

Monuments of cyberspace

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Monuments of cyberspace: Designing the Internet beyond the network framework by Paris Chrysos

Abstract

In light of the challenges entailed by the (re)design of the Internet, this paper develops the concept of “monuments of cyberspace”, to address the lack of clarity in current debates and more particularly in the use of the conceptual frameworks of “networks” and “communities”. To do so, I revisit the conceptual grounds of network approaches in different disciplines and those of communities of practice, using as an entry point the debate on personal data. To illustrate the value of the concept introduced, the article reviews the design of the “datagram” and that of an online communication setting for developers.

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1. Introduction

While the Internet expands more and more, the discussion on its design opens again, given the new challenges that emerge. Thus, a broad, weakly structured discussion explores different design alternatives. In this paper, the notion of “personal data” will serve as an entry point into this discussion, helping to reveal the limits of existing theoretical frameworks in the face of contemporary phenomena linked to the Internet.

The exploration of different possible Internet designs is a process encompassing different levels of analysis, challenging the relevance of established structures at both the empirical and the conceptual level. Perhaps unsurprisingly, faced with the current centralization of user generated information by the dominant enterprises of the Web, the debate on a “return” to the origins of distributed architectures appears as an answer to the challenges such as user privacy (Musiani, 2013, 2011; Aigrain, 2013). Thus, a variety of actors, ranging from members of the free software movement to engineers, academics and enterprises, is engaged in a conceptual exploration of possible distributed designs for new communicational settings, a discussion which is frequently articulated around public conferences. This exploration is, among others, an issue of mobilization of different disciplines, provided that its participants recognise the fact that it is impossible for a single discipline (social or technical) to provide a comprehensive vision of the problem on its own. Still, the debate within the academic community is often engaged according

to the so-called “developer innovation” mode (Chrysos, 2015, 2013), mixing personal incentives and intentions with existing technologies to conceive something new, with no particular methodology or theory to control this design reasoning. Eben Moglen presented his own approach on the requirements of such a system:

What do we need? We need a really good Web server you can put in your pocket and plug in any place. (...). It should know how to start its Web server, how to collect all your stuff out of the social networking places where you’ve got it. It should know how to send an encrypted backup of everything to your friends’ servers. (...) In other words, it should know how to be you ... oh excuse me I need to use a dangerous word — avatar — in a free net that works for you and keeps the logs. (...) It’s all there, nobody needs anything special. Do we have the server you can put in your pocket? Indeed, we do. Off the shelf hardware now. (...) Plug them in, wire them up. [1]

As the excerpt above illustrates, in the debate on Internet re-design, functional requirements (“what” is to be designed) and design parameters (“how” to design it; Suh, 1990) are intertwined, while no distinction is made between between “knowledge” and “concepts” (Hatchuel and Weil, 2009), what is already known and what remains to be invented.

Thus, a broad set of questions remains unexplored: Would a “good Web server you can put in your pocket” have the same performance criteria as the ones we already know? Why would it send “everything to your friend’s servers” and how? What is the difference of “yourself” and “your avatar”? The collective design process goes on, with researchers adding extra requirements to an invisible common wish list. The overall ambiance, that could be summarized by the slogan “just do it”, may remind us the enthusiasm preceding the dot.com bubble, which had been largely based on the assumption that “everything is already there”. However, there are crucial conceptual challenges still to be tackled.

1.1. Defining the problem in terms of design

Moglen’s speech evokes, in a very personal way, the important challenges yet to face. Still, the debate on Internet (and, more generally, digital) design lacks conceptual clarity, addressing digital design in a variety of ways, according to a researcher’s discipline — such as “politics” (Agre, 2003), “law” (Lessig, 2001) and others. This paper addresses design as a reasoning (Hatchuel, 2001) *per se*. Borrowing elements from the methodology of industrial design, I am going to focus on two functional requirements (Suh, 1990), which are usually met in this discussion, although their content remains ill-defined:

1. “Your data” *i.e.*, the personal information of the user.
2. “and those of your friends”.

These two concepts are considered to be fundamental for two reasons: on the one hand, they portray a field where “hot debates”, such as the one on privacy, take place. On the other hand, the very locus of innovation (von Hippel, 1994) of the Internet and the Web is situated here, especially when compared to pre-existing communication systems. As will be shown in this paper, a breakthrough from the standard network framework has already taken place, the conceptualisation of which is fundamental for the further advancement of the discussion on Internet design.



2. Networks and communities: Untangling the nexus

Internet scholars have emphasised the need to take abstract notions seriously, in order to seize the contemporary experience of online settings. For example, Turkle (1995) observed that “Gallic abstractions” by French philosophers of previous decades, such as Lacan, Foucault, Deleuze and Guattari, become “more concrete” in face of today’s online experiences. Still, while scholars recognise the richness and the originality of online settings, there is yet work to be done to construct more relevant frameworks. As of today, we are usually satisfied with factual definitions of “virtual communities”, where the notions of community and networks are frequently (con)fused, used to describe online phenomena without distinction of their conceptual differences. In fact, we are often contented by a mix of notions including communities, networks and some specific characteristics of online conversational settings, such as the fact that people may or may not meet, and that the interaction is mediated by computers:

A virtual community is a group of people who may or may not meet one another face to face, and who exchange words and ideas through the mediation of computer bulletin boards and networks.

Like any other community, it is also a collection of people who adhere to a certain (loose) social contract, and who share certain (eclectic) interests (Rheingold, 2014, 1987).

Hence, online communities, networks and computers form a kind of unity by referring to diverse conceptual frameworks simultaneously. Similarly, this fusion of the terms "networks" and "communities" is to be found in innovation research, as in the case of the well-known Apache server software. Eric von Hippel (2007) opposes the concept of user networks to that of user communities, the latter characterised by a sense of belonging, and calls for further research on the specificities of user networks. He illustrates his argument by providing the example of the user network of the open source software Apache server. Still, this emphasis on the concept of networks, rather than communities, seems to contradict previous conceptualisations of user innovation. Lakhani and von Hippel (2003), also studying the Apache server user community, showed how the sense of belonging in a community animates the collective action of developers.

While the lack of precision induced by this use of the two notions helps people engage in a discussion about online settings, the nature of which is often blurred as well, this conceptual turbidity becomes a problem when one has to mobilize concepts to build functions or parameters during the design process. Of course, blending different frameworks may enable readers to intuitively immerse in the field, but it makes it difficult to distinguish the characteristic attributes of the design of digital settings and to conceptually organise a design reasoning.

To elaborate these abstract notions and concepts that obtain different meaning across disciplines, the approach of philosopher Anne-Françoise Schmid is useful. She proposes the notion of "generic space": a space outside disciplines where concepts can be jointly explored and elaborated, to be later "infused" back into the original disciplines, taking their meaning by re-arranging or extending disciplinary knowledge (Schmid, 2011; Schmid, *et al.*, 2011; Chrysos, 2016). Thus, a review of the notions of networks and communities is required. The following paragraphs operate this review, focussing on social sciences, where illustrations are less technical. In addition, the similarity of the concepts in network approaches allows us to go back to the origins of network theories; as for the notion of communities, we will stick to the definition of "communities of practice", which is more widely used today by scholars.

2.1 Communities of ...: knowledge domain as the backbone of a community

Approaches to the notion of communities generally stress *something* that its members share. Communities are built around common knowledge, and are characterised by it, this knowledge providing them a specific identity.

A well-known case is communities of practice (CoP, Wenger, 1998; Wenger, *et al.*, 2002). In management literature there is a strong tendency to use this term to describe whatever cannot be included in a general organisational schema, making the term far too wide a category to be useful in the distinction of informal organisational phenomena.

However, Wenger, *et al.* [2] have defined three structural elements for communities of practice:

- *The domain*, denoting the topic the community focuses on, creating a common ground and a sense of common identity inspiring members to contribute,
- *the practice*, consisting in the specific knowledge the community develops, maintains and shares and
- *the community*, being the "social fabric" of learning.

Hence, "cultivating" communities of practice means acting on those elements by different means, as by specifying a topic, introducing a new practice or providing interaction tools. In fact, as CoPs have been introduced by the study of relatively stable work environments, as Amin and Roberts (2008a) note, a long-term relationship is to be found in their structure.

By assuming a rather linear process for the evolution of relations, much of the research on CoPs has been able to focus on the ways in which such relational settings guarantee knowledge on practices sharing, maintenance and development. Regarding relationships themselves, the informal, non-biased nature of relations is important. Hence, for Wenger and Snyder (2000), project teams are to be excluded from the notion of CoP, as the authors have a different view on the kind of relationships at stake. For them, while project teams are held together by "*the project's milestones and goals*", the linking power of a CoP is "*passion, commitment and identification with the group's expertise*". In the same work, they nuance the dimension of time, as CoPs exist for "*as long as there is an interest in maintaining the group*" [3]. Hence, when the

interest of maintaining the group stops being present, when the topic or the practice of the community stops being relevant, as in the case of successful disruptions (Christensen, 1997), CoPs also stop being maintained.

Amin and Roberts (2008b) provide a list of the different types of communities of practice identified by the literature (*craft-task-based, professional, expert or high creativity, virtual*). As observed by this list, while the different types do not share any common type of social ties — they vary from long-lived to short-lived — this is not the case for knowledge: every community type shares a specific type of “*knowledge practice*”. Still, “you” and “your friends” do not always share a common practice, as friendship is not limited to a specific professional circle.

A second approach to communities comes from the sharing of resources. The case of open source software is exemplary, as its intellectual property license is designed to guarantee the sharing (O’Mahony, 2003; von Hippel, 2010). Thus, von Krogh, *et al.* (2003) call “communal resources” the rewards of participating in a community, which in the case of open source are reputation, control over technology, and learning opportunities. Still, “your data” and “the data of your friends” are not created as economical resources, although they can become so, if exploited by an enterprise (*e.g.*, for marketing ends). Thus, the paradox that whatever friends share, they create in common online, does not become a resource unless this “commonness” is challenged by a third party.

A third category of communities focusses on a specific commercial good, which structures around it its own community of users. This wide category of client communities, varying from fashion consumers (Maria and Finotto, 2008) to video gamers (Haefliger, *et al.*, 2009) highlights how a product becomes the intermediary between enterprises and users, enabling a feedback acquisition or user-self-regulation. In this situation, friendship emerges through the activity of consumption, *e.g.*, in the well-known case of Harley-Davidson motorcyclists. Thus, data and relations created in such a situation are effects of a well designed and commercialised product, not of independent communities or networks acting independently from an enterprise activity.

In all forms, communities have a way to define their identity and their processes of interaction. Community members vary in seniority, and organising a community means assuring a life “in common”, making sure that the common will be maintained as the newcomers are initiated to the community values and advance their identification with their group, along the process of engagement and participation.

Still, the notion of community in all its configurations presupposes a process of engagement leading to a common identity, a sense of belonging. Thus, ephemeral conversations undertaken around personal preoccupations (such as the ones we see in social media) cannot be considered as “communities”, to the extent that they continuously change subjects of discussion.

2.2. Definitions of the notion of network across disciplines

The emergence of the modern notion of network can be traced back in the eighteenth century and the work of the Swiss mathematician Leonhard Paul Euler (1707–1783), who coined what later became the standard network framework. Euler introduced the conceptual framework of nodes and links to solve a rather playful problem, concerning the seven bridges and the two islands of the city of Koenigsberg: could there be a path to cross all bridges just for one time each? Euler modelled the problem using dots to represent land masses, and lines to represent the bridges connecting them. Concluding that such a path did not exist, Euler incidentally invented an original way to analyse networks. Ever since, this framework has been used by a variety of disciplines, beginning from engineering and medicine (Guillerme, 1986). Via a process of infusion (Schmid, *et al.*, 2011), the conceptual framework of networks progressively became an integral part of an important number of disciplines, where one can still see the semiotics of nodes and connections, although they obtain a different meaning depending on the context.

This pioneering eighteenth century framework is, however, insufficient to face the contemporary challenges of Internet design, namely creating new data and making new friends.

2.2.1. The use of the network framework in social sciences and its limitations

In light of the above mentioned framework, and adopting the social sciences perspective on communication networks, individuals and objects can be conceptualized as nodes (or vertices) and connections (or edges) (Latour, 1996). Specifically for social networks, Castells added the dimension of a “*protocol of communication*”, understood as “*the rules to be accepted once in the network*” [4]. Yet, little attention has been paid to the creation of new links (*e.g.*, new friends), while data have no defined place in this framework.

Generally, a sociologist using tools, such as the Pajek software, to create social network graphs has to declare whether or not two nodes (*e.g.*, two individuals) are connected. While the tool

includes all concepts and operations required for a standard network analysis, it does not provide any option to describe a situation where two nodes are about to get connected, yet it is impossible to know if they will manage to do so, eventually — such an option would be considered a lack of rigorosity. Akrich, *et al.* (2002) consider that a technical artefact is already characterized by “*the existence of a bundle of links which unite the object to all of those which handle it*”, which can be described by a “*socio-technical diagram*” [5]. Exceptionally, the establishment of a new connection is addressed by the notion of “*recruitment*” (Latour, 1987) where, in fact, new relationships are added to one’s network. While rarely mobilized in the usual network analysis (the social-technical diagram), recruitment could be an interesting concept to use, mostly for the study of fields such as the expansion of “standard” telecommunication networks (*e.g.*, marketing methods to “recruit” new customers). Still, this notion would contradict the requirement of “peer” communication and is restrictive in terms of design, thus can mainly be useful for the design of hierarchical networks.

In addition, being limited to Euler’s standard framework, knowledge and innovation are usually conceptualized by network approaches as circulation of information throughout a network’s topology (Granovetter, 1983, 1973), much like the flow of electrical current through a circuit (Davis and Wilkof, 1988; Reid and de Brentani, 2004). Yet, as already mentioned, beyond information that is inserted in the Web (Musiani, 2013), a design process should take into consideration the fact that knowledge is created on the Web itself.

2.3. Network structure and the cyberspace

While network approaches often consider knowledge as information flowing throughout a network, this is not the only possible approach. Granovetter (1985) suggested a way to distinguish knowledge in relations, embedded in network structure, determining actors’ behaviour. Still, the development of cyberspace has introduced the need for new concepts, able to describe its quality as a place to meet strangers.

Granovetter (1985) develops his approach on the notion of embeddedness, suggesting an accumulation of knowledge at the level of structure in a network. More specifically, economic behaviour is examined from the perspective of commercial transactions, considered to be easily generalizable to other settings. Then, Granovetter argues that this behaviour is determined by the history of relations, and their position with respect to other relations. In other words, one’s behaviour is determined by his/her place in a network, and knowledge is all about knowing the relations one has already developed. Distancing himself from the thesis that behaviour is determined by institutional roles, Granovetter also takes a distance from those referring to the notion of the public, thus not answering the question of how strangers can be put in contact. Yet, many scholars have observed early on that the cyberspace is a place where strangers are able to initiate contact with each other. In addition, data can often be accessible to others, not belonging in the initial network. The online existence of “your data” and the “data of your friends” challenges network approaches because it is part of the cyberspace contemporary phenomenon, forcing previous frameworks and approaches built on pre-existing paradigms to change in order to remain relevant.

As pointed out by Turkle (1995), cyberspace is now part of everyday life routines, including the development of fairly intimate relationships with people whom we may never physically meet. Turkle (1995) argues that in the communities of cyberspace “we are dwellers on the threshold between the real and the virtual, unsure of our footing, inventing ourselves as we go along.” Rheingold also agrees that the cyberspace is a different kind of space. Still, while pioneering scholars have worked since the ‘80s to show that the cyberspace actually exists and is no illusion, there is a line that has not yet been crossed: how do we progress from the acknowledgement of the contribution of visionary scholars, such as Licklider and Taylor (1968), and inspiring authors, such as William Gibson, to contemporary scholarly contributions?

2.4. Collective intimacy and intimate places

The notion of collective intimacy emerged to address challenges met in interdisciplinary fields. In epistemology, the notion of collective intimacy is mobilized to describe interdisciplinary contexts going beyond “egos” (Schmid, 2011; Chrysos, 2016), while in ethno-psychiatry, it has been used to designate a method according to which the identity of the patient is developed within a public including various actors (Hounkpatin, *et al.*, 2011). This notion can be useful to account for the design process of Internet settings, to signify a process of individual expression and individual exposure within an ephemeral public, where new identities can emerge.

Thus, an intimate place is a place enabling the development of collective intimacy. A typical case are “*BarCamps*”, ad hoc events where participants gather to discuss and explore emerging technologies, uses and markets (Chrysos, 2015, 2013, 2011). There, a heterogeneous public, constituted mainly by developers and users but also executives, researchers or just “curious”

individuals, defines the program for the day of the BarCamp, which can take place in various locations. Unlike communities of practice (Wenger, 2007) there is no common knowledge domain, as BarCamps may have general topics of discussion, emerging topics or no pre-define topics at all. In parallel, unlike social networks (Granovetter, 1973, and others), participants are usually strangers and may remain so after the BarCamp. Globally, it is a place where individuals share their perceptions on new phenomena and, perhaps, create new acquaintances and seize new opportunities.

The sense of intimacy found in intimate places like BarCamps can be used to describe contemporary online settings. This perspective implies to examine the potential (but not certain) creation of relationships, to explore the process, rather than the structure, prescribed by the design of the cases that we will study. Our vision on "your data" and the "data of your friends" can now be expanded: they are neither private nor public, they belong to the form of intimacy that was developed jointly.

2.5. Introducing the notion of "monuments of cyberspace"

As already observed (Georges, 2009), a particularity of the Web, when compared to other communicational settings, lies in the fact that interactions leave traces on the technical layer. Moreover, those traces have value for the users. Thus, borrowing from Foucault (1969), the notion of "monuments of cyberspace" is introduced here to qualify what a viewer sees on the Web, within social networking tools and collaborative platforms. To visit one of those Web pages is to decipher traces left by the users, understand who they have been and restore their discourse. The potential of creation of new relations is conceptualised here simply as "handshakes".

Foucault (1969) made a distinction between "monuments" and "documents", suggesting a transformation of monuments to documents and vice versa. The first operation of transformation consists in expressing monuments in documents, constructing a discourse out of the traces of the former. The second operation is to treat documents as monuments (*e.g.*, through the study of ancient manuscripts), positioning them in a sequence, in a sort of a chronicle of thought, portraying this way the evolution and the ruptures of reasoning throughout the history.

The concept of "monuments of cyberspace" describes thus the intrinsic mode of knowledge edification in online settings. More specifically, each online interaction is not only limited to an exchange of information, a transaction, nor is it always the effect of a mobilisation of already existent relations. This interaction is always inscribed on the technical substratum, the cyberspace. A common place is thus developed during an event of online interaction. A monument of cyberspace can be visited long after its creation by unexpected visitors seeing the technical substratum as well as the traces left in an intimate place.

Additionally, "handshakes" signify the moment where new relations can be created. Handshakes are considered here as in parties or gatherings, not in business — the latter signifying the closure of a deal, while the former just signifies "nice to meet you".



3. Two cases of Internet design

To illustrate the value of the concept, we review two cases of Internet design. Both are typical of the development process of the Internet. The first belonging to the early days of the Internet while the second being contemporary, they illustrate the preoccupations proper to Internet design. First, we address the discourse of Internet developers by revisiting their stories. Then, we closely investigate the design of the underpinning settings. We find that both cases diverge from the standard network framework: in the first case, the setting is about individuals willing to get connected, while in the second one, the setting becomes the very place where knowledge is created.

3.1. Case 1 — The TCP protocol: Create a connection first, communicate later

The history of Internet design unfolds through the decades and aggregates a heterogeneous set of actors, technologies and perspectives. This paragraph revisits it, focussing on its most distinctive concept. Then, we show how this concept goes beyond standard framework of networks, proposing a new notion for its description, to be taken into account in future design processes.

3.1.1. The story

For those familiar with network theories, the datagram, the design of which was described by the

TCP protocol, has been a very subtle and atypical conception. John Day was one of the first developers to make domestic use of the ARPANET and a pioneer of the Internet protocol design processes that followed (Abbate, 1999). Day (2008) highlights the conceptual importance of the "datagram" in what concerns the design of the Internet. In addition, he argues that the datagram has been a "contentious invention" created to enable a "connectionless communication". According to Day, the contribution of this concept to the further development of the Internet has been enormous, as it became the "religion of the Internet".

To an important extent, the TCP protocol came as a response to the desire "to interconnect separate communities", different both functionally and geographically (Licklider and Taylor, 1968). This desire was shared by early computer-based communication pioneers. The datagram was invented by Louis Pouzin during the "Cyclades" project in France in the early 1970s. Later, the notorious article "A protocol for packet network communication", edited by Vinton Cerf and Robert Kahn (1974), considered to be the initial specification of the Internet protocol, adopted this new logic. Embracing some of the major requirements of the Cyclades system (Schafer, 2012), such as enabling the connection among heterogeneous networks, the authors highlighted the conceptual differentiation between the TCP protocol and the standard network approaches: the protocol would anticipate the way in which two nodes *are getting ready* to communicate.

Afterwards, the effort of standardisation of the data transmission systems (the *OSI*) eventually became a "Tower of Babel" (Schafer, 2012). Beyond conflicts of interests, this lack of understanding was due to the conceptual distance between the standard approach and the one introduced by the datagram, the incompatibility amongst the different disciplines and the lack of concepts to describe the new phenomenon.

3.1.2. The design

Instead of prescribing "*the rules to be accepted once in the network*" (Castells, 2009), Pouzin's datagram prescribed the rules to *get connected*. The subtle conceptual contribution of Pouzin and his datagram lied in the absence of any guarantee on whether a connection will be established or not. In other words, we don't know if we can draw a line between two nodes or not, we cannot positively affirm the acceptance of a user in the network. For the PTTs and the telecommunication engineers of the time, this logic was unacceptable: for them, all users were necessarily connected to the network and this connection should be guaranteed by the operator.

To seize this conceptual expansion in a more intuitive way, let us consider two individuals, Alice and Bob. According to the standard network framework, Alice and Bob are connected if they know each other, otherwise they are not. However, the datagram protocol provides a *way* for them to know each other. What is also described as a "three-way handshake" is a *process* in which Alice and Bob will exchange their contact information. If they do so, that means they can communicate. Otherwise they are not connected, but they can try again.

As surprising as it may seem when compared to standard business logic, enormous communication networks have been built and huge investments have been made throughout the latest decades on the basis of a protocol providing no guarantee on the establishment of a connection. Adopting the TCP protocol was like accepting that "you will share data with strangers as if they were your friends". Thus, the TCP can be socially understood as an intimate place where one can develop new relations, and for that she should accept to be exposed, abandoning the safety of known networks or communities.

3.2. Case 2 — A developers' forum: "Let's talk about my problem"

Web-based enterprises, such as Google or Facebook, have forums at their disposal, where external developers using their technologies to create applications can report their problems (Chrysos, 2013). Such forums illustrate the specific condition of the creation of Web content, as they are used by those actually developing the Web itself. Let us consider one such discussion, among the thousands that exist in the Google Maps developer support forum⁸. The following case shows that the Web is not just a network for information transmission, but it is also a place for collective intimacy development, where information and knowledge production results as a monument of cyberspace.

3.2.1. The story

On 10 March 2009, a developer requests an extra option, that would make his application independent from its users' language. More specifically, he wishes that the users of his application, which is built upon Google Maps, obtain the results of their own search in the language that corresponds to the country of access instead of the one declared by the user's computer interface. In his request, he explains the reason: "*I'd like to be able to compare the answers with places stored in a database, and I don't want this comparison to be dependent on the user's language*". Then, Pamela, working for Google, asks for more precision about the way

this developer builds upon Google Maps: "Are you using the HTTP geocoder or JS GClientGeocoder?" After a short exchange, Pamela indicates how to do it in different ways, also providing a solution that had not been documented yet. Other developers join the discussion four years later, indicating errors in the documentation, and reporting similar problems. One of the latest developers facing the same problem provides more information about his actual situation: "This is big issue for me. I am developing a real estate search Web site, and I can't afford to have formatted addresses containing Brazil, Brésil, Brasilien or whatever in place of Brasil."

By the time this paper is written, the issue is still open and no resolution is given. However, developers facing similar problems may read the conversation and try out some of the solutions evoked, in case something works for them, otherwise they can add their own experience.

This particular Web page did not just serve as a link among the actors that engaged in the discussion, it served as an intimate place, where developers could share their concerns. Throughout the years, this thread had served as a "monument of cyberspace", where knowledge has been progressively constructed through the conversation of developers facing similar problems.

3.2.2. The design of the setting

While this case was chosen for its simplicity, an enormous number of such discussions can be found online. However, they cannot be analysed as if they were telephone discussions, using the standard network framework. Thus, the viewer of this "monument of cyberspace" has to decipher the traces left by the users, get to know who they have been and restore their discourse, in order to understand what this discussion is for and what they can learn from it. Thus, it is helpful to know that Pamela, who changed the status of the conversation from "Accepted" to "Acknowledged", "to clarify their state" was a Google employee, responsible for developer relations. The examples provided by developers indicate that such a problem may be recurrent for those using Google Maps for tourism-related sites or applications, and so on. This possibility the viewer has to re-contextualise the discussion has to be taken into account by the designer of the technical setting, enabling such discussions.

Such design requires going beyond the concepts of links between actors and tackle the issue of how to create an intimate place of interaction, allowing each one to talk about his/her problem to the others, even though a resolution cannot be taken for granted. Regardless to what happened to the actors of this conversation, this monument is still there, providing the knowledge created as an effect of an intimate exchange to those who can decipher it.



4. Discussion: From a structural to a procedural posture

The two cases examined above show the limits of the standard network framework faced with the particular requirements imposed by the Internet and the Web. [Table 1](#) summarizes our findings. While the standard approach is appropriate for the study of pre-Internet networks, such as in the case of telecommunications, the notions of monuments of cyberspace and of handshakes can help go further, both in terms of the topology and in terms of the processes of a communicational setting.

Table 1: Comparison between the standard network framework and the concepts proposed here.

	Network framework	Monuments of the cyberspace
Field	telecommunications	TCP/forums
Topology	static	dynamic
Connections	pre-established	potential
Nodes	finite	infinite
Processes		
Knowledge creation	<i>[a posteriori: embedded in the structure]</i>	"Monuments of interaction"

Relationships creation	<i>[a posteriori: expressed by one's position]</i>	"Handshakes"
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4.1. "Handshakes": Enabling relationship creation

The shift from pre-Internet networks to the Internet portends an expansion (Hatchuel and Weil, 2009) in the nature of the object under consideration. Standard network analysis aims at the configuration of the topology of a given network, by the identification of the nodes and the connections among them (Latour, 1996; Akrich, *et al.*, 2002; Castells, 2009). While the controversy between European telecommunication institutions and the early "people of the Internet" could be interpreted as a controversy between actors supporting different interests, such a view is constraining, as it pre-supposes that the different stakeholders have clearly expressed and known their interests regarding the potential evolutions of the TCP. Yet, the TCP design being original, anticipating its effects on the interests of the different stakeholders wasn't easy. The TCP has created a new context characterised by threats and opportunities for everyone to consider. Still, as we have examined, there has been a major lack of conceptual understanding of the TCP concept, a "Tower of Babel" as put by Schafer, rather than a conflict based on conscious and contradictory interests.

In fact, while telecommunications were based on a static perception of a network, the TCP advocated an expansive topology. Thus, instead of considering pre-established connections among a finite number of nodes, Pouzin introduced a protocol potentially enabling connection between a theoretically infinite number of nodes. This expansive design principle was later inherited by the Web. Online conversations such as the one studied earlier are open to new individuals, as participation does not require prior belonging to a specific network.

The TCP allowed "handshakes" to take place, defining the non-deterministic process of creation of new relationships. Handshakes account for a constitutional uncertainty of the binding between connectionless individuals, that can be described by the will of self-exposure of the actors engaged in the potentiality of networking — a characteristic of collective intimacy (Schmid, *et al.*, 2011; Hounkpatin, *et al.*, 2011; Chrysos, 2011).

4.2. "Monuments of cyberspace": Knowledge creation as an effect of personal expression

The Web, inheriting Internet design principles, went further by providing an intimate place (Chrysos, 2011). In forums such as the one studied earlier, even highly technical issues are not debated on the basis of an "objective" posture. Instead, conversation is deployed in relationship to personal problems or aspirations. Thus, forums are not just channels for knowledge to circulate (Granovetter, 1983, and others) — they are the very places where knowledge is created. Since knowledge creation emerges as a monument of cyberspace, to consult it individuals require to enter the conversation, either actively or passively: one has to understand the problem of the reporter as well as the answers given to him by the other participants, to eventually understand the possible resolution of the issue.

In addition, the functional requirements of a forum design imply the management of a conversation, for it to be fluid and fruitful in terms of both participation and knowledge production. Far from being merely "technical", design parameters such as the labels indicating the progress of the conversation induce restrictions that enable a common way to discuss on a great variety of issues, producing knowledge in the same mode. Thus, the issue of personal data is no longer limited to the information created off-line, such as demographic information (Musiani, 2013, 2011): it includes personal information that are commonly expressed, within a context of collective intimacy (Schmid, *et al.*, 2011; Hounkpatin, *et al.*, 2011; Chrysos, 2011).

4.3. "Your data" and "the data of your friends" are elsewhere


The two cases above show that a debate on alternative Internet designs cannot advance if it is limited to the frameworks of networks (Granovetter, 1983, 1973; Latour, 1987; von Hippel, 2007; Castells, 2009) and communities (Wenger, 1998; Amin and Roberts, 2008a; Rheingold, 2014). While the reality of the Internet and the Web has already moved past what was conceivable within these frameworks, studies that keep on blending those concepts overlook the originality of Internet design and lessen their relevance.

The monuments of cyberspace are new intimate places allowing handshakes amongst those visiting them. Once named, this phenomenon can be treated further across different disciplines, and developed through the creative action of designing alternative architectures for the Internet. However, they should not be reduced to either private or public spheres, as the requirement remains to obtain coherence between personal data and the ways they are treated.

5. Conclusion

Thus far, the notions of networks and communities have constituted the common ground for the debate on alternative designs to the Internet. Still, these frameworks neglect the process of creation of new types of knowledge and new relationships, as they focus on the structural analysis of a network's topology and its effects or the development of a specific knowledge domain. The experience of the Internet and the Web have introduced original requirements; yet, critical approaches as well as alternative design explorations have undermined this specificity, leading to a weakly structured conversation.

The issue of "personal data" and the related design challenges require new conceptual tools to be tackled. As this paper has sought to show, the particular requirements illustrated by the design of the TCP protocol and the design of online forums impose a new perception of the way individuals are engaged in online exchanges and, thus, the way that personal data are formed and shared.

My contribution lies in the exploration and the conceptualization of two fundamental elements of contemporary Internet and Web: the "handshakes", *i.e.*, the ability of users to create new relationships through these settings, and the "monuments of cyberspace", *i.e.*, the contextual production of knowledge through online interaction. These two concepts enable new directions for both the study and the design of online settings, enriching the conceptual framework of the community studying online phenomena. 

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