# The relationships between innovation and human and psychological capital in organizations: A review

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## ABSTRACT

The article by Geoff Mulgan (2007) entitled "Ready or not? Taking innovation in the public sector seriously" points out how it is difficult for public organizations to innovate. It also states that innovation in the public sector is more likely to happen if people with their ideas, skills and competences are taken into due account. Starting from these considerations, the paper provides an overview of the concept of innovation and its relationships with the concepts of human and (positive) psychological capital. Through literature related to business, management and applied and organizational psychology, the article starts by defining closed and open innovation, goes on to show the role that human and psychological capital can play in organizational innovation and concludes by reviewing the latest list of competences that research has identified as necessary in open innovation teams. This review will be useful to researchers and practitioners in their respective activities, including the public sector.

*Keywords*: Closed and open innovation; human capital; positive psychological capital

## Introduction

The paper starts from the article published by Geoff Mulgan (2007) entitled Ready or not? Taking innovation in the public sector seriously. It points out how it is difficult for public organizations to innovate, given their size and their lack of flexibility, and how open innovation in the public sector may be even harder to achieve than closed innovation. Innovation in the public sector is more likely to happen if people with their ideas, skills and competences are taken into due account. The paper provides an overview of the concept of innovation and its relationships with the concepts of human and (positive) psychological capital, with the hope that it will be useful to researchers and practitioners in their respective activities, including the public sector.

### The concept of innovation

According to the Oslo Manual published by OECD[1] (Organization for Economic Cooperation and Development) and Eurostat in 2005, innovation is the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

The OECD (2011) distinguishes four forms of innovation:
1. *Product innovation*, the introduction of a good or service that is new or significantly improved in terms of its characteristics or intended uses;
2. *Process innovation*, the introduction of new or significantly improved production or delivery methods;
3. *Marketing innovation*, the implementation of a new marketing method with changes in product design or packaging, product placement, product promotion or pricing;
4. *Organizational innovation*, the implementation of a new organizational method in the organization's business practices, workplace organization or external relations.

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[1] The OECD is composed of the following countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

As Glor (1997) states, many definitions of innovation are used, often leading to a lack of clarity about what public sector innovation means. According to Mulgan (2007), in the public sector innovation can mean new ways of organizing things (such as public private partnerships), new ways of rewarding people (such as performance-related pay) or new ways of communicating (such as ministerial blogs). Distinctions are sometimes made between policy innovations, service innovations and innovations in such fields as democracy (e-voting, citizens' juries) or international affairs (prepayments for new vaccines or the International Criminal Court). Quoting Zhuang (1995), Glor (1997) underlines that innovation can mean (1) Unique and new activities or ideas; (2) The people who innovate; (3) Improving existing processes; (4) The dissemination of new activities or ideas.

Van der Meer's (2007) synthesis suggests that innovation is the total set of activities leading to the introduction of something new resulting in strengthening the defendable competitive advantage of an organization, while the Oslo Manual specifies that innovation can be *new to the organization* (it may have already been implemented by other organizations, but it is new to one specific organization), *new to the market* (an organization is the first to introduce it in the market) and/or *new to the world* (an organization is the first to introduce it for all markets and organizations).

The simplest definition for the public sector is that innovation is about new ideas that work toward creating public value (Mulgan, 2007; Glor, 1997). The ideas have to be at least in part new (rather than improvements); they have to be taken up (rather than just being good ideas); and they have to be useful. By this definition, innovation overlaps with, but is different from, creativity and entrepreneurship, in that creativity is the tendency to generate or recognize ideas, alternatives, or possibilities that may be useful in solving problems, communicating with others, and entertaining ourselves and others, while entrepreneurship is the capacity and willingness to develop, organize and manage a business venture along with any of its risks in order to make a profit.

Finally, Wallin and von Krogh (2010) see innovation as a process that covers the creation of relevant knowledge for the development and introduction of something new and useful.

### *The concepts of human and psychological capital*

In organizations, innovation involves the collaboration of people and teams with different knowledge, experience and expertise (human and psychological capital). Kelley (2010) stresses that innovation is not realized by a single skilled worker, but can only be pursued in collaboration. In fact, innovation seems to be the outcome of three social activities described as follows (Kelley, 2010; Sloane, 2011):

1. *Social inputs* – At the beginning, organizations seek to identify key insights for innovation. Through such social research methods as focus groups and ethnographic studies or connections to other organizations and disciplines, they try to gather insights and be inspired.
2. *Social evolution* – Organizations adopt innovation teams, not sole inventors, to transform key insights and elaborate new solutions.
3. *Social execution* – It includes such social outputs as trials, beta programs and trade shows. It is critical for customer groups to be educated so that they can recognize their needs for innovation. Henry Ford summed up this problem with his famous quote "If I had asked people what they wanted, they would have said: faster horses."

The life cycle of innovation is an interactive process that starts with *exploration* and ends with *exploitation* (Ferrary, 2011). Exploration is the preliminary phase for knowledge generation; exploitation is when the knowledge that produces innovation is industrialized and commercialized. Exploration and exploitation phases are dependent on human and (positive) psychological capital.

According to the OECD (2011, p. 18), human capital is "the knowledge, skills, competences and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being." Positive psychological capital is defined as the positive and developmental state of an individual as characterized by high self-efficacy (Bandura, 1997), optimism, hope and resiliency (Luthans and Youssef, 2004; Luthans, Luthans and Luthans, 2004).

The skilled workforce is not the only key factor for innovation processes. Internet and related applications (e.g. social media) enable consumers to participate actively and organizations to understand people's needs and behaviors. *Pinterest* is an example of social network that allows millions of people to share their favorite images on different topics. Organizations can access collections and draw inspiration by a simple desk research. This kind of sites is much more inexpensive and gives access to a wider panel than a simple customer satisfaction questionnaire or a focus group, encourages people to participate and enables them to deliver their own ideas and solutions. As a *Lego* employee stated, "consumers of today are intelligent, they are creative and they have an opinion… and they expect you to listen" (http://www.15inno.com/2012/05/29/legoandopeninnovation/).

It is of a certain interest that the Internet and the World Wide Web, two of the most profound innovations of the last 50 years – still widespread, developed and largely used today – came out of public organizations: DARPA (Defense Advanced Research Projects Agency) and CERN (European Organization for the Nuclear Research). And this regardless of conventional wisdom according to which public organizations cannot innovate (Mulgan, 2007)

## Closed innovation

As described by Chesbrough (2003), organizations in the Twentieth Century thought that successful innovation required control. Therefore, they invested heavily in internal R&D (Research and Development), engaged the best and brightest people, enabled them to develop innovative ideas and breakthrough discoveries, and protected them with Intellectual Property Rights. The generated profit realized by more sales was reinvested into internal R&D, creating a virtual cycle of innovation with the following steps (from 1 to 4 and then again to 1):

1. Technology breakthroughs;
2. New products;
3. Increased sales and profits;
4. Increased investment in R&D.

These four steps represent the paradigm of the so-called *Closed Model of Innovation* or *Stage-Gate Model* (see for example Cooper and Kleinschmidt, 1986; Tidd, Bessant and Pavitt, 2005), based on the assumption that technology developed outside does not guarantee the same quality, availability and capabilities than technology invented by internal collaborators, although, through the comprehensive study of 252 new product histories at 123 firms, Cooper and Kleinschmidt (1986, p. 82) conclude that "there appears to be a strong link between project outcomes (success or failure) and doing certain activities [such as market studies, initial screening and preliminary market assessment] and doing them well."

Organizations that still adopt this model have solid boundaries: ideas are internally generated, evaluated and selected, and only potentially successful projects are further developed and taken to the market. There is no access for ideas from outside the organization, nor are there paths for products and services taken to the market.

This model has direct implications on the management of human resources and their expertise. For example, most people recruited into R&D departments are highly specialized scientists and engineers, which makes it difficult to retrain their skills when business conditions change.

Chesbrough (2003) identifies four factors that over the years have been eroding the closed innovation paradigm:

1. The increased availability and mobility of skilled workers;
2. The expansion of the venture capital from 1980 to 2000;
3. The fact that ideas that are not readily used can be lost;
4. The growing capability of external suppliers.

Lindegaard and Kawasaki (2010) put major emphasis on the emergence of knowledge management as a discipline. Over the last decades, the transparency of knowledge has created methods that allow organizations to better tap into the knowledge embedded in their employees and their experiences (human and psychological capital). Internet and networking tools make knowledge more accessible and transparent. Narula (2004) attributes the growth in collaborations with external partners to the increased knowledge content of products in general, and the cross-fertilization of previously distinct sectors.

## Open innovation

In 2003, Chesbrough defines open innovation as the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation.

In 2006, the same author adds that open innovation means that organizations should make much greater use of external ideas and technologies in their own business, while letting their unused ideas be used by other organizations. This requires each organization to open up its business model to let more external ideas and technologies flow in from the outside and let more internal knowledge flow to the outside.

In 2010, Lindegaard and Kawasaki state that open innovation is about bridging internal and external resources throughout the entire innovation process to make innovation happen. The real differentiator in the various forms of open innovation is the level of involvement from external partners, customers, or suppliers in the entire innovation process.

The *Open Innovation Model* considers external ideas as important as internal ideas. Open innovation is both a set of practices for profiting from innovation, and also a model for creating, interpreting and researching these practices (Chesbrough, Vanhaverbeke and West, 2006). West and Gallagher (2006) outline the open innovation process as systematic exploration of internal and external resources for innovation opportunities.

Open innovation enhances access to novel and heterogeneous knowledge belonging to customer needs, technical solutions and problem solving activities (see for example von Hippel, 1994). Access to external knowledge provides adaptation of products and services for customer needs and can reduce the development time. Lowering costs of innovation and commercial utilization of knowledge and technology that otherwise would remain unutilized are also possible. Other factors that attract organizations in adopting open innovation are the shared risks in product and service development and enhanced organization image and reputation (Wallin and Von Kroch, 2010).

Beyond the benefits, open innovation carries risks (Enkel, Gassmann and Chesbrough, 2009; Rahman and Ramos, 2010). The authors distinguish between external and internal barriers. External barriers include the categories supply, demand and environment, other than the loss of knowledge, higher coordination costs, loss of control and higher complexity. Internal barriers regard resources, organizational systems and culture/human factors, other than the difficulty in finding the right partner and the imbalance between open innovation activities and the daily business. Insufficient time and financial resources are also among the constraints companies face.

Maybe for these reasons, open innovation varies among organizations (Laursen and Salter, 2006; Lichtenthaler, 2011). Love, Roper and Vhater (2011) showed that the adoption of open innovation is subject to trial and error. Organizations have to learn which partnerships are most effective to foster the innovation process. By analyzing a panel of Irish manufacturing organizations, they found an inverted U-shape relationship between the extent of openness and organizations' innovation outputs (see Figure 1).

**Figure 1: Inverted U-shape relationship between the extent of openness and organizations' innovation outputs found by Love, Roper and Vhater (2011)**
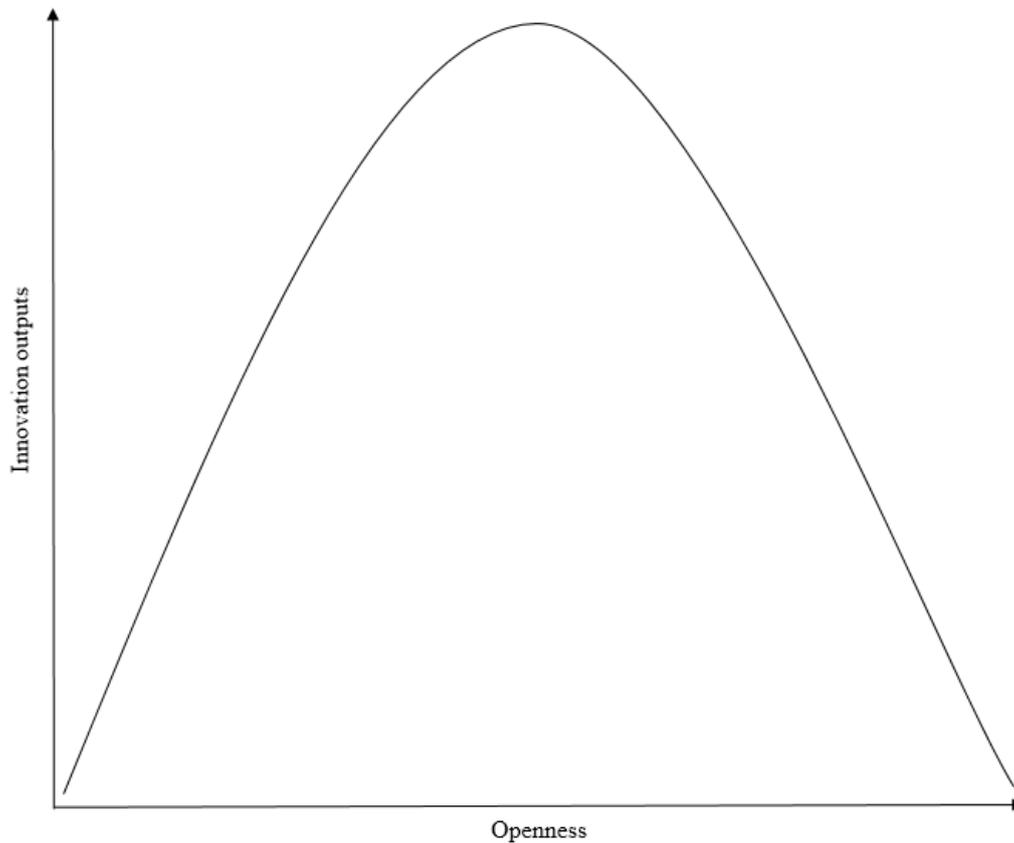


This means either that a narrower network with external partners would be more productive since it is easier to manage or that a wider network is actually productive only if the organization does have the necessary absorptive, inventive, transformative capacity to manage the knowledge coming from external sources, which is difficult to achieve (for a review on the difficulty for organizations to manage large amounts of knowledge and information, see Sartori and Ceschi, 2013).

According to Gassmann and Enkel (2004), the adoption of the open innovation paradigm requires three open innovation processes:

1. *The outside-in process* – Organizations acquire knowledge from outside by establishing collaborations with external partners, such as R&D centers, universities, suppliers and customers. Laursen and Salter (2006, p. 1204) define this process as "the number of different sources of external knowledge that each firm draws upon in its innovative activities."
2. *The inside-out process* – Organizations choose to provide internal knowledge to external actors rather than relying entirely on internal paths to market. This approach searches for organizations with business models that are better suited to commercialize a certain technology. Outsourcing ideas and knowledge means licensing or selling patents and/or technology to external partners. Beyond the economic benefit, both innovation seekers and innovation solvers gain access to new areas of knowledge (*complementary knowledge*).
3. *The coupled process* – It combines the outside-in process with the inside-out process. Since the involvement of external actors happens throughout collaborations, a successful cooperation requires a give-and-take of knowledge. This profound interaction between parties over a longer period of time results in an extensive exchange of knowledge and a process of mutual learning (Hamel, 1991; Lane and Lubatkin, 1998). The transactions can include monetary rewards as well as non-pecuniary exchanges (Dahlander and Gann, 2010). The benefits of cooperation are seen in an improvement of the competitive position and in a risk minimization, but not in a reduction of development time.

Mulgan (2007) sees an innovative public sector as having six elements.

1. *Leadership and culture*: political and official leaders can establish a culture in which innovation is seen as natural. In some cases the cultures then become embedded at least for a time. The Scandinavian governments, for example, have been successful innovators for several decades. In the US, studies of innovation at state level found that the three most consistently innovative states (California, Minnesota and Ohio) became more innovative over time, and the laggards more laggardly, suggesting that innovative cultures can be self-reinforcing (Savage, 1978).
2. *Pulls and pushes*: while leaders support the conditions for innovation, specific innovations start with pushes or pulls. The pushes may come from a political leadership that feels a need for new ideas. The need can come from crisis, financial necessity or technology. But, increasingly, the drive to innovate is coming as much from pulls as pushes. In public services that may be a need that is not being met, such as the need for care, jobs or housing.
3. *Creativity and recombination*: if pulls and pushes create the pressure, creativity widens the range of available options. As Mihaly Csikszentmihalyi (1990) suggested, creativity can come from the alignment of creative people, a discipline, a field of critics, and knowledgeable consumers. Some formal creativity methods, such as those developed by Edward de Bono (1970), can help bureaucracies to think laterally and to see new patterns.
4. *Prototypes and pilots*: innovation depends on creativity, but creativity is a necessary, not a sufficient, condition. The next stages of innovation require different structures and mental styles because few ideas emerge fully-formed. Instead they need to be tried out, tested and adjusted in the light of experience. Tinkering and trial and error contribute to all kinds of innovation. In the social sector this often happens through people trying out new ideas on a very small scale.
5. *Scaling and diffusion*: if the pilot or prototype broadly works, the challenge then is to launch the innovation on a larger scale. This is when selection has to be decisive. Governments have the power and the money to spread ideas, good and bad. They can command people to do things (for example telling all schools to teach the national curriculum) and they can provide generous incentives or use the stick of targets.
6. *Sophisticated risk management*: the final element of any innovation system is sophistication about risks. The most common justification for blocking innovation is that it is too risky. Even a small-scale pilot may be interpreted as a signal of where government wants to take policy. If it fails,

ministers will be called to account for wasted money. If lives are damaged, voters will be angry. So, any program of innovation has to be smart about risks and how they should be managed.

## From closed to open innovation

Closed innovation and open innovation are not binary in their application and research shows that there is not a single recipe in adopting open innovation (Chesbrough, 2003, 2006; Lichtenthaler, 2008, 2011; Narula, 2004). Majority of studies are exploratory case studies, so systematic research is needed to have a better understanding on how to implement open innovation (Huizingh, 2011). On the other hand, very few organizations have an innovation strategy (Lindegaard and Kawasaki, 2010), so the number and the extent to which the tools related to open innovations are implemented vary across organizations. Some of them are:

1. *Co-creation* – Organizations integrate customers in open innovation processes. The relationship can be established with some specific consumers that have been identified and contacted through communities. The co-creation process can also be mediated by online platforms thought to gather potential ideas from individuals (for example Atizo). Fiat allowed visitors to create their own Fiat 500 on the website and to play with colors and interior design.
2. *Voice of the customer (VOC)* – Similar to the previous one, VOC is a term used in business and Information Technology to describe the in-depth process of capturing a customer's expectations, preferences and aversions through both qualitative and quantitative research methods. Specifically, VOC is a market research technique that produces a detailed set of customer wants and needs, organized into a hierarchical structure, and then prioritized in terms of relative importance and satisfaction with current alternatives.
3. *User innovation* – Some of the organizations' costumers are lead users. They adjust and implement products because they are motivated to solve their own problems, to learn from others and to get recognition from peers (Wallin and von Krogh, 2010). In user innovation, customers might develop and implement products by themselves, without any request or help from organizations. An example is the Nokia case described by Wallin and van Krogh (2010).
4. *Crowd sourcing* – Similar to the previous tools, crowd sourcing is a community-based form of open innovation. It consists in submitting a list of problems or objectives faced by an organization to the public (consumers, customers, students, experts etc.). This open call can be launched with online tools, platforms, social media etc. This concept is based on the idea that collective intelligence exceeds the potential of a limited number of internal experts (Surowiecki, 2004). Wikipedia is one of the most explicit examples.
5. *Open source* – Open source is based on the assumption that everybody should have free access to the end product's source material and documentation. Open source software, developed through collaboration, is a perfect example of a fully open innovation approach.
6. *Community of practices* – It means people or professionals engaged in the same practice. They communicate regularly and are eager to improve and develop their competences, by continually sharing and comparing their best practices (Lave and Wenger, 1991).
7. *Coopetition* – It stands for *cooperative competition*. Competing organizations work together in areas of their business where they do not have a competitive advantage. This can provide such benefits as sharing of common costs and complementary resources or building joint technological standards (Alon and Chow, 2008). The partnership between Apple and Toshiba to develop new screen technologies is an example of *coopetition*.
8. *Cluster* – Cluster is a geographical initiative that brings together large organizations, SMEs (Small and Medium Enterprises), start-ups, research centers and policy makers of the same city or region in order to develop synergies and cooperation. Clusters are often representing a particular industry or sector. Due to the shared proximity – in terms of both geography and activities – clusters benefit from facilitated access to specialized human resources and suppliers, knowledge spillovers, and learning from the close interaction with customers and suppliers (Alon and Chow, 2008).

9. *Spin-off* – It refers to a new organization founded to exploit part of intellectual property or to develop innovations or products that are not completely in line with the core business of the mother organization. One of the most prominent examples related to open innovation is *Innocentive*, an online open innovation platform and a spin-off of Eli Lilly. The company searched for a new way of solving their problems by creating an online platform to connect to external partners in the chemical sector. This open innovation tool became a success and other companies wanted to benefit and adopt the platform. Today *Innocentive* is independent from Eli Lilly and one of the best-known open innovation marketplaces at global level (Lafley and Charan, 2008).

At the end of this list, it is important to distinguish the concept of open innovation from that of industrial espionage (or economic espionage or corporate espionage), which is an unethical form of getting ideas from others conducted for commercial purposes. Economic espionage is conducted or orchestrated by governments and is international in scope, while industrial or corporate espionage is more often national and occurs between companies or corporations.

## Human and psychological capital in open innovation

Although most of the consulting books underline the importance of people in the open innovation process, little research on the implications on human and psychological resources has been carried out. To aid with successful implementation of open innovation practices, it is crucial to understand better the conditions that allow a mutual working relationship between two or more parties.

In order to let the outside ideas reach the people best equipped to exploit them, Whelan, Parise, de Valk and Aalbers (2011) suggest that organizations nominate *idea scouts* and *idea connectors*. *Idea scouts* are the antennae of the R&D units and collect the signals on emerging scientific and technological developments that are broadcast from institutions around the world. *Idea connectors* have an extensive network together with the know-how needed to distribute the technological information. *Connectors* are the hub of the organization's social network and much of their expertise lies in knowing who is doing what. They have the ability to translate external information into a form understandable and relevant for internal colleagues, and are also able to convince other network members to take the needed actions.

This model of interaction between different key players fosters the implementation of an open innovation strategy, but research only studied big American enterprises, so it is not clear to which extent this approach can be applied to SMEs or the public sector.

Beyond appointing strategic job roles to single employees, several organizations are implementing open innovation processes through *open innovation teams*, which are formed by professionals coming from different organizations with the common aim to integrate knowledge in order to implement new products or services (Hafkesbrink and Schroll, 2010).

Research shows that the collaboration with external partners is challenging and difficulties should not be underestimated (du Chatenier, Verstegen, Biemans, Mulder and Omta, 2010). Studies on teams underline that "while working in teams can potentially create synergies so that the team produces an output which is better than could have achieved by any individual member working alone, teams can also produce outputs which are worse than could have been produced by the most competent team member" (Newell and Swan, 2000, p. 1291).

Some of the potential problems associated to teamwork include conformity and obedience (Asch, 1956; Milgram, 1965), groupthink (Janis, 1972) and group polarization (Isenberg, 1986), but open innovation teams face additional problems, such as finding external partners (Omta and van

Rossum, 1999). The selection of external collaborators requires an extensive assessment of partners characteristics and a strategic analysis of potentials and risks related to the collaboration. Once the collaboration is established, open innovation teams are confronted with such difficulties as overcoming cognitive distances (Cohen and Levinthal, 1990), the risk of uncontrolled disclosure or leakage of information due to the difficulty of balancing individual and alliance interests (Hamel, 1991), lack of trust (Doz and Hamel, 1998) and unequal power distribution (Falk and Falk, 1981). It is therefore crucial to understand the human and psychological factors that foster or hinder the collaborative knowledge creation. Not surprisingly, research shows that the way partners manage the collective learning process, communicate and collaborate plays a crucial role in the success of strategic collaborations for new products and services (Larsson, Bengtsson, Henriksson and Sparks, 1998).

To have a better understanding of the factors that influence the process of knowledge creation at team level, du Chatenier et al. (2010) carried out a literature research. Factors were identified and clustered using the categories of Mathieu et al. (2008) and labeled as *team emergent states* (group efficacy, social cohesion, learning climate, shared cognition), *team composition inputs* (team diversity, team stability, hierarchy, leadership, structural composition, functional composition, geographical proximity, learning history) and *team level inputs* (autonomy, resource availability, level of uncertainty, learning future).

Different models have been developed to represent the process of the collaborative knowledge creation: the *knowledge creation model* by Nonaka and Takeuchi (1995), the *information processing model* by Huber (1991), the *social learning cycle of the new knowledge flows* by Boisot (1986), the *3-T framework* by Carlile (2004), the *experiential learning cycle* by Kolb (1984) and others. Du Chatenier et al. (2010) analyzed all these models and found out the following four processes stages in common:

1. *Externalizing and sharing* – Professionals share their information, (implicit) knowledge and needs through verbal communication with other professionals. This communication takes place at group level and results in distributed knowledge among the participants.
2. *Interpreting and analyzing* – Professionals absorb, interpret and analyse the previous information by associating it to their own knowledge. This process happens at an individual level and the outcomes result in different interpretations representing the experience of the single person.
3. *Negotiating and revising* – At group level, professionals assemble and order these different interpretations. In this collective process, they gather shared knowledge, a common communication language, shared meanings and common understandings about ideas, roles, tasks and goals.
4. *Combining and creating* – At this stage, which can happen at both individual and group level, professionals combine different knowledge bases and create new ideas for innovation. They also define common goals and action plans to realize their ideas.

## Skills and competences needed to work in open innovation teams

Although literature underlines the crucial role of individuals in the open innovation process, research has not explored in an extensive way the human side of open innovation. Several consulting books describe the skills needed by open innovation teams, but their description is mainly based on their experience and not supported by research. Furthermore some authors refer to the concept of *skill* while others focus on the *competences* required for open innovation professionals.

Sloane (2011) divides into *hard skills* and *soft skills*. Hard skills refer to specific tasks and activities, such as developing a project, evaluating technology or overall project management. Soft skills are a combination of personal traits, attitudes and interpersonal abilities that are applied broadly

across open innovation tasks and activities. Du Chatenier et al. (2010) refer to the term of competence as human knowledge, attitudes and skills related to their work practice.

It is not clear which competences are crucial to make an open innovation team successful. The competences mentioned might not be unique to open innovation projects. More than their uniqueness it may be a matter of skill level on which the competence should be mastered. Competences relevant for open innovation professionals can be found also in closed innovation teams. Research does not show how required competences differ between open innovation settings and closed innovation contexts (du Chatenier et al., 2010). For example, being able to combine different point of views is also necessary in closed innovation teams, but the required mastery level of this competence in open innovation teams might be higher.

Some of the required characteristics for individuals working in open innovation teams are:

- An *entrepreneurial mindset* (Sloane, 2011, Lindegaard and Kawasaki, 2010);
- Strong *communication skills*, which combines listening and articulation skills (Shockley-Zalabak, 2008);
- *Ability to comprehend* complex technical requirements and articulate them in simple terms in relation to partners from other organizations (Kanter, 2006; Sloane, 2011);
- Skills for *relationship* building and maintenance in order to facilitate collaboration across various departments or external partners (Kanter, 2006; Sloane, 2011; Lindegaard and Kawasaki, 2010);
- *Curiosity*, as natural desire to learn new concepts and technologies, and to determine how they can fit together to meet or support strategic goals and objectives (Lindegaard and Kawasaki, 2010);
- *Holistic point of view*: the ability to decipher the internal political landscape that will impact the ability to move innovation forward (Ritter and Gemünden, 2003).

Lindegaard and Kawasaki (2010) underline the importance of involving individuals who are *innovation leaders* or *intrepreneurs* (with the 'i', not with the 'e'). These are people with the capability to focus on the strategic work of building the internal conditions required to develop organizational innovation capabilities and with the aim to drive open innovation projects despite the challenges they face, such as uncertainty, resource availability and difference in goals.

An extensive study has been conducted by du Chatenier et al. (2010) which tries to define the competences required for professionals working in open innovation teams. By combining literature on inter-organizational learning, (open) innovation management, business alliances and networks in organizational management and human resources studies, the competence profile has also been supported by an empirical survey. In interviews and focus groups, participants were asked to talk about critical incidents or challenging situations they experienced in open innovation contexts and to describe how they dealt with those critical incidents. The challenges and competences mentioned varied among the respondents. The interviews collected a great variety of answers with seemingly contradictory competence elements. This could be related to the fact that respondents participated in different open innovation teams, with differences in partnerships, collaboration methods and goals. Furthermore the variety of answers might be a result of the specific background and context of the interviewees. The result of the study is the list of competences reported in table 1, which also shows the relationships found between competences, contextual factors and team performance.

# Table 1: Competences for open innovation

| | |
|---|---|
| **Competences of extra importance in certain contexts** | |
| Project Management | **Involve**: Identifies human, material and experiential resources for accomplishing various kinds of learning objectives. Identifies situations for participative group problem solving, using the proper degree of participation, and recognizes obstacles and corrective actions. Knows who to inform and when.<br>**Influence**: Appropriately adapts, calibrates ones behavior to each situation in order to elicit particular responses from others. Uses influencing skills (as opposed to instructing): position, coalition, stimulation. Knows how to play the political game.<br>**Create learning climate**: Shares success, allows people to make mistakes. Is honest: possesses high levels of integrity, authenticity, sincerity and genuineness. Can be counted on to represent situations fairly. Develops, maintains and uses effective networks. Is approachable, develops friendships easily and strong beneficial alliances and coalitions. Develops a team spirit. Deals with unexpected situations, is flexible with plans, deadlines, improvises. Is not too systematic, rigid. Deals with a flexible team composition. |
| Both | **Prevail**: Has an overall picture of the project and influencing factor. Understands and manages complexity. Supports many things on his/her mind at the same time. Has self confidence. Is competent: able to perform the tasks required by his or her position. |
| Complex alliances | **Take on**: Is aware of, and regulates, own thinking and feeling. Manages tensions created by multiple accountabilities, tasks and roles. Has perseverance, keeps on thinking positively, having end-goal in mind. Is reliable: ensures that the others can depend upon him/her to come through for them, acts consistently, follows through. Is pro-active. Comes up with ideas him/herself and takes initiatives.<br>**Communicate clearly**: Creates a vision. Appreciates the learning domain and has the motivation to learn, has a sense of urgency. Is open: shares information freely with others, even when (s)he is not sure. Communicates clearly and understandably. Recognizes open and supportive communication methods. |
| **Competences related to team performance** | |
| Positively | **Monitor**: Coordinates and synchronizes activities, information, and tasks between team members. Designs a plan of strategies. Carries out the plan systematically and sequentially. Feels responsible for the team and acts as such. Monitors, evaluates, and provides feedback on overall team and individual performance. Accepts feedback about his/her performance non-defensively. Collects evidence of accomplishments. Asks many critical questions. Trusts the other party. |
| Negatively | **Compete**: Is critical but constructive. Is aware that (s)he represents an organization; refuses to accept less. |
| Positively or negatively | **Handle conflicts**: Openness: treats differences as important opportunities. Respects, values and appreciates people and their ideas. Possesses basic knowledge and perceptions of various technical/professional areas and business languages. Has experience working in partnerships. Is assertive, extroverted. Communicates own perceptions and feelings (in a diplomatic way). Is straightforward.<br>**Analyse**: Wants to learn from others. Understands social situations as well as interpersonal interactions. Is sensitive to the roles and responsibilities of all partners, aware of their collaborative motivations and expresses understanding and empathy. Has good reflective skills and applies techniques of lateral thinking or divergent thinking. |
| **Other relevant competences** | |
| Relevant for all open innovation professionals | **Decide mindfully**: Knows what his/her qualities are, does not take the position of the underdog. Possesses basic knowledge and perceptions. Establishes specific, challenging, accepted team goals. Diagnoses, formulates learning objectives in performance outcomes (but not too quickly). Is benevolent: has the best interests of others at heart.<br>**Explore**: Combines high advocacy (egocentrism) with high inquiry. Recognizes types and sources of conflict, encourages desirable conflict but discourages undesirable conflict. Picks up signals, sees opportunities, has intuition for innovation. Balances short- and long-term goals. Identifies problems. Discerns sub from main issues.<br>**Combine**: Employs integrative (win-win) negotiation strategies rather than distributive (win-lose) strategies. Brokers solutions or outcomes. Thinks in ways that differ from established lines of thought. Agrees to disagree (lose-lose strategy). Considers common goals mostly important. Adapts without violating own ideas. |

Collected from: du Chatenier et al, 2010: 278-279.

Open innovation professionals have to deal with the following main activities:

1. managing the overall innovation process;
2. managing the collaborative knowledge creation process;
3. dealing with the challenges caused by collaborations with external partners.

These activities are deeply interconnected with the process of collaborative knowledge creation explained before.

## Conclusion

Innovation requires ideas, ideas come from people and people can be described in terms of their human and psychological capital: knowledge, skills, competences (OECD, 2011), self-efficacy (Bandura, 1997), optimism, hope and resiliency (Luthans and Youssef, 2004; Luthans, Luthans and Luthans, 2004).

People involved in the innovation process should be both internal (for example the idea scouts and the idea connectors suggested by Whelan, Parise, de Valk and Aalbers, 2011) and external (costumers, users, consumers etc.) to the organization that wants to innovate.
As for open innovation in particular, organizations often make use of open innovation teams (Hafkesbrink and Schroll, 2010). Some of the required characteristics for individuals working in them include:

- An *entrepreneurial mindset* (Sloane, 2011, Lindegaard and Kawasaki, 2010);
- Strong *communication skills* (Shockley-Zalabak, 2008);
- *Ability to comprehend* complex technical requirements and articulate them in simple terms in relation to partners from other organizations (Kanter, 2006; Sloane, 2011);
- Skills for *relationship* building and maintenance in order to facilitate collaboration across various departments or external partners (Kanter, 2006; Sloane, 2011; Lindegaard and Kawasaki, 2010);
- *Curiosity*, as natural desire to learn new concepts and technologies, and to determine how they can fit together to meet or support strategic goals and objectives (Lindegaard and Kawasaki, 2010);
- *Holistic point of view*: the ability to decipher the internal political landscape that will impact the ability to move innovation forward (Ritter and Gemünden, 2003).

Some of the potential problems associated to teamwork include conformity and obedience (Asch, 1956; Milgram, 1965), groupthink (Janis, 1972) and group polarization (Isenberg, 1986), but open innovation teams face additional problems, such as finding external partners (Omta and van Rossum, 1999).

As for public organizations, they find it difficult to innovate given their size and their lack of flexibility. Open innovation in the public sector may be even harder to achieve than closed innovation (Mulgan, 2007). Innovation in the public sector is more likely to happen if people with their ideas, skills and competences are taken into due account.

As for the skills, Sloane (2011) divides into *hard skills* and *soft skills*. Hard skills refer to specific tasks and activities, such as developing a project, evaluating technology or overall project management. Soft skills are a combination of personal traits, attitudes and interpersonal abilities that are applied broadly across open innovation tasks and activities.

As for the competences, an extensive study has been conducted by du Chatenier et al. (2010) which tries to define the competences required for professionals working in open innovation teams.

The result of the study is the list of competences reported in table 1, which also shows the relationships found between competences, contextual factors and team performance, and thus the relationships between innovation and human and psychological capital, even in the public sector.

Basically, open innovation professionals have to deal with the following main activities:

1. managing the overall innovation process;
2. managing the collaborative knowledge creation process;
3. dealing with the challenges caused by collaborations with external partners.

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