Knowledge Management & E-Learning
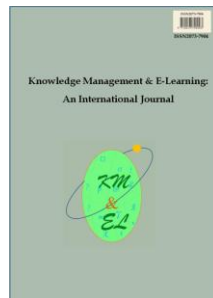
Leveraging teamwork by Google+ in a lifelong learning perspective

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Leveraging teamwork by Google+ in a lifelong learning perspective

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Abstract: The current affordances of ubiquitous global connections, of a large number of open resources, and of social and professional networks may boost innovation in open-minded organisations through their personnel's empowerment. Lifelong and ubiquitous learning, cloud computing and smart working frameworks are the pillars of the change that is replacing the traditional work model and transforming the way crowds of people communicate, collaborate, teamwork, produce value and growth for the entities of which they are part. All this directly involves the smart city concept. The "cloudworker" virtually works, learns and socially participates effectively from anywhere anytime, and comfortably interacts in a knowledge society built on networked ecologies. Cloud teamwork applications, such as Google+ can be, enable teams to be more productive and organisations to devote more time to their core mission. Social networking and collaboration technologies draw renewed attention on the evidence that organisations are social entities above all; as such, they can turn into whole systems of leadership and learning, that is high-performance work systems. This paper aims to evaluate the effectiveness of Google+ as a leveraging teamwork tool in learning organisations. Results show that technology is not only a means of social exchange, but it turns into the joint design of learning and organisational strategies, and into the growth of learning communities.

Keywords: Teamwork; Lifelong learning; Smart working; Organisational learning; Professional development

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1. Introduction

Collaboration and interdependence are key assets in current complex and multicultural society. The current affordances of ubiquitous global connections, of a large number of open resources, and of social and professional networks have contributed to device a model of increasingly more cooperative community. Information and communication technologies (ICT) have enabled evolution and innovation: more efficient, competitive and inclusive solutions are possible in order to provide continuous improvement and sustainable development.

Lifelong and ubiquitous learning, cloud computing and smart working paradigms are the pillars that are enhancing individuals' empowerment and the growth of the organisations of which they are part (Biancofiore & Leone, 2014). Adult lifelong learners in particular are the aware protagonists of this evolution, since they are proactive and self-regulated learners, characterized as demonstrating perseverance, initiative, and adaptive abilities (Leone, 2010).

In a lifelong learning vision, the combination of pervading technological progress and the focus on the individual human resource's potential needs to be harmonized and exploited. The paradigm change driven by cloud computing is replacing the traditional work model and transforming the way crowds of people communicate, collaborate, teamwork, produce value and growth for their entities. The "cloudworker", a prototypical information operative, (Venkatesh, 2008) virtually works, learns and socially participates effectively from anywhere, anytime; he/she comfortably interacts in a knowledge society built on networked ecologies (Leone & Guazzaroni, 2010).

Cloud teamwork applications, such as Google+ can be, enable teams to be more productive and organisations to devote more time to their core mission. In addition, teamworkers can expand their trustworthy professional network thanks to semantic vocabularies, optimise their knowledge management and sharing by exploiting folksonomies, share and keep updated any document, spreadsheet or presentation, and every co-user can make edits at the same time; they can store files, arrange and hold video chats, schedule meetings, and create and manage project sites with people from and outside their organisation, in the cloud.

These remarkable affordances require a smart working approach, that is the array of changes activated by greater flexibility blended with greater use of ICT. This combines flexible work options with changes to the way work is organized and delivered (Lake, 2013). Indeed, implementing smart working goes beyond a pervasive use of the latest technologies or the rethinking of working spaces. Adhering to a smart working vision implies calling into question the fundamentals of traditional organisations.

In the past organisations were centered on hierarchies, coordination, formalisation of roles and standardization of tasks and rules. Even the model of people's growth was based on the concepts of obedience and subordination. As organisations have evolved and have become more oriented on the development of knowledge and innovation, new models of work organization are critical. The new principles are collaboration and

communication, the capability of valuing talents and, thus, of promoting innovation (Corso, 2012). Innovation is a core business process. Success in innovation appears to depend upon the evolution of traditional organisations into high-performance work systems, which consist in the right combination of people, technology, and organisational structure that makes full use of the organization's resources and opportunities in achieving its goals (Noe, Hollenbeck, Gerhart, & Wright, 2013). While the components of high-performance work systems understandably vary, the one common feature is whole systems of leadership and learning (Towers Perrin, 2008). Organisms built on high-performance work systems principles invest heavily in skills development, and design work in a way that provides opportunity for skills to be practiced (McEwan, 2013). Personalisation becomes a crucial element, and the model of growth of individuals depends on their empowerment and on their capability of achieving results (Corso, 2012). At the same time, social networking and collaboration technologies draw renewed attention on the evidence that organisations are social entities above all, where leaders can make organisational learning (Argyris & Schön, 1996) happen by building teams that learn (Edmondson, 2012). This emphasises the need for the ability to learn. Since teaming will be more and more about learning, old patterns for what a team should be, how it should be organised and managed, will not work. The mindset of teaming is to be focused on how to get the job done with the team resources available, and this is a learning process (Schein, 2012).

This paper aims to evaluate the effectiveness of Google+ as a leveraging teamwork tool in learning organisations. The following research questions are tackled: how can Google+ leverage teamwork? What are the advantages and challenges of adopting Google+ for teamwork? How does Google+ produce organisational learning?

The first part of this work outlines the theoretical background to learning organisations and high-performance work systems, smart teamwork and informal networking for professional development. Subsequently, the core section illustrates Google+ features and potential for teamwork. Then, the authors' design-based research experiences are reported and outcomes are discussed.

2. High-performance work systems and staff's empowerment

Each person is individually important, but is also part of the same cog. This is general evidence when it is referred to society and everyday interactions, while it is a determinant in the vision of innovative, lifelong learning organisations. Senge's learning organisations are entities "…where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together." (Senge, 2009, p3). Key features of a learning organization are: continuous learning (each employee's and team's commitment to learn and apply the information to their decisions), knowledge sharing (shift from traditional training toward a broader focus on co-generating and sharing knowledge), critical, systematic thinking (employees are encouraged to see relationships among ideas and think in new ways), learning culture (learning is rewarded, promoted, and supported by managers and organizational objectives), valued employees (Noe, Hollenbeck, Gerhart, & Wright, 2013).

Undeniably, people are the key factors in a learning organization: they are committed to learning and willing to share their knowledge and skills, and the organization acknowledges their role in the production of value in terms of growth and innovation. Thus, managers take an active role in identifying training needs and

encouraging the sharing of ideas, and focus on ensuring the empowerment and well-being of each employee. Indeed, an expertise (Engeström, 1990) is based on full participation, on the one hand, and on freedom of action, on the other, which should inspire a competence-driven approach.

The concept of learning organisation is contained and expanded in that of high-performance work systems, since they have at their core a philosophy of whole workforce participation in innovation as everyone's business, customer-focus and connected, pervasive collaborative learning.

More in detail, in high-performance work systems people, technology, and organisational structure are combined in a smoothly functioning whole. In relation to people, providing employees with new skills and knowledge, designing work in a way that allows for skills to be practiced, offering incentives, favouring autonomy, and enhancing teamwork produces individuals' empowerment and job satisfaction. Rather, some organizations are moving beyond to foster employees' passion for their work, that is occupational intimacy (Boverie & Kroth, 2001).

As a result, Porter's (1985) value chain, in which human resources management and technological development are included among the secondary activities along the process of conversion of inputs into outputs, could be re-examined. High-performance work systems meet intermediate sequenced goals as innovation, high quality, ethical behaviour, customer satisfaction, job satisfaction, reduced absenteeism and turnover (Noe, Hollenbeck, Gerhart, & Wright, 2013), that directly impact on the organisation's global worth.

3. Smart teamwork

The skills that are increasingly in demand to be competitive in the 21st century are the ability to learn, the non-routine analytic (cognitive) skills and the non-routine interactive skills. The non-routine cognitive skills are flexibility, creativity, generalized problem-solving and complex communications. The non-routine interactive skills refer to emotional intelligence, that is individuals' ability to collaborate, work with others, inspire, be effective members of a group and society (Autor, Levy, & Murnane, 2003; Hopkins, 2003). Consequently, since complex is the competence for the multiplicity of its dimensions (Biancofiore & Leone, 2014), collaboration and interdependence, ubiquitous technologies, open resources and a growing acknowledgement of informal learning through social and professional networks have shaped new solutions.

Typically, the work that produces value for organisations is carried out by teams, and increasingly, by flexible team-like entities (Edmondson, 2012). A team is a small number of people with complementary skills who are committed to a common purpose, performing goals, and approaches, for which they hold themselves mutually accountable (Clutterbuck, 2007). Work teams are small groups of interdependent individuals who share responsibility for outcomes of their organization (Sundstrom, De Meuse, & Futrell, 1990).

Building effective teams requires top-level commitment and specific, clear, and agreed upon goals; trust and involvement; willingness to take risks and share information; and time, resources, and commitment to training (Klein, DiazGranados, Salas, Le, Burke, Lyons & Goodwin, 2009; Schuenemann, Bas, Gordon, & Workman, 2013). It is critical that managers spend quality time finding the right task for the right worker and matching responsibilities with appropriate work team (Schuenemann, Bas, Gordon, & Workman,

2013). Building on employees' strengths and managing their weaknesses allows managers to achieve high personnel performance (Buckingham & Clifton, 2001). Indeed, teams that are properly structured and managed can support innovative thinking. Nevertheless, increasingly, coordination and collaboration are occurring in temporary groups requiring teaming skills. Teaming is a dynamic process of coordination and mutual adjustment during episodes of interdependent work by which participants and entire organizations learn and innovate simultaneously. The teaming skill set involves awareness of interpersonal processes and dynamics that occur among people working together for shorter durations, skillful inquiry, and an ability to transfer knowledge and expertise to others (Edmondson, 2012).

Teamwork can suppress creativity and innovation in some cases: overbearing team leaders, the desire to conform in face-to-face relationships, free riding team members, the dominance by articulate extroverts of more creative introverts restrain a group's creativity. The kind of teamwork that often occurs in open systems on the Internet, instead, seems to favour the flow of synergies (Cain, 2012).

Definitely, the affordances of ubiquitous global connections and cloud computing are allowing for more flexible working patterns, new employment opportunities, enhanced productivity and individuals' continuous professional and personal development. Virtual workplaces are becoming growingly popular, also because global, lean and flexible organizations can leverage talented employees regardless of their geographic location, can quickly capitalize on shifts in the marketplace and deliver innovative solutions to their clients, and consider virtual teams as cost-effective and a way to help employees better communicate and manage their time (DeRosa & Lepsinger, 2010).

Although organisations may view technology as the foundation for virtual team effectiveness, a balance is necessary since interpersonal and collaborative processes and virtual team leaders are crucial for success. As a matter of fact, a recent study showed that companies with significant investments in technology and virtual teams were not performing to their full potential due to ineffective team leadership, lack of accountability among team members, lack of time to focus on the team, and lack of skill training.

To compensate for the lack of face-to-face contact, successful virtual teams emphasize the interpersonal dynamics of virtual collaboration and establish practices for building trust, increasing transparency, and enhancing interpersonal relationships. Paying attention to factors like communication and training, team composition, and team leadership directly impacts virtual team success (DeRosa & Lepsinger, 2010).

On these premises, by "smart teamwork" we intend the framework that exploits the requirements for successful virtual teams (DeRosa & Lepsinger, 2010), the teaming skill set (Edmondson, 2012), the smart working paradigm (Lake, 2013) and the affordances of cloud teamwork applications to support the cloud teamworker.

4. Informal networking for professional development

An organisation's innovative capability does not just depend on individuals' knowledge and potential, but specifically on their interdisciplinary and interactive thinking and action. The prerequisite for emerging innovation is embedded in social structures, as the synergy in the relationship of separate individuals (Bischoff, Vladova, & Jeschke, 2013).

Community and network are two facets of social structures in which learning occurs. The community relates to the construction of a shared identity around a topic or set of challenges. It expresses a collective, tacit and distributed intention to attend to a domain of knowledge and to support learning about it. The network consists in a set of interactions among participants who have personal reasons to connect. It provides a series of nodes and links that offer continuous occasions for learning (e.g., information flows, helpful linkages, joint problem solving, and knowledge creation).

Community and network often develop together. Social learning is enhanced by a dynamic interaction of both community and network processes. Such interplay combines focus and fluidity as it interlaces individual and collective learning. The work of nurturing learning needs to take advantage of this complementarity (Wenger, Trayner, & De Laat, 2011).

More in detail, the learning value of a community derives from the ability to develop a collective intention to advance learning in a domain. The learning value of a network derives from access to a rich web of information sources offering multiple perspectives and dialogues, responses to queries, and help from others. This potential for spontaneous connections and serendipity is a key aspect of the value of networks for learning (Wenger, Trayner, & De Laat, 2011).

Networked learning, variously underpinned by constructivism (Jonassen & Land, 2000), socio-constructivism (Brown, Collins, & Duguid, 1989) or connectivism (Siemens, 2004), is manifested in Personal Learning Environments (PLEs) (Leone, 2009; 2013) and exploits ICT to facilitate connections: between learners, learners and tutors, a learning community and its learning resources (Steeples & Jones, 2002). It is the fusion of these connections that provides the most powerful learning potential (Goodyear, 2005).

The learning that is made possible by social networking and collaboration technologies is active, process-based, experiential (Kolb, 1984), anchored in and driven by learners' interests, and therefore has the potential to cultivate self-regulated, independent learning. Definitely, lifelong learners are self-regulated learners that need personalized, participatory and social learning environments, and user-controlled professional growth.

To date, most of the actions of workplace training have been stereotyped and characterized by the inability to capture the skills developed during informal learning activities, the difficulty of reusing the knowledge that emerged during individual and collaborative work, and resistance to exploit effectively and efficiently the existing skills (De Laat & Schreurs, 2013; Mangione, Orciuoli, & Salerno, 2012). Consequently, workplace learning necessitates to be enriched with technology-enhanced solutions suitable to meet simultaneously the personnel's needs and learning styles and the organization's requirements, in order to maximise its ability to learn, innovate and evolve (Argyris & Schön, 1996), and thus to produce value.

Workplace learning is adult learning, organizational learning and knowledge management (Wang, Ran, Liao, & Yang, 2010). The theories related to adult learning emphasize personal reflection, problem orientation and knowledge construction by means of social processes (Granito, Mangione, Miranda, Orciuoli, & Ritrovato, 2014). Knowledge management focuses on approaches and practices exploited in order to identify, create, represent and distribute knowledge for reuse, awareness and learning (Nonaka & Takeuchi, 1995).

5. Google+: Features and potential for teamwork

Google+ is a Google Inc.'s social networking and identity service. It is a "social layer" that enhances many of Google's online properties, and it is not simply a social networking website, but also an authorship tool that associates web content directly with its owner/author (Google Inc., 2014). In this view, Google+ is a valuable tool for the characterisation of adult lifelong learners' PLEs (Leone, 2013).

Google launched the Google+ service as an invitation-only field test on June 28, 2011, for a few months. Currently, Google+ is the second largest social networking site in the world after Facebook, with 540 million monthly active users across Google's services and 300 million monthly active users in Google+ *Stream* (Google+ team, 2013).

Google+ is available as a website and on mobile devices. It offers a wide range of tools that can be enhanced by third party apps built using Google APIs. The following description aims to highlight Google+ core features that can be differently and flexibly combined to enhance teamwork.

In the "Stream" (*Home*) users can visualise updates from those in their *Circles* and post their own (texts, photos, links, videos or events) by an input box (Fig. 1). The *Stream* can be filtered to show only posts from specific *Circles*, domains and users.
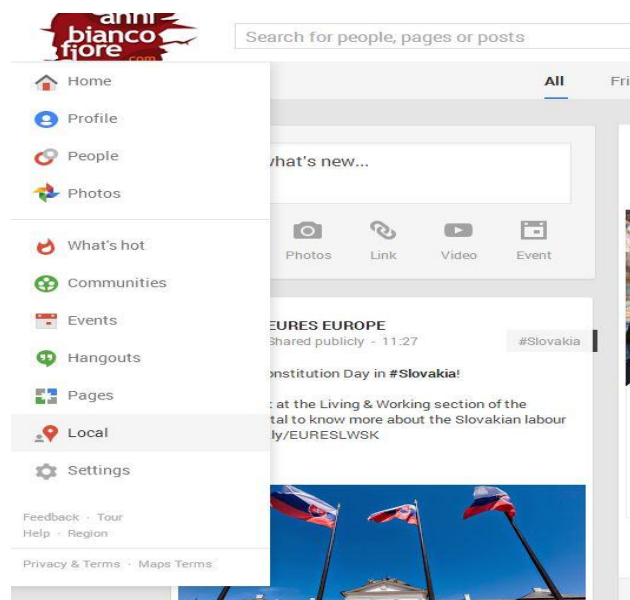

Fig. 1. The *Stream*

Circles are an essential feature of Google+. They enable a user to organize the contacts that are in his/her *People* area into groups for sharing across various Google products and services. A new circle can be created by clicking on *People/Your circles/+* (Fig. 2). Organization is done through a drag-and-drop interface. When a user adds people to a circle, they receive a notification, and this is the first step of the set-up of a virtual team. Subsequently, since in *Settings* users can tailor the visualisation of their *Profile* as they prefer (i.e., who can see what), the teamwork starts to shape. The *View profile as* drop-down menu allows users for an ongoing check of the desired settings of sharing. Indeed, a core element of Google+ is its privacy features, which have been

integrated deeply into the product; Google+ gives users extensive control over these features.

Fig. 2. *Circles*

Users can update their *Profile* through its sections *About, Posts, Photos, YouTube, +1's* and *Reviews* (Fig. 3).
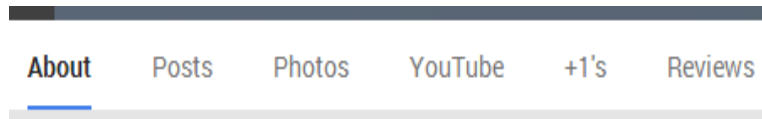

Fig. 3. Sections in *Profile*

What's Hot highlights featured topics, communities and people users might be interested in following and sharing in their *Stream*. Besides, a search box with hashtag is available for a more personalised exploration. *Communities* (Fig. 4) is dedicated to ongoing conversations about particular topics that users can join. More significantly for virtual teamwork, users can also create and manage a new community. In relation to virtual teamwork, *Circles* and *Communities* features could seem redundant. Actually, *Communities* can be exploited to acquire new domain expertise informally in the field of interest of the ongoing teamwork but out of the team. This will facilitate the flow of tacit knowledge into explicit knowledge (Nonaka & Takeuchi, 1995) and subsequently create value for the organisation as a whole.
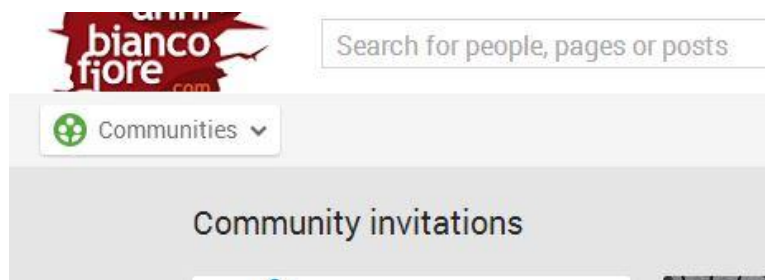

Fig. 4. The *Communities* feature

Events allows users to arrange (by its *Detail* and then *Say something* boxes), plan and share (e.g., by the *Event* button in the *Stream* or by a shared Google Calendar) all kinds of events. Once an event is created, it is directly integrated with Google Calendar and a hangout can be flagged as well.

Hangouts is a videoconferencing tool, for a maximum of 10 active participants and for an unlimited audience. A hangout can be private, by invite, or public (*Hangouts On Air*), which anyone on the web can join in. *Hangouts* can be started from the left menu of the user's Google+ account (from its relevant button or from *Events*) and from

Gmail. The hangout host can operate additional setting features (e.g., the host can silent participants' mics and regulate the bandwidth to optimise the hangout). Whereas private hangouts appear on the host's stream and can't be automatically recorded by Google, public hangouts appear on the host's stream, are automatically recorded (Fig. 5) and can be visualised on the host's YouTube channel.

During the hangout, users can share their screen, a video or a Google document, and collaborate in real time editing.
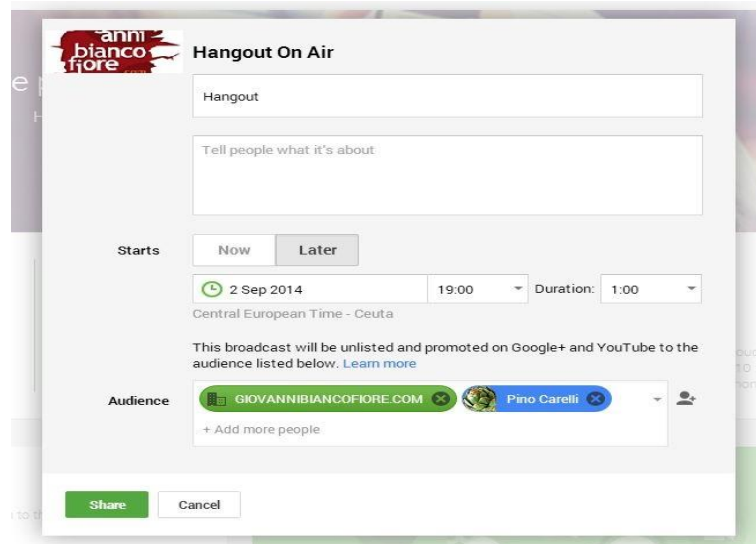

Fig. 5a. Example of a *Start a Hangout On Air* interface (first step)
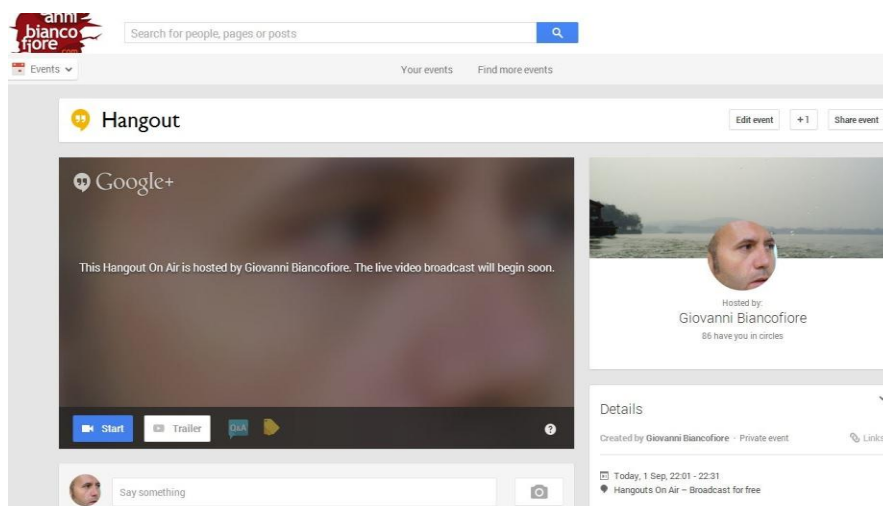

Fig. 5b. Example of a *Start a Hangout On Air* interface (second step)

The *+1* button lets users publicly recommend pages across the web, share with the right circles on Google+, help improve Google Search as well, since Google shows which pages a user's social connections have +1'd right beneath search results and ads.

Users can download a copy of the data in their Google+ account by the Google service *Takeout*.

The potential of Google+ is expanded when a Google Apps platform is implemented as well. Moreover, different versions of Google Apps are available for different kinds of organisations (Google Apps for Work, Google Apps for Non-profit and Google Apps for Education).

The following use case scenario illustrates a practical implementation of Google+ for cogent teamwork.

6.   Use case scenario

John is a mechanical engineer. He is the leader of one of the teams of an engineering firm located in Maastricht and the coordinator of two distance teams: team A (Phil, Sonia, Rachel, Mark and Judy, who deal with the graphic design and the implementation of the projects, and who are located in different European countries) and team B (Carla, Ruth and Francis, who are in charge of logistics and who are located in three different states in the USA).

John's manager entrusts him with the *Skybridge* project which involves the construction of a bridge in New Zealand, between Bell Island and Best Island.

Time constraints and information overload are difficult issues for John. He is a strongly motivated self-directed and lifelong learner. Anyhow, work overload does not leave him much time to update his skills and knowledge as he would like to, especially in this important occasion. Luckily, he is an experienced user of collaborative platforms, he has a deep knowledge of Google products and he is an expert user of Google+. He is confident that his informal professional network will provide him and his teams with useful hints to progress in case of difficulties.

Further, given the location of the *Skybridge* project and taking advantage of a corporate training course that his collaborators attended a few months ago about Google+, specifically focused on remote collaborative work, John decides to exploit this tool for this new challenging project.

John sends an email to the two groups introducing them the project and communicating that they will use their Google+ accounts to cooperate. He informs them of the creation of a Google Calendar called *Skybridge project* (Fig. 6) and that they will receive the corresponding join link. Then he invites them to synchronise their time zone settings and check their Google+ tools settings (e.g., privacy).

Fig. 6. *Skybridge project* Google Calendar

Subsequently, John creates two circles in the *People/Your circles* section of his Google+ account, *Skybridge Team A* (STA) and *Skybridge Team B* (STB), in order to

better interact separately on their respective relevant tasks. Then, with the tool *Communities* he creates the *Skybridge project community* to which he invites the two working groups and domain experts, for collective exchanges, discussion and support along the project. Next, in the *Events* section of his Google+ account John creates an event (Fig. 7) for the next afternoon with its *Hangout* link for the two groups together.
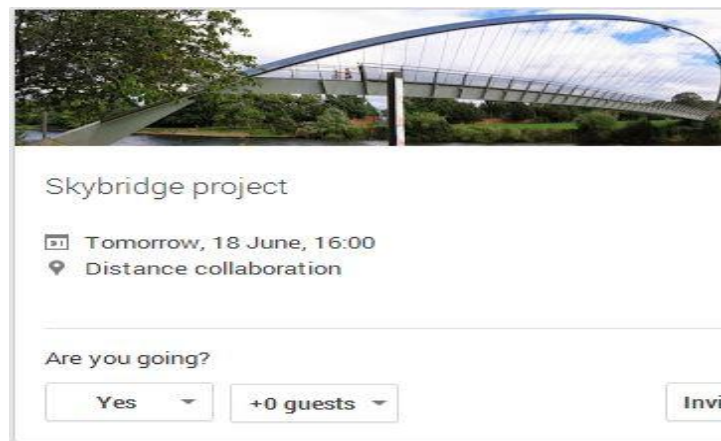

Fig. 7. Example of event in the *Skybridge project*

The next day during the hangout he shares a Google document that describes the project, he shares pictures by the Google+ *Photos* tool and he shares a map of the area, that he is visualising on his screen by Google Maps, by the Google+ *Desktop sharing* feature. He invites everyone to edit a draft in synchronous collaboration, to share ideas and sketches and to visually brainstorm by sharing a Google drawing.

In his Google+ *Profile* John starts to use his *Stream* to share links, photos and videos related to the project by adjusting the settings each time in order to make these materials visible to the *Circle* in charge, and so does each member of the teams.

The fellows of the two groups begin to collaborate, to schedule hangouts and share their video reports later in John's *Stream*. After a few days, each member of this cooperative project has met 10 new peers on average in Google+. He/she realises that, through his/her contacts in this social tool, he/she is already able to easily get to new resources and users related to mechanical engineering in the construction of big bridges.

At the end of the first week, John and his teams appreciate they have greatly enhanced the effectiveness and the quality of their teamwork by Google+ as a distance collaboration tool. In addition, they realise that Google+ is a valuable tool to characterise their PLEs and empower themselves by informal learning.

7.   Characteristics and outcomes of research experiences with Google+

Since the launch of Google+, the authors have conducted the following research experiences with 3 different clusters of professionals:

1. **Google+ in an integrated formal and informal eLearning environment for adult lifelong learners.** In October-November 2011 Google+ was used in its beta version within *SSW4LL2011* (*Social Semantic Web for Lifelong Learners*), an entirely online metacognitive learning experience on the characterisation of

the PLEs of ICT and eLearning professionals who were novice in social semantic web (33 participants, 4 weeks).

The SSW4LL learning format has been devised to support the characterisation of adult lifelong learners' PLEs and is conceived to empower adult lifelong learners by facilitating the acquisition of some of the skills necessary for the 21st century. The format offers an adaptive, modular, flexible and integrated architecture; the SSW4LL system is made up of components of formal (Moodle 2.0 with conditional activities as a suitable mechanism of learning adaptation) and informal learning environments (Semantic MediaWiki, Diigo and Google+).

The influence of the informal learning components of the SSW4LL system is strong: where social software gives users freedom to choose their own processes and supports the collaboration of adult lifelong learners anytime, anywhere, Semantic Web technology gives the possibility to structure information for easy retrieval, reuse, and exchange between different systems and tools (Leone, 2013; Leone, 2014).

2. **Google+ to leverage teachers' ubiquitous professional training and teamwork.** In May-June 2014 Google+ was adopted as a teamwork tool in the final phase of the *Eureka* project (2012-2014), a network of 11 schools (80 teachers) in Apulia, Italy, for the enhancement of curriculum continuity from middle into high school. Within the *Eureka* project, the *uProf!* model (Leone & Biancofiore, 2014) was implemented and successfully validated. The *uProf!* model has been devised for teachers' professional training in ubiquitous learning, in order to support them in acquiring the mind-set (beyond the skill-set) to successfully facilitate technology-enhanced learning. The *uProf!* model has been developed in the vision of lifelong learning and thus of the individuals' empowerment, that is the teachers' and subsequently their students' empowerment, by learner-centred environments characterised by a bottom-up approach, personalisation and adoption of new technologies as means of ri-mediation of networked knowledge (Leone & Guazzaroni, 2010).

A distributed community of practice (Wenger, McDermott, & Snyder, 2002) was activated, the *Comunità di Pratica Progetto Eureka*, in the eLearning space www.elearnigplace.it/corsi (Moodle). A large number of the tools available in Moodle have been used, together with Google Docs and SurveyMonkey (for entry and exit surveys).

Google+ was adopted when the participants were already familiar with the other tools.

3. **Google+ to leverage smart teamwork in business entities.** In August 2014 (4 weeks) Google+ was extensively used (mainly as outlined in the previous use case scenario) with 10 executives to develop and validate the smart teamwork framework. The team's task was metacognitive, that is participants had to share their real-world experience in teamwork, highlight strengths and weaknesses of their real-world teams against the smart teamwork framework, and draft improving initiatives. Half of the participants came from open-minded organisations, whereas the others were from traditional hierarchical entities. This choice aimed at observing more evidently the approach of both organisations on the use of Google+ as a cloud teamwork application, and vice versa its effect in terms of organisational learning.

This was the first phase of a broader ongoing research experience which is aimed at observing the impact of Google+, as an element of the smart teamwork framework, within the organisations engaged.

All the three research experiences were evaluated by entry (expectations) and exit (results) surveys to get how Google+ can leverage collaboration and teamwork, the advantages and challenges of adopting Google+ for teamwork and how Google+ produces organisational learning.

In the entry survey, as a whole learners' expressed their unfamiliarity with Google+, but a strong interest for informal and user-friendly tools as those present in Google+ are.

Relevant elements in relation to the expected empowerment of personnel were: flexibility and semantic features for the retrieval of relevant resources and trustful fellows; collaboration with other employees and teams to exchange and expand best practices; engagement of the organisation as a whole as stakeholder of change, through cultural, organisational, technological and knowledge management innovation.

The exit survey highlighted that tools participants used most for informal learning in Google+ were *Profile, Circles* and *Hangouts*. Participants were uncertain, instead, in using Google+ to search and create *Communities* for their interests.

Underused was Google+ to share others' posts and to 1+ interesting resources. In the participants' perception, Google+ allowed them to increase the number of their interesting, useful and trusted relations; 50% of them established from 6 to 10 new relations.

At the end of the experience most participants declared to be gratified because they learnt to do new things and a few declared to be frustrated because they couldn't exploit it at the best for time constraints. None declared to be deceived because the experience didn't meet her/his learning needs and expectations.

Finally, all of the participants would repeat this learning experience to have more time to learn, to deepen, to collaborate with other people, because "it was very interesting and innovative", "it was useful and I enjoyed it".

The outcomes of the representative cases of adoption of Google+ show that its use as a tool for effective smart teamwork does not pose any technological issues; rather, in all the analysed experiences it rationalizes processes and allows significant savings on IT and human resources spending.

The use case scenario for Google+ as a leveraging teamwork tool and the results of the research experiences of its implementation show that social networking and collaboration technology provides a collaborative context meant to make tacit knowledge emerge through action and applied learning (Nonaka & Takeuchi, 1995). The participants (lifelong learners) improve their competences in their domain by learning, solving, mentoring, and collaborating, producing tacit learning. The community and the network (Wenger, Trayner, & De Laat, 2011) that arise create knowledge by combining prior knowledge in new ways and on the basis of a cyclical process characterized by four stages: 1. socialization (individuals exchange tacit knowledge); 2. externalization (individuals link tacit knowledge to explicit knowledge); 3. combination (individuals unite explicit ideas to create knowledge); 4. internalization (individuals extract knowledge from newly created organizational tacit and explicit knowledge through learning by doing) (Nonaka & Takeuchi, 1995). This model sustains that tacit knowledge

is shared by the reiteration of the four-step process and it results in the shape of a "learning spiral".

The participants, through frequent and repeated interactions, generated an informal learning system to self-train and to validate its members' knowledge and competences, but much of their efforts and expertise are not fully recognized.

In this process an increasing flow of knowledge and skills empowers individuals, feeds innovation and enriches the organization with self-confidence, trust and vision for change.

In technological systems a change of direction of technology is evident: technology is not only a means of social exchange, but it turns into the joint design of learning and organizational strategies, and into the growth of learning communities. Disregarding bottom-up processes of change and improvement, as informal settings can generate, could be a dangerous trap for systems that have the ambition to be part of a knowledge society.

8. Conclusion

Contemporary complex and multicultural knowledge society calls for a diffusion of the culture of learning, indeed learning to learn, through organisations. Renewed attention is posed on a balanced combination of individuals' empowerment, their participation in networked ecologies and the exploitation of the affordances of ubiquitous technology and the Internet.

Collaboration and interdependence are key assets that can overcome the gulfs that have arisen between the culture of ICT that feed the egalitarianism and openness of the new generations and the traditional management culture of hierarchy and control.

Lifelong and ubiquitous learning, cloud computing and smart working frameworks are the pillars of the change that is replacing the traditional work model, particularly in smart cities. The "cloudworker" comfortably interacts in a knowledge society built on networked ecologies and is supported by cloud teamwork applications, such as Google+.

The challenge facing managers today is how to make their organizations into high-performance work systems. Leaders can make organisational learning happen by building teams that learn. The kind of teamwork that often occurs in open systems on the Internet seems to favour the flow of synergies. On these premises, the smart teamwork framework seems to suitably meet the change, and within it, Google+ as an effective teamwork tool. The participants to the research experiences with Google+, through frequent and repeated interactions, generated an informal learning system to self-train and to validate its members' knowledge and competences.

In this process an increasing flow of knowledge and skills empowers individuals, feeds innovation and enriches the organization with self-confidence, trust and vision for change.

The challenge for technological innovation stands in the cultural context in which it takes place.

In the near future, the results of the second phase of the research experience on Google+ adopted to leverage smart teamwork in business entities (described in section 7, point 3) will be analysed, and a comparative study will be conducted in some Italian

municipalities that have already adopted Google Apps, in order to observe the impact of Google+, as an element of the smart teamwork framework, within the organisations engaged.

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