specific*. This is very appropriate to planning and implementing socially relevant networked innovation, as highly interactive and iterative processes needed to trigger learning mechanisms for transformation.

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