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Wikibility
of
Innovation Oriented Workplaces

The CERN Case

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Abstract

The UGC (User Generated Content) revolution of Web 2.0 brought the application of this new paradigm into the enterprise and professional environment. This phenomenon is called Enterprise 2.0 and in these last years has drawn the attention of many experts in the fields of organization and knowledge management.

In this context, Wiki systems and other social networking applications represent an important shift on the way in which people work: at the opposite of other previous IT technologies in this field, the Enterprise 2.0 is not about simple devices of office automation, but requires (and brings to) a dramatic organizational culture shift. In particular Wiki offers new possibilities and opportunities in order to exploit in a more effective way the entire potential of the collaborative work coming from the active participation of all the individuals that are present in a workplace.

This dissertation wants to contribute to the current debate on the cultural shift that the introduction of this tool in a workplace is able to produce: we will see that, for a Wiki – or any Enterprise 2.0 tool – being effective it has to activate a virtuous circle able to create new knowledge.

The peculiarity of this work is that it focuses on this particular cultural aspect and aims to define the features of the ideal workplace that can optimize Wiki use in order to be innovation oriented and "hence" competitive.

Once identified these "cultural key drivers" and defined *Wikibility* as the cultural attitude of an environment able to make the Wiki use in a workplace effective, the further scope of this thesis is to measure the presence of this *Wikibility* mind-set and to propose a new tool (not yet validated). This sort of cockpit could be useful for the management that, interested to promote a better and true collaborative approach to work, want to be sure on the effective support in order to produce true innovation.

The definition of this tool and the importance of the eight cultural key drivers, found with a deductive method starting from theory – *quickness, flexibility, sharing, collaboration, social networking, peering, openness* and *trust* – are supported by an empirical experience at the CERN (*European Organization for Nuclear Research*) in Genève. In fact, in this social network of 10.000 members spread all over the world, the use of Wiki in order to collaborate is at a mature stage and CERN is, moreover, universally recognized as an innovative Organization – in 1989 the Web was invented here – where it was supposable to find an high level of *Wikibility*.

Even if not sufficient to validate any purposed theory or tool, the CERN case shows extremely positive evidences that the deductive insights here presented can be considered as a starting point towards further studies that can researching how to support a painless Enterprise 2.0 impact on the organizational culture of competitive (innovation oriented) workplaces.

Key Words: Wiki, Enterprise 2.0, Knowledge Management, Corporate Communication, Organizational Culture, Social Networks, Corporate, Collaboration, Workplaces, Wikibility, CERN, Web 2.0.

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1   Introduction

The basic idea of the Web is that an information space through which people can communicate, but communicate in a special way: communicate by sharing their knowledge in a pool. The idea was not just that it should be a big browsing medium. The idea was that everybody would be putting their ideas in, as well as taking them out. - **Tim Berners-Lee**[1]

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[1] Berners-Lee, 1999, http://www.w3.org/1999/04/13-tbl.html

1.1   Linking Web 2.0, Knowledge Management and Corporate Culture. The Topic

Something is changed. The Web is changed.

During the last five years - three in Europe - we have been witnessing of a quick revolution that at the beginning seemed to involve only the big public.

Social networking, instant messaging, sharing photos, broadcasting videos and writing encyclopaedic texts, is something that now is normal. But maybe we have to remember what Web was only six years ago and how an inappropriate use of this media brought to the sunset of what, for deduction, is now considered Web 1.0.

The Web 2.0, defined by O'Reilly as "a set of economic, social, and technology trends that collectively form the basis for the next generation of the internet – a more mature, distinctive medium characterized by user participation, openness and network effects"[2], is deeply closer to the original concept of Web that the Web father Tim Berners-Lee meant: "…everybody would be putting their ideas in, as well as taking them out".

So Web 2.0 is not so different from what Web 0.0 was. A networking tool that fosters collective intelligence (Klobas, 2006), a kind of *Wisdom of Crowds* (title of a book by James Surowiecki, originally published in 2004).

In this context, Wiki is the most representative tool that enables this *new* Web philosophy. This socio-economic *new* paradigm, so called *Wikinomics*.[3]

Today *Wikis, blogs, RSS feeds* and the new *mash-up platforms* based on *widgets* integration are some of the many application tools that enterprises have taken by Web 2.0 concept. For this reason gurus define what for analogy is Enterprise 2.0.

"An online platform with a constantly changing structure built by distributed, autonomous, largely self-interested peers. On this platform,

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[2] Musser, 2006, p.1

[3] Tapscot and Williams, 2007, p.2-3

authoring creates the content, links and tags knit it together, and search and (RSS) make the emergent structures and patterns in the content visible, and help people stay on top of it all." - **Andrew McAfee** [4]

In particular, Wiki – invented more than ten years ago by Ward Cunningham as the "Portland Pattern Repository" for a community of computer scientist in an IT context – is now used for many different scopes. Wikis are useful for resources development and collaborative creation in many disciplines and at different scales. In small group context they are used for sharing information (and knowledge) in specific projects. Inside organization is now integrated in the intra-extranet platform, following the principle of openness that forecasts the involvement of all stakeholders (suppliers, partners and customers) in the corporate process (Klobas, 2006).

Wiki, as a symbol of this User Generated Content (UGC) era, is the example of how IT tools are now really changed. They are not just office automation instruments, but are able to produce new business and organizational rules. New business models and new technology and collaborative models change business design and competitive dynamics. In this sense it is an Innovation process that exploits the connection between individuals and the social development. From this point of view, the mass is not just to be considered as a crowd or a collectivism results.

Some big names of the IT business like Bill Gates, defending his position, warn that, even if the "Collective Intelligence" exists, there may be a serious risk of "Collective Stupidity", and that this kind of "Collectivism" is a certain form of "Communism". This is not the case of what is happening. Corporations are in fact discovering the true dividends of collective capability and knowledge. This new way, the Wiki way, make visible and recognizable the individuals, optimizing their genius exchanges. (Tapscot and Williams 2007)

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[4] McAfee, 2006, definition of Enterprise 2.0

A real art and science of collaboration is now developing. The "Wikinomics" doctrine defines the topic not only as an organizational or operational point of view, but observing and analyzing the inevitable cultural change that it presupposes or that it will cause. Openness, peering, sharing and acting globally (Tapscot and Williams 2007) are now the four pillars on which this culture is built. The same values that in the last decade, due to the globalization phenomenon are leading to a new must: "harness the new collaboration or perish…"[5]

Mass projects, like Wikipedia, show how these values and their implications can work in a positive and innovative way: open-source, mass collaboration, peer production, low-cost collaborative infrastructures, the dramatic reduction of barriers for an active participation, need new insights, new ways to make things. The role of trust and transparency, the emergent effectiveness of horizontal organizational structure, the destruction of the once impregnable corporate towers of knowledge and a wide and strategic view, become the core of this cultural mission.

At the same time, Innovation is the most important challenge that enterprises have to confront. To reach the true competitive advantage differentiation is now crucial: being *different* is always possible following the two classical ways of cheapness and quality of goods. In the actual global scenario competing by remaining cheap is hard, is difficult to win *Cindia* low cost production. So it is relevant to point on quality and overall on new products. Innovation in products and in process of production, management and organization is the key. How argued by Heinrich von Pierer, President at Siemens AG, Innovation is actually the core of our economy.[6]

Fostering collaboration is a new way to create value and Innovation: this is now supported by three forces: technology, demographics and global economics.

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[5] Tapscot and Williams, 2007, p.12

[6] Getz and Robinson, 2005, p.3

"The new Web is about verbs, not nouns"[7]. Ross Mayfield, one of Wiki company CEO (Socialtext), explains in this words the real technological Innovation that UGC and the 2.0 trend bring in favor of collaboration, that combined with the generational change in action inside the management and the workforce of enterprise, the hiring of the Net Generation (N-Gen) manpower, is producing a positive conjuncture.

Web 2.0 enables a new way of working. Intranet is evolving: from a channel for content distribution (Mayfield's nouns) to a platform for activity: collaborating, publishing, sharing and innovating (verbs).[8]

Remembering that "technology is at best a tool and a facilitator of efficiency" but " the best technology in the world cannot fix the oh-so-very human issues that sometimes sabotage even the best teams"[9], it is possible to understand how the cultural aspects of the N-Gen and this generational clash are relevant. The pre N-Gen values talked about loyalty, seniority and authority. N-Gen believes are, instead, creativity, social networking, fun, freedom, speed, diversity in workplace.

In these words is not difficult to recognize the features of the Wiki way to collaboration. Collaboration among employees and collaboration across silos (boundaries) are at the base of Innovation production.

"Communicate, collaborate, coordinate and communicate some more"[10] is a mantra for successful virtual teams, but the common denominator of all this phases is the Knowledge. Created and exchanged. Knowledge Management is the discipline that can exploit at best this kind of social and digital revolution: knowledge management systems, knowledge bases or simple repositories are now integrated into tools, like Wiki, used for every day activities.

Indeed, the accessibility of Wiki as collaborative platform, permits an holistic approach to the process: principles are defined by business people and not

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[7] Tapscot and Williams, 2007, p.46

[8] Gilroy and Ives, 2006

[9] Brown, Huttner and James-Tanny, 2007, p.6

[10] Brown, Huttner and James-Tanny, 2007, p.23

by technologists, business units are now viewed as networked services, function, modular, flexible organizational structure.

Instead of old hierarchical and full of bureaucracy organizational structure, the new way to Innovation pass through agility, creativity and connectivity (Tapscot and Williams 2007). In other words a democratization process is starting and smart companies are understanding that Innovation often begins at the fringes.

The manager role is changing: technology like Wikis are transforming them in team leader, acting as facilitator with function of connecting people[11]. The manager is now a kind of coach that guarantees the essential components to collaborate in virtual workgroup: objective sharing, knowledge of what to do, equipments, ability and desire to do it[12].

Using Wiki requires participation or at least *representative democracy*[13], a bottom-up process that marks the failure of top-down knowledge flow. This self-organization system, where there is an integration of new information and new experience (knowledge), is the natural field in which creativity grows (De Bono, 1992) and develops producing Innovation.

The topic of this work is focused on the intranet (and in some cases also in the extranet) use of the Wiki technology, studying the implication of this use on the new knowledge management approach to the corporate culture and the benefits that is generate in terms of *return on Innovation* for the organization.

In this work I will not explain what Wikis are. There are many technical books and handbooks responding to all the issues that came up: how to start a new one, how they work or how to co-write. In this dissertation, I will assume that the reader knows the difference between Wiki and Wikipedia even if the only Wiki visited before is Wikipedia.

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[11] Brown, Huttner and James-Tanny, 2007, p.10

[12] Schafer, 2000

[13] Davenport, 2005, p.59

1.2   Corporate Wiki and Innovation. Research Questions

Wiki in the workplace is the state of the art for 33% of US enterprises responding to the *McKinsey's global Web 2.0 survey*[14] presented on March 2007. For this successful adoption rate, if considered the short period of enterprise life of Wiki, it is interesting to investigate on the effectiveness of this 2.0 tool in order to produce a true competitive advantage, that, as we have seen, is identifiable with the Innovation rate generated.

The main research question springs by crossing features and consequences, observable and perceived, of the use of Wiki in the workplace and the innovation enablers.

In particular the main question is:

– *Which are the **cultural key drivers** that make an innovation oriented organization a* ***"wikible" workplace*** *or* – in other words – *a workplace where Wiki really works in an effective way?*

And then the sub-question:

– *How **to audit this Wikibility** in an innovation oriented workplaces?*

After the theoretical part of this work we will identify common elements that are indispensable for a true and effective use of Wiki in order to be innovation oriented. These elements are strictly correlated with the changes that the introduction of Wiki brings in the way to "how things are done" and "how knowledge is shared", in other words, to *organizational culture.*[15]

The research question, then, consists in verifying the presence of these cultural insights in an organizational environment – where Wiki is already used and where innovation is a natural vocation and not only a strategic objective – in order to furnish a valid support to the work of corporate Wiki sponsors.

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[14] McKinsey, 2007

[15] Hatch, 1997, pp.200-240

1.3   The Methodology

The theoretical part of this dissertation intends to explore potentials of Wiki effects on workplace and – from the other side – the workplace enablers of innovation. In this way we will define the cultural aspects that concerning what we will define as workplace *Wikibility*, further proposing, a practical measurement auditing tool that can be useful to a correct approach to Wiki technology and – generally speaking – to Enterprise 2.0.

In order to obtain an acceptable degree of generalization, considering the objective boundaries of this work, the empirical part of this dissertation consists of an emblematic case, that investigates on cultural elements supporting an effective use of Wiki and thus the *Wikibility* of this workplace.

The innovative organization chosen is the *European Organization for Nuclear Research*, better known as CERN, located in Genève, the "world's largest particle physics centre".[16]

The CERN has been using Wiki in an extensive way since 2002 and each CERN sub-group has a Wiki space. The fast growth it is promoted in an active way inside the whole community. Further, CERN is an excellence place for innovation and is important for the web history: here in 1989, the already quoted CERN scientist Tim Berners-Lee (see p.1) invented the World Wide Web. Nowadays, the WWW (or simply the Web) has expanded – and is then converging as we have seen – from its original scientific environment and has millions of academic, commercial and private users[17].

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[16] http://public.web.cern.ch/Public/Content/Chapters/AboutCERN/AboutCERN-en.html

[17] http://public.web.cern.ch/Public/Content/Chapters/AboutCERN/Achievements/...

After a short Wiki description and an introduction about how the CERN works, this research paper consists in interviews aiming to investigate the effective presence of elements found in the theoretical part of the work. In this sense, the questions are about each one of these elements and in particular about the knowledge management practices and the organizational culture.

1.4   Studying the Connections between Intranet Wiki and Innovation. The Structure

The main research question is focused on two elements: *Wiki* and *Innovation*. In this sense, the empirical research that I propose is based on the idea that, once the Wiki has been introduced - for operative job, work organization, communication between employees, knowledge management and collaboration - the Innovation rate (long term objective) may be influenced in an effective way provided that there are also present the right organizational cultural conditions.

Once defined the two extremes of the construct, *Wiki* and *Innovation*, the common field on which the *potential* of Wiki meets the *enablers* of Innovation will be identified.

Figure 1 – Scheme of research structure
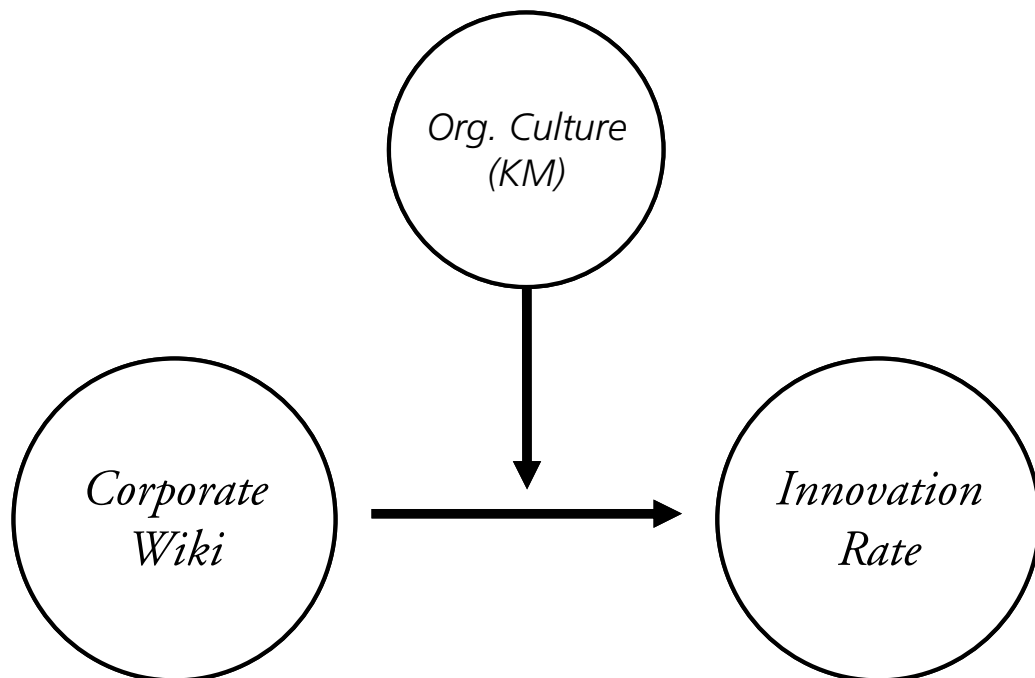
Potentials and Enablers both in the case of IT integration and of Innovation birth, need that environmental and cultural conditions support this process. Knowledge, strictly linked to Innovation, and how this knowledge is exploited and shared among the organization, are intrinsic elements of this process.

In the first part of this work, the theoretical one, we will discuss the key points of Wiki and Innovation, and then define a sort of checklist of the cultural insights that make this process effective, and proposing an auditing tool for measuring the Wiki's influence in a real and daily context. In the empirical research will be studied a successful case of organizational Wiki (CERN), in order to check if the theoretical part – and the derived intuitions – are verifiable in the practice.

1.5   Innovating the Way to Innovate[18]. The Scope

"Wikinomics" is changing the way to intend the relationship between technology and social progress[19]. We are living in a period where old IT devices are now integrated with the human capital and with the relational approach of Web.

Corporate Wiki and more generally the Enterprise 2.0 phenomenon are very current issues. For many analysts[20] the 2006-2007 was the biennium of the Wiki boom as blogging was the one of last years. This event is interpreted in two opposite ways by two of the maximum Harvard's gurus.

> *"The absence of participative technologies in the past is not the only reason that organizations and expertise are hierarchical. Enterprise 2.0 software and the Internet won't make organizational hierarchy and politics go away. They won't make the ideas of the front-line worker in corporations as influential as those of the CEO. Most of the barriers that prevent knowledge from flowing freely in organizations – power differentials, lack of trust, missing incentives, unsupportive cultures, and the general busyness of employees today – won't be addressed or substantially changed by technology alone. For a set of technologies to bring about such changes, they would have to be truly magical, and Enterprise 2.0 tools fall short of magic."* – **Tom Davenport**[21]

This is what professor Davenport wrote in response to a blog dispute with the colleague professor McAfee, that in a following blog post shares the Davenport insights, specifying that the importance of the management role. But, instead of Davenport issue minimization, McAfee asserts that the Enterprise 2.0 is something really innovative and totally different from the previous IT solutions.

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[18] Thomson, 2002

[19] Ebersbach et al., 2005

[20] Hinchcliffe, 2006, http://blogs.zdnet.com/Hinchcliffe/?p=76

[21] Davenport, 2007, http://discussionleader.hbsp.com/davenport/..

> *"My enthusiasm about Enterprise 2.0, even after acknowledging Tom's points, stems from three sources. First is the fact that, as discussed above, its component technologies are both novel and very valuable. Second is a feeling that there are actually a lot of managers who want to make concrete this fuzzy notion of empowerment, and to get out of the way enough to let their teams do all the work they're capable of. These managers want to address the dysfunctions that Tom articulates so well, and they'll seize on any tools that help them do so. Third is a belief in the power of competition. If Enterprise 2.0 technologies and mindsets do in fact help some companies get ahead by creating and disseminating more knowledge, innovating more, reacting faster, etc. then interest will grow, and so might new approaches".-* **Andrew McAfee**[22]

The Davenport-McAfee considerations and the other debates[23] regarded the effectiveness of investment in new IT technologies, for example the *new* SOA (Service Oriented Architecture) or the ERP (Enterprise Resource Planning).

Observing this kind of enthusiasm is not difficult to understand the importance of these topics for a strategic organization management and for enterprises that are changing their way of thinking in order to be competitive with Innovation.

The scope of this dissertation is to bring the philosophical implication of Wiki business use on a practical level, observing the results and the benefits of Wiki adoption in organizations, in order to understand why this *idea* is more than an innovative IT device and how it can be effective end favoured if supported by an appropriate organizational culture.

An useful tool for corporate communication experts – and more in general for how promotes corporate Wiki – is the ambitious challenge that this thesis wants to suggest to researchers willing to explore in this direction.

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[22] McAfee, 2007, http://blog.hbs.edu/faculty/amcafee/..

[23] Retting, 2007, http://sloanreview.mit.edu/smr/issue/2007/fall/01/

2   Wiki and Innovation. Key Concepts

In this part we will go deep in to the topic. Before we are going to explain Wiki potential in a workplace. We will see Wiki's features and critical aspect of the tools (2.1). Then we will focus on the philosophy behind this new kind of collaborative tool: what new kind of approach is required for this new way to work and which are the benefits in social terms for the organization (2.2).

Then we will consider how wiki is used in a professional context, describing the applications of the innovative IT tool (2.3).

From the other side, we will try to define the Innovation enablers in a competitive organization (2.4).

We will conclude this theoretical part of this work with the conclusion that Wiki is a valid tool, but is only an instrument, used in a particular context. For this reason we concluding focusing our attention on observed Wiki potentials and defined Innovations enablers (2.5) in order to proceed with the our study on the cultural aspect of an effective Wiki use.

2.1   The New IT System: Features and Critics

Wiki is a *social software*. A *social software* is an enabler of social interaction, collaboration and information sharing, promoting the growth of communities as users groups.

The wide range of *social software* includes many objects that can be used for this scope. For this reason, a Second Life's island has the same possibility to be tagged as *social software* as well as the "C/C" function on a simple e-mail manager software[24].

May be it is simpler to explain *what wiki is not*.

Wiki is not a forum. Both are structured around topics but forums, follow a chronologically reference. *Wiki is not a collaborative platform or a groupware*: wiki is not pre-structured[25].

At the same time Wiki has some features in common with other UGC application: the interactions between users of the weblogs and the *folksonomy*, user-tagging practice typical of social bookmarking.[26]

2.1.1   Wiki features

The main feature of wiki is explained by the word "wiki" that means "quick" in Hawaiian language. Editing something and sharing the results on the web is simple, easy and quick. In order to clarify in what wiki publishing is

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[24] Klobas, 2006, p. 1

[25] Klobas, 2006, pp.6-7

[26] Gilroy and Ives, 2006

different from a classical webpage creation we will quote a synoptic table of comparison (Klobas, J. 2006).

Table 1 – As Quick as a Wiki: Comparison of steps needed for the creation of wiki page and web pages. (Klobas, J. 2006)

	Wiki Page	Web Page
1	Go to the page on web browser	Search your Web editor preferred (Dreamweaver, Frontpage…)
2	Click on Edit	Open locally the web page (off-line)
3	Make changes in page	Open the source file
4	Save the page	Make modifications
5		Save the file
6		Transfer the file on the web-server (FTP)
7		Open the browser
8		Check the edited page on the browser

The other features that make the difference between Wiki's innovation and simples content management systems are:[27]

> *Pages are accessible by a standard web browser: this guarantees* a maximum of participation and the possibility to collaborate everywhere and with every system;

> *Easiness of writing:* editing pages is simple like writing using a common word processor software. The WYSIWYG is guarantee for users that don't know or don't want to use the mark-up language.

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[27] Klobas, 2006, pp.7-10

> *Easiness of linking:* internal or external links can be made simply, it permits authors to create a structure from a personal point of view.

> *Real time updating:* the technical time of publishing (table 2.0) is reduced to a simple passage Edit > Save.
> The authors can manage personally the publishing phase and can immediately correct errors or mistakes.

> *Collective editing*: remains the base concepts of Wiki revolution. One common document or collection of documents can be created or edited by many authors.

> *History and tracking:* is always possible to revert to a previous version and find the authors of each one. This represent a marginal guarantee on work quality.

> *Visualization of latest version:* is useful to compare near versions of the same documents and to highlight differences.

> *Changes notifications:* using the RSS (Really Simple Syndication) feed is possible to be updated on what happens on the Wiki and which kind of activities users do.

> *Search and navigation:* is simple to find information and topics published by other users.

> *Simple permission structure:* there are only three levels of users: the readers, the editors and the administrators.

For these particular reasons, Wiki is a powerful tool able to assist collaboration in virtual team. The team can focus and optimize efforts of all the components contributing and commenting simultaneously what others done.

Indeed it is also proved a dramatic cutback of e-mail production[28] reducing the confusion and the dispersion of information due to the rising use, and abuse, of this now common media.

The use of Wiki into organization integrates many of different IT devices: beside e-mail, message board, intranet, blog can be simply developed using a Wiki platform. With Wiki is possible to implement a project planning, manage schedules and deadlines, to-do lists and to support the creative work of employees, is also a useful tool for asynchronous brainstorming[29] practice.

2.1.2   Critical Points

Wiki's critics are often linked with the major example of Wiki public application: Wikipedia.

The fact that the biggest encyclopaedia on line is the best known user generated example of social participation, make it sensible to charge *lack of authoritativeness* and *control* [30] but in closed environment like corporation or an organization, where members are identifiable and who participate is motivated by professional aims these critics not represent crucial or particular issues.

The implication of having no structure, or that information seems not to be so good structured, is a consequence of "collective writing". At the same time, the messy appearance is caused by the "work-in-progress" permanent state.

In a collaborative platform like Wiki, it is important to remember and to be aware that Wiki is the mirror of values, perspectives, fears and opinion of the community, and that this will create an unique voice that seems to cancel fragmentation of opinion or individual point of view.

The adoption of Wiki in a workgroup, as we will see later, needs a preliminary cultural approach. The easiness with which others can *spoil* "my

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[28] Brown, Huttner and James-Tanny, 2007, p.116

[29] Brown, M.K., Huttner, B. and James-Tanny, 2007, p.80

[30] The Wikipedia vs. Enciclopædia Britannica dispute (Nature, December 2005) proved that these critics are not completely true.

document" has to be change in the opportunity offers by the possibility that others are able to *improve* "our document". Naturally this is valid for rough and unofficial working documents. The key word is "trust" and we will see further that it is also a key driver of innovative places.

The intellectual property issue is the last tricky point: with collective property, who is responsible if somebody uses contents under copyright? This is a real problem in publics web Wikis, that new type of licence (GNU or Common Creative Licence) are trying to solve. For an intranet use the problem is to be considerate as marginal.

At this point we can certainly argue that *Wiki is easiness*. As we have seen and as a smart video on YouTube[31] explains, Wiki is the integration of three simple functions: *Edit*, *Save* and *Link*.

This supports what Davenport wrote on 2005[32]: easy technology and methodology are the optimal starting point to improve knowledge worker performance.

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[31] Le Fever, 2007, http://www.commoncraft.com/video-wikis-plain-english or http://www.youtube.com/watch?v=-dnL00TdmLY

[32] Davenport, 2005, p.92

2.2   Behind the Technology. The Wiki philosophy

More than a social software, Wiki is not only a technology, but the combination of a place, information and experience, community and philosophy. Wiki is a space where sharing ideas, where people collaborate to social creation of knowledge. This resource of information and knowledge exists and works supported by a kind of ideal philosophy: the wisdom of many is better than one's thought (Klobas, 2006).

Wiki is a social knowledge space that needs common defined topics, rules and norms: in other words, it is a community enabler. But not only. It is a space for ideas that enables culture and sub-culture within organization: sense of stability, continuity, social norms and common identity are benefits that increase the commitment creating a positive and fertile soil.[33]

There is a strong relationship between Wiki as *technical innovation* and the *social progress* that it produces: users, goals and dependence between users define whether the technological tool is used in a emancipated way or not.[34]

Here it is argued how far Wiki and good human capital are two symbiotic elements: if both work, the whole process will be positive influenced in a virtuous manner. In this way Wiki support the teamwork and the collaboration within workplace. Indeed it is demonstrated that communities are effective and self-organized group can react – and then perform – better and faster (Ebersbach et al, 2005).

2.2.1   Cooperation and Collaboration

To better understand the practical effects of Wiki use into a workplace and how it is different by other IT system and other workgroup platform, it is useful

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[33] De Graff and Lawrence, 2002, p.160

[34] Ebersbach et al., 2005, p.21

to define the difference between "cooperation" (old logic) and "collaboration" (supported by Wiki). *Cooperation is when* "the results of independent subtasks are merged to create a final delivery". *Collaboration requires* "teamwork for each subtask as members work toward a common goal".[35]

The collaborative approach is a real "teamwork" that can rise the potential of each team member knowledge, stimulating the creation of something new, the making of new knowledge. It is a more deep concept about "to do something with others", considering this the creation of something new and not the mere collection of individual knowledge, is self-evident truth that the *collaboration* is a innovation process.

In *Wikonomics*, Tapscot and Williams define four principles that support Wiki-culture: *openness, peering, sharing* and *acting globally.*[36]

Openness is strictly linked with *transparency*, come from the observation of what is actually happening: "employees have previously unthinkable knowledge about their firm's strategy, management and challenges" and that "employees of open enterprises have higher trust among each other and with the firm, resulting in lower costs, better innovation, and loyalty"[37].

Trust is the key word of *openness.*

Peering derives from the experience matured by big *open source* projects like Linux or Apache. Peer production communities are different motivated by traditional hierarchical structure: fun, altruism, achieving something that is of direct value to them, make theirs members and all the work produced by the group effective.[38]

Sharing is the practice that promotes and supports the win-win logic as an opportunity for all the stakeholder: share tools, share ideas, share knowledge.[39]

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[35] Brown, Huttner and James-Tanny, 2007, p. 231

[36] Tapscot and Williams, 2007, pp.20-30

[37] Tapscot and Williams, 2007, p.22

[38] Tapscot and Williams, 2007, pp.23-25

[39] Tapscot and Williams, 2007, p.25

Think globally, *act globally* is the new insight in opposition of the previous mantra "think global, act local". In this context it means that the approach has to be global and that thinking a strategy at an international level is also right management across cultures, disciplines and organizational boundaries.

This is an invite to change and to lift-up the point of view in order to obtain an overview of the management texture.[40] Employees too are developing cross-functional teams that interact as a global real-time workforce.

2.2.2   A New Economy of Work

The result of the introduction of Wiki within workplace are deep and observable on long-term period: the preview principles change culture, structure and process, in other words, the economics of work.

Hierarchical workplaces with their rigid relationships are substituted by self organization, with their distributed and collaborative culture supported by a flexible human capital network.

Xerox is an example of how openness and trust brings benefits to R&D staff: more contents and shared knowledge increased efficiency in the innovation process in a easy way.[41]

The "Wikinomics" expert Tantek Çelik (Technorati) analyzing the corporate Wiki use attributes to Wiki the distribution of the weight of the collaborative network of the organization, stressing on the reached independence of individual worker. Further Çelik adds an insight: "the ability to use wikis will be a required job skill in five years".

In order to accept this new way to think the work dynamics and the new relationship system, needs a new generation of worker: "Gen-X" lived the telephone to e-mail passage, now the Net Generation or "N-Gen" is the actor and the first sponsor of this new mentality.

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[40] Tapscot and Williams, 2007, p.29

[41] Tapscot and Williams, 2007, p.254

N-Gen collects all the people birth between the 1977 and the 1997 and assume the web and the web 2.0 as a birthright. The revolution, as shown by a New Paradigm research,[42] is a phenomenon that interest in particular the way in which organizations intent the "employee development model" once based on the sequence *recruit > train > retain* now changed in *initiate > develop > evolve.* In accordance with this human resources evolution what one time was *employees* now are considered *relationship*.

Net Generation has a radically different philosophy of work: the High-Tech adoption is only a way to achieve creativity, social connectivity, fun and diversity. N-Gen will transform and accelerate the current process or transformation of workplaces and the new way to do business.

Older generation of workers could be sceptical on the point of self-organization: the objection more frequent stresses on the fact that no hierarchy could be dangerous and lead to disorganization, confusion and lack of focus and direction. But the answer is that clear goals, structures, discipline and leadership remain important: "the difference today is that these qualities can emerge organically as employees seize the new tools to collaborate across departmental and organizational boundaries. […] The results are often better when self-organization takes precedence" (Eric Schmidt - Google CEO).

The workplace design philosophy is changing. The practice of force employees into a rigid work-flow structure using tools that stifle their creativity into complex processes and architectures is now clashing with the flexibility professes by new Wiki philosophy like a kind of *Wikibility*: "the structure is created by demanding active involvement from users in ways of organizing and creating their own information architecture" (Ross Mayfield – Socialtext CEO & Co-founder).[43]

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[42] NewParadigm, 2007, http://204.15.36.164/default.asp?action=article&ID=74

[43] Tapscot and Williams, 2007, p.255

2.2.3   Starfish and Spider. The Organizational Structure

Self organization is about knowledge, workplaces, processes and personal applications. This will mark the end of routine activities for knowledge worker that are free to dedicate efforts to manage exceptions on processes.

Starfish and *spider* are the metaphor that Brafman and Beckstorm[44] propose to explain the advantages of a decentralized organization (*starfish*) in comparison with an organization that a central leadership based structured (the *spider*). Following this theory there are ten rules making *starfish* organization work: 1. point on *diseconomies of scale*, as the *long tail* phenomenon teaches; 2. foster on the *network effect*, promoting *social networking values*; 3. accept the *chaos* and exploit its power in order to be *creative and innovative*; 4. spread *knowledge at the edge*, being conscious that *the best knowledge is at the fringe*; 5. exploit the *desire to participate, everyone wants to contribute*; 6. *attack the organization is dangerous*, all the authors of this episodes *will be remembered as a threat*; 7. substitute the leader role with the charismatic figure called "*catalyst*" a kind of sparkling personality that lights *employees enthusiasm for the work activities*; 8. agree *values with organization*, in order to stress corporate identity and make *ideology the organization fuel*; 9. *measure, monitor and manage*, checking the *direction of the organization*; 10. *flat or be flattened*, in order to survive, companies and institutions must take the *hybrid approach*.

2.2.4   *Soft-security* and *Large Group Dynamics*

Focusing on Wiki, in accordance with *soft-security* theorists[45] there are six assumptions or principles to consider: 1. *Assume good faith*. People are almost always trying to be helpful; to apply the principle of first trust, confident that

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[44] Brafman and Beckstorm, 2006

[45] Meatball, 2006 http://www.usemod.com/cgi-bin/mb.pl?SoftSecurity

occasional bad will be overwhelmed by the good; 2. *Peer review*. Your peers can ensure that you don't damage the system; 3. *Forgive and forget*. Even well-intentioned people make mistakes. They don't need to be permanent; 4. *Limit damage*. When unpreventable mistakes are made, keep the damage within tolerable limits; 5. *Fair process*. theory that being transparent and giving everyone a voice are essential management skills; 6. *Non violence*. Do no violence lest violence seek you.

Soft-security points on social forces to maintain order proposing this model as a winner model against the *hard-security* model that traditionally supports the rigid order: this model results however unable to recognize simple errors and recognize these from attack or threat.[46]

At this point a question is allowed: if there are so many difference with the traditional way to work it is much simpler and more economic to maintain the status quo? Why Wiki, instead, works?

Wiki works following the *large group dynamics*. Playful creation, flat hierarchies, intellectual challenge, simple rules and norms systems, open access (transparency and incentives), diversity of the participants' experiences, extreme flexibility and self-determined work (following individual strategies, focal points and roles) are the incentives that makes of Wiki a successful IT technology that, as we will se in the next section, is already used in different ways and in different workplaces.[47]

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[46] Klobas, 2006, pp.11

[47] Ebersbach et al., 2005, p. 22.

2.3   Applications and Effects of Wiki in Workplace.
The Knowledge Management and Cultural Shifting

Table 2 – Tools matrix (Brown et al. 2007)

	Collaborative Software	Meeting and Communication	Information Broadcasting	Information Sharing	Information Gathering	Wikis	RSS Feeds and "Push" Technologies
Chat (type) with one or more people in real time	X	X	X				
Talk (chat application or VoIP) with one or more people in real time		X	X				
Run an application on someone else's system		X	X	X			
Share thoughts, opinions, decisions, and more	X		X			X	
Share voice and/or video recordings			X				X
Present a slide show to one or more people		X	X	X			
Hold a scheduled online meeting or training session	X	X	X	X			
Share dates for deadlines, meetings, and more	X			X			
Share files with team members (documents, graphics, and spreadsheets)	X	X		X			
Maintain long-term discussions about concepts, comments, and more with team members	X		X	X	X	X	X
Collect information from team members	X				X	X	
Track tasks, assignments, and due dates	X			X	X		
Collect feedback online from team members	X			X	X	X	
Set up an editable website that team members can use	X					X	X
Distribute information to team members	X		X	X		X	X
Notify team members when information has been updated	X		X		X	X	X

2.3.1   What Wiki Does

There are different IT tools for different kinds of collaboration – from open source to really expansive, from one tool/task to integrated suites.

Collaborative software, instant messaging, platform for sharing and access information, meeting and agenda setting, feeds manager are all devices that are present in an intranet space.

Moreover, Wiki in enterprises, or more in general in organizations, is one of the tools more and more used for the daily work. As we will see, Wikis can integrate and include in the suites many collaborative tools. In the following table, the Wiki is reported as a software in relation with other devices (table 2).[48]

But, as we have seen before, Wiki is not just a software, is a way to do things, and thinking it only as a simple device or software is not representative of all the true possibilities that Wiki offers.

In this sense the *Tools matrix* table requires an integration with another table (table 3) with which is possible to analyze how an intensive use of Wiki in the workplace supports a wide range of activities.[49]

Easy knowledge base, scheduling assistant, feedback collector, quick publishing tool, research and analysis instrument, sales and development support, creativity enabler used as brainstorming facilitator and ideas generator are the activities that take advantage by a smart wiki use.

Technically, Wiki collaboration is traditionally based on the idea of co-creation on text. But the function of *word-processing* is supported by other possibilities of collaboration: there are Wiki modules for sketching using a *whiteboard*, to calculate or to plan using a common *spreadsheet* or to co-think with on line *mind mapping* tools.[50]

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[48] Brown, Huttner and James-Tanny, 2007, p.221

[49] Driver, 2007, http://www.forrester.com/Research/..

[50] Klobas, 2006, p. 21

Wiki is becoming the perfect substitute for *forum*, blog and e-mail and the perfect platform where to build knowledge base exploiting the topic oriented structure of content.

Table 3 – Wiki Are Best-Suited To Activities Not Subject To Legal or Compliance Requirements (Driver, 2007)

Use case for wikis	Examples
Loosely managed knowledge base	Documenting best practices, creating FAQs, authoring glossaries, rating documentation that does not need to be carefully controlled. A public example is Wikipedia.
Building meeting agenda and keeping meeting minutes	Developing meeting agendas based on input from all attendees, capturing meeting minutes and summaries from all attendees. Wikis are an alternative to meeting support point products from vendors like Facilitate.com, GroupSystems, Meetingworks, and WebIQ.
Collecting feedback from course participants	Capturing course participant feedback to instructors on how a syllabus might be changed for future classes. Participants build on each others' feedback; by the end of the training experience or course, instructors have a rebuilt course.
Jointly authoring and editing documents that do not require — at least in the early stages of the life cycle — a high degree of editorial control, auditing, and tracking	Sales proposal drafts, presentations, research documents, policies. At IBM, for example, an editor posted his first draft of a policy on blogging at IBM. By the time the policy was submitted to executives for approval, the document was a polished piece of work written collectively. It sailed through the legal and human resources departments, and past the VP in charge, without any edits.
Researching and analyzing markets, competitors, customers	Notes, comparisons, links to competitive information
Supporting sales	Creating notes about customer visits and briefings, documenting discussions, capturing details about customer's environment and budget cycle
Developing product concepts	Requirements gathering, feature requests, lists of business drivers, design ideas and vetting
Brainstorming and generating ideas	Idea generation and refinement. An alternative to point products from vendors like Brightidea Inc., Imaginatik, and MindMatters Technologies.

2.3.2 Dimensions of Virtual Workplace

The application of Wiki in the virtual workplace can be object of a taxonomy following four dimensions:[51]

> *Support to effectiveness.* The access to information and operational application like suppliers address or a colleague telephone number. In this sense Wiki can be useful to collect and self-update the users index or other descriptive section.

> *Organizational services.* All the services that can be useful to improve work organization. From the self-setting of one's own work shift plan to the booking of the meeting room, it is possible to create with Wiki simple spaces where users can autonomously organize their daily activities (e.g. scheduling and prepare meeting agenda).

> *Knowledge and collaborative support.* The collaboration inside and among teams and the related knowledge management issues. Wiki are used in this sense for many applications, from the creation and the implementation of the common knowledge base to the several applications that requires the matching of many experience (e.g. co-creation of procedures, handbooks, technical information, planning activities, writing articles, prepare presentation, sharing meeting materials and collect real time meeting notes).

> *Communication and socialization.* Fostering a networked internal communication, institutional and intrapersonal. Users are connected using Wiki in order to join the owner of a particular competence or knowledge and real time collaboration with co-worker everywhere they are. Wiki like as an *agora*.

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[51] Dipartimento d'Ingegneria Gestionale Politecnico di Milano, 2006, p.12

Intranets and workgroup platforms cover more o less effectively this four dimensions but Wiki does it better and in a really innovative and efficiency way with the capability to create true new knowledge (collaborative work vs. cooperative work).

In comparison with a traditional intranet or a workgroup platform, in Wiki we can notice this kind of differences[52]:

> *Flexible structure:* the free growing structure of Wiki is what makes this different from the pre-structured platform, or static intranet (o part of it). This fosters creativity and does not build barriers to communication and new points of views.

> *Informal communication support:* the unofficial and self organized aspect, supports the flow of free ideas, comments and opinion sharing. Indeed, the possibility to correct quickly and easily reduce the inhibition to participate to the social and professional life.

> *Simplicity:* expert and beginner are equally able to join: few obstacles to publish contributes. It is easy to understand and appealing by managers (that in this way have the opportunity to be more participative on operative phase of the work).

> *Focus on content:* content and structure are more relevant than visual aspect. This feature, that follow the elementary Nielsen usability law, improve the quality of work.

> *Links importance:* as for the previews point the re-discovery of the hypertext approach stress the attention to the structure of the knowledge.

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[52] Paquet, 2006, pp.88

>   ***Simple and open hierarchy:*** once administrator invited to join the wiki, all participants are peer (rarely there are different level of permissions). This ensure the peering approach and the participation of all the members of the group fostering individual's consideration.

As we have seen, all this features make relevant one of the main application of Wiki in the workplace: the *knowledge base.*

2.3.3   The Evolution of Knowledge Base

Knowledge base is more than a simple glossary or a collection of FAQ (frequent asked questions), this is traditionally a platform where allocate experiences distributed across boundaries.

As Davenport affirms, one of the problems of knowledge management platforms are the fact that these require an extra activity to implement and to update the knowledge in order to make of these knowledge bases a really useful tools.

Davenport says that the real problem is that platform are less used and more static than the channels (operative tools, e.g. e-mail) and are at the edge of the work dynamics (Davenport, 2005). In this sense, as Harvard professor argued, the knowledge management is going to sure dead because not supported by right tools.

Wiki wins this challenge because uses a better approach than the common platforms, arising knowledge integrating the knowledge management tool with daily work technology.[53]

The obstacles to publishing, typical of old intranets and platforms, was a true problem that brought bad consequences in term of efficiency. Wiki encourages participation introducing informal knowledge (e.g. how to achieve a

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[53] Davenport, 2005, p.101

particular information or, for new employees, how to find information about usage and corporate culture) once transmitted just orally, face to face or via e-mail.

The quality and the authoritativeness of the source are ensured by the frequent updating that everybody can do and by the fact that this is a bottom-up procedure: information are reliable because came from who is the direct expert and not by an upper level that had to understand the topic of information before and then approve its publishing, with the possibility of an objective obsolescence of the knowledge.

Further with the possibility offered by 2.0 technology integration is simple make of it new knowledge management tool: RSS feed are able to check particular updates and to bring inside the system external updates (Paquet, S. 2006).

2.3.4   Virtual Workplace Orientation

Figure 2 – Virtual Workplace Integration Orientation Matrix (PoliMi) and Wiki
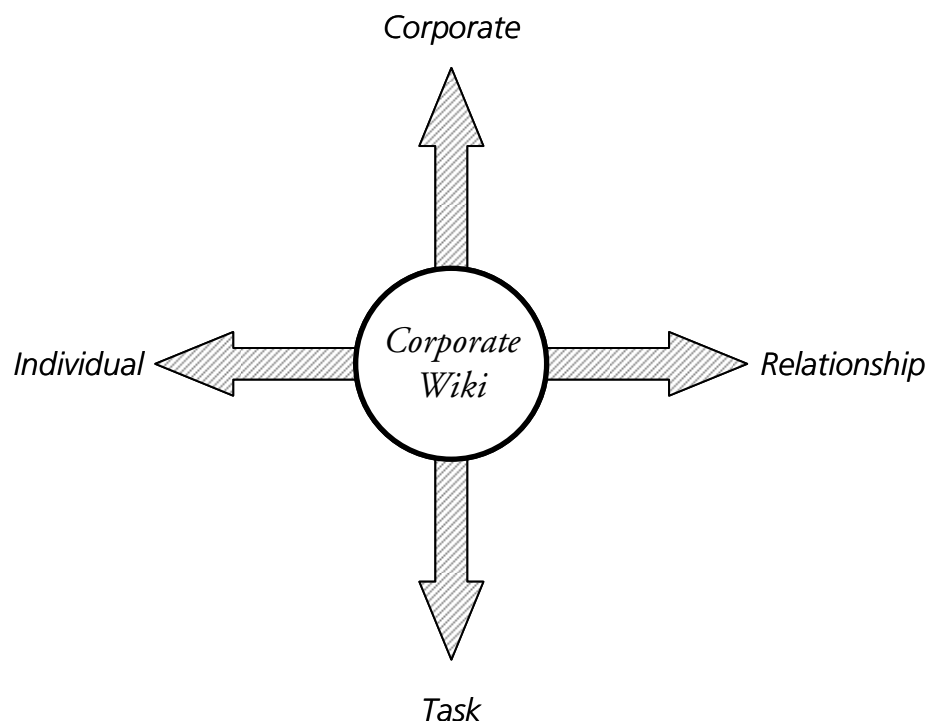
Wiki with its simplicity, transparency and versatility seems to fit perfectly with latest workplace features: dynamism, collaboration, knowledge cantered and communication flexibility.

Also for this reasons, Wiki is seems to be positioned in the middle of the *Virtual Workplace Integration Orientation Matrix* proposed by a study of Politecnico di Milano.[54]

Following the two axis we can affirm that Wiki is a tool that is usable both for *corporate orientation* (internal communication managed by institution) and for single *task orientation* (supporting the operative work); at the same time the *relationship orientation*, that combines communication and socialization with collaborative and knowledge aspects, is fostered by the Wiki networking power.

The *individual orientation* instead is guaranteed by the new possibilities offered by evolutes Wiki, that implies that the Wiki mechanism are able to support the entire work of the single: in this way, by improving the individual knowledge work level, there is a positive increasing at the organizational level (Davenport 2005).

2.3.5   Wiki and Knowledge Management

The knowledge management is shifting. Knowledge as experience or validated information - without a really validated way to exchange this with others – now become also collaboration across organizational boundaries (in an act globally vision) creating, in this way, new knowledge. Emergent technologies (Wiki included) are integrated together in order to become a platform that permits: 1. to generate and access to knowledge, 2. the possibility to exchange this knowledge.[55]

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[54] Dipartimento d'Ingegneria Gestionale Politecnico di Milano, 2006, p.26

[55] Tapscot, 2005

The evolution of these kinds of technology is so quick that at the moment it is reductive referring to Wiki – and analyze it – as a simple software of collaboration. The new intranet platforms (e.g. *QEDWiki* suite by IBM) are *mash-up* systems that permit the personal composition of different collaborative tools that you can share with others: the application uses *widgets* (web-gadget) that allow the predisposition of the personal virtual workplace with the possibility to cross information between different operative tools. The Wiki are evolving, but the principle is the same: mash-up are shared application *Quick, Easy, (and Done as IBM QED acronym means)* following the Wiki philosophy and methodology.[56]

In a short time, Wiki is shifting from a marginal technology (originally used only in IT department) to a fundamental support to (collaborative) information/knowledge management in workplaces, and, further, in big IT evolutes organizations there are many decentralized and connected sub-Wiki.[57]

The key of the Wiki success seems to be that eventfully the workspace did not impose the processes (Aaron Brucell, VPMarketing, Stata Labs)[58], using the new collaborative tool, is the human capital that shapes in a flexible and independent way the environment in order to exploit individual and collective knowledge.

Analyzing the previous debate between McAfee and Davenport about the effective revolution of Enterprise 2.0 phenomenon (on which Wiki assume a main role), the ZDNet expert Dion Hinchcliffe states:

> *"The gap between what's technically possible and what the corporate culture is willing and able to accept is often wider than many people automatically assume"[59]*

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[56] IBM, 2007, http://www.youtube.com/watch?v=63qIq9t9Gqs

[57] Thoney, and Woods, 2005, http://twiki.org/cgi-bin/view/Codev/WikisInTheWorkplaceBook

[58] Socialtext, 2007, http://www.socialtext.com/node/36 cited in Klobas, J. (2006)

[59] Hinchcliffe, 2007, http://blogs.zdnet.com/Hinchcliffe/?p=105

Latest trends (reputation system, external/internal collaboration support, enterprise class feeds readers and management, collective intelligence) providing useful business context to Enterprise 2.0 (Hinchcliffe, D., 2007), support the true challenge that a successful introduction of Wiki in workplace came from the human component of the play.

2.3.6 Barriers to Wiki Introduction

This destructive practices have to been fought from the beginning.[60]

> *Lack of interest, lethargy and lack of contributors.* Wiki had to be "learned" understanding that is "never finished" and this continue learning process improves autonomy between intelligence communities.[61] Nevertheless in order to avoid this sense of uselessness given by the initial empty state, it is opportune to offer benefits from the beginning, to launch the wiki with interesting base contents.

> *Environment resistance.* Wiki introduction needs an appropriate organizational structure: managers and upper levels have to create the right condition to lighten up professional and personal worries.

> *Vandalism.* The problem is overestimated: for hackers, Wiki is too simple to crack to be interesting; as for internal vandals (or false gurus), it is easy and quick to fix the problem or blocking the page.

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[60] Ebersbach, et al., 2005, p.26

[61] Andrus, 2005

> *Attention-seekers.* "Editing wars" are expansive in term of time and resources and often conflicts that are useless to the topic. It is possible to set-up suitable discussion pages.

> *Project portal excursion.* Dispersion of resources and time in order to research inside Wiki. It is opportune create overview pages that summarize mapping contents.

> *Quality assurance.* In order to guarantee a good working tool, it is necessary to create rules and norms using a sort of *wikiquette*.

> *Personal point of view.* Ensuring neutrality and objectivity fosters credibility and reliability in the tool.

> *Open editing.* Shifting from the "me-author" to "we-co-authors" mentality. Matching different ideas or ideas with previous solutions, prove and improve the solidity of the innovative idea.

> *Open text.* Using new kind of licence (GNU Free Documentation Licence or Common Creative alternative).

> *Careful optimism.* Wiki way is too much optimistic? Well, latest experiences are pro this open approach: this is the first step in order to avoid destructive behaviours.

This is the evidence that, in order to introduce Wiki in a workplace, it is necessary to change the previous way to do things, the old way of working. Change corporate culture. People that support these insights are important, are new kind of managers, are at the same time players and coaches, hold community skills, support the talent retention (*talent evolution* for N-Gen), sponsor the knowledge-friendly culture and the bureaucracy reduction (Davenport, 2005). New managers have a role somewhere between Human resource and IT, a kind of

"Czar of cultural change",[62] teaching people how to apply and benefit from new technology.

2.4   Enabling Enterprise Innovation

For an enterprise, *innovation* is a strategic objective in order to be competitive. For this reason it is indispensable try to pursue it in an effective way.

2.4.1   The Innovation Process

During the latest decades of XX century, experts gave several interpretations and explanations about the mechanism that permits to achieve this objective. Schumpeter in 1975 defined the innovation as a linear process (ideas generation > invention > R&D > application > spread); in 1978 Kelly and in 1986 Kline and Rosenberg asserted that this process is more complex and iterative where learning, social interrelation, spreading and communication played a key role. In 1988 Von Hipple focused on users role as innovation creators and re-inventors of products. In 2002 Tuomi defined innovation as a social process rooted in social practice. In a previous study (1998) Wenger had already stressed the importance of community to take part in the process.[63]

The consequence of recognition of social interconnection is the spreading importance and its technological mediation acquired: possibility of recombination of knowledge and active (not passive) spreading.

This concept is very distant from the simple linear process defined by Schumpeter.

Spreading of pre-existent innovation is a fundamental condition to produce new innovation: it is the cumulative effects of knowledge. In this way,

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[62] Moore and Rugullies, 2005 http://www.forrester.com/Research/..

[63] Almirall et al., 2006, pp. 104-105

new ideas, making innovation possible and easier innovation, enable the development of new tools and contexts to spread and adopt innovation.

Indeed, interdependence and assimilation are identified as core components for process: avoiding isolation, in order to guarantee the spread maximization, to forecast internal and external links building a network structure, to avoid "cognitive equilibrium" (homogeneity of group knowledge), to support the structural equivalence (peering) and direct monitoring (transparency) are the new insights to foster innovation process (Almirall et al. 2006).

2.4.2   The Innovation Levels

At an individual level, there are behaviours that are enemy of ideas and innovation: 1. the worries and the *inhibitions* for others' judgement, having a fixed point of view instead a flexible and fluid perspective, 2. to found believes *only on own previous experiences* (personal knowledge) 3. do *not consider oneself part* of the innovative process.[64]

But, as for knowledge management topics,[65] individual level is only one of the three level to consider: individual, group and organization. These three levels are then supported two structure aspects: *connection space* and *concept space.*

Connection space is about the network development and maintenance, that support ideas production and cross-fertilization between organization "silos".

Concept space is about the awareness of what happens in the network, regarding also the tacit knowledge of others, common structures and the definition of discussion channels.[66]

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[64] Allison, 2004

[65] Nonaka, 1991, pp. 162-171.

[66] Almirall et al., 2006, p.109

In other words we can argue that connection spaces support the creation of knowledge and the concept spaces support the share of it. The objective of these parts of the process is promoting diversity of ideas and recombining of its.

To support this kind of approach to enterprise, innovation process needs to focus on social networking that, as we have already seen, is the totality of the connections and relationships that permit to avoid single isolation.

This knowledge network is implemented by spreading and ideas promotion among it, then is fed by ideas generation (creative sessions). Once created the new idea it needs a testing phase in order to evaluate the effectiveness in relation of common objective and its (network) popularity.

This kind of innovation network is then supported by such a featured architecture: *informative*, that assure the possibility to have an overview and understand what is happening and what is changing inside and which are the rising trends emergent ideas, topic or issues; *decision-making oriented*, furnish information on which are connection to follow or opinion leaders and experts; *motivational*, focusing on shared objectives and maximizing the community potential.

Further, in order to stimulate or reinforcing the network, managers can change the structure making it alive and sparkling or confirming the relations and adding sense to the key people (knots of the network). [67]

Innovation needs change, dynamism and continue movement in the network. Instead, the standardization is a static operation.

2.4.3   The Learning Process and Creativity

Innovation requires a continue learning process and for this scope a constant transfer of knowledge is fundamental. [68] We are so able to identify

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[67] Almirall et al., 2006, p.110

[68] Bissola, 2006, pp.167-182

innovation with knowledge activities being the second ones evidence of the first: knowledge meets innovation.

In this perspective innovation has to be promoted as the main objective for all the human capital with their know-how (Bissola, 2006).

In this context, creativity is the sparkling moment of ideas while innovation is the concrete application of this. Creativity and innovation are two key drivers of competitiveness.

Creativity, once considered as an individual capability, is now the topic of studies (Bissola, 2006) that confirm the influence of human behaviours and organizational and contextual elements.

Albert Einstein said: "we are *social* thinkers"[69]. Einstein meant to stress the importance of the others, the relevance of the "contest" and of the "debate", alerting on the danger of a unique point of view an fixed ideas.

In order to stimulate creativity it is fundamental to take care on how ideas, needs, and different points of view are displayed. It is also important to receive always a feedback and observations on proposals and coordinate different contributes, to promote ambitious and challenging objectives.

Naturally independence, group cohesion, resources supply, an appropriate leadership style, to be in the mood, to hold meaning of one's own job, incentives, and an opportune organizational structure with open upper levels are assumptions (Amabile et al. 2005) of an effective creative context.

As for knowledge and innovative process, further studies shows how creativity can be considered at the three levels: beside the individual level, authors speak about *group creativity*[70] and other studies focus their attention on the

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[69] Adair, 2007

[70] Tagger, 2002, pp.315-330

organizational creativity[71]. For this two levels - organizational and group - rise a common and, as we will see, fundamental element: *trust* (Bissola, R., 2006).

2.4.4   Trust and Innovation

Attitudes, perceptions, behaviours and performance's indicator, thanks trust produce positive effects, e.g. on organizational climate, communication and personal satisfaction. There are also positive effects on control and power relations inside and outside the organization. Beneficial effects on organizational projects and on collaborative approach and workgroup performances (including virtual teams) are confirmed by further studies, and at the end it is demonstrated that trust is an assumption on e-business.[72]

Interpersonal trust "… is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviours of another".[73] The *interpersonal trust model*[74] follow this definition and introducing and describing the two players: *trustor* and *trustee*.

The first, the *trustor*, is who takes the risk. His experience and his cultural open background, give him a natural disposition to trust in other people.

The *trustee*, instead, is characterized by his/her ability (as an expert, a know-how keeper), benevolence (unselfishness predisposition, broadmindedness, openness) and naturally by integrity (coherence to acceptable principles, also if not share completely the *trustor* values, owner of a strong equity.)

In a wide context, we can introduce the concept of *collective trust*. In this sense trust is a psychological status - not a behaviour - that came from a set of action and bring to behaviours.

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[71] Woodman, Sawyer and Griffin, 1993 pp. 293-321

[72] Bissola, 2006, p.171

[73] Rousseau et al., 1998, pp.393-404

[74] Mayer, Davis and Schoorman, 1995, pp.709-34

In this way we are able to take in consideration two statements.

1. *Institution is a trust system*, given by *cultural assumption* that produce a sense of stability inside the organization and outside with rating, brand reputation and other parameters.

2. The are also *three level* to identify a trust relation: the *micro* level, that is the interpersonal relations, the one-to-one stage; the *meso* level, in order to transmit this sense of stability from interpersonal to organizational dimensions, this role of trust-keeper are taken by leaders or coaches that, assuming a boundary position, and identifiable with the organization; the *macro* level, that is the organizational trust.

Other studies try, at the opposite, to find a relation between interpersonal-collective trust and collective trust distinctiveness (Bissola, 2006).

Trust and creativity are the starting points of innovation: trust can contribute to create the optimal condition in order to favourite creativity as enabling factor.[75]

Indeed, Clegg defines trust as "an expectancy of reasonable and positive reactions by others in response to individual innovation attempts", linking interpersonal trust and innovation (at creativity stage).

Further, in this definition we can notice two important aspects:

– *"trust that heard"* – the serious consideration of individuals ideas (contributions) and so the recognition, at organizational level, of single as a precious resource;

– *"trust that benefit"* – the legitimate expectancy of participate to benefit generates (individual level) a sort of "opportunism" that influence the creativity (and the decision of sharing own knowledge).

Both of the two different definitions of trust, that we have seen, seems to be valid (Bissola, 2006): Mayer's trust, based on *ability, benevolence and integrity*,

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[75] Clegg et al., 2002, pp.409-422

fits with relationship between colleagues, where open mind and sharing are fundamental; Clegg's *"trust that benefit"* could be applied in institutional relationships (inside or outside the organization, e.g. Connect & Develop P&G case[76]).

In this case, organization can promote trust with mechanisms, processes and procedures (and also with technologies like Wiki) supporting creativity and innovation.[77]

Beside trust, transparency and communication between boundaries are able to produce serendipity creativity (Adair, 2007) that is supported by a special environmental context that fosters collective thinking.

High concentration (density) of individuals with different skills, easy, quick and simple way to communicate, the presence of a developed social network, informal meeting place (also virtual), mobility between different department, opportune resources, freedom, competition, time pressure and good chaos are innovation enablers that are marking the crisis of traditional organizational structure.[78]

2.4.5   Tower of Knowledge and Community of Practice

The new *idea spaces* are different from the concept of "towers of knowledge" that, following the spider metaphor, represent an oligarchic approach to the knowledge management.

The new *idea spaces* are "community of practice" (starfish model): communities support exchange of ideas, storytelling, transparency and the daily tacit and explicit knowledge sharing.

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[76] Procter&Gamble, 2005

[77] Bissola, 2006, p.177

[78] Testa, 2005

In this way the innovative power of these spaces are in the capability that people that are inside spaces have to create new knowledge. More than a sum of individuals' knowledge (result of what we have called cooperation), it is a mutual increment of singles' knowledge (fruit of together collaboration).[79]

Then community, fostering emotional aspects, intangible components for relationship and networking, is a channel for invention and a source of new ideas and business (innovation). Employees, in particular the bottom-line,[80] clients and suppliers will enable future creativity.

2.4.6   Conversational Knowledge Management

During 2007, social network on-line communities for professional self-promotion (e.g. LnkedIn and Xing[81]) have introduced an interesting section of questions/answers. This kind of knowledge creation and sharing is encouraged by *Cluetrain Manifesto*[82] about **conversational knowledge management**:

> "*(1) - Markets are conversations. (45) - Intranets naturally tend to route around boredom. The best are built bottom-up by engaged individuals cooperating to construct something far more valuable; an intranet worked corporate conversation. (48) - When corporate intranets are not constrained by fear and legalistic rules, the type of conversation they encourage sounds remarkably like the conversations of the networked marketplace.*"

Conversational knowledge creation contains several desirable features:

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[79] De Graff and Lawrence, 2002, p.158-160

[80] Getz and Robinson, 2005

[81] http://www.linkedin.com and http://www.xing.com

[82] Locke et al., 2000

> > *It can be economical and technology undemanding*: many online communities are built on little more than a listserv, a (freely availed) web-based discussion forum or better using a Wiki.

> > *It is fast*: taking potentiality only as long as required for one person to post a question and others to post or e-mail a response. Speed makes conversational technologies particularly useful for environments where ad hoc knowledge creation is required.

> > *It is suitable for environments*: where the knowledge is not centralized, but resides with multiple owners (collaborative workplaces).

Next to the *conversational* approach, the *soft security* scopes (see p.24) are linked with the concept of trust, transparency and of easiness on knowledge sharing and so creativity. People are enabled to do not consider errors as permanents because easily corrigible. This reduce the inhibitions to participate on ideas creation[83], supporting one of the traditional way to foster creativity: brainstorming.

Traditionally the brainstorming sessions, that assume parallelism of participants, contribute to generate many ideas (and so to innovate).[84]

But the traditional brainstorming session is not more positively supported by recent studies: it is demonstrated that is not effective and efficiency.

The *channelled creativity method* seems to work better and reduce the resources' waste.[85] Next to the De Bono insights[86] and to the mechanism of *asynchronous brainstorming* supported by e-mail, forum, blog and Wiki, the

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[83] Klobas, 2006, p.11

[84] Almirall et al., 2006, p.107

[85] Klein, 2003, p.169

[86] De Bono, 1992, p.107

channelled creativity method is composed by seven steps of ideas generation and problem solving (creativity): 1. problem proposition; 2. individual work on the dilemma; 3. group presentation of the results of individual works; 4. group discussion session of ideas and feedback collection, 5. integration of ideas; 6. further meeting session; 7. unique solution convergence. (Klein, G. 2003)

This creativity process needs *idea space* that in a wide organizational sight would be desirable also in a virtual workplace decreasing problem of distance and time. In this challenge new IT technologies like intranets are involved.

Intranets are so potentially the new infrastructure for innovation: thanks to the intranet and the dramatic reduction of transaction and collaboration costs between firms, knowledge and capability is available to every organization and to all individuals within the firm.[87]

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[87] Tapscot, 2005, p.23

2.5   Not Just the Right Technology.
How Corporate Wiki Supports Innovation

The theoretical recognition of Enterprise 2.0 and Wiki – as dawn technology able to support workplace needs of collective knowledge and worker interaction[88]– is the arrival point of this dissertation section. But, considering innovation as an articulate social practice, is Wiki technology a real innovation facilitator?

The first Wiki was a patterns repository (see p.3), in other words a box of analogies, that opportunely recombined, allow comparison between these and therefore the creation of new knowledge.

This mechanism of "fusion of pieces of knowledge that have not been connected before" produces "new and creative solution" (Geschka and Reibnitz)[89] and Wiki in 1995 was the technological response in order to favourite this innovative process.

Innovation is the result of reproducible recombination of existing elements. Knowledge simplifies the process and drive the technology that allows capabilities and growth (Hitcher 2006).

2.5.1   Preliminary Insights

New knowledge – as well as innovation – insights are moving towards a new way to mean the workgroup[90]: the shift from *cooperation* to *collaboration*, from "tower of knowledge" to "community of practice", from traditional "knowledge management" to "conversational" knowledge, the passage from "nouns" to "verbs" passes trough a new technological process that, instead of old

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[88] Almirall et al., 2006, p.114

[89] Geschka and Reibnitz, 1983

[90] Driver, 2007

IT devices and tools, does not cover simply the previous way to work with a software's interface, but uses the 2.0 applications, and Wiki in particular in order to innovate the way to innovate.

For a technology being really innovative, it has to re-think application processes[91]. Wiki technology contributes to diffusion of knowledge, that in a society of knowledge, is true innovation.

An assumption of innovation process is that this is not a standard or pre-structured concept.

Indeed, Innovation is a continuum and Wiki is in perpetual "beta-mode" status, innovation is build on previous knowledge and Wiki is a knowledge base, innovation has being shared and Wiki supports social network.[92]

2.5.2　Beside the Wiki Adoption

Wiki enables all this points. But, is that sufficient in order to affirm that a corporate Wiki works fostering innovation rate ?

Innovating technology or simply adopting new tools, in order to increase the innovation rate, is useless if the context is not predisposed and oriented to change. In this way the context is interested in the process too and, if prepared to new way to work, the use of this technologies can improve this virtuous circle and activate this permanent learning process that enables new way to make thing, new organizational culture.

Many cases of study pointed out what Wiki changed in the way to work of people highlighting benefits:

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[91] Granelli, A. 2005, p.2

[92] Hitcher, 2006

> synchronism in documentation (same version for all the users avoiding messy copies), dramatic reduction o e-mail use (from 100 mail/day to 1 mail/week), improved coordination, enabled across-boundaries knowledge and information flow, reduction of 25% of time to make things;[93] - **Ziff-Davis Media Case**

> not just one owner of the knowledge and everywhere access to information;[94] - **Michelin China Case**

> improvement employee productivity and the capability to manage big flows of work.[95] - **DrKW Bank Case**

Big companies make easier to find updated information even without knowing the expert in the field: the real time publishing possibility (traditional time to publish in intranet was nearly thirty days) improves work efficiency.

Indeed, Wiki allows creative power of many people, coordinates horizontally and without further remuneration that, with the dawn of individuals and the recognition of hidden experts, demonstrates also an increase of the motivational factor to contribute[96].

2.5.3   Wiki Potentials and Innovation Rate

In order to synthesize the effects of Wiki use on workplace environment, we can identify five main areas of influence: *teaming*, *time allocation*, *decision making*, *resource allocation* and *communication*.[97]

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[93] Paquet, 2006, p.90

[94] Paquet, 2006, p.91

[95] Paquet, 2006,p.92 and McAfee, 2006

[96] Paquet, 2006, p.97

[97] Tapscot and Williams, 2007, pp.259-262

About *teaming*, in the past corporate teams was assigned building up only on loyalty and trust. Now, with mass collaboration, self organization, peering and social network workers, it continues to change roster and mix teams composition. Indeed, members can work at home as on the road using the right tools and founding collaborative works also on transparency.

Also *time allocation* of employee is changing: people are free to dedicate a percentage of their time (trust) for personal projects (e.g. Google 20%) involving people to be creativity booster contributing actively to the innovative process of organization.

The *decision making* is now supported by the mass of employees, partners and suppliers, with theirs market trend prediction. In this sense it is possible exploiting crowd as opinion leaders.

Further, organizational *resource allocation* is shifting from the logic "first-come-first-serve": wiki allows the internal "marketplace" for resources (from computing power to conference room).

The issue of *corporate communication* - traditional "top-down", now seems to change this approach and smart companies (also using blogging as tactic, e.g. Sun) promote an effective, personal and transparent way to communicate with employees leveraging the network culture. The effects of transparency are various and relevant: increasing the quickness of workflow, inviting accountability and driving dialogue between all stake holders, dissolving boundaries between corporation and its ecosystem.

The other side of the model, from the innovation perspective, we can notice that enablers of innovation are near to be complementary.[98]

First of all, needs of *decision making agility*, in order to understand changes and plan effective innovation strategy: as we have seen, the power of crowd as big opinion leader to investigate and the new conversational knowledge management that allow to have true "experts on demand".

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[98] Dipartimento d'Ingegneria Gestionale Politecnico di Milano, 2006, p. 34

Then, the *collaboration* between different units – across boundaries – permits the creation and the sharing of ideas, capabilities and knowledge. The old trend was for *cooperation* that supported by the limited IT solutions does not allow the free access to the whole knowledge of the organization.

Flexibility on process design is fundamental for an effective innovation strategy: the possibility of change and re-combine is also possible thanks to the "starfish" structure.

Innovation requires *openness to ideas* of all the human capital: *trust* spurs internal and external creativity and contribution of individuals.

Indeed, it *supports people* in their daily work everywhere they are, fostering mobility and portability, increase the rising of innovation.

At the end of the day, we have arrived to define which for authors – and so in the recent but strong literature on the Wiki field - are potentials and enablers o the two respective extremes of the construct of our research structure: Wiki and Innovation.

In the next part we are going to see how and if this dissertation contribute to this huge of knowledge, furnishing a further support in order to study which are the best way to optimize the use of this innovative tool called "Wiki".

3   The *Wikibility* Workplace.

At this point, we are able to apply the model *Wiki > Innovation*, where we will stress on the knowledge management and cultural connections/links between *potentials* and *enablers* (3.1).

The definition of cultural key drivers bring us to define the concept of *Wikibility* in an innovation oriented workplace, furnishing, in this way, elements in order to answer the main research question (3.2).

But how is it possible to verify, measure and then evaluate the level of *Wikibility* maturity of a Workplace?

From this last question we move an insight for further studies: a proposal of survey – not yet validated – for an auditing tool that can be used by management that decide to sponsor the Wiki use in a real workplace context (3.3).

3.1   How to Be Effectively Innovation Oriented

In the previous part we have found theoretical base to define, from one side, what Wiki is able to improve – or to influence – in a workplace and from the other side what innovation requires from an organizational level perspective.

A first comparison of these very concrete *potentials* and *enablers* stresses on the complementary aspects of these two groups of elements:

More exactly, we can notice that: 1. the improvement on teamwork *(teaming)* by Wiki use responds to the *"collaboration"* needs of an innovation oriented workplace; 2. the Wiki effects on *decision making* fits with the *decision making agility* of an innovative management; 3. the possibility of managing time in a personal way *(time allocation)* offered by Enterprise 2.0 thinking is linked with the inclination that makes innovative company open to individuals' initiative *(openness to ideas)*; 4. a better *communication* is able to *support people* in daily work; 5. an easy *resources allocation* system can reduce bureaucracy, obstacle to the innovation needs of *flexibility process design*.

Indeed, analyzing the definitions and the descriptions of each of these elements, made by the authors of *Wikinomics* [99] (for the Wiki side) and by Politecnico of Milan[100] (innovation requirements), as we have already done in the theorical part (see 2.5.3), bring us to the formulation of a ulterior logical insight.

These Wiki improvements on workplace and workplace's innovation needs, in fact, seem to converge at the end in some common core concepts (figure 3) and cultural values: *quickness, flexibility, sharing, collaboration, social networking, peering, openness* and *trust* that are the cultural – and knowledge management – key drivers for an effective use of Wiki in order to be innovative.

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[99] Tapscot and Williams, 2007, pp.259-262

[100] Dipartimento d'Ingegneria Gestionale Politecnico di Milano, 2006, p. 34

Figure 3 – Wiki Effective Innovation Oriented Workplace: definition of Cultural Key Drivers
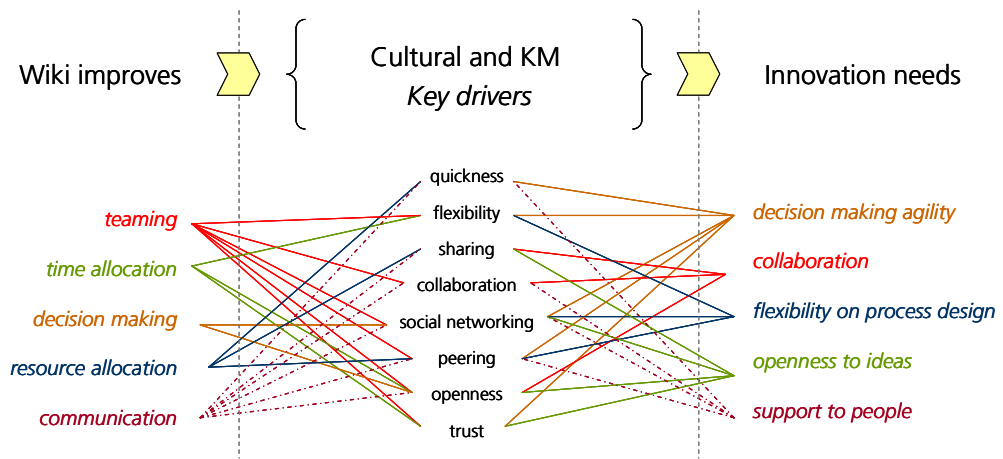
Summarizing, these knowledge management components and these culture values could be considered requisites that organization has to guarantee beside the introduction of Wiki (Enterprise 2.0) technology in an effective innovation oriented workplace (figure 4).

Figure 4 – The Cultural and Knowledge Management Key Drivers in the Wiki – Innovation Model
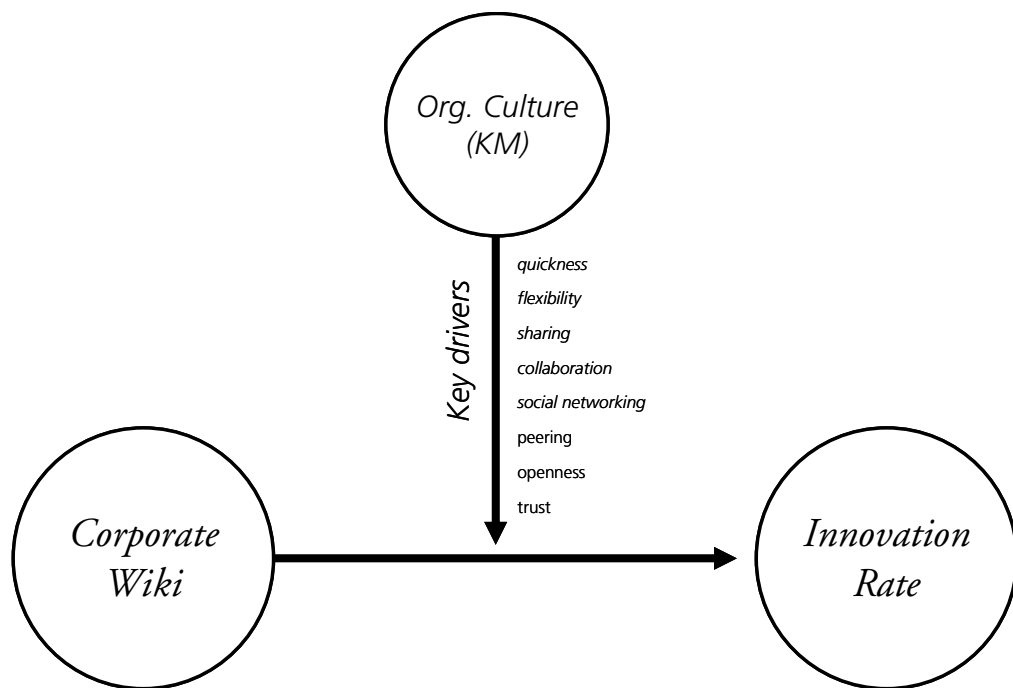
3.2   Between Wiki and Innovation: The Cultural Key Drivers

The eight items arising in this analysis are the starting point of a deeper definition, that support us to clarify some peculiarities of key drivers identified in this eight "key words".

Before starting the definition phases of these cultural aspects, it is useful to underline that a preliminary disposition to experiment new way of working is fundamental. But, what we are referring to is not a mere ability to try new technology or a more basilar computer science alphabetization – Wiki, for definition, do not need particular skills – what we are referring is the desire to improve the way to make things, assuming also the risk to change the way to work: the predisposition to operate a cultural shift.

Assumed that, we can now shortly define these eight insights for an effective innovation oriented use of Wiki in a Workplace.

3.2.1   Quickness

The first key driver for a completely serendipitous case refers to the meaning of the word "Wiki". The fact that a Workplace could be considered "quick" is not properly linked with the easiness to find information or with the speedy level of the communications: in this context it is linked to the Wiki feature of assuring a **real-time updating access to contents and resources** (data, information or knowledge and physical resources).

Up-dated information are, in fact, at the base of an effective support to people's work, and are fundamental in order to guarantee a democratic allocation of resources. Further, up-date information are needed in an effective decision making process and to guarantee a common base for useful communication between workers.

3.2.2   Flexibility

A flexible workplace is characterized by the capability of individuals to manage not only theirs works, time or resources, but also the possibility to influence and operate in an active way inside the community (from team to organizational level) and for this reasons to be part of the operational process.

Flexibility influences the way of allocating time creating moments for personals insights development; it gives the possibility to own a picture of the whole process in order to decide the way to fix personal objectives. Exploiting one of the main Wiki functionalities, it permits as well to handle other contents and the possibility to be active – following personal expertise – in different teams (community of practice).

3.2.3   Sharing

Sharing is linked with the concept of a democratic access – and then utilization – to all kind of resources, from physical tools to data and, even better, to ideas and individuals' insights.

The possibility of sharing improves an effective distribution of common resources (meeting room, projector, corporate car…). In a more general acceptation of the term, the availability to ideas or previous solution useful for different use is an advantage that make co-creation of new knowledge and a healthy circulation of knowledge possible.

3.2.4   Collaboration

As we have seen in theoretical part (see p.21), the true collaboration occurs when people have the possibility to co-work on the same sub-task, activating a

mechanism of new knowledge creation. Collaboration is not so obvious if is not clearly supported: the risk is to exchange this "together" learning process with a simple cooperation process, producing not new knowledge but only a simple addition of individual regress knowledge.

In this sense, collaboration has to be helped in order to avoid isolation in job and supported with a compatible scheduling of daily activities. Is also important to create "collaboration bridges" across teams and groups, involving people to participate to other's activities or involve experts of other area to collaborate together.

3.2.5   Social Networking

The social networking aspect is the starting point of a company sensible to Enterprise 2.0 – then Wiki – solutions. Introducing this concept in a workplace context is possible to change in a radical and effective way the previous organizational culture.

The first step to create a social networking is to allow the creation of personal spaces – if possible with a an internal blog[101] – and then to produce a staff list in order to let people know who their colleagues are and which are personal skills that they own. In this way there will be a simpler identification of experts.

3.2.6   Peering

A common element between Wiki philosophy and innovation successful case histories, is the partial or total absence of structure or, saying better, of hierarchy. The possibility, in fact, to contribute in the same way, indifferently at

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[101] Cannon, M., (2007), slide 36

which level you are involved in the organization, is one of the first steps towards the reduction of barriers to collaboration, participation and involvement in the organizational life.

Peering is to intend in the two ways of organizational commitment: from both the perspective, the access to common information and the possibility to contribute to corporate knowledge.

3.2.7   Openness

Strictly linked with transparency concept, openness is at the base of the principle that people work better if own right information and possibility to assume that all over the organization.

The simple access to other group member data or the possibility to know activities scheduled also in other groups are normal operation in a mature context such as is allowed to look to other team solutions o results in order to decide something for the own team.

3.2.8   Trust

In order to shift from the culture of individual work to the culture of collaborative work, is obvious that the issue of the trust is crucial: as we have seen in the previous part (see p.41) trust is linked not only with the Wiki spirit but it is a very important requirement of creativity and so of the orientation to innovation.

To be considered a credible expert is important such as to be sure to have reliable expert's opinions; the feeling that you are appreciate inside your team ad more in general in your community is an incentive to be active and "creative".

What we intend with the word *Wikibility* fits perfectly with the presence of these cultural aspects.

In other words – and this is a partial answer to the research question – *it is not sufficient to install a Wiki platform in an organization in order to make it works to produce new knowledge and then innovation: for this scope the level of Wikibility should be already mature and prepared to exploit at the top the cultural shift that this new IT technologies will produce in the – one time traditional – workplace.*

The intent of this work is now to propose a way to measure the level of *Wikibility* in an innovation oriented workplace.

This tool will produce a sort of cockpit that supports the management believing in Enterprise 2.0 principles, and therefore in Wiki as instrument to produce a true collaborative workplace.

The *Wikibility* term is, in fact, extended to the whole organizational cultural revolution that User Generated Content has brought into the workplace, following the same logic of the Tapscot-Williams's "Wikinomics".

3.3   Propose for a *Wikibility* Workplace Auditing Tool

In order to provide an useful survey to measure what we have called *Wikibility* and in the same time to deliver a concrete tool for checking which practical aspect of workplace improvement, we can formulate a set of questions including the eight cultural key drivers – previously defined – and the four "dimensions of virtual workplaces" – seen in the theory (p.29) and defined by Politecnico of Milano – obtaining in this way 32 questions.

The questions are not formulated with the aim of studying how Wiki technology is used in the workplace, but in order to investigate how and how much the organizational culture is changed, is changing or is not changed yet in the four different areas working in innovation oriented virtual workplace that uses, or intends to use, Wiki.

For the definition of the survey's questions, it is useful to re-consider the scheme in which we have defined the eight cultural key drivers (figure 5) and consider for each key driver four elements, one for the each virtual workplace dimension (as summarized in the table)

Figure 5 – Wiki Effective Innovation Oriented Workplace: definition of survey's questions
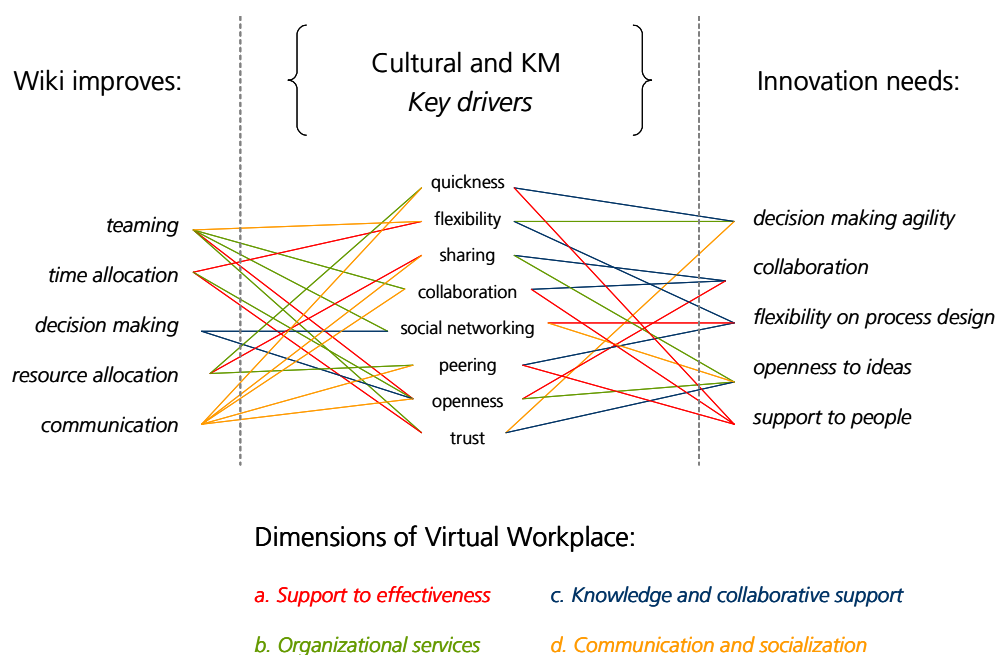
Table 4 – Wikibility in Innovation Oriented Workplace: definition of survey's questions – theme of questions

1. Quickness	a. Supporting people b. Resource allocation c. Decision making agility d. Communication	5. Social Networking	a. Flexibility on process design b. Teaming c. Decision making d. Openness to ideas
2. Flexibility	a. Time allocation b. Decision making agility c. Flexibility on process design d. Teaming	6. Peering	a. Supporting people b. Resource allocation c. Flexibility on process design d. Communication
3. Sharing	a. Resources allocation b. Openness to ideas c. Collaboration d. Communication	7. Openness	a. Collaboration b. Openness to ideas c. Decision making d. Communication
4. Collaboration	a. Supporting people b. Teaming c. Collaboration d. Communication	8. Trust	a. Time allocation b. Teaming c. Openness to ideas d. Decision making agility

After the definition of questions' themes, we are now able to formulate the entire survey.

3.3.1 Wikibility Innovation Oriented Workplaces Audit.
Survey's Questions (see also Exhibit "a")

1. Quickness

1.a *Supporting People* (support to effectiveness)
Do you find up-to-dated data useful for your daily work?
(e.g. index, calendars, telephone number)

1.b *Resource allocation* (organizational services)
Regarding to booking common resources (e.g. meeting room, projector…)
Is it possible to make it by yourself?

1.c *Decision Making Agility* (knowledge and collaborative support)
Do you find in an easy way and quickly up-to-dated information
– or knowledge-owner – useful for your work?

1.d *Communication* (communication and socialization)
Do you find up-to-dated information about organizational activities?

2. Flexibility

2.a *Time Allocation* (support to effectiveness)
Are you free to dedicate a percentage of your time to your own projects?

2.b *Decision Making Agility* (organizational services)
Is it possible to get information about the whole project
work progress and direction?

2.c *Flexibility on Process Design* (knowledge and collaborative support)
Is it possible to re-configure and handle others' contributes?

2.d *Teaming* (communication and socialization)
Are you active in different teams?

3. Sharing

3.a *Resources Allocation* (support to effectiveness)
Are the common resources accessible to all and can these
be booked in an autonomous way?

3.b *Openness to ideas* (organizational service)
Is it possible to access or find results and insights
inside and outside the community?

3.c *Collaboration* (knowledge and collaborative support)
Is it usual to implement others' work or co-create documents?

3.d *Communication* (communication and socialization)
Is the real time circulation of ideas among the community supported?

4. Collaboration

4.a *Support to People* (support to effectiveness)
Do you know which people are involved in your same projects?

4.b *Teaming* (organizational services)
In your team, are individuals plans often compatible
with the group activity?

4.c *Collaboration* (knowledge and collaborative support)
Is it usual to participate to other group projects?

4.d *Communication* (communication and socialization)
Is it usual to discuss with others about their
work, solving problems together?

5. Social Networking

5.a *Flexibility on process design* (support to effectiveness)
Is it easy to identify an expert in the whole community?

5.b *Teaming* (organizational services)
Are members of teams able to know all the competences
and expertises of co-workers?

5.c *Decision Making* (knowledge and collaborative support)
When the group has to take a decision, it is usual to ask opinion
to experts inside the whole community?

5.d *Openness to Ideas* (communication and socialization)
Are individuals insights visible to the whole community?

6. Peering

6.a *Supporting people* (support to effectiveness)
Is everybody able to update useful information like
telephone numbers or scheduled meeting?

6.b *Resource Allocation* (organizational services)
Is everybody able to book meeting room or,
in general, common resources?

6.c *Flexibility on process design* (knowledge and collaborative support)
Is everybody able to recombine documents and then publish it?

6.d *Communication* (communication and socialization)
Is everybody free to publish (in the intranet or wiki)
information useful for your colleagues?

7. Openness (transparency)

7.a *Collaboration* (support to effectiveness)
Is it possible to access to other group contact data?

7.b *Openness to ideas* (organizational services)
Is it possible to know when other groups meet
and, if you want, participate?

7.c *Decision Making* (knowledge and collaborative support)
In order to take decisions, do you usually look
to other groups or departments work results and choices?

7.d *Communication* (communication and socialization)
Have you ever participate in other groups or departments discussions?

8. Trust

8.a *Time allocation* (support to effectiveness)
In your online profile, do you have the possibility
to write your further expertises or personal projects?

8.b *Teaming* (organizational services)
When there are meetings, have you the same
documentation of other participants?

8.c *Openness to Ideas* (knowledge and collaborative support)

Do you think that your ideas and, in general, your work,
get the right acknowledgement from your Organization?

8.d *Decision Making Agility* (communication and socialization)
Do you consider reliable the insights coming from the whole community?

3.3.2 Audit Evaluation and Presentation

Once defined questions, the answers can be measured with a classical scale "not agree/agree" from 1 to 5 (1 = do not agree. 2 = slightly agree. 3 = moderately agree. 4 = mostly agree. 5 = completely agree).

Combining all the values and using the average of all the data, it is possible to have a kind of cockpit that can furnish indications about the levels of the eight cultural key drivers and, furthermore, about the practical aspects of the workplace implementation.

In order to represent data in a clear way it is easy image a set of "cobweb" graphs that are able to show which is the *Wikibility* status of the workplace.

Figure 6 –Purpose of *Wikibility* cockpit (fake data)

Wikibility in Virtual Workplace

a. Support to effectiveness

b. Organizational services

c. Knowledge and collaborative support

d. Communication and socialization

Wikibility Summary
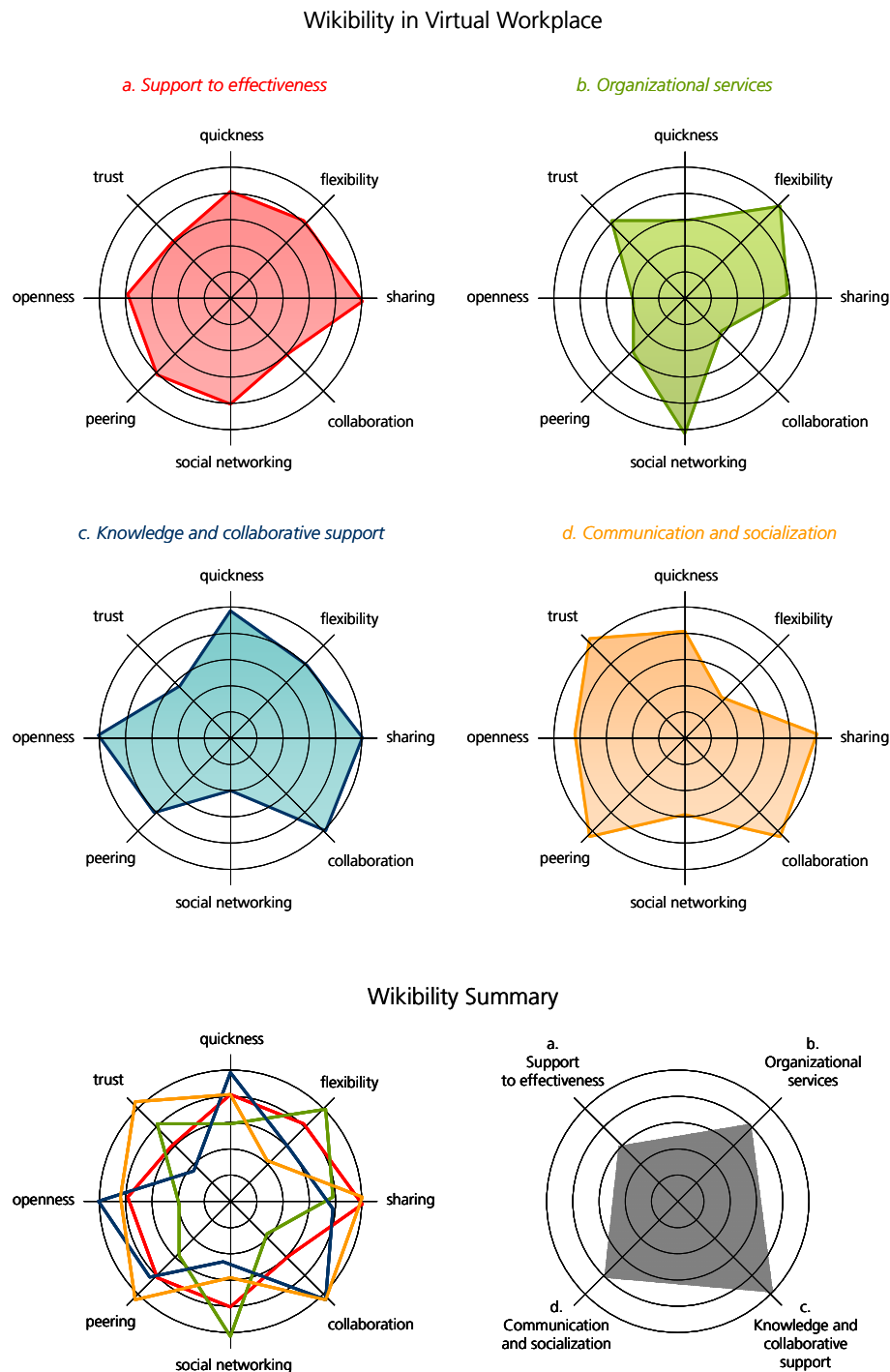
Managers can exploit the results of this cockpit in order to understand what to improve in the organizational culture – which key driver – or, for

example, if the tool is used in order to cover all its potential range of functionality (Virtual Workplace Dimensions).

In this way it is possible to verify the critical aspects aroused by this survey and – with the help of the scheme with the topics of the 32 points (table 4) – to intervene in the specific case in order to promote and communicate the right "Wikible" behaviour.

The tool that we have already seen was defined thanks to a brief research experience (interviews) conducted in a workplace where the presence of all these organizational cultural key drivers elements was expected.

Now we are going to see the successful case of Wiki adoption in this workplace (CERN in Genève) verifying the presence of an high level of Wikibility that can be exploited in order to propose further and deeper studies (validation of the previous audit tool) useful for corporate communication and knowledge managers, sponsors of this true innovative IT technology.

4   The CERN Wiki Case History

Now we are going to analyze and observe the impact of Wiki use in a particular context, the CERN community (Genève), that offers a really interesting field of research in collaborative studies.

After a short description of the Centre (4.1), we will be able to appreciate the dimension of this international Organization and the relevance of what is happening here in terms of innovation.

In this sense, we will see three of the reasons of the choice of this Organization for testing the effective presence of the cultural key drivers that we have found in the previous part of this work (4.2).

Then the CERN case history will be presented, that is useful to understand how the Wiki use can support one of the most innovative project that requires the collaboration and the coordination of thousand of people all over the world (4.3).

At the end of this part, thanks to some on-field interviews, we will be able to verify the presence of an appropriate Wiki culture into this emblematic community (4.4).

4.1   An International Organizational Workplace. The CERN

CERN is the old acronym of French *Conseil Européen pour la Recherche Nucléaire* or *European Council for Nuclear Research*, the provisional name that in 1952 moved the first step toward the *European Organization for Nuclear Research*, founded officially in 1954[102].

The strategically choice of Genève as location (though the centre crosses the France border), is due to the neutrality vocation of Switzerland that is in touch with the spirit of the Organization: the scientific research collaboration above the national interests.

During half century, CERN became the world's largest particle physics centre.[103] It is a laboratory where physicist study the nuclear sub-particle and exists primarily to provide them with the necessary tools and infrastructure in order to reach significant results. Results that have often been awarded with the maximum acknowledge that a scientist can aim: the Nobel Prize.[104]

CERN members are 20, naturally all European, but many non-European countries are involved, in different ways, in its activities.

The current *Member* States are: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, The Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland and the United Kingdom.

Member States have particular duties and privileges. They contribute to the capital and operating costs of the CERN projects and are represented in the Council. They are responsible for all important decisions about the Organization and its activities.

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[102] CERN (2006) http://public.web.cern.ch/public/Content/Chapters/AboutCERN/...

[103] CERN (2006) http://public.web.cern.ch/public/Content/Chapters/AboutCERN/...

[104] http://public.web.cern.ch/Public/Content/Chapters/AboutCERN/Achievements/...

Then there are "Observers" States (or International Organization) and Non-Member States. "Observer" role is meant to allow Non-Member States the access to produced documentation and to attend Council meeting, without taking part in the decision-making process.

Observer States and Organizations currently involved in CERN programmes are: the European Commission, India, Israel, Japan, the Russian Federation, Turkey, UNESCO and the USA.

Non-Member States currently involved in CERN programmes are: Algeria, Argentina, Armenia, Australia, Azerbaijan, Belarus, Brazil, Canada, China, Croatia, Cyprus, Estonia, Georgia, Iceland, India, Iran, Ireland, Mexico, Morocco, Pakistan, Peru, Romania, Serbia, Slovenia, South Africa, South Korea, Taiwan and Ukraine.

At the moment 220 Institutes and Universities of non-Members States use CERN's facilities. Their physicists and funding agencies of Member and non-Member States are responsible for the financing, construction and operation of the experiments on which they collaborate.

Almost the totality of CERN budget is spent on building new machines such as the famous Large Hadron Collider (LHC) accelerator project that is the actual target of the whole CERN community.

Currently, the CERN is reaching the installation and commissioning stage of the LHC project[105] that will be ultimate in the 2008.

In order to understand the dimension of the Organization, it is useful to consider that only 3552 are the CERN employee (2645 staff members and 907 with other kind of contract).

Altogether, CERN's research programme involves some 8000 researchers from over 500 institutes in 56 countries (figure 7), that if we consider the totality of the internal people involved, achieve the number of about 10.000 members spread all around the world.

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[105] Høimyr and Jones, 2007

Figure 7 – Distribution of all CERN users by nation of institute (CERN Annual Report 2006)
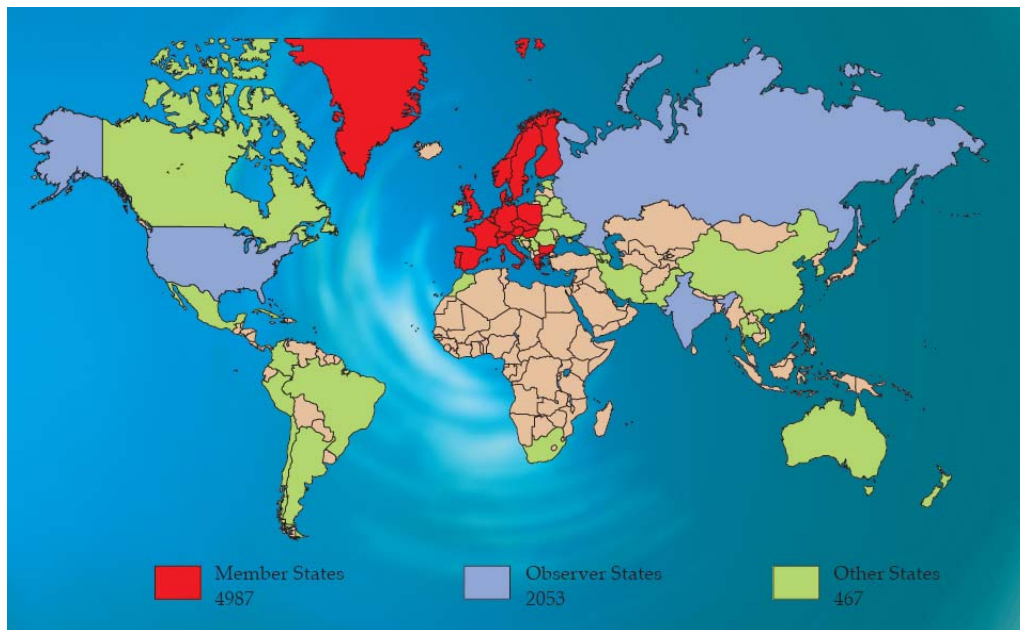
Figure 8 – CERN accelerator complex (CERN Annual Report 2006 and web site)
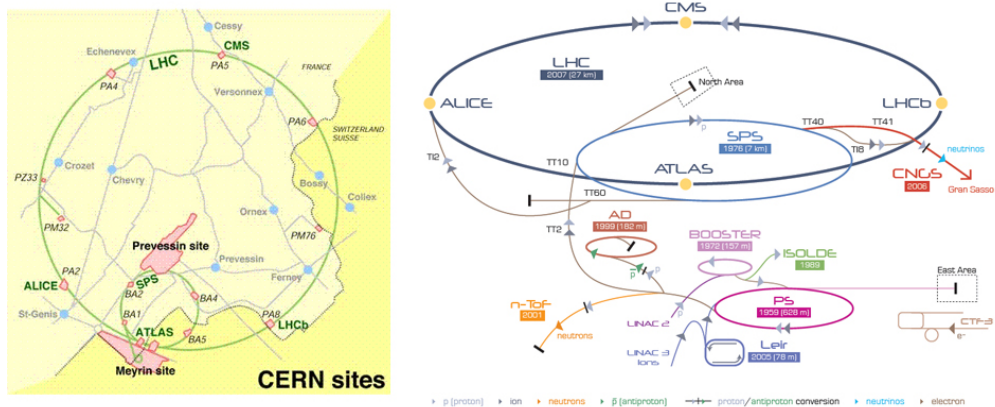
Indeed, the complexity of the CERN activities (figure 8) and experiments requires a large amount of investments that in 2006 was 1.255.762 kCHF[106].

Though the experiments that take place at CERN are about nuclear physics, the CERN community is a very heterogeneous patchwork of know-how and experts in different fields. In order to better understand the various

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[106] CERN (2006) http://preprints.cern.ch/cernrep/varia/annual_reports/...

relationships and links that there are between all the members is useful to show the organizational chart (figure 9).

Figure 9 – CERN Internal Organization (CERN Annual Report 2006)
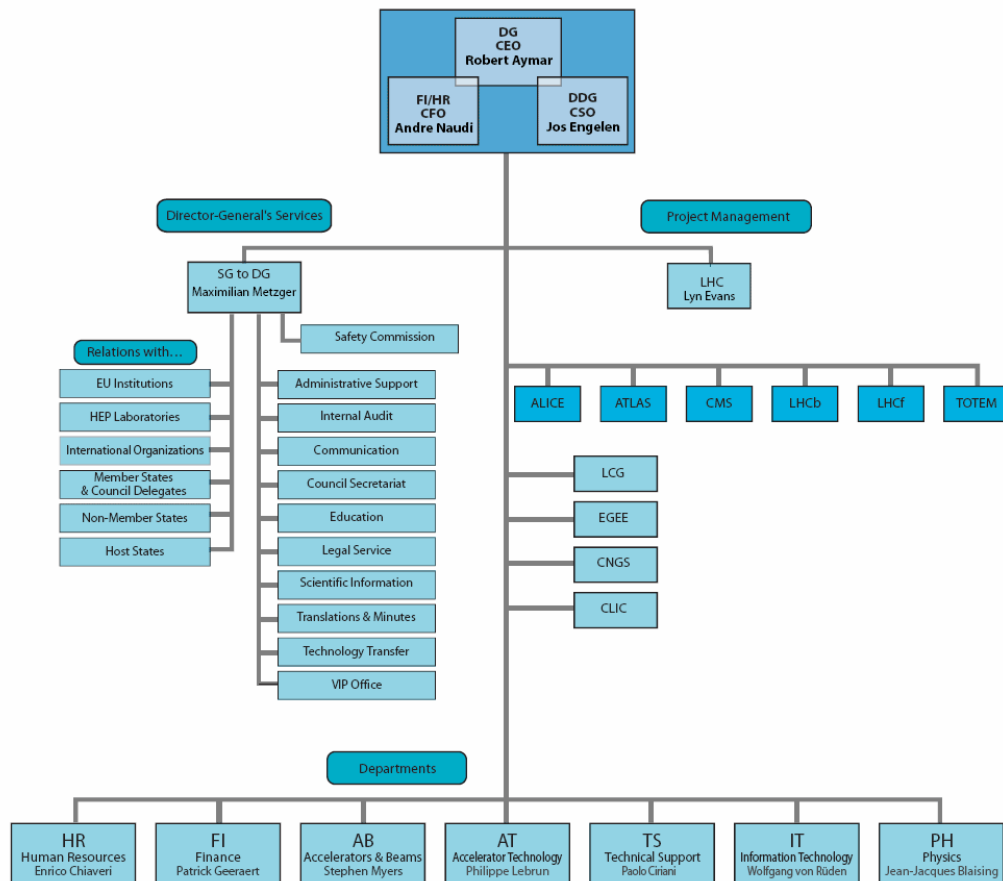
The entire structure is supported by the department that works to furnish resources and over all know-how to set up the different experiments (ALICE, ATLAS, CMS…) that will be done when the LHC project will be ready.

Each department can be considered similar to a middle-big company that is related with others in a complex network of supplier/clients relation: for example the IT (Information technology) supports all the departments for the side of ICT and works in order to solve the problem of storage data of the required experiments. Inside each department there are different groups and in each group the work is organized in teams.

If we take in consideration the international Institutes and Universities' involvement on department activities, each member of the team manage relationships - and then knowledge - exchanges with "over than forty people"[107] in different country.

The CERN can be defined as an hub of an enormous *Social Network*: for the large number of members, for the knowledge that is owned inside and for the big needs of collaboration and then of knowledge transfer, could be considered also a lab from an "unusual" point of view, useful to be studied from a sociological perspective.

In particular, for the research questions that this thesis intend to investigate, the CERN case seems to fit perfectly for the reason that we are going to explain.

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[107] Giuseppe Lo Presti – CERN IT Dep., interview

4.2   The Reasons for a CERN Wiki Case History

There are many reasons that support the CERN choice as an useful context to validate the theoretical intuition about the cultural key drivers needed in order to use Wiki in an effective way in order to produce Innovation.

One of this, the "sociological" relevance of the CERN community, was already explained in the previous paragraph.

The second is a symbolic one and is referred to the author of the first quotation of this work, in the first part of introduction: Sir Tim Berners-Lee, that in 1989 was member of the CERN community, and in order to support the knowledge sharing and the collaboration, invented, on the NeXT platform already visible on the CERN "Microcosmo" exhibition, the "Web 0.0".

> *"…The idea was not just that it should be a big browsing medium. The idea was that everybody would be putting their ideas in, as well as taking them out." -* **Tim Berners-Lee**[108]

In this sense the Web was intend as a two-way communication media to share and distribute knowledge in a democratic manner, enabling everybody to contribute.

The Web 2.0 and overall Wiki just empower users to edit pages on the Web-server and are very much in the same spirit as the original Barners-Lee Web.

Communication and collaboration, characteristic of CERN community workgroup, fosters from the beginning the use of technology in order to satisfy these needs. This make us suppose that we are researching in the right context if we want to investigate about collaborative culture.

Further, about Wiki potential, a fundamental data to consider is about the adoption of the Wiki from the CERN.

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[108] Berners-Lee, 1999, http://www.w3.org/1999/04/13-tbl.html

The 2002[109]-2003 is indicated by Pete L. Jones,[110] one of the CERN Wiki administrators, as the date of adoption of this tools.

Five years use is relatively a lot of time in order to observe and study how Wiki changed the organizational culture of the workplace. People are no more influenced by the impact with the new tool and many procedures of work are already validated by practices.

We are so sure that the first element of our construct Wiki>Innovation is useful for an appropriate study.

And what about "innovation"?

It is not difficult to assert that innovation is the "core business" of CERN. If "CERN's mission is to serve Science in conceiving, building and operating new research instruments (large accelerators), which provide particle beams to teams of physicists from all over the world organizing experiments"[111], the *Transfer Technology Group* (TT Group) transforms into "innovation" all the discovers or inventions that are arising during the main mission (LHC at the moment). TT Group mission is "to make known and available to third parties, under agreed conditions, technologies and innovations achieved in fulfilling CERN's mission in fundamental research, for the benefit of Member States".[112]

CERN produces several patents (IP) during its activity and starting from the WWW invention, it contributes to produce innovation in many field: materials, medicine, microelectronics, chemical, astronomy, etc.

We can assert that CERN is an innovation producer and for these reasons it is possible to find validation for our cultural key drivers in this particular Workplace.

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[109] External Institute used Wiki since 2002 - Finnish Grid team using TWiki to document Nordic Grid activities. https://wiki.hip.fi/twiki/bin/view/Hiptech/MeetingMinutes16Jan2002

[110] Pete L. Jones – CERN IT-DES Dep., interview

[111] http://visits.web.cern.ch/visits/guides/tools/manual/english/new_keymessages.html

[112] CERN – TT Group, 2007 - http://ttpromo.web.cern.ch/ttpromo/Home.do

4.3   A Successful Case History[113]. The Wiki Adoption at CERN

As seen before, the whole community of CERN is working in order to achieve the common objective: the Large Hardon Collider (LHC) accelerator, that - once started its activity - will be the biggest accelerator in the world.

As shown in figure 6, along the ring of 27 km (circumference), there are the LHC Experiment Detectors that – "large as cathedrals" – correspond with the experiments that physicist are conducting: ATLAS, ALICE, CMS and LHCb.

At the same time, there are the LHC Computing Grid project (LCG) born to build a worldwide computing grid that allow to make simulation and analysis of all the data that came from LHC Experiment Detectors and that physicist scattered all over the world.

Both of these two LHC linked activities require effective collaboration and documentation tools.

Formal documents (papers) such as specifications and user-guides would typically be stored in a Product Lifecycle Management (PLM) platform, further there are web-based document management applications for scientific publications, as well as conferences and meeting.

These tools are knowledge base platforms, and as we have seen in the theoretical part, as asserted by Davenport (see p.31), are not sufficient to support an effective collaboration given by the possibility to work together on the same document co-creating *new* knowledge.

PLM and web document management platforms, in fact, are not suitable for Web-pages, guides and "as you go along" documentation. A Wiki, instead, helps to capture knowledge from all the members of the workgroup, not only for people with access rights or with the skills needed to use PLM platform or html.

Since January 2002,[114] a Finnish team involved in CERN Grid activities used Wiki for theirs activities and then, in 2004, a centrally supported Wiki for

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[113] Based on Høimyr and Jones, 2007 and Pete L. Jones interview

[114] https://wiki.hip.fi/twiki/bin/view/Hiptech/MeetingMinutes16Jan2002

software project documentation was requested by the software team in the ATLAS Physics in order to increase the collaborative work quality.

> *"The request of a very simple wiki to set-up, came up in the IT department from ATLAS Experiments group…"* say **Pete L. Jones,** *"… People e-mail us* - I sought that there is a wiki on line. Is it possible to have one? *By* **word of mouth** *the request of wikis grown… Indeed, people of Institute or Organization all around the world, that already used this tool, pushed for this new way to use the web, a new way to work."*

In particular, among different Wiki implementations, supported by the Finnish experience, CERN IT department chose TWiki as open source platform: "TWiki comes well out for typical engineering and software documentation purposes".[115]

There are other platforms that are valid leading contenders of TWiki: Confluence and MediaWiki – on which is developed Wikipedia – are two of the alternative to TWiki.[116]

For this reason inside the CERN community "TWiki" is synonymous of "Wiki". Høimyr and Jones the two Wiki administrator, resume here the advantage of this collaborative platform:

> \>   **Shared** Web portal and document **workspace**;
>
> \>   Allows for **direct editing of web-pages** with **revision control**, keeping full change **history**;
>
> \>   Divided into **"Webs"**, with **local templates** for layout and look and feel, **access control** and other **preferences for each web**. (One web may be used for one project organization).
>
> \>   Really **easy to set up**, can run on standard Web-servers
>
> \>   Powerful for writing **documentation "as you go along"**
>
> \>   **Simple and un-bureaucratic** tool for e.g. "How-to", developer notes and discussions
>
> \>   Possible to use **knowledge database for FAQs**

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[115] Høimyr and Jones, 2007

[116] For other Wiki implementations and their capabilities see http://www.wikimatrix.org

The CERN TWiki portal[117] (figure 10) contains numerous "webs", a kind of sub-Wiki: there are webs for LHC detector collaboration, IT-projects and support groups as well as control systems, some are used as internal documentation workspaces and keep the default layout, while others have been customized to a different Web-layout for the particular project or group.

Figure 10 – The CERN TWiki portal
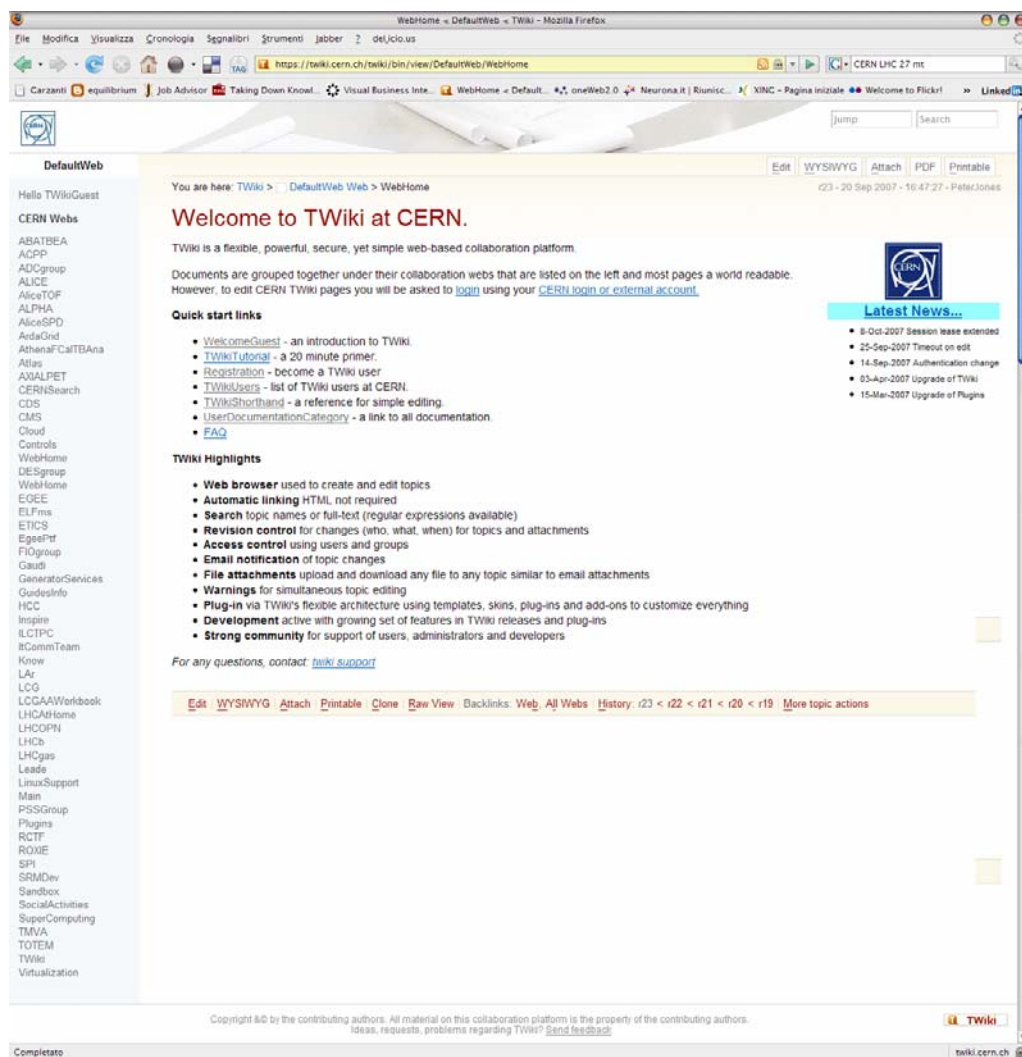
The CERN TWiki has also one peculiarity, that for the two Wiki administrators (Høimyr and Jones) is implicit but from the organizational culture perspective is

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[117] https://twiki.cern.ch/twiki/bin/view/DefaultWeb/WebHome

relevant: the Wiki is open to external users, only deeper levels requires the CERN authentication. This characteristic is due to the openness of CERN community to all the international Institutions, University and Organization that with theirs researcher and experts constitute a global "social network".

4.3.1   Use of Wiki in ATLAS Experiment Detector

ATLAS is one of the four main LHC experiments. In this project are involved 164 institutions in 35 countries including more than 1900 scientific authors. The ATLAS software community works in order to develop analysis and simulation software that make possible to physics the data handling.

Wiki is used to document software modules, test procedures, user and installation guide: physicist adapt Wiki for the "inner detector", others ATLAS team document in this way procedures and operations.

Wiki pages are so used as a space for shared project documentation, linking this to engineering specifications, drawings and CAD-models of the PLM platform for the detector groups. At the moment ATLAS Wiki collect 4000 topics (web pages).

The dimension of ATLAS projects dawn a data quality issues linked with the "free for all" aspects of the Wiki. To solve this kind of problem and ensure quality control on the information in the ATLAS Wiki pages, all the pages and the up-date had to be checked and validated by a *central documentation team* that mark the pages with a kind of quality tag.

Summing up, the ATLAS community learned to integrate in an complementary way the Wiki collaborative style and the traditional knowledge management tools (PLM and web-based document management system).

4.3.2   Wiki use for the Firewall and network management project

The second case of CERN Wiki adoption, is linked with the Grid project: the LHC Computing Grid ensure an easy way to share data, information and knowledge between the Genève Centre and remote physics institutes and organizations.

The re-design of the whole network infrastructure and then the design of an ad hoc Firewall infrastructure required an intensive activity of documentation process. The project, launched in 2006 and put into production in 2007, utilizes the Wiki previously employed by the Communication System group – responsible for Network Infrastructure at CERN – as document software development.

The Wiki document workspace was therefore a natural environment to start collaborating on the Firewall requirements and specification.

In this case the Wiki user community for this particular project considered 11 stakeholders: 8 contributors from the project team and 3 from the "customer" side. Furthermore other people were granted read access for information.

In their paper, Høimyr and Jones explain the value of Wiki use for this new project: "… From the Wiki page with the original project outline and user requirements, the TWiki workspace spawned a complete set of firewall documentation, from a description of the system architecture and documentation of software modules and components, to user guides for system administrators and operators. This documentation is kept up to date also now after the new firewall has been put into production. (The main Wiki page for the firewall project currently has 75 revisions.)"

Indeed, a further use of Wiki in the group, was the preparation, with initial draft, of a conference paper about High Throughput Firewalls for the TERENA networking conference.

4.3.3   CERN Considerations on Wiki Use

The two CERN Wiki administrators formulate interesting conclusions[118] for the two cases that we have already seen.

The main use of Wiki is linked with the huge documentation that daily the community produces. In this sense, Wiki improves communication and knowledge capture.

Thanks to the open approach and simplicity of use, Wiki usage grows organically among the entire community. Compared to the older and already used knowledge management systems – PLM or web-based knowledge base platforms – people start to use "TWiki" without needs for training session or system coaching.

Indeed, the global dimension of CERN community and the numerous interconnections with other international organizations, make of it the perfect medium to share – and easily to up-to-date – documentation and knowledge through the internet, generating a great value for the whole network.

An emergent tricky point is the possible chaos towards the Wiki's open approach can lead: Høimyr and Jones recommend to define before a clear and exact core scope of the Wiki and to enforce some structure to keep information in the right place, proposing the figure of a "gardener" – using Wiki language – in charge of the maintenance of the project documentation, ensuring the contributes validity.

Further, remembering that "web is about linking knowledge", the two CERN experts explain that web documents and notes should contain links to PDM/PLM or similar in order to produce data and documents under configuration control.

At the end of the day, the CERN experience brings to argue that "a good combination of configuration management and knowledge capture may be to

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[118] Høimyr and Jones, 2007, p. 4

baseline product versions and allow for free editing and revisioning of *supplementary* information and documents attached to the formally managed baseline".

From our point of view the Wiki use in CERN can be further developed: not only with a closer integration with previous knowledge management technology, but also with the other possibility that *conversational knowledge management* typical of Enterprise 2.0 and social networking offers:

> *The place where wikis really shine is in developing, mining, and sharing group intelligence. While wikis are in the spotlight right now, alongside other social computing tools like blogs, shared bookmarks, and social networking, wikis are not in and of themselves an independent software category. Wiki functionality is becoming part of enterprise collaboration platforms and enterprise content management suites — and in the future just another feature of Information Workplace platforms. - **Erica Driver - Forrester**[119]*

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[119] Driver, 2007, p. 12

4.4   The Wiki Culture at CERN

In order to investigate the attitude that the members of the CERN community assume towards Wiki use, we can show how a mature context – where the possible initial euphoria for the new tools is now irrelevant – is changed or how the new tool influenced the regress organizational culture.

As seen before, the first Wiki adoption experiment dates back to 2002-2003, thanks to its previous use in groups of other institute or organization. The *word of mouth* referred by Jones in the previous pages (see p. 76), brought in 2005 to generalized and at the same time organized and intensive spread employ of Wiki in this large heterogeneous environment.

The interviewed users (CERN centre in Genève – 8-12 October 2007), chosen within two departments – Physics and IT – but all part of different groups (and experiments), confirmed that the relationship with Wiki inside the CERN community is very complex and not all the group uses it.

"When I arrived in CERN Wiki was not used, I did not know what Wiki was, but then, the tool became a known tool inside our [CERN] community and other groups starting to use it. In our group, we do not use yet this kind of tool because we are using other tools for the documenting process" (A.C. - PH ALICE, fellow), all the other users interviewed confirmed the intensive introduction of Wiki in their daily job: "I use Wiki almost every day, for reading and writing documents, as a memo and to consult notes and checklists" (I.S. PH CMS, staff)

In all the Wiki users the needs that the tools seem to satisfy is linked mainly with documentation, but as seen before, it is recognized also an organizational function that simplify and support the daily activities.

The perceived value of Wiki is in the easiness of the publishing system and in the simplification of the traditional (draft) documentation repository: "…It is quicker and simple than the html if you want to publish something on the web" (A.D.S. PH ATLAS, fellow) and more: "It is a sure place where to find your draft documents. Indeed, this *way to work* reduced the e-mail charge!" (I.S. PH CMS,

staff). In particular, in these words – *way to work* – there is the consciousness that this tool changed the cultural side of the organization.

Further, these words prove what Jones argue "Wiki influenced in a very positive way the quality and the effectiveness of people work: they share ideas and permit the collaboration on informal documents such minutes – that can be seen and check practically in real time – in order to release daily up-to-dated documentations".

The aspect of production of documentation is very presents: "… Using Wiki, I increased dramatically the quantity – and I think also the quality – of documentations production: in IT started to use Wiki in January 2006 for documenting the installation procedures of our software" (G.L.P. IT FIO, staff).

Considering this point of view, one valid parameter to measure effectiveness of a Wiki – in order to produce innovation, can be the number of Wiki topics (Wiki pages) published.

The statistics of CERN TWiki (figure 9) show the dramatic increments of Wiki use during last year (May 06 – September 07): analyzing only the topics number, we can argue that in one year the document production achieved the number of 27,345; in July 2007 – probably during an experiment – the "monthly topic views" reach 1.8 M (1,793,646).

Figure 11 – The CERN TWiki statistics – CERN (https://twiki.cern.ch/twiki/bin/view/Main/CERNTWikiStatistics)
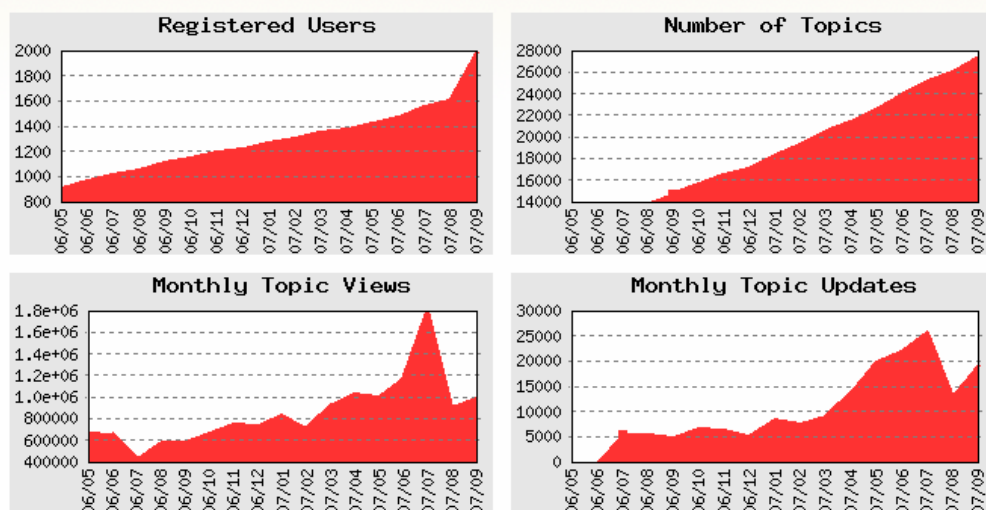
The level of successful of the Wiki at CERN is linked also to the traffic that a platform like this is able to generate: every day people read and contribute to the Wiki grow: the "registered users", the active users, are now more than 2000 able to generate (in July 2007) a production of 25,556 pages (updates).

Changing perspective to investigate the relationship aspect of the CERN Wiki adoption, users are differently involved: "the communication is improved" (A.D.S PH ATLAS, fellow); "the reduction of human contact is balanced by the autonomy in finding information without the needs to ask to others" (I.S. PH CMS, staff); "In our office is not yet considered useful: we use other communication tools" (A.C. PH ALICE, fellow); "…Effectively, the use of Wiki slims the workflow, but nothing of significant: the investment not support the benefits…" but also, "[…] It is great when you are able to share knowledge, but in an experiment documentation is not so relevant… it was a tool willed by the top…" (F.Z. PH ATLAS, fellow); "I'm sure, now I can see what other groups are doing and ask directly to a peer information: yes, the horizontal communication is improved!" (G.L.P. IT FIO, staff).

Collecting these witness, are able to understand that the approach to the new technology is important. In some cases, for example at fellow level - also if at the end the value is acknowledged - the Wiki is something that others (management) impose; in other case we can notice a different approach to the technology between physicists and IT experts: both admit the communication and knowledge sharing, but in IT department this is lived also as an *opportunity to contact people* instead of something that reduce the *human contact*.

Asked to sort in order of importance the cultural key drivers that we have find in the theoretical part of this dissertation (*quickness, flexibility, sharing, collaboration, social networking, peering, openness* and *trust*), Pete Jones identifies the main three key drivers: *collaboration, sharing* and *quickness*.

But the "TWiki" of the CERN satisfies also another point: the *openness*. The Wiki site – excluding some privates areas – is, in fact, totally accessible from

the extern of CERN network by a common web-browser: in accordance with Jones data, 95% of Wiki visits came from outside the CERN network and became without a login access.

4.4.1   The Wikibility Auditing Tool at CERN

The CERN experience, was not useful in order to validate the tool seen in the previous part: the number of people interviewed and the short time at disposal for this particular research are not sufficient in order to assure a relevant importance to the *Wikibility* Audit that remains only a purpose.

Anyway, the CERN situation helps us to define better and to check whether the terminology and the sense of the survey's questions are feasible and possible.

Indeed, when the 32 questions of the survey were submitted to the five "users" that I interviewed, all the answers were positive, fitting perfectly with the original hypothesis that the CERN is a context with an higher level of *Wikibility*.

The interesting aspect of the research shows how *Wikibility* is not linked to what Wiki does in a workplace, but is strictly connected with *the way in which things are done* and than with organizational culture.

How we have seen before, the TWiki CERN system, is used essentially as documenting activities support, covering only part of *Wikibility* parameters. The other aspects related to *Wikibility*, assuring a high level of this, are covered by others social and "2.0" tools.

This gives another insight to Wiki use in workplaces: Wiki can be used in a right way in order to improve or support the only not yet *Wikible* aspects of workplace organizational culture .

5   Conclusions

Summing-up the topic (5.1), we will stress on what Enterprise 2.0 phenomenon is and how Wiki, in particular, is influencing the "way in which things are done" in workplaces, thus focusing on how organizational culture is changing.

The purpose audit tool that we have defined thanks to the CERN experience is, in fact, built in order to furnish to enterprises (5.2) an effective instrument to verify what we called *Wikibility* – referring to the context – so important in these last years that – as the majors experts and research companies and institutes pointed out – it is characterizing the present of workplaces knowledge processes, representing a dramatic shift from the traditional knowledge management systems.

Of course, as we will see (5.3), this research intends to propose just a personal and not yet validated manner to assure a right adoption of Wiki inside an organizational context.

Anyway, a contribute to a scientific validation of the audit here proposed may be given from further studies and structured empirical researches in this direction, promoting systematic survey activities in order to measure the *Wikibility* level in different workplaces and – more in general – in different contexts.

5.1   From "2.0" to *Wikibility*. Summary

We have started this dissertation with the words of the Web inventor Tim Berners-Lee who, satisfying the needs of collaboration of scientists at CERN, created a "place" where "everybody would be putting their ideas in, as well as taking them out"[120]. This was the original spirit of the web, a "simple" collaborative tool.

This spirit is recently risen again with the name of Web 2.0 thanks to a new democratic "for dummies" approach that opens the Web contribution possibilities to a huge number of *no-nerds* people.

If Web 1.0 was a simple on-line .html pages catalogue, simply browsed by the large publics, and for this reason – following the Ross Mayfield's metaphor (see p.5) – it was about "nouns", Web 2.0 is about "verbs", in the sense that for the first time it is not only a media to sustain, but a "tool" where people can participate, contribute and influence in an active way the (social) network in which they are integrated.

Shifting from the concept of Web – as a general concept – to the impact of what this new paradigm can imply in a Enterprise context, Wiki opens infinite possibilities and opportunities to a new real "cultural" season that influence the way to work and supports a relevant shift from "cooperation" to an effective "collaboration".

In this context we are able to participate to an actual debate that at present involves majors experts in knowledge management regarding the way in which Enterprise 2.0 and Wiki are really influencing aspects of organizational culture.

One of the points in which they agree is that knowledge management – traditionally supported by *cooperative* platforms workgroup tools – is evolving, being now supported by the *collaborative* approach offered by this new Enterprise 2.0 tools (blog, Wiki, social networking platforms…) that permit not just a

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[120] Berners-Lee, 1999, http://www.w3.org/1999/04/13-tbl.html

knowledge "stocking" or the sum of previous information but a true creation and circulation of new knowledge.

In order to support a practical approach to the issue of Wiki adoption in workplaces, we concentrated our attention on the effects of this IT investment on the main actual competitive advantage enabler for enterprise: the innovation rate.

At this point, we have introduced the two extremities of the construct: corporate Wiki and innovation rate. But considering Wiki merely as an instrument, a tool that offer many opportunities but that required a particular organizational cultural approach, can be useful to investigate about these "cultural key drivers" assuring an optimized use of Wiki in order to guarantee an effective innovation oriented vocation of the (virtual) workplace.

Crossing Wiki potentials with workplaces and enablers that encourage an appreciable innovation rate in an enterprise, we were able to find and propose eight "cultural key drivers": *quickness, flexibility, sharing, collaboration, social networking, peering, openness* and *trust*.

In order to verify the effective presence of this "cultural key drivers" – exploiting my personal social network – I had the opportunity to taste the field in one of the most important "collaborative context" of the world, the CERN centre in Genève, the very place where in 1989 Web was born right in order to support collaboration.

The CERN is born in '50s in order to support experiments of physics of international interest and at the moment consists of 10.000 persons from all over the world, such representing one of the biggest and active professional social network that – for this reason – can be considered relevant not only for the experiments that they are preparing (LHC), but at the same time also for social studies, also in the field of knowledge management and organization.

The two CERN episodes proposed in the fourth chapter of this work, show that the experience of Wiki use in a organizational environment is not a recent fact, but it dates back 2002, thanks to the use of this innovative tool in

other Institutes connected with Genève community, by a effective word of mouth, pushed for a centralized Wiki system (2004). Is not difficult to understand that such an intensive use of Wiki and such a good try out tool is already able to produce significant effects or potentials on the workplace way of working (organizational culture).

From the other side, during these years of activities, innovation was one of the products of the CERN: the Technology Transfer group manage patents derived by the resolution of technical problem during the construction of CERN main machinery. New materials, new discovers and invention exploited in medical field, new storage techniques of information in the IT fields, represents only a little part of innovation vocation of CERN community.

Thanks to experts (Pete L. Jones) and to a small pool of active members of CERN community – also Wiki users – it was possible to check and collect opinions and different approach on Wiki adoption inside the CERN and, even if not significantly relevant from a research validity point of view, they helped us to define a purpose for an audit tool to measure the *Wikibility* level of the workplace.

Focusing on the *Wikibility* audit tool, defined in the third part, it is interesting to point out how it derives from the crossing between the eight "cultural key drivers", previously seen, and the four dimension of the virtual workplace defined in the theoretical part by the Politecnico of Milan (see p.29).

In this way words such as *flexibility, peering, trust, collaboration,* and so on, assume practical connotation in each one of the four dimension: *supporting effectiveness, organizational service, Knowledge and collaborative activities* and *communication and socialization.*

The result is an interesting "cockpit" at disposal of managers intending to verify – before or after the setting up of a corporate Wiki system – whether the present culture effectively supports all the possibilities in which Wiki can be successful used, as we will show in the following paragraph.

5.2   The Importance of *Wikibility* of an Innovation Oriented Workplace. Enterprises Implications

As is easy observable by the bibliography of this thesis, the adoption of "2.0" applications inside the workplaces and, more in general, in enterprises or organizations, is a living matter that interests the life of workers and in specific the activities of those Davenport called "knowledge workers".

From Institutions (also academic ones, like Universities) to middle small commercial companies, this revolution will touch the way of working and go over the old way of working with others that will be more and more important in the future.

At the same time, in the prospective to achieve ever more competitive advantages, as we have already seen, it is important to adopt policy of differentiation respect old and new competitors that bring the only way to be competitive on the floor of innovation.

We have deeply analyzed – in the theory part of this work – the possibilities and the opportunities given by this new IT technology in order to promote an effectively collaborative workplace and for this reason, it is difficult to find authors that do not recognize Wiki as an useful tool able to support collaboration producing new knowledge and then innovation. All the critics, in fact, are related to an erroneous connection with the most famous application of Wiki: Wikipedia. But this is the fruit of a superficial analysis of the context in which Wiki systems can be used in a circumscribed environment, often identified with intranet boundaries.

From the other side, the whole thesis is a kind of "critics" against the exceedingly enthusiastic voices that think that installing Wiki in any workplace brings to extraordinary results only because it is a "cool" tool on which a trendy company or organization has – definitely – to invest.

As stressed in the answers to the research questions, *it is not sufficient to install a Wiki platform in an organization in order to make it work to produce new knowledge and then innovation.*

This position is not only supported by common sense, but also by the fact that – as we have seen widely in the theory part – Wiki is not just a technology, but a true philosophical way of intending work.

Analyzing from a practical point of view the contribution that this dissertation and the insights discussed here, we can find a possible help for particular "open minded" managements willing to introduce Wiki and Enterprise 2.0 technologies in a successful way.

The *Wikibility* cockpit, in fact, can be used in different cases: for instance, if a Wiki is already adopted and we can use it to know if it is working in a effective way or not, and in this case which behaviours to change, how to communicate a right Wiki approach and if there are *Wikibility* aspects already covered by others tools, towards which direction is opportune that Wiki use will be pushed.

Our case study shows how high is the level of *Wikibility* at CERN, as previously supposed and supported by the few considerations on the Audit tool here proposed. But, as our interviews on Wiki use pointed out, it covers all the dimensions of *Knowledge and collaborative activities* because it is mainly used for documenting activities. As for the other dimensions, the community is already covered by others software tool that for instance support people in meeting arrangements (IndiCo) or in the sharing of internal resources in an autonomous way.

If we look up *Wikibility* on Google, we will find this term referred to issues linked to "Disability" Rights Movement[121] or, closer to our topics, we can find the abstract of a paper on *Wikibility* referring to "Developing 'wikibility' – a

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[121] http://www.wikibilityrights.com/wiki/index.php?title=Main_Page

multi-dimensional approach to achieving critical mass for building informal repositories"[122] and therefore it refers exclusively to content management aspects.

In this sense *Wikibility* is not linked to the context, that is with human being or behaviours. The conception of *Wikibility* we have studied, instead, is much larger than this, and oriented to be a step before the pure academic e-learning approach of Churchill and Dence.

In this way we intend to support a clear understanding towards an effective way of working, in order to discover a new impulse for an effective collaborative approach that will create new knowledge and, in consequence, innovation.

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[122] Churchill and Dence, 2006

5.3   The *Wikibility* Audit: Proposal for Further Studies.
          Open Questions

One of the scopes of this thesis is to promote a serious debate on the issue of how a fertile organizational culture can activate a virtuous circle where technologies that change the way of working can found a prepared soil for an effective cultural growth.

The initial debate between the two gurus and Harvard professors, Tom Davenport and Andrew McAfee (see p.21) about the effective change of organizational culture brought by Wiki adoption – even if contemporary and alive – from the point of view of this work is now already outdated.

In fact, considering that, at the base of this assertion the main objective of a healthy organization is "to be competitive" – and more precisely "to be innovative" – the question can be faced in a proactive way and identified with the idea of *Wikibility* in the context where Wiki are introduced.

As we have often said, the definition of the eight "cultural key drivers" and the *Wikibility* Audit – the main results of this work – are both supported by theory, and obtained by personal intuition. In particular, for the survey proposed with the *Wikibility* Audit tool – available in a operative realise in the exhibit at the end of this thesis – we considered the few interviews at CERN .

The *Wikibility* of Innovation Oriented Workplaces Audit is just a proposal, and has to be intend as a starting point for designing and validating a formal measurement tool, that can be considered reliable thanks to a wide population of enterprise or organization workers.

Further studies in this sense are welcomed in order to guarantee an important referring point for the future literature willing to study how Enterprise 2.0 is going to develop the new organizational culture of innovation oriented workplaces.

Exhibit "a"

Proposal for the

"Wikibility of Innovation Oriented Workplaces Audit" (WIOWA)

Cultural Key driver	Questions	agree 1 - 5
1. Quickness	Do you find up-to-dated data useful for your daily work?	
	Regarding to booking common resources, Is it possible to make it by yourself?	
	Do you find in an easy way and quickly up-to-dated information – or knowledge-owner – useful for your work?	
	Do you find up-to-dated information about organizational activities?	
2. Flexibility	Are you free to dedicate a percentage of your time to your own projects?	
	Is it possible to get information about the whole project work progress and direction?	
	Is it possible to re-configure and handle others' contributes?	
	Are you active in different teams?	
3. Sharing	Are the common resources accessible to all and can these be booked in an autonomous way?	
	Is it possible to access or find results and insights inside and outside the community?	
	Is it usual to implement others' work or co-create documents?	
	Is the real time circulation of ideas among the community supported?	
4. Collaboration	Do you know which people are involved in your same projects?	
	In your team, are individuals plans often compatible with the group activity?	
	Is it usual to participate to other group projects?	
	Is it usual to discuss with others about their work, solving problems together?	

5. Social Networking	Is it easy to identify an expert in the whole community?
	Are members of teams able to know all the competences and expertises of co-workers?
	When the group has to take a decision, it is usual to ask opinion to experts inside the whole community?
	Are individuals insights visible to the whole community?

6. Peering	Is everybody able to update useful information like telephone numbers or scheduled meeting?
	Is everybody able to book meeting room or, in general, common resources?
	Is everybody able to recombine documents and then publish it?
	Is everybody free to publish (in the intranet or wiki) information useful for your colleagues?

7. Openness	Is it possible to access to other group contact data?
	Is it possible to know when other groups meet and, if you want, participate?
	In order to take decisions, do you usually look to other groups or departments work results and choices?
	Have you ever participate in other groups or departments discussions?

8. Trust	In your online profile, do you have the possibility to write your further expertises or personal projects?
	When there are meetings, have you the same documentation of other participants?
	Do you think that your ideas and, in general, your work, get the right acknowledgement from your Organization?
	Do you consider reliable the insights coming from the whole community?

Avarage for Virtual Workplaces Dimensions (Total/8)	a. Suppor to Effectiveness:
	b. Organizational Services:
	c. Knowledge and Collaborative Support
	d. Communication and Socialization

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