

Collaborative and Distributed E-Research: Innovations in Technologies, Strategies and Applications

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Chapter 16

E–Research Collaboration of International Scope in Social and Political Sciences: Scale and Complexity Linkage with the Requirement of Physical Encounters

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ABSTRACT

This chapter presents a comparative analysis of three case studies (all from the field of social and political science) on global e-research collaboration, describing how Information and Communication Technologies (ICTs) are facilitating the overcoming of geographical barriers. Previous research points out that physical e-research collaboration meetings play a relevant role. This chapter explores whether this requirement of physical meetings in e-research collaboration is independent of the scale and complexity of the collaboration established. The findings suggest that high complexity can be achieved using communication tools if the scale of the group is small, while very large groups can collaborate using communication tools if their target is a loose collaboration. However, if the collaboration involves both a large group and a considered complexity of collaboration, establishing a balance between communication tools with the requirement of physical meetings becomes a relevant issue.

INTRODUCTION AND BACKGROUND

In 1963, Price noted that since the beginning of the 20th century, a more rapid increase of scientific collaboration has taken place. Over the last decades, several authors have agreed that the

adoption of ICTs has provided a strong impetus on growth in collaborative research (Anandarajan & Anandarajan, 2010; Hackett, 2005). However, ICTs not only quantitatively increase research collaboration, but also transform the way collaboration is carried out. Research has always depended on the dominant media matrix (Johns,

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Chen, & Hall, 2004) and has changed over time, depending on the communicational capacities of each conjuncture. The adoption of ICTs represents the latest stage in this development and transformation.

The term “collaboration” originates from the Latin word *collaborare*, which means to work together. Hagstrom defined scientific or research collaboration as a group of intellectual peers working together over a period of time to solve a research question (Hagstrom, 1965). Research collaboration can take many forms. Several questions emerge from Hagstrom’s characterisation: 1) Who are those peers? (peers from the same institution or diverse institutions; peers from the same discipline or from several disciplines; academic peers only or also collaboration amongst academics and non-academics); 2) How many peers will be involved? (i.e. collaboration amongst two researchers or small- and large-scale groups); 3) How long will they have to work together? 4) How closely will researchers have to work together? (in physical terms or in terms of regular contact); and, 5) Which type of common goal or question do they have or address together in order to constitute collaboration? More importantly, is the adoption of ICTs in research changing research in some of these parameters? Several authors agree that with the advancement of ICTs, scientific collaboration has evolved into new forms of social network and interaction mediated through computers, known as e-research collaboration (Anandarajan & Anandarajan, 2010; Jankowski, 2009; Jirotko, Procter, Rodden, & Bowker, 2006; Ribes & Lee, 2010) or e-science (Hine, 2006).

Apart from the initial theoretical conceptualisation and the prospects of ICTs’ potential for research, empirical analysis of cases of e-research collaboration has already been developed (Dutton & Jeffreys, 2010). Initiated in the field of science and technology research, it has more recently expanded to humanities and social and political science research (Anandarajan & Anandarajan, 2010). However, even if empirical research on a

specific case has already been developed, little empirical research is based on a comparative analysis of different types of e-research collaborations. Consequently, the following chapter aims to analyse and compare emerging forms of e-research collaboration in the field of social and political science.

Furthermore, the analysis will be developed on a global or international scope, that is, collaboration that involves research in different regions of the world. Edge (1979) and Stokes and Harley (1989) found that most collaborations start informally. In addition, the spread of ICTs’ spatial proximity seems to have encouraged collaboration in the past, since it tends to encourage informal communication—communication that is dependent on physical meetings (Hagstrom, 1965). Hence, the following chapter will address the question: How do ICTs facilitate the overcoming of geographical distance barriers and facilitated e-research collaboration of global scope? Since Siemens (2010) highlighted the importance of not being over-reliant on e-research tools, and that a balance between e-research tools and face-to-face meetings is needed in order to strengthen collaboration, this chapter aims more specifically to explore and compare how this balance is established within collaborations that involve diverse scale and complexity.

This chapter will analyse the links to physical encounters of diverse cases of e-research collaboration in terms of scale, specification and complexity of the collaboration. Scale refers to the number of researchers involved in the collaboration. Specification and complexity of the collaboration refer to the level of definition of the common goal (if the common goal is clearly defined around a specific common target *versus* if the collaboration is left open to what emerges from the interaction around common interests) and the level of interaction that is involved (from developing a final outcome together versus sharing a space). Links to physical encounters refers to the frequency and type of physical meetings as part of the collaboration process.

The chapter will proceed by providing an overview of e-research collaboration in social and political science of global scope, after which three cases of emerging forms of e-research collaboration will be presented. Comparison of the cases will be developed in terms of the dynamics of interaction and collaboration and by analysing how the differences in scale and complexity of the collaboration might relate to the requirements that allow the organization of physical encounters. The ICT methods used in each case will also be presented. Consequently, the chapter aims to contribute to two main areas: ICTs in research collaboration (Anandarajan & Anandarajan, 2010; Jankowski, 2009; Jirotko, Procter, Rodden, & Bowker, 2006; Ribes & Lee, 2010) and ICT in research methods (Hine, 2000, 2005; Rogers, 2009). Finally, potential future trends in e-research collaboration will be presented.

CONTEXTUALISATION: OVERVIEW OF E-RESEARCH IN SOCIAL AND POLITICAL SCIENCES

In order to contextualise the analysis and limit the possibility of generalisation in the findings, it is useful to provide some background on the adoption of ICTs by researchers involved in the field of social and political sciences.

Researchers with a background in social and political science do not possess a more advanced context in which to adopt ICTs; that could initially limit their capacity to incorporate ICTs into their research processes. Analyses of other fields with more advanced ICT capacities may arrive at other conclusions about how ICTs are reshaping the organisation of research collaboration.

On the one hand, social and political science is not a technologically intensive discipline (unlike research on computer sciences or information sciences). This limits the possibility for the use of technology in the field. Firstly, social scientists are not generally trained in the use of technological

tools. Secondly, universities are not adapted to respond to researchers' technological needs. It is either difficult to find funding for technological support or it is not included in competitive research funds. Furthermore, there are no references or institutional facilities to build partnerships with other disciplines that have more advanced technological training. The current situation in most departments is that only the researchers who have double training (in social science and computer science) or access to technological skills through their own costs and risks are in a competitive position. In other words, the technological training required to approach the potential opened up by ICTs to develop research is being determined by researchers' personal capacities. Hence, more institutional support is required to consolidate and advance the use of ICTs in social and political science.

In terms of the general spread of the use of ICT in the field of social and political sciences, the adoption of ICTs varies substantially, depending on the university. Generally, however, rates tend to be *low*. For example, the community of researchers at the Social and Political Science Department of the European University Institute (an international postgraduate and post-doctoral teaching and research institute based in Florence) uses e-mail as a communication channel (not mailing lists), a static-expositive website and a limited Intranet. Another aspect contributes to shedding light on the low level of awareness and capacity to adopt ICTs: While funding is available to support PhD travel to international conferences, applications to obtain technical support for PhD development are not considered¹. The same can be said of the Institute of Government and Political Science of the Autonomous University of Barcelona². Generally, universities or centres specialising in ICT research and those with a more plural interdisciplinary character adopt more developed sets of tools amongst their communities. For example, the School of Information at the University of California, Berkeley (a graduate school offer-

ing both professional master's degree programs and a research-oriented PhD), in addition to the tools mentioned in the previous cases, provides researchers with e-lists, an elaborate Intranet and technical support, as do the Internet Interdisciplinary Institute (the research body of the Open University of Catalonia, a private Internet-centred open university based in Barcelona, Spain) and the Berkman Centre of Internet and Society (a research centre at Harvard University that focuses on the study of cyberspace³.)

Finally, in terms of the limitations or challenges within e-research, the potential for collaboration amongst researchers and greater access and diffusion of scientific production, as opened up by the ICTs, is being wasted and limited by a frame predominant in academia (through the intellectual property regulation and system of merits) that privileges individualism and non-collaboration. According to an analysis of 50 cases, the online settings based on free licenses (such as copyleft or Creative Commons licenses) hosted and raised more collaboration than the online settings based on copyright (Fuster Morell, 2010). This finding suggests that a redefinition of the academic career towards a system of merits that would privilege collective research and collaboration and a transition towards open access policies might increase e-research collaboration.

Even if this background does not seem to be the more favourable one in terms of e-research collaboration of global scope, several types of international interactions and group collaborations that have emerged as a result of the new windows being opened can already be distinguished. For example, ICTs have facilitated the emergence of very lively mailing lists around common research topics. This is the case in the example of the International Forum for Discussion and Information on Social Movements (social movements mailing list⁴), with a total of 357 subscribers and a mean number of 2 messages per week of traffic publications or calls for papers and conferences. Professor Laurence Cox started it in 1998 as an

individual initiative, and it is mainly used to post bibliographical questions, debates on concepts or research problems, and announcements of new facilities opened up by ICTs. It builds on the personal network of the mailing list's founder and the network of people researching social movements. Similar mailing lists have been created around other international research associations and conferences (such as the Informational Technology and Politics of the American Political Science Association or the Standing Group of Internet and Politics of the European Consortium of Political Research⁵). Other particular types of mailing lists have a "solidarity" character. This is the case for the Get Article mailing lists⁶. The goal of this mailing list is to provide researchers with access to articles in poor countries or universities with meagre resources that do not have much access to scientific publications compared to high-resource universities.

Another set of "windows" for research collaborations is linked to blogs as arenas for online debate. These could be individual blogs, such as Danna Boyd's blog on youth culture and social media⁷, or a blog by a set of several authors around a particular discipline such as organisational theory⁸.

As there is increased contact and information exchange in society through networking platforms, so is the case amongst researchers. The more popular interactive platforms tend to host groups dedicated to topics or international research associations. This is the case for Facebook. More recently, since 2010, www.academia.edu, a networking site specifically for academics and researchers, has become more popular.

There is also a set of online resources linked to academic literature, with various formats such as communities of collaboration for the exchange and systematisation of bibliographic references (such as the Zotero program) or the promotion of open access publishing (such as the Public Library of Science⁹).

Linked to ICTs and the capacity to spread information and coordinate groups, as well as the

decrease of transportation costs and the processes of political regionalisation (such as the creation and promotion of the European Union), there has been an increase in international associations around disciplines or specific topics. In addition, there has been a proliferation of international meetings associated with these, such as the European Consortium of Political Research.

In terms of e-research grouping collaboration of global scope, three typologies can be distinguished: groups around a specific research project, large networks, and communities of researchers building or sharing a common goal. These three typologies of research collaboration will be presented in more detail in the next section as part of the empirical analysis.

METHODOLOGY

The analysis is based on three case studies with international scope, (as they involve researchers and research centres placed in various regions).

The case selection is driven by aiming to achieve diversity in terms of scale of the case: a small, middle and very large size case. It also considers diversity in terms of the three degrees of complexity of the collaboration. The indicators of the complexity and specificity of the collaboration were obtained from the presentations of each project goal and were dependent on the specification of the common target and the level of interaction between the case members required by the goal (from an interaction that involve all the members and the collective building of a final outcome, to forms that do not involve the interaction of all the members and are mainly based on sharing a space without a collective final outcome).

The three cases were a small group centred around a specific research project (the research project on “Dynamics of Online Interactions and Behaviour” developed in partnership between the Berkman Centre of Internet and Society at Harvard University and Sciences Po), a large international

network that builds connections around common interests (the Networked Politics collaborative network), and finally, a large community building and sharing a research commons, that is to say, a community (composed of a galaxy of individuals and research groups) that collaboratively builds and shares a common resource (Wikipedia research commons).

Concerning empirical data, the use of “organic data” was privileged. “Organic data” refers to a collection of digital threads available online, or the observation of the public practices and discussions that the cases generate in their daily on and offline lives without the researcher’s external intervention. In using “organic data,” the *digital methods* approach, which was based on “following the medium,” was followed (Rogers, 2009). This contradicts the virtual method approach of trying to adapt already known methods of the study of online practices and methods, requiring the “creation” of data rather than the use of available data (Hine, 2000).

The methods used were virtual ethnography and participative observation. Field notes were kept during the data collection. The researcher’s experience as a researcher participant in the three cases was also used as data for the analysis. Additionally, unstructured interview and content analysis were developed in two of the cases (Networked Politics international network and Wikipedia Commons), due to their larger dimension and fact that they were more complex in contrast to the research project case. In these two cases, five people were interviewed (in an informal setting) amongst the main promoters or participants in the projects. The Networked Politics international network was observed from 2005 to 2008, online behaviour research project from November 2009 to July 2010, and Wikipedia Commons from 2007 to 2011¹⁰.

Finally, the analysis was based on the systematisation of the experiences approach (Capó, et al., 2010).

CASE STUDIES DESCRIPTION AND QUALITATIVE ANALYSIS

In this section, each case study will first be presented and then analysed in light of the linkage between its scale and the specificity of its collaboration, and in terms of the balance between communication tools and physical encounters.

The differences between the cases are also exposed in Table 1.

First Case Study: Research Project Partnership between Berkman Center and Sciences Po based on Large-Scale Digital Methods¹¹

This case is based on a small group of researchers from different universities that established collaboration for the development of a specific and time-limited research project.

Table 1. Comparison characteristics of case studies

	Research project partnership	Networked Politics collaborative network	Wikipedia research commons
Type of group	Small research group based on a partnership between Universities	Large network of researchers and specialists with an international promotional group	Very large ecosystem of individuals and research groups around common resources with multiple centres
Scale: Number of members	4	Around 300 people involved at different levels: 3 heavily involved; 10 medium involved; 200 contributors; 100 weak contributors	More than 500
Collaboration goal	Development of a specific research project	Exchange on a set of questions of common interest	Build and share a common resource
Outcomes	Articles	Books and online repositories	Online bibliographic repositories and forums
Research methods	Online experimental games	Focus groups, case studies, interviews, and e-mail surveys	Online surveys and wiki compilations
Time frame	From October 2010 to October 2011	From 2006 to 2010	From 2005 to present
Communicational tools	E-mail & chat	Mailing lists, website, chat, e-mail, phone	Wiki pages and mailing lists
Celebration of physical encounters	None	Seminars, meetings of the promoter group and coincidentally in larger audience conferences	Coincidence of some of community members in larger audience conferences
Linkage with physical encounters	No need for physical encounters when there is a clear research goal for a small research group (and previous trust built amongst the research group's members).	* For loose networks with elaborated outcomes, physical encounters played an important role. * Once the network stopped its physical activity, the maintenance of the network's production became problematic.	No physical meeting place for all the community where there is not a specific goal framing the whole interaction.
Lessons in terms of ICTs methods used	Digital methods might require more time than expected. Building trust with research subject required time.	Difficult technological transitions. Interactive website required high levels of facilitation.	* Risk of informational overwhelming. * Wiki facilitates the <i>know-how</i> transfer without the need for coordinators.

Source: author elaboration

In 2009, the members of one of the three universities applied for research funding and wanted to involve the research members from the other two universities in order to complete and enrich the expertise and skills needed for research development. The group was comprised of four individuals: two professors, a post-doctoral researcher and a PhD candidate. A programmer also provided technical support. The group was international: Two of the research members (and the technical programmer) lived in Paris, another researcher in Boston, and a fourth one in Barcelona.

Some previous connections between the members were present on the basis of previous encounters or activities. However, not all the members knew one another, and no physical meetings took place during the research project.

At the beginning, very intensive and rapid e-mail exchanges were observed, and chat meetings were arranged in order for the members to get to know each other and establish the research goals and procedures. The research project was then developed through e-mail exchanges and occasional chats.

The research group had a specified research goal and limited time frame. The group's collaborative time frame was one year and was set by the research funding. The project outcomes were articles in scientific journals.

The methodology for the empirical research was experimental and ICT-intensive. There were also no physical encounters with informants. It was a large-scale research project addressed to online users, and in particular, Wikipedians. In order to research their online behaviour and dynamics, informants were asked to participate in an experimental game. The most difficult part involved defining a subject recruitment strategy (that is, a method of mass message delivery to request participation in the survey) and establishing trust with the community when forming the subject of the research; there was the risk that the call would be considered intrusive or mistaken as spam. Another problem associated with this

method concerned the difficulty of controlling the representativeness of the sample and the low response rate. Beyond the need to know the online community target netiquette and community rules, highly developed technical skills and knowledge of the technical platform of the community were also needed in order to use programs to spread the call, which required several instances of time rescheduling. In total, understanding (technically and socially) the target community and building trust are required elements when using digital methods; this opens up possibilities for large-scale data analysis, but might require more time than expected.

Scale and Specificity Collaboration and Balance between Communication Tools and Physical Meetings

Apart from the fact that two of the members were from the same institution, the small dimension of the entire group and the clear objective or target and time frame of the collaboration (as well as the trust amongst the researchers on the basis of previous relationships amongst some of them and their research reputation) seems to be the basis for the group's managing to function entirely using communication tools and without requiring any physical encounters. Additionally, the research methodology (based on an experimental game for online users) did not require any physical encounters between the researchers collaborating or between the researchers and informants. This case suggests that under certain scale and specific collaboration conditions, e-research collaboration of global scope can take place without the requirement of physical encounter.

Second Case Study: Networked Politics Collaborative Network¹²

This case is based on a large network of researchers interacting around common research questions.

In 2004, a group of three researchers from different European countries who held similar research, activist and personal interests, and who met regularly at events and conferences, decided to set up a network of researchers and practitioners. They specialised in a set of research questions of common interest (linked to questions about how ICTs are reshaping political organising).

The collaboration was more problem-oriented than funding- or career-oriented, in the sense that the researchers involved were highly committed to increasing their common understanding of the research questions without a clear timetable or funding framework to establish the collaboration. The organisation of several seminars resulted from the collaboration, built from two online repositories and the publication of books in several languages (based on individual authorship or collective authorship by the network).

The first activities were based on organising panels and discussions held at larger events and conferences, after which a set of seminars (one or two per year) were organised. Seminars took place in different parts of Europe (Germany, Spain, Italy, and Great Britain), Latin America (Venezuela and Brazil), Kenya, and the United States. After the first encounter, the network set up mailing lists and then built a website. 300 people were involved in the network at different levels: 3 were heavily involved (promoters); 10 were involved at medium levels (organisational support); 200 were contributors (to mailing lists, book contributors, attending seminars, etc.); and 100 were weak contributors (basically receiving the mailing lists). The promoters played a leadership role in the process, defining the agenda and the boundaries of the network membership, and they managed the organisational matters.

The collaboration between seminars was sustained through the mailing lists, which became highly international and lively. Participation in the mailing lists was connected to the organisation of the upcoming seminar. An online repository and collaborative tool was designed. However, it

became difficult to migrate the activity from the mailing lists to the web tool. The web tool was mainly used to present and document the research project, to provide practical information, as a directory of the network members, and to provide access to the research outcomes. However, its collaborative features were poorly employed. A digital library was then designed in order to collect, spread and share the literature and materials related to the research question.

The research methodology to address the common questions was an adaptation of the *focus group* method utilised during the seminars, surveys conducted by e-mail, and commissioning case studies. The surveys were a set of questions distributed via e-mail. Participants reported that it was difficult to obtain answers from informants without previous relationships being in place. However, the active character of the research increased their willingness to participate or facilitated the establishment of contacts and trust. Following this, the results of the research conducted by network members were also discussed. Seminars were designed in detail following an adaptation of a *focus group* method. They involved no more than 30 participants (selected on the basis of equilibrium between approaches and backgrounds to ensure diversity in the discussion), and were very participative and discussion-focused (not based on panel presentations). The discussions at the seminars were then transcribed (collaboratively edited through the website tool), elaborated and adapted, and used as material to build upon and further the discussion, as well as content for the publications.

The collaboration was quite active and productive for a number of years (from 2005 to 2010, even though it took more than one year to achieve a more collaborative dynamic amongst the research members). However, for this loose and middle-site network, physical encounters played an important role in fostering and keeping the process alive. With the economic crisis in 2008, it became more difficult

to find funding for organising the seminars, and the network gradually ceased its activities. Promoters also reported that it became difficult to encourage organisational willingness from other members who were not the initial promoters and to rotate the organisational effort and leadership. The collaboration between many of the network members endured over time, but in other projects or through other frameworks. This case suggests that the network ceased its activity in terms of physical encounters when the maintenance of the network's production and memory on the web tool and mailing list archive became problematic.

Scale and Specificity Collaboration and Balance between Communication Tools and Physical Meetings

In terms of scale, this network was made up of 300 people spread around the world who had several degrees and diverse methods of involvement. The collaboration was not specified in terms of a time frame or specific target, even if the network could be considered highly productive on the basis of its resulting outcomes. Communication tools such as the mailing list were important to maintain the connection between one physical encounter and the other, and the online repositories helped to systematise the results of the process and coordinate the network. However, the network dynamics were very much physical encounters, both driven and dependent. The physical meetings between the small groups of promoters were also developed in order to organise the larger seminars. Once the physical encounter stopped taking place, the network stopped being active. Overall, this case suggests that in the development of specific and collective outcomes amongst a relatively large network, physical encounters amongst the network members and amongst a small group of promoters play an important role to foster and keep the process alive.

Third Case Study: Wikipedia Research Commons

This case examines the interaction and collaboration of a very large community of researchers and non-researchers, based on a set of common interest via a plurality of online channels and repositories in order to exchange expertise and build and share diverse informational pools.

Wikipedia research commons, in contrast to the other two cases, is neither small nor time-constrained, and there is no structured goal around a specific research project (as in the first case). In addition, it is even larger, of much more permeable membership (practically open to any person willing and with the skills to contribute), and more fluid in its organisation than the international network in the second case. Furthermore, and again, unlike the second case, it does not have a core-promotional centre and moments of congregation of the entire community, but rather multiple pulses and several processes and networks feeding into it.

Wikipedia research commons is a very large (more than 500 collaborators) global, and multi-centred network of sub-networks composed of individuals (researchers, experts, or Wikipedians) and research groups (national or international research groups performing research projects in universities and research committees and other research groups linked to the Wikimedia Foundation or other wiki-related initiatives and foundations) that communicate, collaborate and interact in several online channels (mailing lists, wiki pages, real-time Internet text messaging [IRCs], without clear coherence and sometimes overlapping amongst those channels). The goal is to become a node and resource of expertise (from the most plural of perspectives and disciplines) and to build, maintain, update, share and provide (as a public resource) a set of diverse research resources (including a compilation, systematisation and review of bibliographies, directory of researchers and experts, list of on-going research projects, access to research data, methodological guides

and manuals, amongst others¹³). This community interaction takes place without a predefined plan or centre of coordination, even if the Wikimedia Foundation, which is based in San Francisco, is in charge of maintaining the infrastructure that sustains this community interaction.

It is worth highlighting that in 2011, more than 2,100 peer-reviewed articles and 38 doctoral dissertations were dedicated to Wikipedia¹⁴. This constitutes a substantial amount of research on Wikipedia—even more so if one considers that Wikipedia started in 2001 and the academic research on it has substantially increased only since 2005¹⁵.

Wikipedia itself (through wiki pages and other communicational channels) provides an environment and framework for collaboration within this community, even if some collaboration takes place outside Wikipedia (in conference panels or external digital resources). In terms of physical encounters, non-physical encounters are planned amongst all the community of people interacting around the project. However, some of its members meet in conferences or during the annual meeting of Wikipedians (called Wikimania). Actually, this collaboration amongst the Wikipedia research community takes place as part of the overall Wikimedia ecosystem of projects. As with any other wiki collaboration, wiki facilitates the *know-how* transfer without the need for “coordinators,” and it promotes the generation of a community more than a centralised core that plans and coordinates collaboration.

The fact that the collaborative community has grown inside Wikipedia makes it less of a protagonist or visible from certain perspectives compared to other international academic associations. However, as a collaborative research community, it is relatively productive and builds useful research resources, even though this research community might be difficult to evaluate in terms of traditional academic indicators (such as academic publications), and even if community members are amongst the more academically recognised researchers in the area.

The network of wiki pages and communicational channels that synthesise and concentrate the up-to-date scientific knowledge and expertise conducted within Wikipedia and its sister projects conforms to the structure of a sort of common community of Wikipedia researchers. The free license used to preserve the resources facilitates collaboration, and it allows reuse and derivative work. As it is referred to in one of its wikis, it exists to “wiki-organize all individuals engaged in Wikipedia research¹⁶.” Benkler (2006) refers to common-based peer production to point out this type of collaborative production amongst individuals, suggesting the growing importance of this type of production in the digital environment. The commons becomes a valuable resource (to identify literature or obtain methodological advice) for conducting research on Wikipedia; furthermore, researchers have incentives to maintain the commons and contribute to it in order to distribute their own research and achieve community recognition. Research groups or individual researchers at universities and academic institutions then use this commons to feed and gain input in order to define their research projects.

Finally, a limitation of this type of format is the risk of information overload. For example, a search on Wikipedia is easy to carry out and allows access to the available literature on Wikipedia. However, the researcher would experience difficulties if he or she aimed to manage or read it all. It is practically impossible for a single researcher to read all of the material and literature already available on the matter. Interestingly, this is leading to the creation of collaborative groups to develop reviews of parts of Wikipedia literature.

Scale and Specificity Collaboration and Balance between Communication Tools and Physical Meetings

This case involves a very large community of collaborators sharing online communications tools and repositories around a set of common research

questions. Although the community does not have a centre, the interaction is distributed through several online channels. It has neither a structured plan nor goal beyond sharing a space, and it does not exchange expertise or communally systematise informational resources. Non-physical meetings are planned, even if community members meet each other on a larger scale at conferences. The Wikimedia Foundation, a formal foundation based in San Francisco, maintains the online infrastructure. In summary, this case suggests that collaboration based on a loose and open interaction without a centralised outcome, specific time frame, and planning framework, even if it involves a very large community, does not require physical encounters between the community members.

FUTURE RESEARCH DIRECTIONS

Several current and future trends in ICTs and collaborative research can be highlighted: internationalisation, multi-belonging formats, trans-disciplinary groups, the use of organic data, and “interactivity” in the methodology and results.

As this chapter discussed, ICTs facilitate the formation of different types of international research groups. Furthermore, another characteristic observed from the cases presented is the increase of single researchers’ multiple belongings, that is, single researchers who are linked to several universities or research groups (even in different countries).

Additionally, several aspects suggest that the use of ICTs in research will lead to increased multi-disciplinary research (Anandarajan & Anandarajan, 2010). First, the design of ICTs as a research tool requires a variety of skills. Researchers need to not only know how to use research methods, but also have the skills and capabilities to design technical tools. Consequently, the use of ICTs to investigate the formation of research groups with several profiles (data analytics, designers, and engineers) is frequent (Rogers, 2009). In order to

profit from this frontier, it is useful for research centres and departments to build alliances and create the conditions for the technological support of research. However, the need to find solutions for social scientists and engineers to work together in cross-disciplinary groups is probably one of the greatest challenges in the field, as the authors have reported the difficulties encountered in these types of groups (Lampe, 2010).

Second, in those cases where researchers use organic data generated in the case of daily life and available in the Web (and do not build a specific tool to collect data), the larger possibilities opened up by the use of organic data suggest a tendency towards an alliance between researchers and providers and the designers of online infrastructures. The sensitive nature of the organic data and the necessity to obtain permission and access to use them imply an intrinsic alliance between the providers and designers of online infrastructures and social scientists. Furthermore, social research can contribute to helping infrastructure designers develop tools in ways that generate more useful organic data for research needs. The mass of information produced as a consequence of actions designed for other ends has become a contended source of research and analysis, and it can be used to produce very sophisticated knowledge. Two examples of the commercial type are centre cards and Google Mail. Both attain the possibility to store and elaborate these information threads by paying “something” to the users (a gift after a certain number of purchases or free services). In this way, they use the “natural” behaviour of the users to elaborate marketing profiles. This is probably a new frontier in the research—the possibility of storing and elaborating information produced independently of direct research aims.

In terms of “interactivity” in the methodology and results, ICTs and the World Wide Web facilitate the establishment of a channel for a more continuous relationship with informants. It was a standard practice in the cases analysed to build a website dedicated to the research that contains information

about the project's development. Moving forward, Web 2.0 opens up possibilities to develop more participative and collaborative research methodologies¹⁷. As part of its layout, a Web 2.0 site can allow, through the mechanisms of interactivity and easy intervention, informants to provide data for the empirical research directly or/and interpret and debate the data and results themselves.

DISCUSSION

Research collaboration has always depended on the dominant media matrix (Johns, Chen, & Hall, 2004), and it has changed over time, depending on the communicational capacities of each conjuncture. The adoption of ICTs represents the latest stage in this development. Although ICTs are rapidly evolving and still in an expanding phase, theoretical reflections and empirical analysis of their results in the form of e-research collaboration have been undertaken (Anandarajan & Anandarajan, 2010).

Initial empirical analysis focused on specific cases or on cases in disciplinary fields where the use of ICTs was intensive. This chapter aimed to expand the current stage of knowledge by providing a comparative empirical analysis of three case studies from the field of social and political science.

This field has no particular proclivity towards e-research collaboration in contrast to other ICT-intensive disciplines. Even if the ICTs have opened up great potential for development in the field and future trends can be drafted, at this stage, research in this field generally has neither a high technological profile nor expertise. Furthermore, most universities lack the institutional support to promote and support a technical infrastructure. Hence, analyses of cases linked to other fields that are more ICT-intensive may arrive at diverse findings.

The analysis was developed in cases of global or international scope, that is, collaboration that involved researchers based in different regions of the world that are not in spatially proximity. Prior

to the spread of ICT communication, research collaboration was more dependent on physical meetings and spatial-proximity encouraged collaboration (Hagstrom, 1965). With the spread of ICTs, the three cases analysed suggest that ICTs facilitate the overcoming of geographical barriers. The three cases show that the use of ICTs are intensive and play an important role in supporting e-research collaboration of global scope. Furthermore, the analyses also shed light on the fact that the emerging global e-research collaboration could assume very diverse forms in terms of group configuration. ICTs are suitable to support very diverse common goals. As it has been presented in detail, e-research collaboration can take the form of specific projects, loose networks and very large communities.

According to Siemens (2010), in order to strengthen collaboration, it is important not to be over-reliant on e-research tools and to find a balance between e-research tools and physical meetings. This chapter explored whether Siemens' findings, in terms of the relevance of physical meetings, are independent of the scale and complexity of the collaboration that has been established, and whether the establishment of such a balance between communication tools and physical meetings has a regular pattern in terms of scale and the complexity of collaboration. This includes an increase in physical encounters, depending on the scale and/or the complexity of collaboration established. In order to explore these questions, an empirical analysis of a case comparison of three cases, all of a diverse scale and specification of collaboration, was developed (see Table 2).

CONCLUSION

According to the findings, there is no common pattern or incremental parallel evolution of the need for physical encounters with the scale and/or complexity of the collaboration established. Instead, it seems that the need for physical encounters depends

Table 2. Cases comparison based

	Scale	Complexity and collaboration specificity	Communication tools	Physical encounters
Research project	Small	Specific and limited (empirical research project)	E-mail and chat	None
International network	Large	Intermediary (collective reflection)	Mailing lists, interactive website (low use), chat, e-mail and phone.	Network seminars, common participation in larger conferences and promoter groups meetings.
Commons	Very large	Lax and plural (sharing a space and pool around common interests)	Wiki pages and mailing lists	Does not target the whole community.

Source: author elaboration

on the combination between scale and complexity of collaboration, that is, depending on the overall type of grouping.

Both the small- and large-scale cases did not require physical encounters, while the case situated in the middle was very much physical encounter-dependent. The same could be said in terms of specificity and complexity of the collaboration: Neither the project that involved a more specific and complex interaction nor the one that had a vaguer target involved any physical meetings; however, the inter-medium case was dependent on physical meetings.

In other words, high complexity could be achieved using communication tools if the scale of the group is small, while very large groups can collaborate using communication tools if their target is a loose collaboration. However, if the collaboration involves both a large group and a considered complexity of collaboration, establishing a balance between communication tools with the requirement of physical meetings becomes a relevant issue.

In contrast to Siemens (2010), these research findings suggest that the relevance of a balance between e-research tools and physical meetings depends on the conditions of the collaboration in terms of the existing balance between scale and complexity of collaboration.

Finally, the systematisation of experience when comparing the three case studies suggests

the above presented findings. However, in order to validate this hypothesis, further research in terms of verifying statistical significance over a large N analysis may be required.

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KEY TERMS AND DEFINITIONS

Research Collaboration Links to Physical Encounters: Frequency and type of physical meetings as part of the research collaboration process.

Research collaboration scale: Number of researchers involved in the research collaboration.

Research collaboration: Researchers working together over a period of time to solve a research question or to achieve a research goal.

Research Commons: A community composed of a galaxy of individuals and research groups that collaboratively builds and shares a common resource.

Research Network: A set of loosely connections, activities and research relationships around common research interests.

Research Project: A group of researchers centred around a specific research goal.

Specification and Complexity of the Research Collaboration: Level of definition of the common goal (if the common goal is clearly defined around a specific common target *versus* if the collaboration is left open to what emerges from the interaction around common interests) and the level of interaction that is involved (from developing a final outcome together *versus* sharing a space).

ENDNOTES

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- ¹⁰ For the online interaction research project, virtual ethnography was developed through e-mail exchange, chats and voice conferences. For the Networked Politics international network, online ethnography was conducted for the mailing list (network@lists.euromovements.info) and the web and wiki www.networked-politics.info and www.openlibrary.info and participant observation at seminars on the Networked Politics Project: Barcelona October 2006; Berlin, June 2007; and Berkeley, 6-7 December 2008. For the Wikipedia Commons, virtual ethnography was developed on the Research Committee

- and wiki-research mailing list and in the pages dedicated to research on meta. Participative observation was developed in Wikimania 2009 in Buenos Aires and at the Wikimania and Wikisym conferences 2010 in Poland.
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 - ¹³ Wikipedia research commons is composed of: Academic Studies on Wikipedia (http://en.wikipedia.org/wiki/Wikipedia:Academic_studies_of_Wikipedia); Wiki Research Bibliography (http://meta.wikimedia.org/wiki/Wiki_Research_Bibliography); Zotero group on Wikipedia research (http://www.zotero.org/groups/wikipedia_research/items); Wikipedia research (<http://meta.wikimedia.org/wiki/Research>); Research Committee of the Wikimedia Foundation (http://meta.wikimedia.org/wiki/Research_Committee); Aca Wiki (<http://acawiki.org/>), Wikipedia research mailing lists (<https://lists.wikimedia.org/mailman/listinfo/wiki-research-l>), amongst others.
 - ¹⁴ Academic Studies. (2011). *Wikipedia*. Retrieved 26 March 2011 from http://en.wikipedia.org/wiki/Wikipedia:Academic_studies_of_Wikipedia.
 - ¹⁵ Academic Studies. (2011). *Wikipedia*. Retrieved 26 March 2011 from http://en.wikipedia.org/wiki/Wikipedia:Academic_studies_of_Wikipedia.
 - ¹⁶ Wikimedia. (2011). *Research network*. Retrieved from http://meta.wikimedia.org/wiki/Wikimedia_Research_Network.
 - ¹⁷ ICTs have several technological generations. The latest ICT tendency is found in the concept of Web 2.0. Web 2.0, initially proposed by O'Reilly (2005), refers to a second generation of ICT-based services, such as social networking sites, wikis, and communication tools that emphasize online collaboration and sharing amongst "users" to build up the site content. It also differs from early web development (retrospectively labeled Web 1.0) in that it moves away from static websites, the use of search engines, and surfing from one website to the next, and towards a more dynamic and interactive World Wide Web.