The new communication methods into scientific arena.

The development and use of computer-mediated-communication (CMC) is a model of teaching and learning that has grown considerably in recent years and in science is used when participants in debate are involved in an interaction dislocated in time and space.

The CMC has potential to encourage the active construction of knowledge among peers working remote [Holliman and Scanlon, 2006].

Inside the typology of instruments that describes the computer-mediated-communication there are some tools that are widely spread in science, these include videoconferencing, folksonomy, blogs and social networks.

• Videoconferencing.

The videoconferencing was been designed to extend the power of face to face communication, and is used especially in the early stages of research and feedback to increase chances of a productive learning at distance.

Scientific communication uses videoconferencing in different ways depending on purposes and involved actors. Scientists have several software to maintain direct communication with colleagues or with head of research, and conferences can be created with a different level of formality and extent, for example, there are "Cafe conference" that convey informal discussions, other conferences that involve small people groups (research group), others that are open to whole classes of study or research areas. Point in common is "almost synchronicity"

Almost synchronicity means that, those interested in a video conference do not necessarily have to be online to view the speech, nor must be connected for all duration of the debate. In fact, scientists can view records at their discretion, and they can access and respond to texts and comments of other participants when they prefer. This almost synchronic approach, reorders the normal pattern of take the floor typical of normal conference or face to face communication, and allows coexistence of multiple and contemporary lines of discussion [Ibid. 2006].

A study that monitored use of video conferencing adopted by a course of study [Holliman and Scanlon, 2006], has showed that some factors are particularly influential in success of a videoconference and has described what benefits this tool may lead inside of a scientific community.
The first factor to check is that during videoconferencing must exist a balance between two groups, that we can label active participants and passive participants. The first one is composed by those that initiate discussions, brings messages and comments, and ensures existence of the second one, components of which have followed the discussion only listening and / or reading comments left by others.

The research shows that the presence of a passive group, not interferes or limits activity of the active one. Moreover read or follow videoconferences not actively participating, encourages tacit cooperation of most reluctant to become directly involved.

The tacit collaboration beside the explicit cooperation is indicative of the development of a learning community on-line, in which scientists become responsible for their own learning but also supports community in general.

A second important factor in videoconferencing is the role assumed by the figures of conference moderator and of coordinator of the research, especially when functions are facilitating and distribution of tasks and activities, and promoting greater discussion among members of the group. The video conferencing encourage true collaboration among colleagues, especially through advices, comments and responses exchanged between scientists. These are also encouraged to criticize each other's work, to re-examine together individual contributions, to analyze and test their method of cooperation, and through this to make improvements to the final work.

Finally, an essential precondition to get positive results in collaboration and communication through videoconferencing is to provide researchers an agreed set of meanings and knowledge that can be used during the discussion. Also they must have sufficient knowledge of the instrument used, and they must belong to the same technological area, and analytical skills base [Ibid. 2006].

- Folksonomy.

Another fundamental scientific activity is taking on new meanings and forms with Internet advent and especially Web 2.0. This activity is indexing of documents. If before contents had been ordering and labeling by a small number of experts following the dictates of taxonomy, today all those who access web, can index documents without following any specific way, but using only personal keywords. In this "popular indexing", actually called folksonomy, where user has an active role in transmission of information.
As Alvin Toffler has predicted, the Internet user today has become a "prosumer", and on tasks of indexing and classifications this trend is manifested through use/creation of folksonomy. Coherently with idea of collaboration of Web 2.0, the reader has opportunity to enrich consulted documents writing comments suggesting other references and, if necessary, proposing criticisms and improvements.

This new interpretation of communication and indexing of scientific knowledge is taken and supported by some recent 2.0 projects, as citeULike23 or Connotea24, that are virtual databases, alternative to traditional scientific databases that are not yet part of the folksonomy model. In traditional databases, the user, or the scientist who reads, uses and interacts with available literature in a passive way (limited to role of consumer). Using common databases, the user for participate actively in improvement and growth of scientific knowledge (becoming a producer), has only two main options

- Use informal channels (personal communication).
- Prepare a critical article and publish it through formal channels (like scientific journals).

The first one is feasible, but has a power and limited value, the second one presents an inconvenience: completion time is too long. The solution proposed by proponents of Web 2.0 wants formalize informal channels, or use folksonomy to transform the reader scientist, into a scientist "prosumer". The scientific databases are part of formal system of scientific communication, would be useful to improve today databases, use labels created by users.

The label (tag) created by the user can be retraced by anyone, stays beside (not on) to that created by field expert, and stays next to the label resulting from the citations, and with a simple tag you can get many benefits [Stock 2007]:

a) The terms used to label, usually are taken from authentic daily language used inside scientific community, and this helps to understand and learn new words and new scientific terms.

b) Each document can be associated with more than one label, making possible multiple interpretations from different disciplines or different schools, this can also act as a quality control: a document that receives a lot of tags, is synonymous of a high number of players capable to check validity of the content and note any anomalies.
c) If we intend documents, labels and users as nodes in a network, it is easy to identify various scientific communities who share the same interests and interpretations.

But inside this simple and cheap method of organizing scientific knowledge there are also evident gaps, including lack of precision:

a) In modern databases that allow to tag, labels are expressed in different forms, names in the singular, or plural, abbreviations, acronyms, dialectal forms, and since anyone can assign a tag to the same document we can frequently found terms in different languages for the same item.

b) There is also no control over meaning of terms, whether they are synonyms, homonyms are not removed.

c) Users that use tag, act in different environments, have different skills and different motivations. So they haven't in common a basic methodology for indexing. Most of labels explains the topic of document, but in some cases the tag describes the kind of document (book, article, review etc.), or gives a judgment (general, specific, incomplete etc., or indicates an intention (to be read, already seen).

Despite limitations described above, from folksonomy can derive a good classification criterion, able to formalize the informal part of scientific communication and overcome, in part, problem of "information overflow" in formal communication of science.

Because of possible inaccuracies, however, is not recommended (for now) to work in a professional environment using only folksonomy as a method of organization of the content, but at the moment when this mode should be used in combination with other more formal methods to index, can become a valuable resource in terms of cognition and of content.

- Blog.

As previously affirmed, the term 2.0 is commonly associated with Web applications that facilitate information sharing, interoperability, user-centered design and collaboration within Network. The advent of blogs and simplification of procedures for construction of websites, meant that each user in a few simple steps could reach millions of people in a very short period.

The old model of production and consumption of information conveyed by Web, has been completely transformed in recent years. The use of Web as a source of
information displayed, contained in web pages static and predefined, has been replaced by a model that allows the user to publish their content through blogs, vlogs, wikis, or share them on sites sharing photos or video [Babu and Gopalaswamy 2011].

People collaborates, discuss, forms online communities and shares data and content, researchers use services derived from multiple sources in order to create personalized experiences and applications on a personal basis.

Commonly and collectively called Web 2.0, this new place of sharing contents, this new arena of discussion and collaboration has transformed the consumer of web.

Symbolic instrument of this revolution is the blog. In the same way as other services related to web 2.0, the blog gets more attention from the scientific arena, especially if you use this as a useful platform for sharing knowledge management in collaborative work environments. As showed by Luca De Biase blogs and sites are beneficial to scientific communication as:

- Expose any manipulation of communication.
- Make it more interesting and attractive science.
- Change the way of science communication.
- It gives you the ability to write to many people, independently, gaining audience and a good level of confidence.

Several studies show how researchers are highly motivated to use blogs for learning purposes, and are mostly attracted by opportunity to share knowledge and to express and enhance their creativity. Looking the five most popular science microblog on Twitter [Bucchi and Pellegrini 2011, 137] we can see that blogs of individual scientists, research institutions and newspapers today have millions of follower, which appear to be increasing.

The blog is described by many scientists as a catalyst for creativity in research work. Informal enough, conveys an alternative academic content, challenging and relevant socially, that can overcome academic and disciplinary barriers, collecting new and innovative contributions.

Sandra Ordonez, expert in community management, for example, has created Ourblook26, which is an online forum to exchange planned research, information and conversations about latest global and national issues, with final goal to collect opinions from experts and to start discussions and debates, in hope that, working together they can find tomorrow solutions.
Use the shape of blook (blog + book), is useful in creating a tool bridge between the blog and the book, and it wants to combine the flexibility and accessibility of Web, with strength of traditional means of publication of the book, focused on documentation and bibliography.

The technologies offered by web 2.0, turn away scientists from their activities of reader and turn them in actors with a role in process of science communication [Bucchi 2010 (b)]. Furthermore scientific blogs foster opportunities for scientists to link other colleagues and researchers and to become part of professional work areas related to scientific communication scientific, such as education and politics [Babu and Gopalaswamy 2011].

Many of these interactions that are started on blogs, frequently turn into face to face communication or initiate fruitful collaborations and valuable friendships. Today, with the emergence of open and accessible Web 2.0 tools, science communication is instantaneous and fast. The best example is 3quarksdaily (3QD). 3quarksdaily is a modern tool that takes the shape of a blog, is ideal for entertaining and fast communications. This site collects the most interesting topics recovered daily in the web site, about science, design, literature, art etc.

3QD can be interpreted as a blog that acts as a filter, which supports the view of more than 50 experts, among which we find authors, scientists, journalists, who are anxious to select and classify the news from all over the world.

Another example of how science interacts with Web 2.0 blogs is Scienceblogs, portal in which have gathered more than 80 scientists, bloggers, selected not on basis of publications or citations, but rather on their originality, insight, talent, and dedication, and daily the staff evaluates proposals to enrich and enter into constructive discussions inside the portal.

• Social network

Another way of sharing and dissemination of information, strongly facilitated from arrival of internet is the social network.

It’s time that science labs have discovered potential of this cross-linked structure, and with beginning of the technological revolution, concept of social networks has been transposed within computer, creating computer supported social networks or CSSNs.

Today several American universities have already use federal funding to create a professional network based on Facebook style in order to connect researchers across the country who are concerned with the same issues, and by some years we can find
foundations and research institutes that have decided to use networking tools as catalysts for internal communication between colleagues or between external institutions [Bitter and Muller 2011].

Make easier for scientists the task of creating, or locate a "invisible college" as refer, means improve quality of research in progress, build more partnerships and provide stimulation and constructive comparisons in order to arrive at new discoveries, ideas and approaches .

Scientists, now more than ever, have logistical problems to meet their colleagues. Due to increasing specialization of disciplines, enlargement of the complexity of research themes, multiplication of means of communication available to scientific community, locate a colleague that studies exactly the same issues or has the same interests of study, it's difficult.

Today in academic/formal level, researchers can obtain a list of publications and contributions of other scientists, but this is equivalent to know what the scientist has done, has written and researched, and contains no reference to the projects in progress or in programming or topics learned for interest and curiosity. In other words, knowing "who does what" is not knowing "what is interesting for who" [Bittner and Muller 2011].

To overcome shortcomings of the formal tools, scientists can adopt search strategies on Internet in order to identify other experienced colleagues in their field, or specialists in other areas adjacent to their own.

However those informal inquiries give informal and inaccurate information, gleaned here and there, between comments, posts and blogs. The new networking system attempts to formalize informal part of the scientific networks, and wants provide to research institutions, academic journals and searchers themselves additional information more accurate and reviewed.

Creating a social network for scientists, is not an unprecedented idea. The creators of Academia.edu30, Ologeez31, Labmeeting32, SciSpace33 and ReserachGate34, starting from the objective to provide a platform free and open for scientists, they have developed a variety of functional applications, virtual communities of researchers and scientists, through which they could share their work, discuss results and problems encountered, write and publish articles and scientific papers quickly, thereby increasing its visibility inside the scientific arena [Ibid. 2011].
Blogs, social networks, videoconferencing, folksonomy, pre-print, together other forms of communication, are increasing the importance of so-called Para-scientific media, which are becoming increasingly important in scientific communication.

With the emerging of a new paradigm of collaborative science, new disciplines and fields of study are emerging, new meanings need to be forged and new fields defined and established. Those new medias, following the thought "scientistic", are no exclusively in laboratories and research institutes, but involve politic and economic arenas, press and public opinion.

The MPS are distinguished from scientific media by the fact that communication is direct with audience and is positioned both inside and outside of scientific community. The term "para" which can be translated as "over", expresses a subsidiary relationship which these media have with official magazines, which do not overlap but are added to these. Some magazines in international markets such as C&EN, scientific journals like Scientific American widely distributed, web pages as Nòva100, and electronic databases as ArXiv can be considered as MPS.

From this brief description of how technological revolution has changed some of modes of interaction inside scientific community, we can identify a key movement, born in scientific milieu thanks to advent of internet: Open Science.

Here is impossible to determine in which order actors have entered into scene, if technology influenced the scientific context (technological determinism), or science has made possible creation of a specific technology (scientific determinism). The proper resolution of this dilemma is that none of two elements has generated change, but both are part of this [Neresini 2011].

Said that, we don't want determine if Open Science came first than Internet, like the dilemma "Which came first the chicken or the egg?”. Below we will attempt to summarize what is meant by the term Open Science and what are ideas that supports and on which it is based.

As first general assumption, science should be open and accessible at all and the dissemination of knowledge should not be limited by patents or by copyrights. After entrance of businesses in university research and increasing use of intellectual property rights, is arisen the need to adopt a "social contract for science", in order to regulate use of data held by it. This was the subtitle of the first edition of the OSS (Open Science Summit) held in 2010 in Berkeley, attended by scientists, researchers, social
entrepreneurs, experts in non-profit sector politicians etc. with the aim to discuss strategies and possible evolution of the movement of the Open Science [Delfanti 2010].

But how define Open Science? According to Jason Hoyt, co-founder of Mendeley, science can be defined "open" when all its contents are accessible to everyone, anywhere in the world and are easily processed.

Other definitions focus instead on importance of having a open code of writing. Other definitions show value of reproducibility, proposing a standard publication that includes analytical instruments, raw data, protocols experimental and of implementation, that give scientists the ability to perfectly reproduce the experiment described by colleagues [Delfanti 2010].

Although today goals of Open Science, thanks to the new technologies, can be easily reached, we haven't seen evolution expected, and despite the philosophy behind is shared by most of young component of scientific community, science is moving backwards toward the Mertonian paradigm.

From these assumptions has emerged a cultural and generational problem: adaptation to new technological tools to stimulate openness and sharing of knowledge (blog, post, e-print etc.) did not happen fast enough, and this has caused a crisis of credibility of science.

In addition, young scientists accustomed to online communities and social networks, tend to try to share everything, unlike veterans of science, which not follow this example, and not provide to "new generation" tools appropriate for achieving security in their desire to share and to ease tension between cooperation and competition that was always been inherent in science [Gewin 2010].

This reinforces the need to forge new legal and social instruments as well as technological security in order to pursue the ideal of open science. It also serves to protect new researchers, from an existential crisis that they might feel whenever they move from their world where everything is shared, into the formal and institutional area in which the knowledge is remained private.

To prove reputation and skills of a scientist, we need to create a new grading scale, based on new tools of science communication. Until the formal system of incentives (publish in journals with high IF) will lead the scientific work, scientific community will not be able to adopt new solutions with risk that brilliant scientists and important scientific results remain imprisoned in the shadow of the "long tail" of scientific publications [Bucchi 2010, 60-64].
Today's funds and grants impede to science to adopt new technologies and new solutions, scientists are motivated to reveal findings through traditional media.

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Today, science needs a new system capable of distributing benefits to those scientists who decide to openly share their knowledge and their data, and those want innovate and conduct research outside the boundaries of scientific institutions.

In the middle of this scenario, the modern scientist has to combine requests arising from diverse sectors of society, has to adapt to an ever-increasing access to information, increased digitization of archival material and different research methodologies. To answer these new challenges, technology has provided powerful tools of communication, but technological revolution has cut down quality of communications in the same way that it has increased the amount.

The unfailing upsurge that usually accompanies development of research, and in specific context, development of media, cannot avoid consider effects on humans and their transformed by virtue of this enhancement. We must therefore break widespread belief that the technique can be used as something neutral with respect to nature of man. Marshall McLuhan [1964, 16] already had warned that "message of any medium or technology is the change of scale or pace or pattern that it introduces into human affairs." This consideration, which can be applied to television, radio, telephone, etc. ... also is valid for mass media, including Internet, in fact the use in common of the medium is not the same as having experiences in common.
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