Collective Intelligence In Organizations: Toward a Research Agenda

Gregorio Convertino
Palo Alto Research Center
convertino@parc.com

Antonietta Grasso
Xerox Research Center Europe
antonietta.grasso@xrce.xerox.com

Joan DiMicco
IBM Research
joan.dimicco@us.ibm.com

Giorgio De Michelis
University of Milano – Bicocca
gdemich@disco.unimib.it

Ed H. Chi
Palo Alto Research Center
chi@parc.com

ABSTRACT
A new generation of Web tools is penetrating into organizations after their successful adoption within the consumer domain (e.g., social networking; sharing of photos, videos, tags, or bookmarks; wiki-based editing). These tools and the collaborative processes that they support on the large scale are often referred to as Collective Intelligence (CI). The workshop discusses CI tools for collaboration in work-related settings, especially for task forces now increasingly common in industry or government. The aims are refining the problem, summarizing pioneer work on CI, and ultimately develop a research agenda on the problem of supporting CI among workers in organizations. CI studies, tools, and new research methods for studying CI are discussed.

Author Keywords
Collective intelligence, CSCW, organization, task force

ACM Classification Keywords
H.5.3 Group and Organization Interfaces, Computer-supported cooperative work; Web-based interaction

General Terms
Design, Measurement, Theory

WORKSHOP OVERVIEW
Collective Intelligence is not a new term. It was used together with the term groupware when the latter was introduced for the first time at the end of the Seventies [1]. It denoted the emerging and - at the time - still visionary possibility of having large groups of dislocated people carrying out complex tasks by collaborating and coordinating each others' activities.

Since then the Web has been widely adopted and with the improvement of computing and collaboration tools, especially the diffusion of web-based tools available via the Internet (e.g., Web 2.0), new forms of collective intelligent behaviours have started to appear. Systems like Wikipedia have allowed million of people to collaboratively create and organize content with mechanisms that do not fix a priori what the final outcome will look like or by whom or when it should be produced. Another example is del.icio.us, where people share their bookmarks, and categorize them with user-defined tags, collectively creating a shared annotated resource about relevant information sources

Two general properties can be observed in socio-technical systems that exhibit CI: first, the bottom-up, non-scripted genesis of the community, which self-organizes; second, the formation of a common capital (e.g., re-usable knowledge) via selective accumulation of shared by-products of individual activities motivated – initially - by personal utility. In fact, individual consumers adopt the tool for the specific purpose for which it was initially designed (e.g., shared editing or bookmarking), but at the same time the tool enable the accumulation of critical by-products such as detailed interaction traces and individual contributions (e.g., a wiki page, a bookmark). When aggregated, these become a resource for the community.

These tools, the large-scale processes that they support, and the value they produce are examples of what has been again recently referred to as Collective Intelligence (CI) [2] and these first successful examples are starting to highlight which technology and people preconditions should be in place for such intelligent behaviors to appear. These behaviors are referred to as 'intelligent' (or skilled) because they enhance the workers' abilities to adapt and control their social, informational, and physical environment.

Examples of CI Tools in Organizations
Wikis, Blogs, del.icio.us, Flickr, and Twitter have made it easier and faster for people to create, share, and edit content online. Examples of adaptations of these tools to the enterprise include IBM's social bookmarking tool Dogear and wiki engines such as Wikispaces (e.g., shared editors; wikispaces.com) or TikiWiki (tikiwiki.org). Several enterprise software platforms such as IBM's LotusLive, Jive Social Business Software, Microsoft's SharePoint, and SAP's NewWeaver include social software features that can be considered 'ante litteram collective intelligence tools'. Social network systems such as Facebook or LinkedIn are

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seen as valuable in an enterprise because they allow people to easily create, browse, and organize directories of contacts and support better sharing and reuse of previous work experiences by making employees more aware of each other interests, skills and projects. IBM's Beehive is an example of a social network tool for the enterprise.

However, despite these initial adaptations, this process of diffusion from the consumers' space to the organizations' space is still lacking a general research and development plan that accounts for the unique requirements of workers in organizations. The experience of the Web has shown that letting behavior emerge is a winning strategy when a large population of users is in place who can "naturally" let order, as well as quality control, pop up from the bottom. However, companies have different structures: the scale is different, a top-down control structure is already in place, and the employees have specific motivations, skills, and duties. Key properties that differentiate the organizations from consumer spaces pertain to the people, task, tools, and the criteria used to evaluate new technology (see below).

WORKSHOP THEMES

Properties of Organizations

In organizations such as enterprises or government institutions, the *people* using technology are knowledge workers, who perform specific and stable jobs. They generally know each other (even indirectly), are paid to work, and are part of a reporting structure. Their contributions are monitored and evaluated. Moreover, in the organization, teams and task forces are used as a strategy to improve performance. Such work units are not formed on the basis of personal interest, but are assembled by (or under supervision of) the management, given the functions needed and the experts available. Typically, the workers have to coordinate with (and rely on) others in order for the organization to be productive as a whole. The *tasks* for workers and teams are information intensive. Expert knowledge workers in global enterprises routinely make sent of large amounts of information from multiple information channels or work tools. Both the tasks performed and the *tools* used (email, phone, content editing tools, databases) are non-discretionary: typically, they are assigned by the management and not chosen by the workers (e.g., see the conflicts between who gets the benefits and who bears the costs of using the tools). Finally, the *criteria* to evaluate and predict the goodness of technology are also different. In the consumer space these are mainly the utility to the user, quality of user experience (e.g., simplicity and fun), and social benefits. In the organizations the key criteria are also the worker's productivity (worker's output and workload), the organization's productivity (i.e., ROI), political returns, security, and compatibility with the legacy infrastructure. Thus, additional constraints include the compatibility with prior tools, security, costs of maintaining new tools, and the fit with the current management structure, work procedures, and motivational mechanisms.

CI in Task Forces and Communities

Task forces represent a tactic used to enhance the CI of organizations. A task force is a temporary, ad-hoc work unit assembled to perform a complex task: e.g., develop a report on climate change or evaluate opportunities in a new business area. The same expert worker typically contributes to multiple task forces at the same time. The managers of large organizations rely on task forces to coordinate expert work around complex tasks and at the same time make optimal reuse of highly skilled professionals. Task forces tend to cross boundaries within the organization. These particularly demanding and constrained conditions makes these workers a good target population for specific CI tools.

Moreover, new collaborative tools that support learning and development in persistent communities of professionals can, over time, promote new forms of CI. In fact, the communities of practices within the organizations are key mechanism used for building workers' competences and adapting such competences over time (i.e., professional development). Future design of CI tools can build on prior research in areas such as communities of practice and learning [3], social networks and information foraging.

Studying and Designing for CI

A detailed understanding of the attributes, tools, and practices of task forces and communities in organizations can point the designers toward specific needs that the CI tools can address. Such understanding can help answering design questions about CI tools such as:

- What are the *information sharing* processes that constitute the context to the various activities and what features of CI tools that can capture these?
- What are available *traces* from previous activities and how they be exploited for the current activity?
- What is the degree of *domain modeling* that the tools need to support to leverage content created and shared?
- What *visualizations and abstractions* can help to monitor and make sense of the activities of others?
- How do factors such as *trust, motivation, attribution,* and *traceability* affect information and activity flows in organizations; how can they be 'designed in' CI tools?
- What *mix of research methods*, such field studies and logs analysis, are suitable for CI research and design?

REFERENCES

1. Johnson-Lenz, P. and T. 1980. Groupware: The Emerging Art of Orchestrating Collective Intelligence. First Global Conference on the Future, Toronto, Canada.
2. Malone, T.W., Laubacher, R., and Dellarocas, C.N. (2009) Harnessing Crowds: Mapping the Genome of Collective Intelligence. MIT Center for CI. 2009-001.
3. Wenger, E., McDermott, R., Snyder, W. Cultivating Communities of Practice: A Guide to Managing Knowledge, Harvard Business School Publ. 2002.