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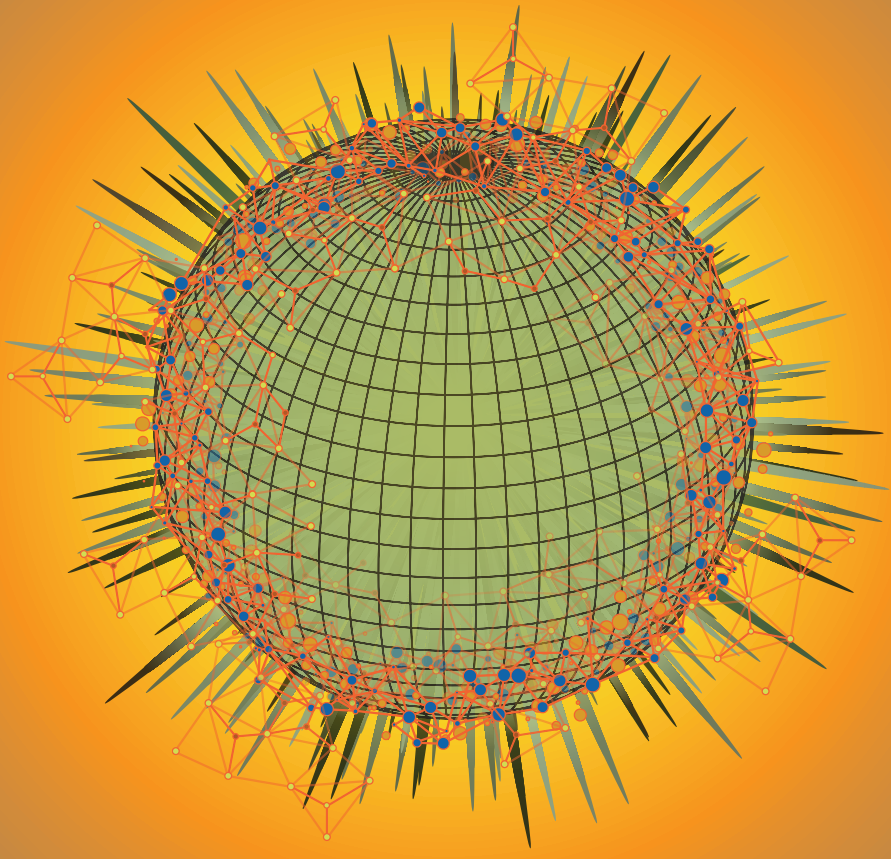
PAOLO BORY

THE INTERNET MYTH

From the Internet Imaginary to Network Ideologies



The Internet Myth: From the Internet Imaginary to Network Ideologies

Paolo Bory

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Preface

Internet history is a growing and relevant field in contemporary media history, the history of technology, and other related disciplines. Several research projects with national and international collaborations, dozens of books and papers, and even a specific journal called *Internet Histories* are now focused on this topic, shedding new empirical and theoretical light on how the Internet developed and how it has changed over time.

This book clearly adds new theoretical reflection and empirical documents to this field, but it does much more than that. For example, it adopts such a broad and combined theoretical perspective that it has the potential to change the field itself. It is, first of all, an attempt to reconstruct a history of a powerful idea (the network, defined by the author as 'the unfulfilled dream of the digital age') and the imaginaries linked to it. Indeed, the Internet is full of narratives and ideologies surrounding its origins and its development and some of them have become mythological. Media mythology is not a field *per se*, but this book starts to reflect on it: is the Internet one of the most powerful mythologies today? How is (and was) this mythology narrated? And how to study these 'digital' mythologies? The answer is complex and inter-disciplinary. Paolo Bory combines history, sociology, materiality, media archaeology, Science and Technology Studies, the political economy of communication, critical media studies, and perhaps more. The variety of collected sources is impressive as well: political and business documents have been collected from different archives; qualitative interviews have been conducted with key actors; other sources not

easy to identify have been included, like archived videos from the web, pictures, ephemera, etc. Overall, this is a prototype of how to approach Internet and media historiography at large, and to inform it with other perspectives.

The book examines the World Wide Web and two failed Italian Internet projects from the 1990s. Several scholars have recently studied Web history, but Paolo Bory tackles this issue from two unusual angles: the mythical story behind the birth of the Web and the persistence of old imaginaries and ideologies and of old media in the Web itself. This is an attempt to rebuild an **archeology of thought and possibilities** at the basis of the idea of the Web. This is also an innovative way to study the reasons for – and the systems of – believing in what we normally call new or digital media. The second case study is mostly unknown: the origins and failure of two networks in Italy: *Socrate*, an ambitious national project to build a high-speed network in the country, and *Iperbole*, one of the best known and now forgotten civic networks in the country, based in Bologna. Even this second case study is analyzed with an innovative approach: instead of studying successful technologies, this book opts for failed ideas or projects. Failure is a difficult term, like myth, and it should not be taken for granted: behind failures, future success can emerge (see *Iperbole*) or, again, failures can be long-lasting and can shape technological development even today (see the fascinating paragraphs on the ruins of *Socrate* and the legacies and material persistence of past wrong choices). In other words, this book starts an enquiry into the **path dependency of Internet failures**.

The World Wide Web, *Iperbole* and *Socrate* are not stand-alone case studies, but they are closely and surprisingly interrelated. Following a trend and a plea for de-Americanizing Internet studies, this book focuses on the 'European' history of the Internet: all cases are European-centered and two of them deals with the Italian history of the Internet, probably one of the most understudied countries in Europe. Secondly, the three case studies happened in the 1990s, 'a turning decade for Internet and the Web' according to a special issue of *Internet Histories* edited by Valérie Schafer and Benjamin G. Thierry. A turning decade because, during the 1990s, several imaginaries of the contemporary Internet emerged and this book focuses on one of them: the Internet as a *need*. A need for transmitting and receiving information, a need to create a repository of human knowledge, a need to exploit civic duties and possibilities, and finally just a need to communicate more (with more speed and more efficiency, first of all). I think this book starts another inquiry into the **myths of contemporary communication needs**. There is also a third way in which the case studies are linked: especially in chapter 4, Paolo Bory places them under the umbrella of an 'unquestioned *faith* in and towards networks'. In the end, this is a book studying and deconstructing the idea of networks and, even if this journey can take different directions, it is a study of 'the ideological force of the Internet myth' (to quote Paolo). For a long time, the Internet has been considered an agent of positive change in contemporary societies: among others, democracy, mutual understanding, public services, knowledge should have benefitted from the

Internet. The 1990s was the decade when, to quote Umberto Eco, this *integrated vision* of the network emerged, while more recently a turn towards the *apocalyptic vision* occurred with key authors such as Morozov, Lyon, Zuboff, Fuchs and others. But, in the contemporary 'network imaginaries', the two visions still co-exist. The one studied in this book is already in place and has limited the possibilities to imagine other forms of network. This is a relevant aspect, underlined by Paolo Bory in the final pages: the power of limits. Consequently, this book is also an inquiry in the **limits of imagining the Internet** and the technologies we live by in general.

Internet imaginaries, ideologies, narratives, and myths (all terms used and explained by Paolo in his book) take time to be built, spread, accepted, and maybe then killed by society. They all have effects in the long term, they need long periods to be metabolized, and their effects are persistent even if often unnoticed. This book uses history, one of the few disciplines able to grasp long-term changes and continuities, in order to understand crucial issues in the relationships between contemporary societies and the Internet. It is an attempt to retrace how the digital culture today is based on forgotten ideas, to revitalize the powerful and persistent narratives behind failed projects, and to understand how the Internet was built with a mix of mythologies, human needs and limits. Every technology of communication is a by-product of the society that created it. And in every society, imaginaries, ideologies, narratives, and myths play a crucial role in establishing a taken-for-granted and yet powerful system of looking at the world. This book ultimately aims to study the *habitus* where the Internet was created and, in the end, to better understand the ways in which contemporary societies decide to imagine, show, and limit themselves.

Gabriele Balbi
Lugano, 7 February 2020

Introduction

Histories, Narratives, Networks and the Internet

The network is the unfulfilled dream of the digital age. By the end of the last century, the Internet and the Web seemed to be the bearers of a new era in which the integration of connectivity and digital devices would bring 'the workings of society closer to the workings of our minds' (Berners-Lee 2000: 6). According to this narrative, especially starting from the mid-1990s, a new horizontal, coordinated, and interdependent organization of knowledge, work and social life would be realized thanks to the distributed model of communication. However, two decades later, what was once forecast to be the *golden age* of networks has instead turned out to be an age in which networks have become a *gold mine*, especially for a few actors who have taken advantage of the collective enthusiasm for networked systems. In the last decade, many critical scholars have stressed that the Western ideal of a 'technology of freedom' (Aouragh and Chakravartty 2016) embedded in the Internet and the Web has become a powerful model for social, economic and political control (Goldsmith and Wu 2006; Zuboff 2019). Notably, this profound change has taken place not only at the technical, economic and political levels, but also at the discursive level. The spreading narratives of the so-called 'Internet revolution' professed by intellectuals, politicians and countercultural movements (Turner 2006) have been subsumed by corporate players that centralize information and economic power while promoting the very same values on which 'the network of networks' was built. However, not only corporate actors, but also governments, cultural and political movements, and even social scientists have long professed this narrative.

This book is an attempt to retrace and challenge the 'Internet myth' that lies at the foundation of the longstanding network ideologies, i.e. the idea that networks, by themselves, are the main agents of social, economic, political and cultural change. In particular, this work will decode, analyse and challenge the

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foundations of these network ideologies, looking at how networks were imagined, designed and promoted during the crucial phase of the 1990s in two different socio-cultural contexts. To achieve this goal, three case studies will be scrutinized so as to unveil the complexity of the narratives and imaginaries of networking: the birth of the World Wide Web in the early 1990s and the mythization of the new medium and its inventor Tim Berners-Lee; and two networking projects, the national infrastructural plan named *Socrate*, led by the monopolist Telecom Italia, and the Bolognese civic network *Iperbole*, which was the first to give free Internet access to citizens in Europe.

At first glance these stories can look too diverse. National and local histories of networking – and especially the way in which a single country or local community domesticates, interprets and forecasts future networks – contrast sharply with a unique global vision embedded in the Web idea. Nevertheless, by studying the history of failures and situated projects, scholars can unveil the plurality of actors who took part in technological change. Furthermore, such stories emphasize the different expectations for the future of society, the way in which global narratives of networks were integrated in national and local contexts and, last but not least, they show how different networking projects embedded different forms of network ideologies that still permeate contemporary political, cultural and techno-enthusiast movements.

In order to unveil the complexity and the ideological dimension of the cases at the heart of this work, a media history perspective focused on the role of 'old media' will serve as an interpretative lens to de-construct and 'de-mythicize' the Internet myth and the myths surrounding networking technologies in general. The aim of this media history perspective is twofold. Firstly, the way in which 'old' media were seen as a reference for the construction of digital networks helps us to de-mythicize the idea of the Internet as a fully disruptive and self-fulfilling technology. Secondly, a source-based analysis of the impact of old media on networks provides scholars with a strong historical background to support a critical perspective on contemporary networks and their advocates.

Indeed, critical media studies have rarely intersected the history and imaginaries of new media with old media imaginaries. In this regard, the new media scholar Geert Lovink claimed that, in order to be effective, a critical approach towards networking technologies and networked cultures should keep its distance from the obsolete term 'media', including the outdated meanings embedded in this concept:

> In times of budget cuts, creative industries, and intellectual poverty, we must push aside wishy-washy convergence approaches and go for specialized in-depth studies of networks and digital culture. The presumed panoramic overview and historicity depth suggested in the term 'media' no longer provide us with critical concepts. It is time for new media to claim autonomy and resources in order to leave the institutional margins and finally catch up with society. (Lovink 2011: 76–77)

Lovink is right to reclaim in-depth studies of networks. However, rather than keep a distance from the term 'media', this book aims to show how past, present and future networking technologies have always maintained a stable and necessary bond with the so called 'old'. As some technological artefacts persist and endure –symbolically and physically – within our social life, and are in dialogue with new ones (Edgerton 2011; Marvin 1988), so also narratives of the past and narratives of the future shape the social imaginary and, in turn, forge social and individual perceptions of reality. In this regard, the conflict and the dialogue between history and narrative[1] represent the conceptual arena in which reality is socially constructed, and where monuments, institutions and founding myths such as the digital revolution or the so-called birth of the Web, are alternatively erected and torn down. Narratives and history are thus the building blocks of the social imaginary, and the imaginary is one of the most powerful instruments to weave, promote and disseminate ideological stances and power (Jasanoff and Kim 2015).[2]

In the last century, sociologists and philosophers have addressed the key role of the imaginary within societies. In an interesting debate around the possible meaning of this term, two leading scholars, Cornelius Castoriadis and Paul Ricoeur, tried to summarize their theoretical views on this subject. During the debate Ricoeur claimed that 'we are always immerged in a dialectic relationship between a horizon of expectations and a space made of experience' (Castoriadis and Ricoeur 2016: 58). Castoriadis replied, 'It's because of the change of horizons that we constantly need to interrogate our origins' (66). In Castoriadis' view, the imaginary defines and institutionalizes cultural processes integrating the experiences of the past and the vision of the future; hence the imaginary should not be seen as a static dimension, since it creates new realities and is constantly changing (it is like 'magma', in Castoriadis' term). From this perspective the imaginary is constantly stretched between the two forces of the past and the future; stories and narratives are the expressions of this tension between our institutionalized reality and desires for change, hence the imaginary projections of individuals, communities and societies. To question, to retrace and to analyse past imaginaries of networking means to interrogate both the origins of networking technologies and the way in which their life-paths have been narrated over time. Today, the institutionalization of the Internet myth has contributed to lay the foundations of the conceptual shift from a technical object (the network as infrastructure) to an ideological reference (the network as the elective model for the organization of societies). However, as this book aims to show, ideological visions of networks are older than the Internet, and network ideologies are much older than digitalization.

In broad terms, the theoretical frame adopted in this work relies on three main assumptions. Firstly, there is more than one Internet, thus there are several histories of networking which are expressions of a complex system of technical, cultural and historical trajectories, most of which are still uncharted. Secondly, the development of any computer network depends also on the past,

on the media and the socio-cultural environment in which every networking project was realized and conceived. Finally, the imaginary, coupled with socio-economic forces, influences and shapes the way in which innovation is used and framed, and in some cases exploited, at the pragmatic and discursive levels. Media and technologies, from this perspective, are not mere instruments or channels for human communication. Rather, technical objects such as networks, the Internet and the Web both convey and *are themselves* narratives; they communicate something to us.

Applying to these insights a perspective that is critical and informed by media history may help to unveil and scrutinize the tension between different network imaginaries, while also highlighting key aspects such as the influence of broadcasting media, the material dimension of networks and the rhetorical constructs lying at the core of the dominant narrative of Internet history. To look historically at the multiple dimensions of 'network imaginaries' is thus an essential step to challenge and de-construct network ideologies. Notably, digging into *network imaginaries* means examining how narratives, and the history that they carry, are able to shape technological and cultural change by acting as metaphors for ideological visions, as contemporary myths and, most importantly, as powerful means of cultural and social action or control. As stressed in the Castoriadis-Ricoeur dialogue, the category of the imaginary is not interpreted here as an independent or transcending dimension of social life; rather it is a key element for the social construction of reality, but also for the symbolic struggle for control which is still taking place in the digital media landscape.

Again, history is essential to the analysis of the imaginary. In order to stretch the possible angles of analysis of network imaginaries, historical research is not only useful, it is necessary. Acknowledging and taking the risk inherent in such a multidisciplinary approach, this book takes into account the need for new forms of integration between media history, Internet studies and critical theories; it is for this reason that the epistemological premise of this work is in line with Peter Burke, according to whom 'without the combination of history and theory we are unlikely to understand either the past or the present' (Burke 1993: 19).

The book is organized into four sections. The first section highlights the presence of a dominant narrative of Internet history. In particular, this narrative constructs a linear, progressive and US-oriented perspective on the evolution of networking technologies, disregarding a series of alternative and competing histories. Narratives regarding the birth of the World Wide Web and its spread during the 1990s are here interpreted as the culmination of this evolutionary process, which interested networking technologies in Western societies for at least five decades (1950s–1990s). Challenging this deterministic vision, paragraph 1.2 underlines the different projects that co-existed or competed with the Internet before the 1990s. The section 1.3 highlights the importance of studying the more complex subject of *network imaginaries* rather than confining

historical and social analyses only to the Internet imaginary. This terminological shift about the very subject of the field is justified through some key examples that demonstrate the plural and multifaceted identity of network histories (Sections 1.4–1.5), the networking models (centralized, decentralized and distributed) that guided different projects and other media histories, and the importance of materiality and networking infrastructures for the construction and the conceptualization of computer networks. Finally, section 1.6 establishes the link between network imaginaries, the political economy of media and the emergence of network ideologies. This discussion also looks at how critical media studies and the political economy of media and communication can profit from network histories and engage in dialogue with the case studies at the heart of this book.

Chapter 2 focuses in depth on the first case study: the narratives and the imaginary constructed around the birth of the World Wide Web. By examining the narratives constructed and disseminated to promote the Web during and after its invention, the chapter stresses two main theoretical aspects. Firstly, it highlights how the Web's invention and the figure of its inventor Tim Berners-Lee have penetrated the social imaginary by means of an old and well-known narratological structure: Joseph Campbell's monomyth (2.1.1–2.1.2). Secondly, the chapter highlights the undisclosed continuity and the direct relationship between the Web imaginary and a series of longstanding narratives and imaginaries related to media and communication technologies such as broadcasting, transportation and digital networking systems (2.2). Finally (2.3), a critical stance towards the monothematic and deterministic vision of Web history is advanced in order to downsize its cultural dominance. In this regard, to assume a critical distance from the Web's myth is here considered an essential action to expand the view on the wider and complex media landscape characterizing both the past and the present stage of networking systems in order to challenge one of the strongest narratives supporting the network ideology.

Chapter 3 focuses on two alternative and unknown histories of networking: the failed Italian project for a national infrastructure named *Socrate*, and the Bolognese civic network *Iperbole*. *Socrate* was a fibre-optic national infrastructure aimed at connecting the main cities of the Italian territory during the mid-1990s, whereas *Iperbole* was the first attempt to use the Internet for direct and participative democracy in Italy. After a brief introduction that stresses the relevance of national and local histories in relation to network imaginaries (3.1), section 3.2 introduces the Italian networking landscape at the time. Then, sections 3.3 and 3.4 deal with the different network imaginaries that co-existed in Italy, focusing in depth on specific aspects such as the technical development of the *Socrate* project, the networking model on which it was designed and promoted, the different vision of networking entailed in the concurrent project of the civic network *Iperbole* in Bologna and the different reasons behind the decline of the two projects. Sections 3.5 and 3.6 deal with two theoretical

aspects emerging from these histories: the first concerns the conflicting imaginaries entailed in the *Socrate* and *Iperbole* projects, while the second highlights the persistence of these networks, the importance of their material traces and the communicative function they serve. The last paragraph of the section (3.7) focuses on the relevance of alternative network histories for the analyses of the different imaginaries of networking that have co-existed, dialogued and competed over time. It stresses how these projects left both an imaginary and pragmatic legacy in terms of digital infrastructures, literacy, and even in terms of political and economic strategies today.

Chapter 4, drawing on the previous analyses of the case studies, proposes a theoretical perspective that looks beyond network ideologies, thus overcoming a vision of networks as determining and autonomous structures/models for the organization of societies. In order to relate the perverse effects and the power structures that took advantage of the Internet myth to the legacy of its underlying narratives, this section highlights the long-term permeability of network imaginaries, arguing that contemporary networks should be seen as limited technologies, and thus as models that rely on a structural and discursive continuity with older media and imaginaries. A critical move within this theoretical framework is here considered a strategic step towards a deeper understanding of technological and social change in contemporary societies. To be aware of the *limits* of networks and of the imaginaries founded on networking models, means in fact to accept the constant tension between the past and the future, between the dreams of a networked society and those socio-technical, cultural, economic and political constraints that are able to regulate, shape and control networked societies. Questioning the dominant narrative of Internet history is in fact a first essential step in order to re-position human imagination at the core of the social imaginary, challenging at the same time the idea of a future left in the hands of an immutable techno-cultural system under the control of a few powerful actors.[3]

CHAPTER 1

Internet Histories, Narratives and the Rise of the Network Ideology

People believe, thought Shadow. It's what people do. They believe, and then they do not take responsibility for their beliefs; they conjure things, and do not trust the conjuration. People populate the darkness; with ghosts, with gods, with electrons, with tales. People imagine, and people believe; and it is that rock solid belief, that makes things happen.

Neil Gaiman, *American Gods*

1.1 The Dominant Narrative of Internet History

In their essay on the missing narratives of Internet history, Martin Campbell-Kelly and Daniel Garcia-Swartz claim that 'most of the current crop of histories of the Internet can be characterized as 'teleologies' or 'Whig history'" (Campbell-Kelly and Garcia-Swartz 2013: 28). The authors highlight the fact that, beside a prevailing and pervasive narrative of Internet history, there is a long list of missing or neglected narratives that are essential to understand the actual development of the Internet and its present form. Unearthing the multiplicity of Internet histories (Brügger et al. 2017) makes visible the complexity and the intertwined paths that different networking projects have taken over time within a variety of cultural, political, economic and social contexts.

Notwithstanding the complexity of the untold histories of the Internet, most of them have also been overlooked by scholars for a long time. This blindness is not accidental; indeed, it can be explained by looking at the cultural environment in which the first works on the history of the Internet took place. Early historical accounts of the Internet were disseminated in the mid-late 1990s under the umbrella of the so-called 'digital revolution', thus in a period in which the network was becoming global and crossing the threshold into the homes of

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domestic users in Western countries. In this context, the Internet was seen as a radical change in the way people could communicate, work, learn and do business, and it was part of the radical transformation effected by the emergence of the so-called post-industrial society (according to the definition of Daniel Bell, 1974), which would later be renamed the information society or information age (Benkler 2006).

At this early stage, the Internet did not need a history; rather it needed what the media historian Simone Natale calls a 'biography' (Natale 2016a), a story about the life of the medium to be recounted starting from a mythical genesis.[4] It is not by chance that the first books on Internet history were written with the very same enthusiasm that digital technologies were exciting in Western societies: successful works such as *Where Wizards Stay up Late: The Origins of the Internet* (Hafner and Lyon 1996) and *Casting the Net: From ARPANET to Internet and Beyond* (Salus 1995) are two examples of how the literature celebrated the glorious lives of Internet pioneers. By doing so, these works contributed to the hagiography and the glorification of the Internet's founding fathers, who were portrayed as modern characters of mythopoeic literature (Katz-Kimchi 2015; Russell 2017).

This teleological and self-referential history was set in a specific geographical area. In fact, the first corpus of writings on Internet history was based on what can be defined as a US paradigm; these works describe a very linear (and inherently revolutionary) path of the Internet that begins with the birth of the ARPANet project in 1969, then evolves with the invention of the TCP/IP protocols by Vint Cerf and Robert Kahn in the mid-1970s, ending-up with the invention of the World Wide Web in 1990. In line with this narrative pattern, the key role of users, probably the most 'anonymous heroes' of the Internet revolution, has also been narrated through the lens of US actors.[5]

In broader terms, there are only three exceptions to US stories within this dominant narrative that are still in wide circulation: the first one deals with the link between the US pioneer Paul Baran and the UK scientist Donald Davies, who simultaneously envisioned the packet switching method in the early 1960s (Campbell-Kelly 1987); secondly, the literature recognizes the influence of the French networking project *Cyclades*, led by the influential figure of Louis Pouzin, who inspired Vint Cerf and the creation of TCP/IP protocols; finally, the third and most known exception is the invention, by the British scientist Tim Berners-Lee, of the World Wide Web, which took place in Geneva in 1990 at the European Organization for Nuclear Research (CERN).[6] For the rest, it seems that the Internet was born, inspired, developed and spread mainly thanks to the work, the ideas and the cooperation among US actors. As a consequence, US pioneers are frequently depicted as gifted minds very far ahead of their time, as 'saints' able to anticipate the future with their brilliant and innovative visions (Berners-Lee 2000: 6).

This dominant narrative of Internet history[7] is also traceable in historiography, especially in the few works aimed at recollecting the 'classics' of this field,

including those meticulous efforts that have opened a wide perspective on the historiography of the Internet taking into account a large variety of sources and actors (see Schafer and Serres 2017). Furthermore, the evidence of this dominant narrative emerges in the most respected books on Internet history (e.g., Abbate 1999, Flichy 2007). Janet Abbate's *Inventing the Internet* is one of the most influential works in this area. Thanks to its exhaustive corpus of sources, and its social constructivist approach, the work of Abbate is unanimously considered an example of good and objectivity-oriented history. Nevertheless, the prevalent focus of this kind of research on the stories of ARPANet[8] and US countercultural movements – thus, respectively, on the prehistory and on the recent history of the Internet – seems to hide a temporal void, namely the time-lapse between the development of the ARPANet and the invention of the World Wide Web. This period, approximately from the mid-1970s up to the late 1980s, seems to be irrelevant in the construction of the Internet *imaginaire*.

This fact bring us to another key feature of the dominant narrative, which concerns the chronological framework of the Internet imaginary. The references adopted to tell the story of the birth of the Internet are usually linked to a corpus of texts written by US scholars and scientists between the 1940s and the 1960s, thus before and during the first phase of the ARPANet project. In recounting the Internet's origins and its foundational ideas, scholars frequently quote US classics such as Vannevar Bush (1945), Joseph Licklider (1960), Douglas Engelbart (1962), Paul Baran (1964) and Robert Taylor (Licklider and Taylor 1968). Certainly, this set of theoretical and technical writings has been essential to the narratives of the Internet's origins; on the other hand, however, the exclusive focus on these actors has contributed to strengthening and institutionalizing a fixed imaginary that has been shared among political, cultural and economic actors up to the present. In this sense, the myth and the narratives of the Internet genesis have shaped and inspired its development but also its use over time. As Patrice Flichy argues, the imaginary 'is at the center of design and use of the Internet. […] Narratives precede social practices and pave the way for them.' (Flichy 2007: 208).

Two main processes summarize the way in which the dominant narrative of Internet history has been woven and consolidated over time. The first deals with the crystallization of certain specific longstanding ideas dating back to the Internet's origins; the second process is related to the emergence of the so-called 'digital sublime' (Mosco 2004) during the 1990s, in conjunction with the spread of the World Wide Web in Western countries.

As the result of two mutually reliant narratives, the myth of the Internet's origins has been co-constructed within two different time periods. According to the first narrative, a group of pioneers, most of whom were involved in the ARPANet project, shared their visions about the future of networking technologies, and so assembled the conceptual frame of the Internet imaginary; the second narrative comprises the stories about the pioneers and founding fathers of the Internet and the Web that were told and spread starting from the 1990s.

In this period not only academics, but also political and cultural actors, institutionalized the myth of the Internet's origins in Western culture.

1.1.1 The Narratives of the Internet's Origins

Foundational narratives play a key role in the conceptualization of media. The main characters of the Internet's origins are bearers of specific values and concepts lying at the core of the dominant narrative of Internet history. In particular, three longstanding ideas, corresponding to three key narratives, were composed during the early stages of Internet history and are still inscribed in the Internet imaginary. The first narrative relies on the *digital library* metaphor, and thus to the possibility of collecting and organizing human knowledge by means of interlinked directories. The second narrative deals with the *military origins* of the Internet and the defensive purposes of the ARPANet project. The third narrative focuses on *communitarian ideology* and the socio-cultural reappropriation of computer networks by means of bottom-up movements.

The *digital library* metaphor depicts the Internet as the perfect and infinite repository of knowledge, a virtual library aimed at organizing an infinite amount of information. This idea stepped into the imaginary thanks to a famous article written by the US scientist Vannevar Bush in 1945. 'As We May Think' (Bush 1945) was published in *The Atlantic Monthly*, one of the most prominent US cultural magazines. Bush's work dealt with the shared need within the scientific community to organize the growing quantity of information made available thanks to the progress of computer science, but also to the birth and the spread of other 'new' media such as radio broadcasting and telephony.

Remarkably, a key technological metaphor, the 'web', was already at the heart of Bush's writings. For instance, in describing the complexity of radio broadcasting networks as an example of unexpected and extraordinary invention, Bush claimed:

> A *spider web* of metal, sealed in a thin glass container, a wire heated to brilliant glow, in short, the thermionic tube of radio sets, is made by the hundred million, tossed about in packages, plugged into sockets—and it works! Its gossamer parts, the precise location and alignment involved in its construction, would have occupied a master craftsman of the guild for months; now it is built for thirty cents. (Bush 1945: 1 *emphasis* added)

Well-established media such as radio and photography were depicted in this paper as examples of previously impossible technologies, both in terms of timework and material costs, that had taken shape in modern times. As would happen later in the case of the World Wide Web, media imaginaries (and the

utopian visions that are typical of media innovations) were used by Bush as key rhetorical tools to raise hopes and expectations about a new technological form. In this case, the revolutionary technology was the *Memory Extender*, a wonderful new machine:

> Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, 'memex' will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory. (Bush 1945: 5)

Thanks to this upcoming innovation Bush forecast that:

> Wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them, ready to be dropped into the memex and there amplified. (Bush 1945: 8)

As authors such as Ian McNeely and Lisa Wolverton (2009) have shown, collecting and organizing knowledge is one the oldest goals of media and human knowledge institutions: the myth of the Library of Alexandria is the most famous example of the longstanding dream to collect, organize and preserve knowledge in a single accessible space. Nevertheless, the idea of the digital library has been perceived by scientists and scholars as a unique, special chance in history to realize the dream of the universal library (Stefik 1996).

A second step towards realizing this idea was taken by the head of the Information Processing Techniques Office (IPTO) at the US Defense Advanced Research Projects Agency (DARPA), Joseph Licklider, one of the key figures both of the cybernetics and Internet world. In his *Libraries of the Future*, published by MIT Press in 1965, Licklider envisioned the development of computer networks and he drew the best strategies to be adopted to build a coherent and accessible digital library.[9] Curiously, as stated by Licklider in the forward of the book, he had not read anything about the *Memex*. However, as a token of gratitude, he decided to dedicate his work to Bush:

> Perhaps the main external influence that shaped the ideas of this book had its effect indirectly, through the community, for it was not until Carl Overhage noticed its omission from the references that I read Vannevar Bush's 'As We May Think'. I had often heard about Memex and its 'trails of references.' I had hoped to demonstrate Symbiont to Dr. Bush as a small step in the direction in which he had pointed in his pioneer article. But I had not read the article. Now that I have read it, I should like to dedicate this book, however unworthy it may be, to Dr. Bush. (Licklider 1965: xii–xiii)

The indirect influence of Bush on Licklider is a first indication of how the imaginary of the *libraries of the future* was already circulating in the US academic milieu, especially thanks to those key figures who were depicted, later on, as the visionaries or pioneers of the network society.[10] In this sense Bush is the first representative of a lineage which constitutes a sort of pantheon of Internet history. The universal library is a distinctive feature of this lineage, since it is part of the shared vision of the Internet's founding fathers. As Bush had done before him, Licklider anticipated the birth and the development of the universal library, the emerging system that would appear a short time later:

> The size of the largest fast, random-access memory could continue, on the average, to double every two years. If memory capacity were to grow at that rate, it would be possible to put all the possible solid literature of a subfield of science or technology into a single computer memory in 1985. The corresponding date for a field would be 1988 and for all solid science it would be about 1996. (Licklider 1965: 17–18)

The idea of the constant growth of memory recalls another classic theory of the history of computing: Moore's law, according to which 'the number of transistors in a dense integrated circuit doubles approximately every two years'.

The parallel with Moore's law reveals a critical point for the entire history of networking systems: the growth of information is proportional to the complexity of its organization. Networks are the final solution to this problem. As Licklider pointed out, the main problem of the universal library was not collecting existing information; rather, the most difficult task would be to find an ideal method of organizing and retrieving it properly. It was to address this issue that the hypertext concept took shape thanks to the figure of Ted Nelson, one of the most eccentric and controversial characters of Internet history. Nelson coined the term hypertext in 1965, only one year after the publication of Licklider's seminal book.[11] He is mostly known for a series of works written in the 1960s and 1970s (e.g., Nelson 1974) and for a bidirectional hypertext software called *Xanadu* which has never been completed.[12] Notably, even though Nelson's ideas have been extremely influential for the birth of new systems and especially for the World Wide Web (Dechow et al. 2015), he is not formally recognized at the same level as the other Internet pioneers.[13] The dominant narrative of Internet history seems to create a linear connection between the first generation of computer scientists (such as Bush, Licklider and other key figures like Douglas Engelbart), and more recent figures such as Tim Berners-Lee, the inventor of the World Wide Web.[14] This lineage of precursors is characterized by the shared dream of the digital library, a dream of knowledge dissemination that would be embedded in successful projects like Wikipedia, but also in the corporate mission of private companies like Google and Facebook that have by now amassed the power to decide what information is worthy of consideration and what is not.

A second key narrative of the Internet's origins concerns the myth of its early military use. In popular culture, the idea that the Internet was invented for military purposes is still widespread.[15] As authors such as Janet Abbate (1999) and Tung-Hui Hu in his *A Prehistory of the Cloud* (2015) have shown, however, the first connections of ARPANet were not created as a response to a potential nuclear attack; even if ARPA was funded by the National Defense Agency, the project was aimed at linking research infrastructures and empowering computational processes, and thus to address a common concern among computer scientists. Nevertheless, the myth of the initial military purposes of this network is still alive. As Tung-Hui Hu points out, the most interesting question is not whether this story is false or not, but why it has survived historical refutation:

> If the Internet never had this nuclear-proof shape, then why do scholars continually tell or write this idea back into existence? In other words, I'm interested less in debunking the myth than in the reason that it persists in digital culture […] There is, in short, a collective desire to keep the myth alive despite evidence to the contrary. (Hu 2015: 9–10)

Hu argues that the importance of this myth does not lie in its truthfulness; scholars should investigate instead why the myth of military purpose is still kept alive in popular culture.[16]

From a media studies perspective, this foundational myth is not an isolated case. The histories of media such as radio and cinema also have mythical foundations based on specific anecdotes. As scholars such as Arjun Appadurai (1986), Alfred Gell (1998) and Simone Natale (2016a) have shown, not only humans, but also these technological artefacts have their own 'biographies', and these stories are usually narrated starting from a foundational myth based on powerful exemplary tales. A clear example is the biography of the motion picture. An urban legend tells the story of the audience running away from the moving image of a train during the first projection of *L'arrivée d'un train en gare de La Ciotat,* one of the first movies directed by the Lumière brothers. This story is so influential that the concept of the 'train effect' is still used as a metaphor of the motion picture's capability to break into reality. Similarly, the radio drama *The War of the Worlds*, narrated by Orson Wells on CBS in 1938, is still used to describe the power of radio and the capacity of broadcasting to terrorize and drive the audience to specific behaviours. Even if historians and social scientists have demonstrated that there is no proof of the *train effect*, and that the *War of Worlds* terrorized only a small part of its audience, such anecdotes persist as foundational narratives of the birth of these media (Natale 2016a).

Somehow, these stories, like ancient myths before them, persist over time and become part and parcel of the media imaginary. The myth of the military genesis of the Internet follows a similar pattern; it is still at the core of

the foundational narrative of this medium. There is a strong link between all these stories: they all tell of a powerful new technological form able to change the perception of space and the very meaning of mediated communication. Furthermore, these narratives are all woven around a specific emotional state: fear. In this regard, each medium seems to have broken into reality in a socio-cultural context characterized by the fear of technology itself (Bory 2018b). However, whereas in the case of cinema and radio the fear was connected to the capability of these media to create 'true and too real' episodes, in the specific case of the Internet fear was connected with the possibility of an imminent nuclear attack; thus the new technology was not a menace, but rather a key tool to preserve and protect information against the technological threats of the cold war. The Internet was a shield, a defence rather than a weapon. In this context, Tung-Hui Hu links this military myth of the Internet's origins with paranoia:

> If we only imagine the network as a product of the military, working with their contractors, to 'invent' ARPA and the Internet, then the network that we take away is a deeply paranoid one – a vision of nuclear strikes and distributed tanks. (Hu 2015: 34)

From a socio-cultural perspective, this military myth of the Internet's origins is related to the third key narrative of Internet history: the communitarian ideology of computer networks. Indeed, the use of ARPANet for alternative purposes such as compiling the first mailing lists on sci-fi literature and wine tasting illustrates another dominant narrative of Internet history. The idea that a military technology was illicitly used by researchers for peer-to-peer communication is a *topos*[17] of Internet history in general, a narrative that promotes the idea of a technological artefact re-adapted as an instrument for cultural resistance against the monopolization and centralization of power. This narrative is very close to the histories of other media such as radio and optical telegraphy (e.g., Douglas 1989; Hilmes 2012; Walker 2004). In the history of digital media, both the history of computing and the history of the Internet follow the same path: at an early stage, both technologies were owned by limited and authoritarian oligarchies (mainly connected to the military and academic technicians). Then, in a second stage, users seized and changed the very meanings of these technological artefacts by using them for unexpected purposes such as interpersonal communication or playful activities (Bory 2016; Levy 2010). Within the dominant narrative of Internet history, the use of networks for communitarian communication is a *topos* intersecting different phases: from the ARPANet's mailing lists to the hacker movements' forums, from the BBS (Bulletin Board Systems) to the MMPORG (Massively Multiplayer Online Role-Playing Game), up until contemporary social media.

Still, as Internet scholars have demonstrated, this process was not so linear. For example, in her work on the history of ARPANet, Janet Abbate has pointed out that:

> The network was not originally to be a medium for interpersonal communication; it was intended to allow scientists to overcome the difficulties of running programs on remote computers. The current commercially run, communication-oriented Internet emerged only after a long process of technical, organizational, and political restructuring. (Abbate 1999: 2)

Recently Internet historians have stressed that this 'long process of technical organizational, and political restructuring' has been influenced by several factors, among which are those alternative histories and projects of computer networks that have been and continue to be overlooked. To date, biased histories of the Internet carry on the symbolic structure of a techno-social imaginary that stepped directly from childhood into maturity, from the few connections of the 1960s to the global network of the 1990s. The digital library, the military origins and the communitarian visions of the Internet have been used as foundational narratives for the legitimization of a system of beliefs; such ideas represent the foundations of an imaginary driven by the narrative of the digital revolution.

These three longstanding myths can be seen as the rhetorical bricks of a larger narration, constituting what Friedrich Nietzsche called a 'monumental history' (Nietzsche 1874). As a worshipped, unbreakable monument, the dominant narrative of Internet history seems to rely on a mono-referential model that

> …will always bring closer what is unlike, generalize, and finally make things equal. It will always tone down the difference in motives and events, in order to set down the monumental *effectus* [effect], that is, the exemplary effect worthy of imitation, at the cost of the *causae* [cause]. Thus, because monumental history turns away as much as possible from the cause, we can call it a collection of 'effects in themselves' with less exaggeration than calling it events which will have an effect on all ages. (Nietzsche 1874: 9)

1.1.2 The World Wide Web and the Transition of the 1990s

The 1990s mark a turning point in the dominant narrative of Internet history; during this period large phenomena such as the invention of the World Wide Web, the global spread of personal computing and the development of mobile telephony altered the foundations of the media ecology of Western societies. It was in the 1990s that enthusiastic visions coming from academic, political, cultural and economic sectors tended to glorify and idealize the figures of Internet pioneers (Katz-Kimchi 2015), and it was in the 1990s that Internet romanticism permeated Western societies (Streeter 2011). The media scholar James Curran defines this period as the 'edenic phase of Western Internet development' (Curran 2012: 59). The 1990s are thus the period in which mass media,

literature and academic writings presented a romantic and mythical account of the main protagonists of Internet history. This phenomenon was particularly intense in the US. It is not by chance that during this period the US had the highest number and fastest growth-rate of Internet users in Western societies (Fig. 1); in 1995, 63% of Internet users were based in this country.[18]

In this context, besides technological innovations, new narratives of the Internet imaginary were emerging thanks to two key metaphors describing new forms of spatial and social change: *cyberspace* and the *information superhighway*. Enthusiasm about the future of the rising networks society, a new societal system in which the Internet was considered 'the fabric of our life' (Castells 1996:1), is well symbolized by the famous figure of John Perry Barlow, the leader of the Electronic Frontier Foundation (EFF), who wrote the famous *Cyberspace Independence Declaration* (Barlow 1996). In 1995, the very same year in which the World Wide Web was opened to commercial uses, Barlow claimed:

> With the development of the Internet, and with the increasing pervasiveness of communication between networked computers, we are in the middle of the most transforming technological event since the capture of fire. I used to think that it was just the biggest thing since Gutenberg, but now I think you have to go back farther. (Barlow 1995)

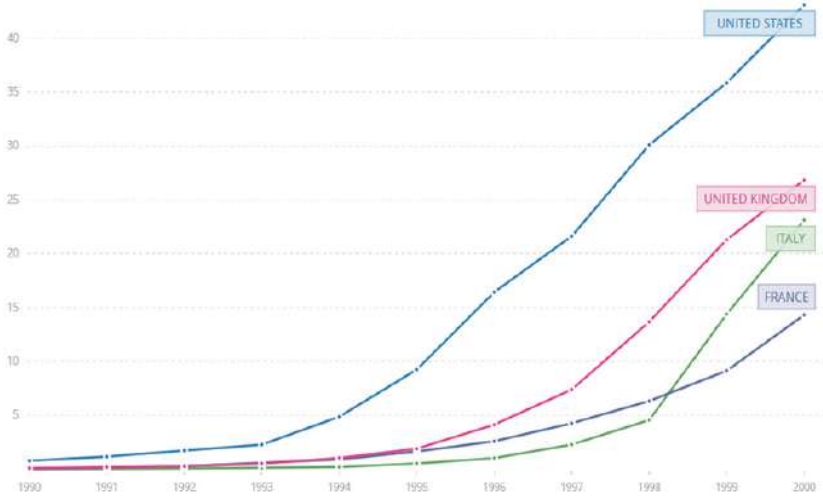


Figure 1: Number of Internet users per 100 people: 1990–2000. USA – France – Italy – United Kingdom.
Compared to European countries the US had a higher percentage of Internet users. Source: World Bank http://data.worldbank.org.

With this sentence Barlow highlighted a radical change in communication and space, but he also claimed that time, especially historical time, was going to be redefined by technology.

In a classic essay, the French sociologist Marcel Gauchet argues that mythical narratives are based on two dimensional concepts: the future (*avenir*) and the infinite; more specifically, Gauchet claims that for any human myth 'The future is to time […] what the infinite is to space' (Gauchet 1985: 253).[19] As a mythological place, cyberspace was perceived as an infinite and timeless environment, a boundless frontier in which human beings could live in a constant condition of equality, thanks to the horizontal distribution of knowledge and to the creation of a the so-called global village.[20] Within this boundless and timeless space, collective freedom and communitarian partnership were the shared values at the core of a new societal organization. Looked at through the lens of the imaginary, narratives of cyberspace momentum were shaping a form of re-enchantment of the world: a world enchanted with a new, modern myth.

Drawing upon Leo Marx's concept of the 'technological sublime' (Marx 1964; Nye 1996), Vincent Mosco (2004) defined this period as a phase of the 'digital sublime'. According to Mosco, within Western society, cyberspace was largely perceived as the unstoppable cause of three imminent radical changes: the end of history, the end of physical distance and the end of traditional political systems (Mosco 2004: 55–115). The concept of the sublime adopted by Mosco has a long theoretical history; for example, the Kantian definition of the sublime fits perfectly with the *boundlessness* of cyberspace. In Kant's terms:

> the sublime is to be found in an object even devoid of form, so far as it immediately involves, or else by its presence provokes, a representation of limitlessness, yet with a super-added thought of its totality. […] The sublime is that, the mere capacity of thinking which evidences a faculty of mind transcending every standard of the senses. (Kant 2007: 78, 81)

During the 1990s, this idea of a limitless space was associated with a long list of forerunners and prophets celebrated by media, scholars and specialized magazines such as *Wired* and *Mondo* (Stevenson 2016). Marshall McLuhan's *global village* (1962), Theillard de Chardin's *Noosphere* (1977) and Pierre Levy's *collective intelligence* (1996) are examples of how the idea of a communitarian global unity became part of an imaginary projected towards a definitive transformation of human history. All these concepts were tightly linked to the cyberspace metaphor[21]; they conveyed the idea of a global union in which individual and collective lives would be indistinguishable from each other.

The idea of cyberspace as an overextended territory was conveyed by another key figure of the 1990s, Bruce Sterling, who used the 'old' medium of the telephone to explain the drastic change that the Internet was bringing:

> But in the past twenty years, this electrical 'space,' which was once thin and dark and one-dimensional — little more than a narrow speaking-tube, stretching from phone to phone — has flung itself open like a gigantic jack-in-the-box. Light has flooded upon it, the eerie light of the glowing computer screen. This dark electric netherworld has become a vast flowering electronic landscape. Since the 1960s, the world of the telephone has cross-bred itself with computers and television, and though there is still no substance to cyberspace, nothing you can handle, it has a strange kind of physicality now. It makes good sense today to talk of cyberspace as a place all its own. (Sterling 1994: 10–11)

The technological key for this spatial transition was an innovation that has gradually become a semantic equivalent of the Internet: the World Wide Web. Values such as publicness, universality, openness and horizontality were all symbolically represented by the new universal system for information exchange. However, as Thomas Streeter has shown, the romantic narrative of cyberspace was even more powerful than a radical innovation like the Web. According to Streeter, in fact, narratives of change were more pervasive than disruptive technologies:

> What happened in the 1992–1996 period was not so much a revolution in Internetworking technology as a revolution in the way Internetworking technology was imagined by American leadership. […] A romantic construction of the emerging Internet as an unpredictable space for adventure was certainly more alluring than, say, the information retrieval or shopping mall visions being proffered by corporate and government leadership at the time. (Streeter 2017: 6)

Nowadays, although cyberspace is an old-fashioned myth, its relevance for the construction of a social imaginary of the Internet remains unquestionable. Through its legacy, this myth is still alive, as Vincent Mosco claims in *The Digital Sublime*:

> A myth is alive if it continues to give meaning to human life, if it continues to represent some important part of the collective mentality of a given age, and if it continues to render socially and intellectually tolerable what would otherwise be experienced as incoherence. To understand a myth involves more than proving it to be false. It means figuring out why the myth exists, why it is so important to people, what it means, and what it tells us about people's hopes and dreams. […] Myth does not just embody a truth; it shelters truth by giving it a natural, taken-for-granted quality. (Mosco 2004: 58)

Myths are pre-political; they can 'foreclose politics, can serve to depoliticize speech, but they can also open the door to a restoration of politics, to a

deepening of political understanding' (Mosco 2004: 16). In this regard, a critical analysis of the social and political power of the cyberspace metaphor in different contexts such as telecommunication companies, governments, research centres and mass media communication is an essential step towards a better understanding of the relationship between the Internet imaginary and the contemporary organization of societies.

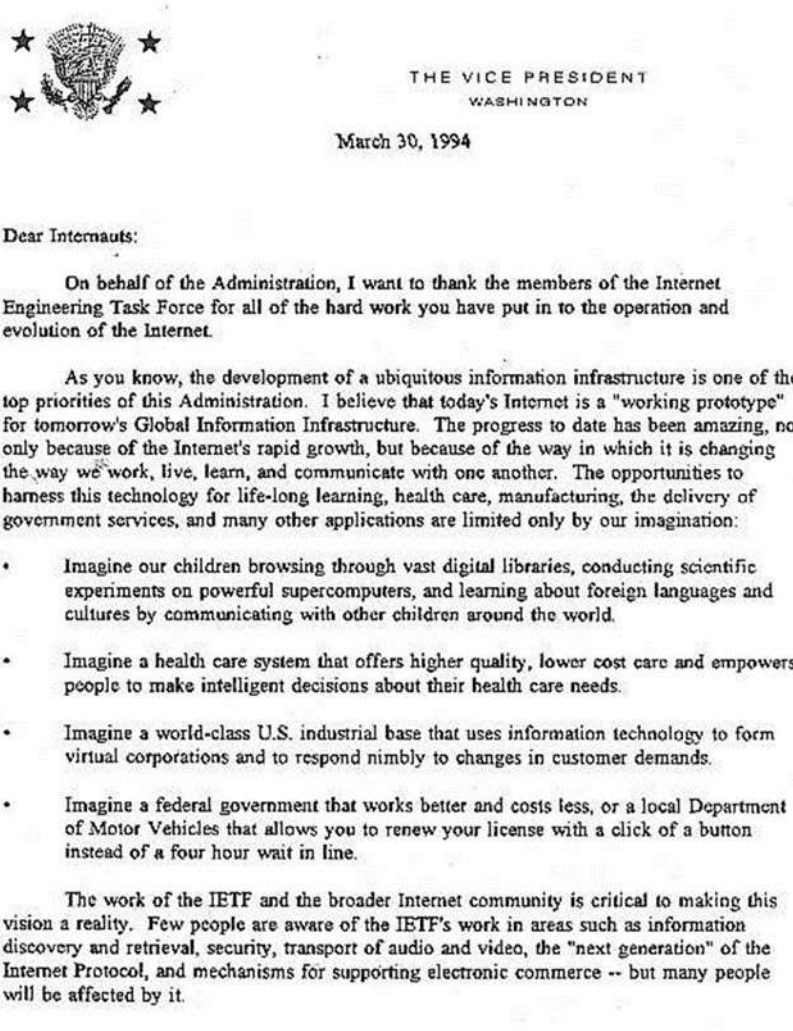
The second key metaphor of the 1990s was on several counts the opposite of the cyberspace ideal. The *information superhighway* was a metaphor of political and economic progress from above (mainly from institutions and companies), which penetrated deeply into the imaginary of economic and political players. As is known, the superhighway idea was at the core of the political project of the Clinton administration, which promoted the development of digital infrastructures through the figure of Vice-President Al Gore. In a paper titled 'Infrastructure for the Global Village', Gore stressed the need for a powerful national infrastructure able to face the upcoming competition on the digital market:[22]

> Most important, we need a commitment to build the high-speed data highways. Their absence constitutes the largest single barrier to realizing the potential of the information age. […] If we do not break the communications gridlock, our foreign competitors could once again reap the benefits of US technology while we remain mired in the past. The most effective way to break the stalemate would be to show the American people what fiber-optic networks could offer them. (Gore 1991: 152)

In a letter written on 30 March 1994, addressed to the Internet Engineering Task Force (IETF), Gore perfectly synthetizes the way in which the information superhighway metaphor was presented as an equivalent to the unstoppable progress of the information economy (Fig. 2):

> Imagine our children browsing through vast digital libraries, conducting scientific experiments on powerful supercomputers […] Imagine a health care system that offers higher quality, lower cost care and empowers people to make intelligent decisions about their health care needs. Imagine a world-class US industrial base that uses information technology to form virtual corporations and to respond nimbly to changes in customer demands. Imagine a federal government that works better and cost less or a local Department of Motor Vehicles that allows you to renew your license with a click of a button instead of a four hour wait line. (Gore 1994)

Despite some common references, the information superhighway metaphor was very distant from the cyberspace one. Whereas cyberspace was perceived as a virgin territory, a new frontier for cultural and social change, the imaginary presented by Al Gore promoted the information superhighway as a tool for governance, national empowerment and economic progress.



THE VICE PRESIDENT
WASHINGTON

March 30, 1994

Dear Internauts:

On behalf of the Administration, I want to thank the members of the Internet Engineering Task Force for all of the hard work you have put in to the operation and evolution of the Internet.

As you know, the development of a ubiquitous information infrastructure is one of the top priorities of this Administration. I believe that today's Internet is a "working prototype" for tomorrow's Global Information Infrastructure. The progress to date has been amazing, not only because of the Internet's rapid growth, but because of the way in which it is changing the way we work, live, learn, and communicate with one another. The opportunities to harness this technology for life-long learning, health care, manufacturing, the delivery of government services, and many other applications are limited only by our imagination:

- Imagine our children browsing through vast digital libraries, conducting scientific experiments on powerful supercomputers, and learning about foreign languages and cultures by communicating with other children around the world.
- Imagine a health care system that offers higher quality, lower cost care and empowers people to make intelligent decisions about their health care needs.
- Imagine a world-class U.S. industrial base that uses information technology to form virtual corporations and to respond nimbly to changes in customer demands.
- Imagine a federal government that works better and costs less, or a local Department of Motor Vehicles that allows you to renew your license with a click of a button instead of a four hour wait in line.

The work of the IETF and the broader Internet community is critical to making this vision a reality. Few people are aware of the IETF's work in areas such as information discovery and retrieval, security, transport of audio and video, the "next generation" of the Internet Protocol, and mechanisms for supporting electronic commerce -- but many people will be affected by it.

Figure 2: Al Gore's letter to the IETF. (Source: https://www.ietf.org/proceedings/29/gore.html)

Subjects such as welfare, national industry, education and public administration were at the core of a parallel narrative able to drive and influence the decisions of national and international companies in Western countries for many years.[23] From a theoretical perspective, the two metaphors represented ideological poles: cyberspace allowed users to overcome any established form of power by creating a new boundless world, a world with new forms of social interaction and knowledge distribution; in contrast, the information superhighway

was the elective instrument for the legitimization and empowerment of Western economies, historically based on liberalism and on free market ideology. Eventually, the World Wide Web was used as the technological key to open the doors of both these possible futures, foreseen through these metaphors.

At the present time, well-established corporations such as Google and Facebook are re-adapting and developing the contents of the dominant narrative of Internet history. Not by chance, these players promote an imaginary based on new global infrastructure and on interconnected communities. Their platforms act as the new superhighways and the new spaces where change, or in some cases conservation, happens. Corporate narratives still rely on a form of determinism tightly bound to the imaginary of the Internet's origins. Even if the information superhighway and cyberspace metaphors have gradually disappeared, or have at least become subsumed into new forms of contemporary narrative, what Peter Simonson calls the longstanding American dream of 'democratic togetherness' (Simonson 1996) is still alive. New actors are relying on the very same mythical pattern designed by the leadership of a single country, from both cultural and technological points of view. To deconstruct and de-mythicize this narrative, history and social theory have a double task: to identify its real origins, trajectory and purpose, and to allow alternative, more reliable, network histories to emerge or re-emerge.

1.2 Alter-Net Histories

In the last decade, Internet and media scholars have challenged the dominant narrative of Internet history by retracing a series of alternative trajectories that networking technologies, situated in a variety of geographical and cultural contexts, have taken over time.

Firstly, scholars have started to integrate and extend new plots and contents by identifying understudied events, hidden sources and key characters from the missing stories of the 1980s. One of the main problems with the dominant narrative of Internet history is its lack of studies aimed at investigating this crucial period. As Kevin Driscoll and Camille Paloque-Berges have recently argued:

> The gap in this disjoint chronology reflects the messiness of internetworking. In Europe and North America during the 1980s, thousands of networks were built under a variety of social, technical and political-economic conditions. Store-and-forward mail systems, commercial X.25 networks, UUCP links and packet radio mailboxes each contributed to the emergence of a global infrastructure that enthusiasts began to call 'the Net.' In contrast to the direct hop from ARPANet to the Web, the plurality of the 1980s Net resists narratives of linear progress. As long as we conceptualize the Internet in the singular, we will

> find ourselves entangled by its polymorphism. (Driscoll and Paloque-Berges 2017)

Beside the many stories about those independent networks that used different protocols for data transmission, such as USENET (Paloque-Berges 2011), BITNET (Grier and Campbell 2000) and FidoNet (Bush 1993), the corpus of research focused on this period also includes the histories of alternative standards. For instance, one of the most relevant and neglected histories is the development and the failure of OSI (Open System Interconnection), the international standard that lost the competition with the TCP/IP in the long term (Russell 2013). Other compelling histories of this period deal with networking projects that failed for political and cultural reasons: such is the case of the Soviet Union network (Peters 2016) or the stories of the many European networks (e.g., the European Unix Network EUnet) that are still largely understudied (Shahin 2006).

Secondly, some recent historical accounts have stressed the importance of standards organizations and engineering groups that contributed to the creation and the stabilization of the Internet's open standards (Russell 2014). This kind of analysis is crucial since it can illuminate the hidden, silent characters and institutions working backstage in the Internet's construction process. Whereas the first approach is mainly based on the history of uses and contents, this second approach highlights the importance of the hierarchical structures (political, academic and economic) and hidden actors that drove the standardization process of the Internet. These actors did not get enough credit for making networking technologies workable and available on a large scale, and they also sacrificed some worthy projects and innovative ideas that were non-aligned with more powerful organizations and political structures.

Finally, scholars have been analysing the national, international and transnational histories of computer networks, looking also at the different ways in which the Internet, its competitors and its predecessors were developed, regulated and domesticated in different areas of the world. The French case is probably the most famous example of how computer networks have been constructed and conceived in different ways in the US and European countries respectively. Compelling stories about the French national network Minitel (Schafer and Thierry 2012; Mailland and Driscoll 2017), but also the developments of early networking experiments like *Cyclades* (Russell and Schafer 2014), are a first demonstration that the Internet had many competitors and alter-egos; moreover, at least till the end of the 1990s, the Internet had not yet monopolized the imaginary of networks. Furthermore, other understudied cases Internet pre-histories, related for instance to hybrid media like Teletext (Moe and Van Del Bulck 2016), are also precious in order to retrieve those old systems that incorporated some key features and characteristics of the Internet.

This heterogeneity of trajectories and paths that network histories took over time has recently been highlighted in books (Goggin and McLelland 2017),

special issues (Bory et al. 2019) and also in a new journal named, on purpose in the plural form, *Internet Histories* (Brügger et al. 2017). Besides these publications, a long series of relevant neglected histories is emerging in Internet studies: think of the development of the Chinese Internet (Negro 2017; Tai 2007; Zheng 2007), the histories of South American national networks such as the Chilean *Cybersyn* recounted by Eden Medina (2011) and the Costa Rican case as outlined by Siles (2012); other different and complex histories of internetworking have been retraced in East Europe (e.g., Harindranath 2008; Volcic 2008). Overall, these histories challenge the linear progress of Internet history by stressing two main points. Firstly, Internet history cannot only rely on the figures of the founding fathers if it aims at providing an exhaustive explanation of the development of digital networks on a global scale. Secondly, these works show that each national infrastructure and each networking culture has been shaped by specific policies as well as cultural and social backgrounds. Since the histories of the Internet are in the plural form, the imaginaries are plural as well, because they are based on different narratives both of the past and the future of the techno-cultural environment.

However, notwithstanding the collective effort made by the academy to overcome and problematize Internet history, the extent to which these histories permeate the social imaginary is still uncertain. Myths and network ideologies seems to resist history, as Paul Ricoeur argued in *Temps et Récit*:

> Myths, which are slow to develop, also correspond to structures of an extreme longevity. Their mythemes, their atoms of intelligibility, conjoin the infinitely small and the very long time-span. But for the historian this extreme *longue durée* is the 'excessive *longue durée*' which makes us forget the diversity of life—the movement, the different time spans, the rifts and variations. (Ricoeur 1984: 47)

In line with the thought of Ricoeur, historians have started to challenge the Internet myth and the 'magic wand of computer communication' (Mosco 2000: 7). Nevertheless, alongside the fundamental work of historical research, Internet studies also need a theoretical framework able to convey and challenge the myth of the Internet and the tough shell, the resistance, of the dominant narrative in the social imaginary. The first step towards this *disenchantment* of the Internet imaginary is to question and problematize the centrality of the very term 'Internet' by replacing it with the wider term 'network'.

1.3 Looking for Network Imaginaries

In his critical stance against the hagiographic history of the Internet, Andrew Russell makes a plea for a new concept aimed at decentralizing the term from historical accounts of networks. As Russell claims:

> We could benefit from situating the Internet's past in an even broader conceptual frame, histories of networking. […] Many of the omissions and blind spots in the source material for Internet histories – as well as the historiography of the Internet – could be addressed by confronting a category error in historical conceptualization. The category error operates in the following way: curiosity about the Internet prompts questions about where the Internet came from, which, in turn, prompt investigations into the Internet's history. The story then is researched and written in a teleological fashion: what were the forces in the past that led to our present moment in its current configuration? (Russell 2017: 19–20)

Russell's theoretical stance opens the field to computer network histories, but it is also his view that historians should take advantage of all the histories related to previous technological networking projects.

By connecting and intertwining, for instance, the histories of railroad networks (Burrington 2015), telegraphy networks (Downey 2001) and undersea cables networks (Starosielski 2015b), historians could illuminate the intersection between a variety of technological innovations and the development of computer networks from a *long durée* perspective. Furthermore, Russell points out that integrating historical research with other disciplinary approaches is an essential step in order to understand and 'deconsecrate' the history of the Internet that has been told during in recent decades:

> Each of these approaches pushes historians to consider continuities between the Internet era and previous eras in human history. In doing so, they chip away at the veneer of innovation and novelty painted by accounts that present the Internet as something exceptional or unprecedented.
>
> There is reason to be optimistic that new scholarship, guided by methods from outside the historical profession, will generate source material that will help future historians reckon with the ongoing development of the Internet. (Russell 2017: 20–21)

Relying on this proposition, the shift from Internet history to the histories of networking suggested by Russell is a theoretical key for the transition from the analysis of the Internet imaginary to the investigation of network imaginaries. As part of this transition, this approach takes also into account the role of media imaginaries in the conceptualization of networks within different cultural and social contexts.

However, the dominant narrative of Internet history cannot simply be reinterpreted as a 'false story', since it has profoundly influenced and shaped the ways in which computer networks have been interpreted at local, national and international levels; it is rather in the intersection, or even the tension, between different narratives (global and local perspectives; political, social and economic

choices; pragmatic and philosophical approaches) that network imaginaries take shape.

For instance, the parallel between the structure of the Internet and democracy is crucial in the analysis of these imaginaries since, as Tung Hui-Hu has shown, the network is not only a semantic representation of technology, but 'primarily the idea that 'everything is connected,' and, as such, is a product of a system of belief. […] … the network exists primarily as a state of *desire*' (Hu 2015: 10). As Hu points out, the concept of the network embeds social and cultural expectations for the future, and thus constitutes a specific kind of projection towards change that has persisted in the imaginary. As we use it, pragmatically, the Internet has never been inherently democratic, despite the evidence that its hierarchical structure has driven technology till nowadays (whether at the technical, cultural or political level).

However, as Thomas Streeter points out, the fact that we have imagined it as a *hope*, 'that we have invested it with widely shared hopes for democracy, deserves our attention' (Streeter 2015: 186). The extent to which the Internet has been seen as a tool for horizontality and egalitarian life is directly linked with the models of networks that have been imagined and designed by Internet pioneers. Hence, in order to define a theoretical model for the analysis of the Internet imaginary, it is essential to outline the three models of networking that have driven network imaginaries so far.

1.4 The Ideal-Typical Network Models: Centralized, De-Centralized, Distributed

The innovation paths that have shaped networks in Western societies are often mixed with the lives of their inventors. This is a common trope of the US paradigm of Internet history. US scientists have frequently been depicted as heroes who challenged the *status quo*, questioning the theoretical and technical references of a society that needed a radical change of organizational and technical models. In this sense, Internet history links both to the story of ideas such as time sharing, packet switching or the TCP protocol, and to the biographies of the Internet pioneers, who are depicted as the symbolic equivalent of new technological artefacts (Natale 2016a). In this respect, the conceptualization of networking models and their inventors has been essential to the construction of the Internet myth. Calling into question these histories is a fundamental task to reframe the relevance of US scientists and heroes for the histories of networking at large.

In particular, one specific narrative has become a cornerstone of the Internet imaginary, namely the narrative of the distributed model of networking. In 1964 Paul Baran, an engineer working at the RAND Corporation[24], wrote one of the most famous papers in the history of the Internet, which dealt with the possibility of saving US data in case of a Soviet nuclear attack. The paper was titled 'On Distributed Communication: Introduction to Distributed Connections

Networks' (Baran 1964), and was part of a corpus of memoranda related to network communication and technical design. Although Baran's work is not easy reading, being very complex for a non-expert user, it has become a classic of Internet research; whether from theoretical, historical or sociological perspectives, the distributed communication idea is considered a foundational idea of the Internet.

The great success of Baran's paper seems to lie in two main elements. Firstly, Baran is considered the inventor of packet switching, a key concept that shaped the structure of computer networks and in turn the Internet itself. Secondly, Baran drew a very clear and simple representation of the three possible models of computer networks: centralized (also called *star*), decentralized (*tree*) and distributed (*mesh* or *cloud*) networks (Fig. 3).[25] Thanks to the communicative power of a simple graphical representation, the basic scheme designed by Baran has become an immediate reference of the ideal-typical forms of networking structures. The linear progress from a centralized to a distributed network can easily be (mis-)interpreted as a process of power dispersion by which hierarchical and vertical structures, the central nodes, are gradually dissolved in a horizontal management of resources. The Internet itself, despite the fact that it has never really been distributed, has been mostly represented in terms of the last model. As Tung-Hui Hu points out:

> This model of rupture remains a seductive myth because it explains the dispersion of power through the formal qualities of the computer networks that supposedly enable it. One problem, however: the distributed network, as designed by Baran, was never built. […] It is because of Baran's 1960 paper that one of the most widely held beliefs about the Internet began to propagate. (Hu 2015: 5, 9)

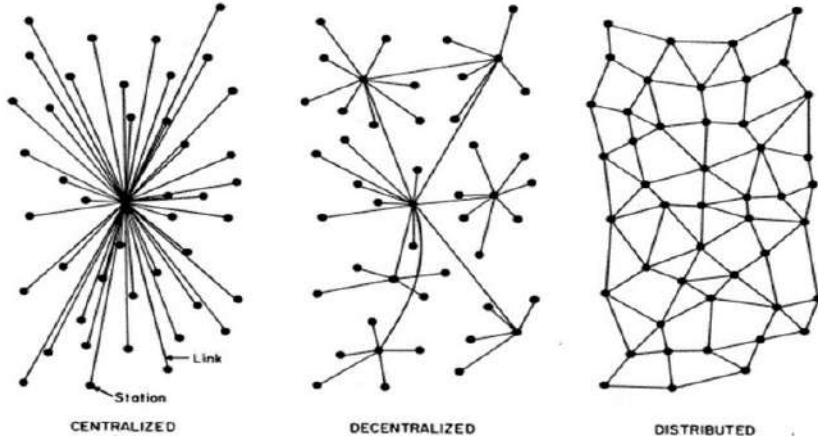


Figure 3: Paul Baran's three models of networks. (Source: Baran 1964)

Also relying on the 'distributed' myth, contemporary forms of what we can call net-determinism are deeply invested in the idea that networks themselves are agents of change. This idea is not only related to the Internet, but to networks at large. As the French sociologist Pierre Musso has aptly shown, networks have been conceived as elective structures of democratic liberation for a long time — at least, from a technological perspective, since the birth of industrial society (Musso 2003). Musso's criticism of the ideology of networks is summarized in the term 'retiology':

> The network, a multidimensional object and fetish word, has become a *doxa* for contemporary thought. All that remains today are the images and ideologies of the network, but these are the decayed remnants of a social utopia and conceptual thought developed in the early nineteenth century by philosopher and sociologist Henri Saint-Simon (1760–1825), who conceptualized industrial society. We are left with a 'technology of the mind' and 'a symbolic image' that re-interpret an ancient imaginary of the network with every technical change. This is what we call a *retiology*, a neologism created by contracting *retis* (network in Latin) and *logos*, that is, a set of representations, discourses and images supported by technique-networks. (Musso 2016: 21)

According to Musso, whereas in previous horizontal ideologies (deriving mainly from Saint-Simon's positive philosophy) the network was a key element for the pragmatic realization of a political project, contemporary retiology sees social, economic and political change as a natural effect of network distribution. Thus, as one of the main manifestations of retiological vision, the myth of the Internet is seen as a recurrent self-fulfilling prophecy, a self-determining destiny that prevents any critical thinking about the actual condition of democracy and culture in the information age. As Musso claims, 'contemporary *retiology* recycles and carries into the future an old imagery of the reticulated, burdened with a long history. It produces and reproduces old futures.' (Musso 2016: 63) Similarly, media scholars such as Richard Barbrook (2007) and Robin Mansell (2013) have stressed that the imaginary of the information age results from a long process of reiteration of techno-social discourses embedded in the visions of cybernetics, computing and social sciences. As summarized by the title of the first chapter of Barbrook's book, even today 'the future is what it used to be' (Barbrook 2007: 3).

The Internet imaginary is thus based on the idea of an inherently distributed *network of networks*, notwithstanding the constant hierarchical organization lying behind both its material infrastructure and the way users pragmatically reach information by means of powerful systems aimed at managing, controlling and exploiting information access (e.g., Google and Facebook can be seen as two centralizing hubs of our information universe). The distributed model

described by Paul Baran, rather than being a genealogical reference, is the most effective representation of the Internet as a 'state of desire' (Hu 2015: 10), rather than a real proof of its actual shape.

1.5 The Material Dimensions of Networks

In his criticism of Baran's model, Tung-Hui Hu claims that the Internet's geography is an actual demonstration of the apocryphal vision of the distributed model:

> Indeed, a truly distributed network is impossible to create, because of economic, political and even geographic consideration (it is hard to run fiber-optic cable across mountain). As a result, virtually all traffic on the US Internet runs across the same routes established in the nineteenth century, a point that is readily visible when looking at network diagrams, which changed remarkably little since Baran's day. It is worth remembering that the fiber-optic cables that run from Salt Lake City to the San Francisco Bay Area are in the same position they always have been, since the telegraph: in the immediate vicinity of railroad tracks. (Hu 2015: 6–7)

For a long time, scholars have largely overlooked the strategic role of the materiality of networks. An initial reason seems to lie in the fact that infrastructures are usually 'defined by their invisibility, most of us hardly notice them until they fail or break down' (Parks and Starosielski 2015: 6), so the hidden dimension of infrastructures would imply the generic disinterest of researchers toward this topic. In fact, according to John Durham Peters, this invisibility is tightly linked to the way in which people perceive and imagine technology, often ignoring its underlying structures:

> Infrastructure is often defined by being off the radar, below notice, or off stage. Redundancy may be boring, but the essence of robust systems is backup options. Technology, in contrast, is a concept biased towards newness: breathing, fire control, writing, or cities rarely count, even though that's where much of the hard work is. We have the unhelpful habit of isolating the bright, shiny, new, or scary parts of our made environment and calling them 'technology,' to the neglect of the older, seemingly duller parts. (Peters 2015: 36)

Theoretically, Internet metaphors such as 'cyberspace', the 'information universe' or 'collective intelligence' seem to exclude *a priori* the existence of a material infrastructure necessary to keep networks 'alive'. More ancient myths, like the dreams of the gnostics, refer to a pure intelligence made of a

world 'of bits' in which the absence, or even the total detachment, of human thoughts from material conditions was an essential point (Davis 2015); one of the main utopian narratives of the information age similarly forecasts a dematerialized world.

Nevertheless, viewed from a critical perspective, the geography of the 'actual' information society is extremely relevant in terms of information distribution and control; servers, undersea fibre-optic cables (Fig. 4) and corporate data centres,[26] are tangible and visible indicators of the tendency to centralize and limit the distribution of networks by controlling its material components. At the same time, these components represent the weak points of the centralized infrastructure. As Nicole Starosielski points out:

> Depending on their geography, cables might increase the susceptibility of media to censorship or surveillance. Cable routes are places where media systems can be disrupted, where infrastructures can become entangled in local politics, and where concerns about privacy play out. Rather than extending uniformly across space, cables have often remained embedded in existing geographies, and their effects on media industries, user experiences, and the politics of circulation occur unevenly around the world. (Starosielski 2015a: 56)

Although people underestimate its role, the material dimension of networks is well known to institutional and economic players such as governments, public administrations, telecommunication companies and digital corporations. In this regard, the awareness of the physical presence and distribution of technological power embedded in infrastructures is a characteristic element of the diversification of network imaginaries: the perception of the presence – or

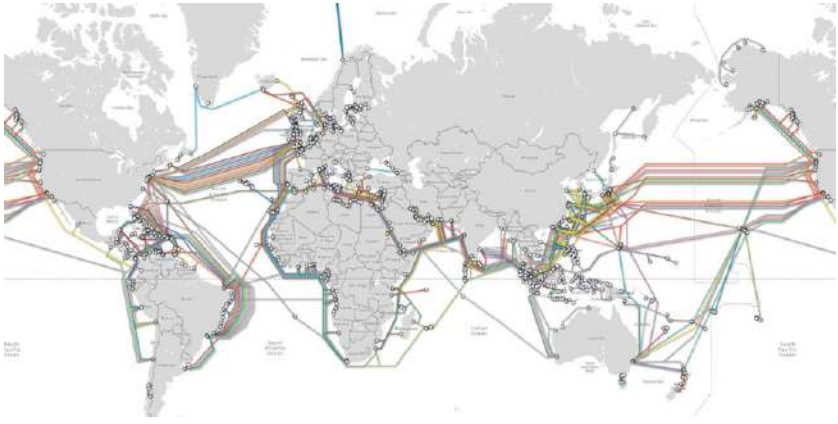


Figure 4: Undersea global cables in 2019. (Source: Telegeography, https://www.submarinecablemap.com)

the absence – of material networks accentuates an imaginative gap, a distance between popular, entrepreneurial and political cultures.

Furthermore, the overlap and the integration between different networking infrastructures (railroads, highways, fibre-optic cables, electric cables, antennas, telegraphic lines etc.) is a proof of the historical continuity and co-dependency between 'new' and 'old' media/technologies and, in turn, between new and old media imaginaries. From the global to the multiple local dimensions, just as much as for other pre-existing media, infrastructures are actual representations of the distribution of power; they are material indicators. These tangible traces are essential to understanding how and why specific media technologies were conceived, imagined, constructed and integrated over time. As Shannon Mattern argues in her work on the deep time of network infrastructures:

> It is important to recognize the codependency, the intertwining of these various entities and systems—the telegraph and the telephone, the railroad and the telegraph, transportation infrastructures and the postal system, print and writing infrastructures, writing and oral address, architecture and inscription, and various social and regulatory systems—and perhaps write their histories together. (Mattern 2015: 104)

As with any new infrastructure, that of the Internet penetrates and adjusts to a given environment, to a previous pattern of physical manipulation and spatial organization. Hence, the material distribution of networks, like the dynamic formation of the imaginaries, follows a path of interdependency.

Finally, network infrastructures are not all the same; rather, their geometry, the technics that they incorporate and even the contents that they transmit, depend also on the specific cultural, economic and geographical history of the areas – whether cities, regions or nations – in which they are constructed.

The US dominance over the global undersea data infrastructure is evident from the two overextended wings of threads connecting it to Europe and Asia respectively (together with a crowded cluster in the Mexican Gulf). These lines highlight the dominant material and geographical position of this territory over broadband communication. Through maps, the visual space occupied by fibre optic cables conveys the idea of centralization of the infrastructure immediately, debunking the longstanding myth of the distributed architecture of the Internet.

1.6 The Rise of Network Ideologies

The materiality of networks is a key indicator of the political economy, as it displays the unequal distribution of information and infrastructural systems. What I term the dominant narrative of Internet history persists today in part

precisely because it does not show how decentralization has actually converged in an oligarchy of preferential hubs. These are well represented by servers and proprietary data centres, and thus by key material information hubs like Google or by controlling institutions like the Chinese government. Notwithstanding this clear oligarchy of information control, centralization is not just an elective feature of corporate and political power. As I will show, even the most recognized decentralized system, the World Wide Web, is rooted in the tension between the verticality of the dissemination model (the vertical, tree-based, structure of information management) and the horizontal dream of egalitarian dialogue and peer-to-peer communication (Peters 2015). The tree and the web are always intertwined in the history of technology, both at the technical and the political level. In some cases, like the Italian plan *Socrate* analyzed in this book, institutional and private actors have tried to exclude the distributed ideal from their economic and infrastructural plans, failing because of their monolithic vision.

The longstanding tension between different models of networking is not only expressed through their graphic representation or through narratives, but is also deeply embedded in political and economic choices and in corporate strategies. The political economy of the media has paid much attention to this crucial aspect. As defined by Mosco, political economy is 'the study of the social relations, particularly the power relations, that mutually constitute the production, distribution, and consumption of resources' (2014: 24). Frequently, this approach focuses on the evolution of communication and media produced and distributed by profit organizations in capitalist industries (Wasko 2014: 261).

At first glance, the relationship between the political economy and the study of social imaginaries may appear weak, but the two areas of research are in fact highly interdependent. Narratives can maintain and reinforce power structures, and conversely social imaginaries are often fed by the characters and the interactional dynamics of powerful actors such as politicians, businessmen or even corporate brands, governments and public institutions.

Narrative forms can be used by relevant actors to drive attention towards a specific vision of media change, and also to exclude and make invisible other, less convenient, paths. In some cases, actors such as corporations and governments are even able to found, exploit and weave new myths almost from scratch; at other times they can literally steal myths and imaginaries from alternative or countercultural movements to legitimate their decisions and actions in the digital market. In the late 1990s, Vincent Mosco already warned about the double-edged power of the cyberspace myth. He argued that the myth of a horizontal and egalitarian network could be used at the transnational level by political and economic forces for different aims and scopes. As Mosco pointed out:

> Myths are important both for what they reveal, in this case a genuine desire for community and democracy, and for what they conceal, here

> the growing concentration of communication power in a handful of transnational media businesses. (Mosco 1998: 57)

Similarly, when addressing the relevance of the political economy of new media for the study of our contemporary socio-technical systems, Robin Mansell wisely questioned:

> What dominant principles, values and perceptions of power are being embedded in our technologically-mediated interactions? How is technological innovation in the new media field being structured; by whom and for whom is it being negotiated? (Mansell 2004: 103)

By whom and for whom: that is probably the key question raised by Mansell. When it comes to technology, myth and power, narratives and political and economic forces, feed each other. Solutionism and faith in technology are forms of exploitation of myths and of the social imaginary. For instance, they can act as a powerful instrument to reassure people through the idea of the supposedly 'neutral' role of actors such as digital media companies. At the same time myths can be used to hide economic and political processes aimed at promoting some economic actors while other are cut off from the market.

In recent decades, the critical turn in media and communication research has shown how so-called techno-solutionism and the Internet utopia have facilitated the centralization of information in the hands of digital media corporations that employ new exploitive forms of control on labour and personal data (Fuchs 2007; Morozov 2011; Terranova 2000; Tréguer 2019). Nevertheless, notwithstanding the contemporary disenchantment from the digital sublime in media and communication research, political and economic choices related to the digital media market are still promoted under the umbrella of a glorious past, a time in which the cyberspace and the Internet were seen as a *promised net*. Born free, protected by the heroes of the information age, the network of networks has become a mythological creature that grew by itself and is now under the protective shield (or, according to others, under the evil control) of a few powerful actors. Significantly, these actors did not obtain their power only at the economic and political level, but got it also at the discursive and imaginary level; they have built their own image by exploiting and making use of the Internet myth, of the characters and the main narratives surrounding technological innovation.

From a critical theory perspective, the Internet and the Web can be seen as two powerful forms of 'objectification' (Lukács 1971) of the contemporary societal organization, which is currently based on the exploitation and control of data and digital labour by and through corporate actors (Fuchs 2016). In particular, the Internet, from a technical object, becomes the actual subject that defines the working of societies, whereas the role of people is objectified through the technical operations of data transmission and control. In the last

two decades, digital media companies have subsumed and replaced the subject 'Internet' and its historical role, becoming the new and essential reference for societal and technological change. The network ideology is deeply dependent on this transitive process of objectification. To name only the most emblematic cases, Google and Facebook are rapidly superimposing their platforms, interfaces and infrastructures on the Web and on the social media system. At the same time these actors are also superimposing their names and brands on the terms 'Internet' and 'social media'. By degrees, this process of subjectification and objectification of the contemporary socio-technical system tends to obscure and hide, by means of several strata of symbols and misleading narratives, the real subject that produces and keeps alive the unequal economic, political, cultural and social structures: users.

It is at this juncture that history can serve a powerful tool of collective consciousness. A wider picture of the technological, economic and political landscape of the 1990s, together with a long-term view of Internet pasts, shows us that the popular narratives which constitute the Internet imaginary, including the outstanding success story of the World Wide Web, were and remain limited by a lack of depth and complexity. The 1990s are the decade in which the Internet and the Web definitely gained the status of 'technologies of freedom'. However, as the next chapter aims to show, the Web resulted from a series of technological, political and economic choices that, mixed with the collective construction of a powerful narrative of media change, forged and drove its current shape.

Notes

[1] As any historian knows, history and narratives have a complex relationship. As the historian A.R. Louch argued by quoting Benedetto Croce, historical research can be driven by contingency, by the present social and cultural context in which historians are immersed: 'All history, Croce says, is contemporary history, and his critics argue that this implies a radical subjectivity in the story of the past. The plot provides understanding, and the plot in turn is shaped by current conceptions of what is important. The connections drawn by means of historical narratives tell us how it is that one thing, one event, one idea is important to another.' (Louch 1969: 69) Nevertheless, the bond between contingency and historical research can, or better should, be brought into contention by other narratives. The diversity and the accumulation of different perspectives, approaches and subjects is essential for the reliability of historical accounts; new sources and insights can revise and correct a biased history, reframing the plot, and in turn the cultural meaning, which a specific narrative conveyed before. As Louch points out: 'For though a condition of constructing a narrative may be the historian's choice of what he deems important, still his story is limited by the chronology of events and his picture can be challenged by the accumulation

of detail out of which his narrative is constructed.' (Louch 1969: 70) The long corpus of primary and secondary sources collected during the archival research behind this book has been essential to the construction of a different narrative of Internet history.

[2] In English, the term 'imaginary' is rarely used substantively. According to the Oxford dictionary, 'imaginary' is an adjective meaning 'existing only in the imagination', whereas the substantive refers to 'Visually descriptive or figurative language, especially in a literary work' or a 'Visual symbolism'. On the contrary, the substantive forms *immaginario* and *imaginaire* are quite common respectively in Italian and French. Among the possible meanings of the terms, two specific definitions will be intersected in on the present book. In its philosophical application, the term *immaginario* can be read both in a negative sense as 'a movement or diversion-escape from reality' and in a positive sense as 'a synthetic function of perception or as integration of real data towards the possible.' Under another meaning, the term *immaginario* is defined as 'the sphere of imagination that is constructed and can be identified through myths, literature, cinema etc.', thus as a sort of translation of human imagination by means of different media and narrative constructions. Although these definitions convey two different meanings of the same word, they are not mutually exclusive: indeed, the imaginary can be conceived either as a 'repository', thus as a 'catalogue', of images and representations based on collective and individual experiences, or as the 'activity of imagining'. In the latter, 'to imagine' is an activity by which, relying also on previous experience, individuals and social groups create a projection of themselves 'towards the possible', thus towards the future. In the last century, prominent scholars such as Edgar Morin (1977), Paul Ricoeur (1984) and Cornelius Castoriadis (1998), even if from different perspectives, have agreed on the fact that human beings tend to create and shape the imaginary by means of stories, thus recounting and sharing specific narratives, whether true or false, which are mediated and disseminated within societies. Thus the imaginary, and in turn the narratives upon which it relies, can be seen as the territory on which social time and human actions are concurrently configured and constructed by means of storytelling. For a comprehensive analysis of the history of the term 'imaginary' see also the work of Lucian Boia (1998).

[3] The case studies presented in section 2 and section 3 have been partially outlined in scientific papers and book chapters published in the last 3 years. For section 2, see: Bory 2018a; Natale & Bory 2018. Section 3 is derived in part from an article published in *Internet Histories* (2019), copyright Taylor & Francis, available online: http://www.tandfonline.com/10.1080/24701475.2019.1596407

[4] As the historian of religions Mircea Eliade pointed out, any myth refers to a sacred time of the 'beginnings':

'Myth narrates a sacred history; it relates an event that took place in primordial time, the fabled time of the "beginnings." In other words, myth tells how, through the deeds of Supernatural Beings, a reality came into existence, be it the whole of reality, the Cosmos, or only a fragment of reality–an island, a species of plant, a particular kind of human behavior, an institution. Myth, then, is always an account of a "creation"; it relates how something was produced, began to be.' (Eliade 1964: 2–3) The media historian Peppino Ortoleva argues that even if they have lost the sacredness of old mythologies as depicted by Eliade, contemporary myths maintain the structure and the rituality proper to old myths. As 'low intensity myths' (Ortoleva 2009; 2019), these contemporary forms do not require any formal act of faith but they are still able to affect and influence the way in which people imagine, think and shape the world and its social, political and economic structures.

[5] Such is the case, for instance, of the socio-cultural appropriation of computer networks as told by Victor Turner in his book on the US countercultural movement and the creation of the WELL (World Earth 'Lectronic Link) founded by the mythical character Stewart Brand (Turner 2006). Or consider the stories of the hacker movements and communities as told by authors such as Steven Levy (2010).

[6] However, as I will stress, the new 'home' of the Web was built in the US. The World Wide Web Consortium (W3C) was founded by Berners-Lee at the MIT a few years after the release of his invention into the public domain.

[7] The British scholar Robin Mansell adopts the concept of 'prevailing narratives of Internet history' (Mansell 2017). The idea of a 'dominant narrative' is here used to stress the fact that such stories did not 'prevail' on any competing narrative. Rather, they convey a hegemonic perspective, attributing technological innovation and social change to a single dominant actor, thereby also avoiding historical competitors. In the late 1990s, Roy Rosenzweig (1998) warned historians about the risks of an apologetic narrative of Internet history.

[8] For a compelling analysis of the ARPANet history see the work of Alexandre Serres (2000).

[9] Licklider is among the most cited authors of the 'classics' of histories of the Internet and computing. Beside *Libraries of the Future* he authored two key papers forecasting the future of communication networks and the naissance of the so-called 'intergalactic computer network': 'Man-Computer Symbiosis' (Licklider 1960) and 'The Computer as a Communication Device '(Licklider and Taylor 1968).

[10] It is not by chance that in 2015 Vint Cerf, the inventor of the TCP protocol, published an article titled 'As We May Think', that created a direct connection with the figure of Vannevar Bush. As Cerf claims in the introduction: 'I hope the reader will forgive me for plagiarizing Vannevar Bush's

famous essay title […] The title is so apt, however, that I dare to use it.' (Cerf 2015: 7) In 1995 also, Tim Berners-Lee gave a speech in honor of Bush, acknowledging his relevance for the Web's invention. See: https://www.w3.org/Talks/9510_Bush/Talk.html (Accessed 20 January 2020)

[11] Marshall McLuhan, who Nelson often quotes in his writing, had published his hypertextual book *The Gutenberg Galaxy* three years before. Thanks to authors like McLuhan, the hypertext concept permeated both the technical and the social imaginaries; nevertheless, from a historical perspective, as scholars such as David Bolter (1991) and Belinda Barnet (2013) have shown in their works on the history of hypertext, this idea had already been adopted in the arts, literature, play and mathematical schemes.

[12] Whilst Bush never completed the *Memex* project, it persists in the Internet imaginary more than other failed projects such as *Xanadu*. In fact, the dominant narrative of Internet history tends to describe Bush as an important forerunner, while Nelson is depicted more as a utopian and crazy dreamer.

[13] A key proof of the exclusion of Nelson from the pantheon of the Internet pioneers is the absence of any reference to his work in the Internet timeline of the Internet Hall Of Fame: see https://Internethalloffame.org/brief-history-Internet#concepts.

[14] Robert Cailliau and Berners-Lee's descriptions of the World Wide Web (Gilles and Cailliau 2000) refer to these pioneers to stress the importance of the idea of a digital library, whilst Ted Nelson is recognized as the inventor of a key term, and nothing more (see Par. 2.2.1).

[15] E.g., in 2016 an article in *The Guardian* claimed: 'In 40 years, the Internet has morphed from a military communication network into a vast global cyberspace'. See: https://www.theguardian.com/technology/2016/jul/15/how-the-Internet-was-invented-1976-arpa-kahn-cerf.

[16] However, the false myth of the military 'origins' of the Internet idea should not be confused with the real military uses of this technology (e.g., Harris 2014). Since its invention, the Internet has been extensively used as a powerful means of military control, political oppression and social exclusion.

[17] Here,*topoi* are interpreted in line with Errki Hutamo's definition: they are recurrent narrative discourses which 'can be considered as formulas, ranging from stylistic to allegorical, that make up the 'building blocks' of cultural traditions; they are activated and de-activated in turn. Even though they may emerge as if 'unconsciously', they are, however, always cultural, and thus ideological, constructs.' (Hutamo 1997: 225).

[18] Source: Internet World Stats, http://royal.pingdom.com/2011/03/31/Internet-1995/ (Accessed 20 January 2020).

[19] OT : 'L'avenir, on a déjà eu l'occasion de le suggérer au passage, est au temps ce que l'infini est à l'espace.'

[20] The structure of this myth recalls an old US mythical space: the Western American frontiers of the Nineteenth Century (Flichy 2007).

[21] As it is now known, the term 'cyberspace' was coined by William Gibson in his book *Neuromancer* (1984); thus it came from the narrative media *par excellence*: a novel. Within academia, the works of scholars such as Mark Poster (1995), Nicholas Negroponte (1995), Howard Rheingold (1993) and Sherry Turkle (1995) contributed extensively to the magnification of cyberculture and cyberspace. Two decades later, Sherry Turkle radically changed her perspective, criticizing the effects of the Internet on social interaction in her book *Alone Together* (2011).

[22] Although the meaning of the information superhighway was very different from the cyberspace ideal, key concepts like the global village were employed by both philosophies, since they convey a general idea of interconnection susceptible to different interpretations.

[23] Another interesting speech by Al Gore was given during the G7 Information Society Conference, held in Brussels in 1995. Just as Barlow had done previously, Gore used the analogy between the birth of the information superhighways and the birth of Gutenberg's press. Second, Gore drew a parallel between the dreams of industrial society and the dream of the information age: 'Just as human beings once dreamed of steam ships, railroads, and superhighways we now dream of the global information infrastructure that can lead to a global information society. But our dream today is not fundamentally about technology. Technology is a means to an end. Our dream is about communication -- the most basic human strategy we use to raise our children, to educate, to heal, to empower and to liberate.' Source: http://web.archive.org/web/20040911114930/http://europa.eu.int:80/ISPO/docs/intcoop/g8/is_conf_95_gore.pdf.

[24] RAND is an American think-tank offering research and technical analyses on communication systems to the United States Armed Forces.

[25] From an intermedia perspective this paper is quite fascinating: TV stations, telegraphs and satellites are used to describe or integrate the functions of packet switching messages, integrating in a symbiotic way different networks' infrastructures. Moreover, the case studies in this book will highlight, when describing networking technologies scientists constantly evoke postal services. In Baran's paper, a 'postman analogy' is used to describe the working of networks, in which the postman is a metaphor of a node: 'The switching process in any store-and-forward system is analogue to a postman sorting mail. A postman sits at each switching node. The postman records bulletins describing traffic loading status for each of the outgoing links. With proper status information, the postman is able to determine the best direction to send out letters. So far, this mechanism is general and applicable to all store-and-forward communication systems. Assuming symmetrical and bi-directional links, the postman can infer the 'best' paths to transmit mail to any station merely by looking at the cancellation time or the equivalent handover number tag' (Baran 1964: 25).

[26] A 2015 article in the *Computer Business Review* shows that seven out of the ten biggest data centres of the world are in the US. See: http://www.cbronline.com/news/data-centre/top-10-biggest-data-centres-from-around-the-world-4545356/.

CHAPTER 2

The Myth of the World Wide Web

The structure is everything.
Tim Berners-Lee

2.1 The Birth of the Web: A Hero's Story

On 12 March 2019, CERN, together with the World Wide Web Consortium (W3C) and the World Wide Web Foundation, celebrated the 30-year anniversary of Information Management: a proposal, the paper in which Tim Berners-Lee (1989) described for the first time the Web idea. The proposal, in which the name World Wide Web was not yet coined, represents a watershed moment in digital media history. The proposal has rapidly become the symbol of a revolution, and as the historical proof of the birth of a myth it conveys the constant tension between history and narrative. It is not by chance that the Web's birthday is celebrated on the day of its conceptualization, rather than the day of its actual operation.

In one of his Massey Lectures of 1977, Claude Lévi-Strauss highlighted the particular relationship between history and mythology in contemporary societies. When concluding his lessons, he argued:

> I am not far from believing that, in our own societies, history has replaced mythology and fulfils the same function, that for societies without writing and without archives the aim of mythology is to ensure that as closely as possible – complete closeness is obviously impossible – the future will remain faithful to the present and to the past. For us, however, the future should be always different, and ever more different,

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> from the present, some difference depending, of course, on our political preferences. But nevertheless the gap which exists in our mind to some extent between mythology and history can probably be breached by studying histories which are conceived as not at all separated from, but as a continuation of mythology. (Lévi-Strauss 2005: 19)

In line with Lévi-Strauss intuition, the history of the Web's birth has gained the status of myth, and documents like the first proposal have become shared symbols, notwithstanding their complexity (and the tedium) of their contents for non-expert readers.

Starting from the first key events of its historical and narrative path, the Web has become the medium that has changed the way people use computers and connectivity to retrieve and exchange information. This radical sociotechnical change happened thanks to a user-friendly, open and intuitive system shared globally. However, the mythical dimension of the Web goes far beyond its technical qualities; the Web also represents the peak of a process of cultural change bound up in the dominant narrative of Internet history. It has become, in a very short time, the symbol of democracy and horizontal decision making, as well as the ideal model for openness and public service media. Symptomatically, the first key event in the Web's history coincided with the collapse of those constraints and boundaries that had divided the world for a long time. Berners-Lee wrote his first proposal for a new information management system in 1989, a few months before the fall of the Berlin Wall. This double happening – the fall of the Berlin Wall and the conceptual birth of the Web – entailed the opening of a new and boundless space where physical barriers would only be simply downsized, but would no longer be perceived as communicative constraints. From this moment on – passing through other key events such as the publication of the first website in 1990; the creation of Mosaic, the first popular web browser, and the Web's release into public domain in 1993; ending up with the commercial use of the Web in 1995 – the history of the Web has come to be an ideal-typical story of a successful, revolutionary innovation. The Web was perceived, starting from the late 1990s, as *the* technology able to change the way in which people communicate, share and learn in everyday life, but it also changed people's role in the construction of a better, egalitarian future for societies.

In the narrative construction of any mythological account, the hero is often a fundamental character. As for other fields such as sports, cinema and war, media history is a reservoir of contemporary heroes who are usually associated with the birth of a key invention such as the radio and computers. Historical figures such as Thomas Edison, Guglielmo Marconi, Alan Turing and Steve Jobs, are clear examples of the double dimension, both mythical and historical, of those characters whose biographical accounts conveyed also beliefs, behaviours, values and principles frequently associated with the social and cultural meanings of their own inventions.

In the case of the Web, the British scientist Tim Berners-Lee represents the figure of the hero: the humble, altruistic, open-minded inventor who decided to give his treasure for free, as a duty towards the good of humanity. Unlike many other heroes of our time, Berners-Lee is depicted by journalists and writers as a low-profile character who does not profess specific rules or collective behaviours (think about the Jobsian 'Stay angry, stay foolish'). However, it is also thanks to his neutral position that the rhetoric of Berners-Lee is constantly associated with the meaning and the role of the Web in our society.

In October 1999, the American journalist Katie Hafner wrote an enthusiastic article in which she promoted Berners-Lee's new book *Weaving the Web*. The piece started with a very indicative claim:

> Berners-Lee, the 44-year-old English physicist who created the World Wide Web, is precisely the kind of hero that a relatively simple invention with profound social and economic consequences should lay claim to. He is not just creative but democratic, diplomatic, polite and generous with credit and praise. (Hafner 1999)

Hafner's introduction suggests that the Web should 'lay claim' to its inventor Berners-Lee; thus Hafner treats the Web as a real and active subject able to dialogue and share positive values such as democracy and generosity with a human heroic figure. This is only one example of the extent to which the Web and its inventor have become two connected symbols embodying an imaginary that was narratively constructed during the very same years of the Web's global spread.

As stressed before, the narrative construction of the Web's myth has been largely based on the story of the first stages of Berners-Lee's invention. Berners-Lee's autobiographical account of the Web's birth at CERN in Geneva has been for a long time the main reference to Web history. This book, along with a list of celebratory events, international awards and magazine interviews, showcased the figure of Berners-Lee, who narrated the birth of the Web in parallel with his professional and private life. In this autobiography, the association between the Web and its inventor surfaces in illuminating ways. When he describes the creation of the first Web browser, for instance, Berners-Lee links the episode to the birth of his child, claiming that 'as amazing as it would be to see the Web develop, it would never compare to seeing the development of our child' (Berners-Lee 2000: 33). The strong connection between the two biographies is also highlighted by external perspectives, as in the case of the book's introduction, in which Michael Dertouzos claims that it 'is a *unique* story about a *unique* innovation, by a *unique* inventor […] he opens a rare window into the way a *unique* person invents and nurtures a *unique* approach that alters the course of humanity' (Berners-Lee 2000: vii, emphasis added). The unified paths of these biographies were essential to conceptualize and frame the Web as a good, egalitarian and revolutionary invention.

From a narratological perspective, if we look in depth at the literature exploring the archetypal structure of narratives and myths, both biographical writings about the Web's inventor, Tim Berners-Lee, and also the biographies of the Web technology, seem to follow quite closely the trajectory of the hero's journey, as sketched in *The Hero with a Thousand Faces* by Joseph Campbell (2004). Ultimately, this narrative pattern provides a familiar framework through which the story of the emergence of the Web has come to make sense to people, contributing to the formation of an imaginary that portrays Berners-Lee's invention as the symbol of a revolution.

In the wake of previous works such as the *Morphology of the Folk Tale* by Vladimir Jakovlevič Propp (1958), Campbell shows how stories and myths from different traditions replicate a common narrative structure: the *monomyth*. As he points out:

> Whether presented in the vast, almost oceanic images of the Orient, in the vigorous narratives of the Greeks, or in the majestic legends of the Bible, the adventure of the hero normally follows the pattern of the nuclear unit […]: a separation from the world, a penetration to some source of power, and a life-enhancing return. (Campbell 2004:33)

Campbell's monomyth provides a useful resource to unveil how stories about the emergence of the Web and its inventor were constructed with the same pattern used for mythical characters. This model helps us also to understand how such narratives are essential to the symbolic appropriation of the values and the features apparently embedded in Web technology.

2.1.1 The Web's Journey

Joseph Campbell's monomyth is based on three main stages of the hero's journey (Fig. 5): the departure or call to adventure, the initiation, and the return or reintegration within society. According to Campbell, the journey, which exalts the figure of the hero, is interpreted as a response to the social need for meaningful stories able to organize and give sense to reality. The hero is thus a character who fills a specific lack of meaning in the social world; he is a bearer of those values that are necessary to keep and strengthen the identity of a community, the cohesion of societies and other forms of social organization. In sociological terms, the figure of the hero serves to fight a specific form of *anomia*, the lack of shared cultural and symbolic guidelines that help the individual make sense of the social world. As Campbell points out:

> The composite hero of the monomyth is a personage of exceptional gifts. Frequently he is honored by his society, frequently unrecognized or disdained. He and/or the world in which he finds himself suffers from a symbolical deficiency. (Campbell 2004: 35)

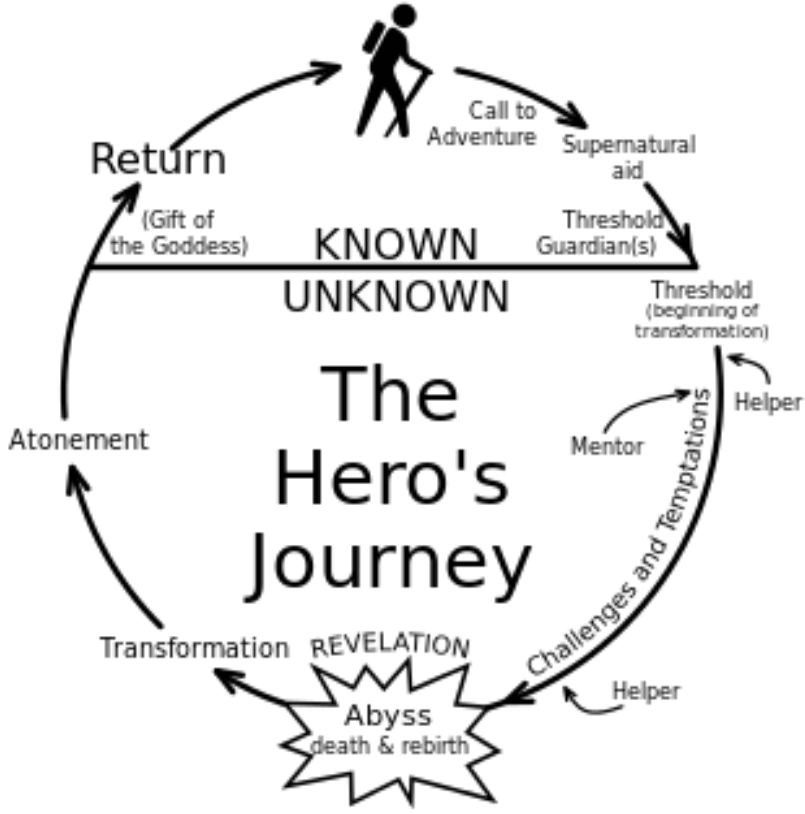

Figure 5: The hero's journey; the basic scheme. (Source: Wikipedia Commons.).

In the case of the Web and Berners-Lee, the three stages of the hero's journey coincide with three phases of the development of the medium, starting from the late 1980s and then incorporating the late 1990s to the early 2000s. The narrative emerging from these steps has been essential in conveying the revolutionary trait of the WWW (and by extension of the Internet at large) as an instrument of liberation from the old, outdated, conservative and constrictive media like radio and television.

a. The Departure

According to Campbell, the first stage in the narrative of the hero is the *departure*, where the hero receives his call to adventure. Through this call, destiny summons the hero, preparing him to enter an unknown space of adventure. Following a pattern that characterizes many biographies of inventors, a call to adventure was foretold in the familiar background of Berners-Lee. His parents were both scientists and worked together on the Mark I, one of the first

computers sold commercially. In his autobiography, the inclination of the young Berners-Lee for computing is directly related to his family; the premature passion for experimenting and problem-solving foretells the destiny of the hero, who since youth had begun to assemble and hack electronic devices such as TV screens and model trains. Also, the first evident symptom of Berners-Lee's fascination with connectivity is identified with a specific anecdote. During a brief discussion with his father, Berners-Lee realized that networking systems would play a paramount role in his life:

> He (Conway, the father *rev.*) was reading books on the brain, looking for clues about how to make a computer intuitive, able to complete connections as the brain did. We discussed the point […] The idea stayed with me that computers could become much more powerful if they could be programmed to link otherwise unconnected information. (Berners-Lee 2000: 4)

Similar episodes establish a twofold representation of inventorship as the result of both predestination and good fortune – a combination of natural gifts, family heritage and chance.[1] Chance is a common element in the biographies of scientists and inventors, in which it often plays a key role, like in the famous case of the Newton's falling apple. The role of chance is essential also in Berners-Lee's biography. For example, the acquisition of the NeXT computer at CERN was a special gift through which his supervisor Mike Sendall encouraged him to work on the Web idea. Through the lens of Campbell's monomyth, the gift of the NeXT computer is the supernatural aid that prepares the hero for his initiation and for the upcoming invention of the World Wide Web.[2]

The call to adventure may coincide with a specific episode, as Campbell points out: 'an event, often happened seemingly by chance, activates the hero's adventure' (Campbell 2004: 53). In the footsteps of Campbell's work, the Hollywood screenwriter Christopher Vogler argues that 'most stories take the hero out of the ordinary, mundane world and into a Special World, new and alien' (Vogler 2007: 10). The new and alien world was, in Berners-Lee's journey, the European Organization for Nuclear Research (CERN), which he joined for the first time in 1980. The new environment is portrayed in mythical tones in Berners-Lee's autobiography, for instance in his description of the control room at CERN:

> Inside were racks and racks of computing hardware, with no lighting except for the glow of the many indicator lamps and dials. It was an electronic engineer's paradise, with columns of oscilloscopes and power supplies and sequencing equipment, most of it built especially for or by the CERN. (Berners-Lee 2000: 8)

The call to adventure characterizes not only the biography of Berners-Lee, but also the biography of the Web itself. Stories around the Web's birth contain several traces of a similar call that prepares and anticipates the destiny of the medium as an egalitarian and democratic system. A lineage of precursors of the Web, such as Ted Nelson's *Xanadu*, Apple's *Hypercard*, the narrative software *Storyspace* and Berners-Lee's *Enquire*, represent a parallel time-line characterizing the Web's story. This lineage is part of canonical histories of the Web (Banks 2008; Gillies and Cailliau 2000: 11–46). Through the reference to a pre-history populated by visionary thinkers (e.g., Bush 1945; Engelbart 1962; Nelson 1987) who imagined the design and implications of technologies and systems yet to be, as well as enthusiastic early adopters, the preconditions for the Web take the shape of a call to adventure that ultimately supports claims about the revolutionary character of this medium. Additionally, as in the case of Berners-Lee's biography, the 'special world' (Vogler 2007: 10) where the emergence of the Web took place is CERN – an environment characterized by some of the same qualities, such as openness and cooperation, commonly attributed to the Web. CERN, a collaborative scientific centre created under the auspices of European cooperation, based in Geneva – 'a city at the heart of Europe with a cosmopolitan heritage' (Gillies and Cailliau 2000: 48) – is represented as the ideal context in which a medium like the Web might originate and flourish.

Notably, this myth of the Web's origins contrasts sharply with the military narrative of the Internet's origins, thus reinforcing the idea of a re-appropriation of the technology by research centres and academics. Hence, the Web's origins at CERN tally with its supposed decentralized and egalitarian character; it was born in an open environment thanks to the effort of a collaborative and horizontal organization, and a mind of genius free to experiment within it. This social sphere represents the principles of sharing and unifying knowledge, expertise and skills for the progress of science and human wealth.

In this context, the constant parallel between anecdotes about Berners-Lee's life and anecdotes about the development of the Web shows how the hagiography of the inventor contributes to the hagiography of the medium. According to this narrative, when Berners-Lee was hired by CERN, some relevant technological events were occurring too. In the late 1980s, powerful new computers like the NeXT were commercialized, hypertext-based software spread in Western countries, and CERN had just decided to adopt the TCP/IP protocol, a keystone for the Web's success but especially the narrative and technological link between the Web and the Internet. Berners-Lee himself claims that, unlike his unlucky predecessors, his creative life coincided with the time in which the Web could finally occur:

> Unfortunately, just like Bush and Nelson, Doug (Engelbart) was too far ahead of time. [...] I happened to come along with time, and the right interest and inclination, after hypertext and the Internet

> had come of age. The task left to me was to marry them together. (Berners-Lee 2000: 6)

Similarly, the emergence of the Web is grounded within a context of social and technological foundations that work to make it seem not only possible, but also to a certain extent *inevitable* (Lesage and Rinfret 2015). The inescapable destiny of the departure, in this sense, is an essential narrative trope for the construction of the Web's founding myth.

b. The Initiation

In Campbell's monomyth, the departure is followed by the second phase, the *initiation*, in which the hero transgresses the threshold to an unknown world in which the core of the adventure takes place. This stage includes the hero overcoming several trials and finally completing his quest, for which he might receive a material or immaterial reward. Translating this pattern into the biography of Berners-Lee, this phase corresponds to the uncertain pattern of institutionalization and diffusion that the new invention took in its early stage. Biographical accounts of Berners-Lee's life underline the struggles and trials he had to endure in this phase. For instance, the CERN community did not immediately grasp the implications of Berners-Lee's idea. A famous anecdote in this regard focuses on the remark written by his supervisor, Mike Sendall, who wrote of the first Web proposal that the idea was 'vague but exciting' (Berners-Lee 1989: 1), thus showing at the same time both enthusiasm and uncertainty towards the project. Promoting the Web at CERN and reducing the real or perceived vagueness of the project was therefore the first trial Berners-Lee and Robert Cailliau—the hero's *ally,* to use another archetypal character in the narrative of the hero (Vogler 2007) – had to face.

In his proposal, Berners-Lee argued that CERN is a 'model in miniature of the rest of the world in a few years' time' (Berners-Lee 1989: 1). The fluid environment of this institution, characterized by the constant exchange of international researchers and the consequent problem of information loss, was in Berners-Lee's narrative an element that also characterized larger challenges the new information society would face. The parallels drawn by Berners-Lee between CERN's organizational structure (which represented a micro-model of the new society) and the need for a new system of information management, pointed out that technological and social change were following a common path, or in other words, that the same biographical transitions would occur both within the media landscape and in everyday life.

Berners-Lee knew that promoting the Web meant first of all persuading expert users to adopt the new system. Hence, beyond CERN, the major step towards the evangelization of the Web was to convince the hypertext community that hypertext and the Internet could be matched and used together. For this reason, in 1991 Berners-Lee and Cailliau attended the Hypertext Conference

in San Antonio. Even though their paper proposal was rejected because of a lack of references to the field, they asked to give a demonstration of their project. At this point, a big obstacle stood in their way: the conference building had no Internet connection. As Stephanie McPherson recounts in her biography of Berners-Lee:

> Several obstacles stood on their way. First they needed a telephone outlet to hook up their modem. (…) They had to dismantle the modem, rewire it, and put it together with a soldering iron. Then they still needed a way for the modem to get Internet access. (McPherson 2009: 59).

Thanks to the hacking skills of Cailliau and to the creative thinking of Berners-Lee, the demonstration finally took place. Beside this key anecdote, other attempts to promote the Web and demonstrate its usefulness are depicted by Berners-Lee as challenging trials, such as stopping the attempt by the NCSA to rename the WWW as Mosaic (Berners-Lee 2000: 70), or the difficult negotiations to acquire the funding and human resources essential for the project. Another key trial was to demonstrate the usefulness of the Web to important players such as editors and publishing houses, convincing them that the Web was not a menace to their role or habits, but rather a tool for work optimization:

> Publishing houses, far from being unnecessary, will be in for very exciting times. Their job and those of librarians seem to have merged into one of classifiers and reviewers of the world's knowledge. (Berners-Lee 1992a: 16)

As in the case of the departure stage, the pattern of initiation can be applied to the biography of the Web as well as of its creator/hero. Narratives of the Web's emergence, in fact, underline the trials and difficulties of promoting the World Wide Web as a functional system, and the fight against opposite visions and scopes in order to preserve the spirit of its founding ideals (see: Gillies and Cailliau 2000: 172–201).

According to Campbell, when the hero completes his quest and his initiation, he might reach an apotheosis that takes him closer to a godlike state – which is, however, never to be fully reached, as the story of Prometheus teaches us (Campbell 2004: 127–147). In the case of Berners-Lee's life, the apotheosis coincides with the sacrifice of his invention's intellectual property. In the last two decades, many authors and scholars have acknowledged the heroism of Berners-Lee. A video interview given by the media scholar Andrew Keen to the website C-Span is a good example of how the sacrifice contributes to the hagiography of the Web's inventor. As Keen argues:

> In my view, Tim Berners-Lee is a hero. He was a typically publicly-spirited scientist who did this out of love. No one was paying him. He

> essentially gave it away. He could have owned the World Wide Web. He could have put all sorts of IP around it and would have become an incredibly rich man, but he didn't. He was very publicly-spirited. (Lamb 2015)

Along similar lines, in an article that appeared in 1997 in *Time*, Berners-Lee is depicted as:

> the unsung – or at least undersung – hero of the information age. Even by some of the less breathless accounts, the World Wide Web could prove as important as the printing press. That would make Berners-Lee comparable to, well, Gutenberg, more or less. Yet so far, most of the wealth and fame emanating from the Web have gone to people other than him. Marc Andreessen, co-founder of Netscape, drives a Mercedes-Benz and has graced the cover of several major magazines. Berners-Lee has graced the cover of none, and he drives a 13-year-old Volkswagen Rabbit. He has a smallish, barren office at M.I.T., where his nonprofit group, the World Wide Web Consortium, helps set technical standards for the Web, guarding its coherence against the potentially deranging forces of the market. (Wright 1997: 64)

As Marcel Mauss has shown in his classic essay (Mauss 1990), every gift bears its donor's identity. In this regard, the sacrifice of Berners-Lee and the gift of the Web to society is a 'personal renunciation that nourishes social forces' (Hubert and Mauss 1964: 102). It is not just a technological transfer; it is also a transfer of meanings and values. The sacrifice is thus an act that reinforces the characterization and the identity of the hero as much as the intrinsic value of his invention. More broadly, the refusal to receive money or any other advantage from his invention, which coincides with the sacrifice of the hero, does not only contribute to the hagiography of Berners-Lee, but also strengthens the analogy between the Web's inventor and the Web itself, which is also portrayed as a neutral space in terms of economic interests and power. In this way, the sacrifice of the hero makes the Web a milestone, a final step in the dominant narrative of Internet history which depicts the final evolution of the 'network of networks' as a horizontal space for information exchange and peer-to-peer production – a sacred gift to society.

c. The Return

In the third and last stages of Campbell's monomyth, the hero returns to his own world:

> The full round, the norm of the monomyth, requires that the hero shall now begin the labor of bringing the runes to wisdom, the Golden Fleece, or his sleeping princess back into the kingdom of humanity, where the

> boon may redound to the renewing of the community, the nation, the planet, or the ten thousand worlds. (Campbell 2004: 167)

This stage might involve new difficulties, as the hero is reluctant to return, or has to overcome further trials before reaching his final goal. In Berners-Lee's biography, the conclusion of the (first) hero's journey coincides with the foundation and governance of the World Wide Web Consortium (W3C) at the MIT in Cambridge. According to its institutional page the consortium is:

> […] an international community where Member organizations, a full-time staff, and the public work together to develop Web standards. Led by Web inventor Tim Berners-Lee and CEO Jeffrey Jaffe, W3C's mission is to lead the Web to its full potential. (https://www.w3.org/Consortium/)

However, in recent times the main task of the W3C seems more to protect the Web from centralization and control rather than leading it to 'its full potential'. Once the Web had spread globally, in fact, new responsibilities and trials emerged as Berners-Lee struggled to protect his invention from new powers threatening the Web's public domain, as well as to preserve the message it conveys through the mythological narrative inscribed in its biographical path. In summary, within the W3C, the hero becomes the guardian of a collective treasure, since the Web has become a common good. Consequently, rather than representing the final stage of the adventure, Berners-Lee's return seems to coincide with a new call to adventure in which the hero, rather than exploring new worlds, has to safeguard his heritage by making people aware of the importance of the Web's openness. Additionally, Berners-Lee's late conversion to the Unitarian Universalist church (UU) – a religious community that lists among its principles the 'respect for the interdependent Web of all existence of which we are a part' (Unitarian Universalist Association, n.d.) – also stresses the new quest of the hero. On the FAQ page of his website and in the final chapter of his autobiography (Berners-Lee 2000: 207–09), Berners-Lee compares the Web and the UU, claiming that:

> Web and the UU concept of faith are similar in that both serve as a place for thought, and the importance of the quest for truth, but without labelling any one true solution. (Berners-Lee 1998)

Covering the same biographical path, the institutionalization of the Web as a global medium goes hand in hand with the foundation of a new supervising institution, the W3C, and the promotion of a religious association, the UU: two different but concomitant expressions of the Universalist vision behind the technical structure of the Web. As Berners-Lee himself points out, 'the parallels between technical design and social principles have recurred throughout the

Web's history' (Berners-Lee 2000: 207); the social principles at the basis of the UU are an example of this theoretical parallel.

As for the other stages in the hero's path, the return phase also applies well to the construction of biographical narratives related to the Web as a medium. Crucially, the preservation of Web neutrality is ensured through a process that involves continuity and change at the same time. In this context, paradigmatic shifts in the conventions and uses of the medium are offered as biographical narratives through which the Web's participatory and neutral ideology is preserved even in the process of change. This is the case, for instance, of the passage between Web 1.0 and Web 2.0, which represents one of the key narratives through which the recent history of the medium has been told and constructed (Cormode and Krishnamurthy 2008). According to such narratives, the shift in the definition of the Web reproduces the same values as its origins, such as authenticity, openness, the relinquishing of control, the sharing of codes and building on the efforts of others. Nevertheless, as authors such as Matthew Allen have shown, the implied values of the Web 2.0 risk turning into a justification of the corporate control over the Web landscape:

> Web 2.0 also serves as an ideology for the creation of new forms of dependence between individual humans and corporations who, by monopolising and controlling the network activities through which key forms of human sociality becomes possible, can therefore benefit disproportionately from that dependence. (Allen 2008)

As an unblemished hero, the Web – especially in its evolved version – risks becoming an unquestionable subject. As a consequence, the supposed co-participative environment of the Web risks justifying the increasing centralized control over information. It is not by chance that in several sequential stories, the hero revered by the people turns out to have become wicked (as in the case of the Web) or, at least, to have lost his former strength.

2.1.2 The Biography of the Web as a Myth-Building Narrative

As the media scholar Peppino Ortoleva has shown (1996), biographies of inventors constitute a standardized subgenre with its own patterns and narrative tropes. The biographies of inventors include recurring anecdotes that help define their genius, while highlighting at the same time the radical change that such figures brought with their revolutionary ideas. Similarly, the story of the Web's birth has been recounted through recurring patterns and tropes coinciding with the life-path characteristic of the hero's journey. As the previous paragraphs have shown, the three stages of Campbell's monomyth – the *call to adventure*, the *initiation* and the *return of the hero* – can be equally applied to Berners-Lee and to the Web. This means that the Web has somehow *internalized*

the life of its inventors and *vice versa*. The overlap between the hero and his creation, in this sense, results in the medium's introjections of its creator's system of value and beliefs. Moreover, the figure of Berners-Lee, who is depicted as an under-sung and humble hero of the digital revolution, amplifies features such as the neutrality and the implicit goodness of the Web, reinforcing its supposed independence, not only from any proprietary power, but also from human agency at large. As a self-fulfilling prophecy (Merton 1948) of a mythological character, the Web has its own destiny, which is written in a future mission to be accomplished. Even the subtitle of Berners-Lee's book (1999) highlights this aspect; it is not by chance that it recounts *The Original Design and 'Ultimate Destiny' of the World Wide Web*.

Generally speaking, looking at this pattern reveals the way in which narratives of the Web have been woven, creating a stable and influential myth in the social imaginary. The imaginary associated with the biographies of the Web, rather than being relegated to the status of a mirror metaphor (Castoriadis 1998), actively contributes to the shaping and institutionalization of this medium in our society; the imaginary is not something stable, but acts as a process of sensemaking rather than as a depository of unchangeable memories. Hence, the Web means something to people because it is narrated in a certain way, and its meanings guide, in turn, the agency of users, programmers, companies and stakeholders concerning the very role of this technology.

The Web would not have gained such influence and agency without a foundational narrative behind it. Myths, even contemporary myths, are often inserted into a specific cosmogony, into a narrative of the world in which mythological stories come in succession, building up a long-term narrative of origins. The Web imaginary emerges in historical continuity with the dominant narrative of Internet history according to which the Web's invention is the culmination of a revolutionary process which started in the 1950s in the United States. From a geopolitical and cultural point of view, the final stage of Tim Berners-Lee's journey is crucial, as it links the life of the Web and its inventor to the mother Earth of the Internet: the United States. Berners-Lee and the Web migrate to MIT and, at the same time, he converts to an American religious association based on libertarian and egalitarian values, the very same ideological framework on which the Web, like the Internet before it, was constructed.

This theoretical link – between the US history of the Internet and the European history of the Web's birth – is well summarized by Berners-Lee himself when he describes the moment in which he decided to move to the MIT:

> It was clear that MIT was very much in control, moving faster, with more experience and relevant contacts. Some people in Europe expressed concern that Web technology would move west, leaving Europe behind. I knew I had to move to the center of gravity of the Internet, which was the United States. (Berners-Lee 2000: 89)

By moving to the 'center of gravity of the Internet', the journey of the Web ends in the very same context in which the dominant narrative of Internet history took place. The role of CERN is no longer considered, since CERN was only a transitory world, a sort of gestation space for an invention that was destined to grow up into its elective environment.

Today, the overlap between the Internet and the Web is so much rooted in the social imaginary that even newspapers, scholars, and opinion leaders tend to mix up the two concepts. But the main focus on the heroic figure of Berners-Lee has another important effect on the imaginary: the personification of the Web. The transfer of values from the inventor to his invention makes the Web a sort of self-sufficient technology, naturally able to shape and horizontalize the social sphere. It is for this reason that the oversimplification of Internet and Web history is dangerous and needs to be challenged through deep scrutiny of its complex and multiple paths. These paths include the history of previous media and imaginaries that shaped the Web's invention. To look at the historical continuity between the birth of the Web and its predecessors such as hypertext programs, broadcasting networks and information retrieval systems is a good way of highlighting the complex intertwining of innovative and conservative features entailed in the so-called 'digital revolution'. To retrieve media history and imaginaries within the Web is therefore a way of looking past its revolutionary aura to question one of the most powerful myths lying at the foundations of network ideologies.

2.2 Questioning the Myth of the Web: Media Imaginaries and Web History

The biographies of both the Web and its inventor have played a paramount role in the dissemination of a linear and clear narrative exalting a new system that has changed social life. The strength of the narrative lies in its familiar trope and its symbolic meanings, but also in its simplicity, self-closure and reader-friendliness; these kinds of stories, exactly like the Web itself, are easy to recognize and internalize, just like fairy tales. But if we look in more depth at the way in which the story of the Web was recounted during and after its invention, the plot is not so linear. In fact, complexity and even contradictions characterize early narratives of the Web. If we look, for instance, at the way in which early accounts of the Web included specific figures of speech (e.g., metaphors and analogies, see Ratzan 2000), familiar and figurative concepts, and old narratives of change and well-known objects; if we understand this pattern of associations we will gain a deeper understanding of how this new medium was integrated into everyday life.

From a media studies perspective, the Web has tended to refer to pre-existing media technologies such as broadcasting, telecommunication and transportation networks, going far beyond a digital networking system. In contrast, from an Internet and network studies perspective, the Web intertwined the assumed

intrinsic horizontality of the Internet with more vertical and hierarchical communicative structures characteristic of other media.

Especially since its global spread, the WWW has been represented by means of powerful metaphors such as the *information universe* or the *human brain system*. These metaphors have been used mainly to convey a message of power: that the infinite potential of the new medium and its universality symbolize a new form of organization and knowledge distribution – a horizontal, neutral technology able to radically reshape information and communication exchange. But before and beside these disruptive and fascinating narratives, metaphors and narratives based on media imaginaries have been essential to represent and describe the early functions and the reliability of the new system. It is not by chance that the first lines of the famous book on the history of the Web written by James Gillies and Robert Cailliau describe the system as follows:

> The www is like an encyclopedia, a telephone directory, a record collection, a video shop, and speakers' corner, all rolled into one and accessible through any computer. (Gillies and Cailliau 2000: 1)

This idea of a *net-metamedium,*[3] – a system able to organize and link all previous media – is at the core both of the Web's invention and its first promotion. Media such as books, telephonic networks, computers, cinema, transportation and analogical directories have all been used by the Web's founding fathers as key metaphors to fix and communicate the identity and the distinctive features of the Web as a medium. Furthermore, as Maria Lindh (2016) has shown, another metaphor has been continuously used to promote computer networks such as the Internet and the Web: the *utility* metaphor has been a constant within Internet-based technologies. In order to facilitate their penetration into ordinary life, net-based media have been interpreted and promoted first of all as utilities, as useful tools able to simplify everyday life rather than as active players in political, economic and social change. Broadcasting media were also seen through the utility metaphor: gas, electric light and especially water networks were used as metaphors to describe the role of broadcasting in bringing information, education and entertainment into the home. The stream of television or radio programmes, according to Raymond Williams (1974), *flows* like water flows, in order that it should be *drinkable* to the audience. Similarly, during its promotional stage, the Web was predominantly depicted as an easy and useful tool for information retrieval, rather than a symbol of a disruptive technological, social and cultural shift.

In line with a corpus of recent works that looks at the relationship between 'old' and 'new' media from a co-constructive perspective (e.g., Balbi and Magaudda 2018; Stevenson 2016; Theophanidis and Thibault 2016), the following paragraphs investigate some key media metaphors used to recount the Web's genesis, and stress the continuity and the co-constructive relationship between the imaginaries of 'old' media and the imaginary of the World Wide Web. These

media metaphors will be analyzed in conjunction with their discursive use – with the objective and ideal readers to whom such accounts are addressed.

2.2.1 Hypertext: The Forgotten Hero Ted Nelson

As is well known, hypertext is one of the key concepts of the Web's structure. At the end of the 1980s, when Berners-Lee started to conceive his idea, the most used hypertext program was Apple's *HyperCard*, which was included for free in all Macintosh machines. The software became a successful interface, organizing databases by means of intuitive graphic links with considerable efficiency. Other hypertext-based programs like *Storyspace*, a piece of software programmed by Jay David Bolter and Michael Joyce in 1987, aimed at creating and reading hyperlinked fiction literature. However, these programs can be considered just part of the Web's pre-history: as Belinda Barnet (2013: 135) points out, a program like *Storyspace* was 'not intended to create networked hypermedia like the texts found on the Web. Arguably, it still belongs to the pre-Web era'. Curiously, although familiar with hypertext, Berners-Lee used this term for the first time in his 1989 proposal when he claimed: 'I first made a small linked information system, not realizing that a term had already been coined for the technique: Hypertext.' (Berners-Lee 1989: 5).

Although Berners-Lee's proposal for the WWW has become a keystone of Web history, scholars have paid more attention to specific elements such as the front page (Fig. 6) and the notes added by his boss Mike Sendall, and have tended to overlook the brief reference list at the end of the paper.

In this short bibliography, the most relevant reference of Berners-Lee proposal is an article written by the inventor of the term 'hypertext', Ted Nelson, probably one of the most controversial and underestimated characters of Internet history.[4]

At the time, Nelson was involved in a very ambitious project called *Xanadu*, a system aimed at organizing and sharing documents by means of bidirectional links. *Xanadu*[5] was the main competitor of the World Wide Web, and it was also the project that had most in common with Berners-Lee's idea.[6] Although Nelson was mainly known for his eclectic and visionary book *Computer Lib: Dream Machine* (Nelson 1987), Berners-Lee decided to quote in his proposal a very unusual paper written by the hypertext inventor in 1967, more than two decades earlier. Nelson's paper was titled 'Getting it Out of Our System' (Nelson 1967), and it remains difficult to find. The reasons for Berners-Lee's choice of this paper are very clear, since it shares a similar subject matter and programmatic questions with Berners-Lee's vision of the future of hypertext. Firstly, the hypertext-based organization of information was, in both Nelson's and Berners-Lee's visions, the ideal solution for the same problem: information loss and the need to re-organize document retrieval practices in specialized fields of research. The following quotes highlight the common goal of the two inventors:

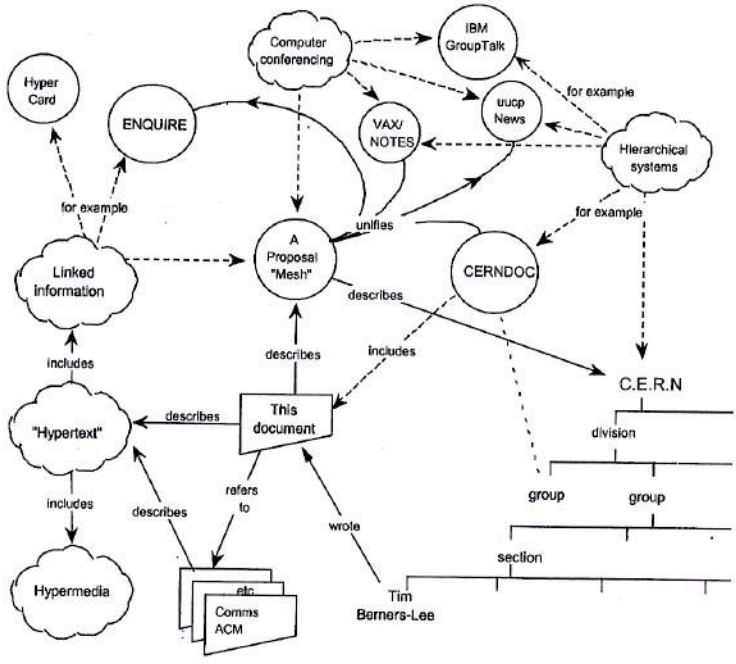

Figure 6: The famous jumping-link model described in the 1989 proposal. (Source: Berners-Lee 1989: 1).

> The information problem I will confront here is the overall question of how to keep specialists informed and updated […] information has been lost, prodigal, or shot down in the bushes. (Nelson 1967: 192)

> The problems of information loss may be particularly acute at CERN […] The aim of the project would be to allow a place to be found for putting any information or reference which one felt was important and a way of finding it afterwards. (Berners-Lee 1989)

Secondly, both papers refer to previous media to describe and forecast the evolution of hypertext systems. From a theoretical perspective, Nelson's writing can essentially be read as a media studies analysis. Indeed, the theoretical framework adopted by Nelson in this paper relies on an analogy between the rise of motion pictures in the first decades of the nineteenth century and the development of hypertext in the mid-1960s. The first aim of Nelson's work was to stress the progressive process of institutionalization and self-definition characteristic of any new medium.[7] By connecting two media imaginaries (the imaginary of cinema and the imaginary of hypertext), Nelson claimed

that hypertext needed to find its distinctive features just as motion pictures had done previously thanks to the seminal work of David Griffith in *Birth of a Nation*. In Nelson's terms any media 'has an internal dynamic, I think, immanent and intrinsic in the technology. This we must discover' (Nelson 1967: 197). Therefore, the systematization of hypertext would be an answer to the 'social need to turn the new machines into information systems' (Nelson 1967: 198), so as to escape from the old system of information organization. Berners-Lee's proposal seems to follow closely the theoretical framework adopted by Nelson. The Web should be 'a superset of most existing and seriously conceivable information systems' (Berners-Lee 1989: 3), and the new hypertext based system, just as for the motion picture in Nelson analysis, had to be based on a list of ingredients old and new that would correspond to the distinctive features of the medium. These ingredients were the blocks the Web would be built on; they represented both the functions and the distinctive limits able to frame the identity, the 'internal dynamic', in Nelson's terms, of the Web. Seen from this perspective the Web was not the result of an epiphany or of the disruptive vision of a genius. Instead, it resulted from both a technical and imaginary systematization of pre-existing media that had been taking place for a long time.

Despite its influence on his own project, Berners-Lee quoted Nelson's paper only in the first proposal. Some scholars have seen this as a clever strategy to depict himself as a mastermind inventor. The Italian scholar Paola Castellucci argues that, in *Weaving the Web*, Nelson was portrayed as the artistic and eclectic inventor of the *term* hypertext, whereas Berners-Lee depicted himself as the inventor of the thing itself (Castellucci 2009: 12–18). This thesis is supported by Mike Sendall, who claimed: 'Ted Nelson had thought about this forty years ago but it was Tim who went and did it!' (Gillies and Cailliau 2000: 201). In other words, depicting Nelson's hypertext as an idea that only he (Berners-Lee) realized, made Berners-Lee seem to be the only innovator able to *systematize* hypertext. This is a narrative often used by inventors such as Edison, Marconi and Steve Jobs, who created images for themselves as clever minds with disruptive ideas which nobody had had before. By hiding Nelson's ideas from their account of the Web's origins, Berners-Lee and his colleagues strengthened the innovative dimension of their invention, making the Web a watershed in Internet history and depicting the new system as something that had never been imagined before. However, Nelson's idea of hypertext was not the only one that predated the Web. Several pre-existing concepts related to other media influenced and took part in the construction and the dissemination of the World Wide Web on a global scale.

2.2.2 Retracing Old Media in the World Wide Web

Besides Nelson's work, Berners-Lee referred to many other media to describe the origins of the Web. First, he listed a variety of software types to describe

hypertext and its basic functions. For instance, in his proposal, he quotes *Adventure*, a videogame released by Atari in 1979 (Berners-Lee 1989: 5). *Adventure* was the first videogame to be based on an imaginary world made of multiple links between different rooms and scenarios that could be freely explored by players. The game plot was based on *Dungeons and Dragons*, probably one of the most successful products of gaming history.[8] But the main precursor of the Web was *Enquire*, which was programmed by Berners-Lee himself in 1980 for personal use. *Enquire* aimed to organize personal records of people and modules by using a link-based system connecting personal information such as telephone numbers, addresses and other information. On his FAQ (frequently asked questions) page, Berners-Lee depicts *Enquire* as the first source of inspiration for the Web:

> I arrived at the web because the 'Enquire' (E not I) program—short for Enquire Within Upon Everything, named after a Victorian book of that name full of all sorts of useful advice about anything—was something I found really useful for keeping track of all the random associations one comes across in Real Life.[9]

As any archivist or historian knows, the organization of information is one of the oldest tasks carried out by media (McNeely and Wolverton 2009), and it is no coincidence that Berners-Lee's invention's first reference is a book, one of the oldest media used to record and re-organize information. Furthermore, the Web's inventor chose one of the most rigorous books for information retrieval, the telephone directory, to make users familiar with the new medium. In his biography, he claims that in the early stages:

> It was too soon to try to sell the Web as the ultimate documentation system that would allow all of CERN's documents, within and between projects, to be linked and accessible, especially given the history of so many failed documentation systems. Small but quantifiable steps seemed in order. Our first target, humble beginning that it was, would be the CERN telephone book. (Berners-Lee 2000: 32)

Telephony has been often used as a rhetorical reference in Berners-Lee's narratives. For instance, he compares telephonic networks to the decentralized structure that facilitated the chaotic growth of the Web:

> Philosophically, if the Web was to be a universal resource, it had to be able to grow in an unlimited way. Technically, if there was any centralized point of control, it would rapidly become a bottleneck that restricted the Web's growth, and the Web would never scale up. Its being 'out of control' was very important. The international telephone system offers a decent analogy. (Berners-Lee 2000: 99)

From a historical perspective, it is no coincidence that telephony has frequently been referenced in the histories of the Web and the Internet; telephonic systems have always played a key role in the development of computer infrastructures. Telephonic cable networks have been the main infrastructure for digital data transmission; public phones were the subject of one of the most famous stories about hacking (Fell 2017: 30); the phone book was the most familiar of directories, and it was the most read book after the Bible. In wider terms, the telephonic system was an ideal conceptual instrument to make the unfamiliar – familiar – to assimilate an unknown technology, the Web, by means of a narrative that was already part of the social imaginary. Telephony is an emblem of user-friendliness, and it is one of the best-domesticated media in Western societies. Furthermore, telephonic systems had already been used as narrative tools to promote new media (for example, the personal computer).[10]

Besides telecommunication, books, directories and motion pictures, the imaginary of the Web is also tied-up with other means of communication such as roads, transportation and postal service networks. By recalling the history of the industrial revolution, Gillies and Cailliau compare two key events related respectively to the industrial and the digital ages:

> The arrival of the web in 1990 was to the Internet like the arrival of the internal combustion engine to the country lane. Internet transport would never be the same again. (Gillies and Cailliau 2000: 1)

In this case, the parallel with the combustion engine is used to stress the revolutionary role of the WWW, a system able to transport information in a new way, just as the combustion engine transported people and goods before; thus old technologies were also used to stress the disruptive power of a 'new' medium depicted as the new *engine* of social change. It is worth noting that the parallel between innovations from the industrial revolution – especially transport and communication – and digital technologies is not only characteristic of the Web; networking infrastructures such as the Italian project *Socrate* have also been compared to industrial innovations such as railway networks by following the common trope of the so-called 'information superhighway' (see Chapter 4.2). In this regard, the constant linking of media technologies with technologies such as transportation highlights the relevance of non-media innovations for media change (Krajina et Al. 2014), not only at the infrastructural and technical levels, but also at the narrative and metaphorical ones.

Another interesting example of the relationship between the Web and pre-existing systems emerges in the description of URIs (Universal Resource Identifiers, now URLs). URIs were, in Berners-Lee's view, the most important ingredients of his invention. In order to explain their functions, he compared them to the zip codes used by the US postal system (Berners-Lee 2000: 39), re-adapting an analogy already adopted by Paul Baran in 1964 to describe the packet switching

process. Indeed, the idea of giving a name (or an address) to any Web page was very similar to the geographic identification, the tagging system, adopted by postal services to identify the final addressee. In this way, Berners-Lee made a new and unknown system based on tags very easy to understand for non-expert users by relying upon a well-known system of information distribution.

It is important to realise that these media were already in Berners-Lee's mind before the invention of the Web and of URIs: encyclopaedias and zip codes were based on tags and numeration long before the invention of URIs, and they could have directly or indirectly inspired Berners-Lee's invention. In this regard, the Victorian *Enquire Within Upon Everything*, the book that inspired *Enquire*, the first hypertext software coded by Berners-Lee, seems to forecast several key terms and features that were at the core of Berners-Lee's idea. In the preface, the book editor wrote:

> Like a *house*, every paragraph in 'Enquire Within' has its number,—and the *Index* is the *Directory* which will explain what Facts, Hints, and Instructions *inhabit* that number. (Kemp 1884: III, emphases added)

As this quote shows, the imaginary behind the Web's naming system had already been expressed in different media systems a long time before. Moreover, several terms used for the Web, such as 'address', 'index', 'directory' and 'house' (a term very close to the 'home' of web sites), had already been used for other media. This persistence of names, images and functional schemes brings out the continuity and the powerful link at an imaginary level between the Web and its predecessors: media such as broadcasting, cinema, videogames, hypertext software, the Internet and telephony, but also other means of communication such as transportation networks and postal services have all contributed to the conceptual framework of the Web. Another interesting point is the fact that the Web and older media imaginaries share several points in common if we look at the narrative of change through which they are represented. For example, to describe the revolutionary power of the Web, Berners-Lee claims that:

> Now that the metric is not physical distance, not even time zones, but clicks, we do have to make these decisions. The Internet and the Web have pulled us out of two-dimensional space. (Berners-Lee 2000: 200)

The geographic narrative of space reduction – in this case the revolutionary power of the Web to change the idea of distance – is probably one of the oldest narratives in media history. As stressed by Vincent Mosco (2004), the death of distances was a trope used to explain and to push for the introduction of telegraphy, telephony, wireless and broadcasting. Moreover, the Web could change geography also by generating new spaces of inclusion (and exclusion), as the motto of the WWW consortium recalled: 'If it isn't on the Web, it doesn't exist' (Berners-Lee 2000: 163). This media ecology[11] idea was used by different

media enthusiasts and researchers in the last century, especially when referring to the power of television to change reality and to influence its audience. Berners-Lee used the same old narratives to present the Web as a new and disruptive idea able to bring 'the workings of society closer to the workings of our minds' (Berners-Lee 2000: 6). This last quote recalls a key body-analogy adopted by Marshall McLuhan to describe the new organization of society: the global nervous system (McLuhan 1964). Indeed, McLuhan stated that the human brain system was extended by another key medium in modern history: the telegraph (McLuhan 1962). Although McLuhan was not quoted in his writings, Berners-Lee acknowledged his fascination with the brain-system analogy:

> The analogy of a global brain is tempting, because Web and brain both involve huge numbers of elements – neurons and Web pages – and a mixture of structure and apparent randomness. However, a brain has an intelligence that emerges on quite a different level from anything that a neuron could be aware of. From Arthur C. Clarke to Douglas Hofstader, writers have contemplated an 'emergent property' arising from the mass of humanity and computers. (Berners-Lee 2000: 204)

In this quote, besides an emphasis on the role of Sci-Fi literature in the construction of socio-technical imaginaries[12], the brain metaphor highlights the importance of a last, crucial reference for the Web imaginary: the network.

2.2.3 The Web and the Network

The network concept is so tied up in the Web imaginary that the two things seem to semantically overlap. Other than hypertext, the most relevant medium on which the Web was constructed is the Internet, and thus it is considered the network *par excellence*. As previously noted, in describing its features, Internet historians have often made reference to the three theoretical models of networks that shaped the evolution of the Internet: the centralized, de-centralized and distributed models designed by Paul Baran (see section 1.4). As authors such as Richard Barbook (2007) have shown, computer networks (and consequently the different models on which they are constructed) have been a staple of the technological and social imaginaries of the twentieth century. Networks' architectures have been incorporated within the 'imaginary of the future' (Barbrook 2007) since the birth of computer science, and they have played an important role at both the technological and political levels (Russell 2014). It is not by chance that the legitimacy and the pragmatic value of each model are still at the core of academic, political, social and cultural debates.[13] Nevertheless, before the Internet, these models had already emerged and coexisted within other media landscapes such as radio, telecommunications and transportation networks.

As with other media, the Web, far from representing an ideal type of distributed communication, tends to hybridize the distributed model at the core of both the philosophical and technical frameworks of the Internet with a more centralized, broadcasting-based one. As Francesca Musiani and Valérie Schafer (2011) argue, 'Internet broadcastization' is a direct consequence of the Web's structure, and it derives from the client-server model that redirects the distribution of information to specific hubs, called servers.[14] From a theoretical perspective, the integration of two different imaginaries, the horizontal ideology of distributed networks associated with the Internet and the dissemination power entailed in broadcasting media, has been essential for the Web's success and its global spread. This is not only true at the technical level: the centralization of the Web is also evident if we look at the importance and the role played by specific hubs, such as Google and Facebook, within the contemporary media landscape. Going beyond the power to centralize information through servers, media corporations have been able to centralize elements such as content access, platform-based interaction, and even the production and the selection of user-generated content (e.g., the so-called 'filter bubble', as outlined by Pariser 2011).

In this regard, the centralization of the Internet also resulted from two constitutive choices (Starr 2004) made by Berners-Lee and his colleagues. On the one hand, the commercialization of the Web – which can be considered an act of *hubris* by the hero – allowed powerful new actors to compete for the monopolization of the Internet. This aspect arose alongside the birth and the diffusion of 'killer apps' such as Netscape, the first widely-used browser. At an imaginary level, this event coincided with the Americanization of the WWW and with the growth of business investments in the digital sector. This happened especially in Silicon Valley, thus in the very same area in which the Web's centralizers such as Google, Amazon and Facebook were and are still based. As Berners-Lee claims in his book, an important step for the Web's success was for it to become a *product*:

> Unlike CERN, NCSA never doubted for a moment that creating products was an appropriate activity […] Andreessen and Clark set out aggressively to conquer the entire market […] The arrival of Web software and services as a commercial product was a very important step for the Web […] Robert and I had spent so much time trying to persuade companies to take on the Web as a product. At last, it had happened. (Berners-Lee 2000: 82)

Berners-Lee clearly recognized the relevance of the Web's commercial use. Digital media companies and commercial stakeholders would play a pivotal role in spreading the new system. It is not by chance that the commercialization of the Web, and the role of companies like Netscape – according to some, the real key to the Web's success – went hand in hand with its large-scale adoption. A few years later, the commercialization process allowed the concentration and

control of content and data in the hands of a few leading actors (Couldry and Mejias 2019).[15]

The result is that nowadays, even if potentially the Web could still be surfed with no dominant path indicators (that is, even if it could be potentially decentralized), digital companies such as Google owe their success to the possibility of concentrating information in proprietary servers and to the missing bi-directionality of the Web's hypertext structure. In fact, from the very beginning Google was created to re-organize the Web in quantitative terms, becoming a hub by ranking each webpage on the basis of the number of links and clicks per each source. Seen from a technical perspective, the mono-directionality of links (the impossibility of *getting back* to the linking source of a webpage) and the client-server models have been essential to the historical transition from the horizontal ideal of cyberspace, characteristic of the 1990s, to the centralization and the corporate dominance of the contemporary Internet. Google was created 'to map' and concentrate the Web by showing relevant sources to users and excluding the 'irrelevant' ones, making them almost invisible; it has reorganized the Web into hyperconnected centres and abandoned peripheries, linked by highways and country roads respectively. The theoretical paradox of the contemporary Web is that, even if it was once perceived as an instrument of liberation, the client-server model has clearly facilitated the dominance of centralizing actors in the market; moreover, the centralization of information into servers has allowed powerful companies to maintain a permanent competitive advantage in the digital market: the more these actors *provide* information to users the more information is *stored*, thus owned, in their proprietary server centres. It is clear that, as Albert Barabási argues in his book on the behaviours of networking systems, these hubs 'are the strongest argument against the utopian vision of egalitarian cyberspace' (Barabási 2002: 58). Hence, the Web has not become the distributed architecture that was imagined, since servers, links and information in general, far from being distributed and controlled by users, are managed and controlled by an oligarchy of dominant companies which are able to filter information (Pariser 2011; Morozov 2011).

The dominance of these hubs in the digital landscape is not only the result of an economic process: the contemporary Internet landscape is also the result of a lack of critical opposition to the way in which the development and the history of the Internet itself have been recounted so far. In this regard, the media scholars Gabriele Balbi and Peppino Ortoleva have taken a tough stance against any *naturalistic* approach to the history of digital media, claiming that:

> […] the way in which digital media are considered in single cultures is historically and culturally constructed and not superimposed, and that Google is not the 'natural' engine for information retrieval. (Balbi and Ortoleva 2014: 489)

Network imaginaries (and the way in which networks *could* work or grow) contribute to the construction and the conceptualization of technology, but they can also hide or overlook those centralizing forces which try to legitimate their leading role in the digital landscape; these centralizing actors (e.g., Google, Facebook and Amazon), usually make use of the very same imaginaries that contest their predominance, if not their actual existence, in the digital media landscape.

If the Web imaginary was based on the idea of an irreversible path towards the distribution and the horizontalization of information, conversely, the history of the Web shows how the new system demanded centralization at technical, political and economic levels in order to be spread and used worldwide. In order to cross the intrinsic limits of a non-mass medium, the Internet, thanks to the Web, has in many ways had to *become* a mass medium, or at least it replicates some key-feature (the vertical distribution and selection of information) of broadcasting media. As this work aims to show, the Web is not an exception; the technical, the political and the social construction of networking structures, content and infrastructures (including the World Wide Web), have always been shaped by the permanent tension between the centralization and the distribution principles or, in other words, by the ideals of openness and freedom and the desire, but also the need, for control. The balance between these two principles of organization is also determined at the discursive, historical and imaginary levels.

2.3 Rethinking Web History

The metaphors, analogies, narratives and models described so far show that, as part of the environment or the 'media system' (Ortoleva 1995) in which the Web arose, media imaginaries played a key role in the conceptualization and the narration of the new medium. In their seminal work on the role of metaphors in ordinary life Lakoff and Johnson claim that:

> Metaphors have entailments through which they highlight and make coherent certain aspects of our experience. […] A metaphor may thus be a guide for future action. Such actions will, of course, fit the metaphor. This will, in turn, reinforce the power of the metaphor to make experience coherent. In this sense metaphors can be self-fulfilling prophecies. (Lakoff and Johnson 1980: 157)

As self-fulfilling prophecies, metaphors and analogies, and in turn the media imaginaries that they entail, have played more than one role in Web history. Firstly, they have been essential for spreading, explaining and making familiar the new system. In fact, media metaphors and analogies related to broadcasting media, books, telecommunications and transportation

networks have all been essential for the symbolic and pragmatic domestication (Silverstone and Haddon 1996) of a new and unfamiliar medium. As the media scholars Philippe Theophanidis and Ghislain Thibault argue in their work on 'media hysteresis':

> So called obsolete media inform more recent ones not just as a reminder of the past, but as familiar references capable of guiding our march toward unknown novelties. (Theophanidis and Thibault 2016: 18)

Hence, familiar objects create an imaginative bridge, a temporal and figurative connection, between the experience of the past and the imminent penetration of information technologies in everyday life. In order to understand the Web of the present through the Web of the past, we cannot exclude the role of other media in our analysis. Rather than treating the histories of different media as though they were discrete, Internet scholars should study the environment in which they were born and have grown over time. The World Wide Web, rather than being constructed on an imaginary island, has been shaped, integrated and constructed (as several other media) by and through the imaginaries of its precursors, neighbours and competitors. Again, historical research is essential for the review of this process. In addition to the dissemination process, the act of describing, communicating and recounting the potential (and thus the imaginary future) of a new medium like the Web is also a way to conceptualize, design and realize the medium itself. Moreover, the ideological power of such visions of the future can also be used by dominant forces to legitimate their centralizing role.

Through a combination of historical research and critical social theory this chapter has stressed two main theoretical points. Firstly, narratives show how stories surrounding the Web's birth have a strong relationship with other, external, but also complementary histories and narrations; pre-existing narrative patterns and contents are constantly interwoven in order to make familiar the unfamiliar, strengthening at the same time the pervasive power of those mental connections that people recognize as elements of a shared world, as collective memories and experiences, as *collective imaginaries*. The World Wide Web has been seen, perceived, but especially *accepted* as something new because it is inhabited by those very 'phantoms' with which it is constantly paralleled. Hence, the Web imaginary, like its *technique*, have not been produced *ex-novo*, but were rather created in continuity with other imaginaries and techniques related to other media, as well as to other social and cultural narrative constructions.

In stressing the importance of the imaginary for innovation, the French scholar Pierre Musso claims that any technological artefact, including the reticular Web, is always both *functional* and *fictional* (see: Garcia 2014: 6); Musso argues that technologies *serve* to do something insofar as they *tell* something to people. In other words, we may argue that technology is always both *useful* and *storyful*; it produces *models* and *meanings* of action at the same time. Authors such as

Cornelius Castoriadis, Bruno Latour and Patrice Flichy have convincingly demonstrated that there is no technology without a *discourse* about it, and we may also argue that there is no valuable discourse without the consciousness of the importance of past discourses and technological artefacts – of what already exists – as well as of their future – what is expected and imagined to come.

To delegate the narrative voice of the Web's history to a limited number of key actors (in this case mainly to the Web's inventor and his narrow intellectual entourage) means to underestimate the multiplicity of narratives and paths that have determined its very meaning and its role. Placing a single inventor at the centre of the discursive stage means to centralize the history and the narrative of the Web, providing a narrow and strictly interpretative model at the historical level. But change is not the result of a single event (in this case the invention of the Web); rather, change, as history, is the result of processes. Whereas an event can be caused by a singular or individual action, processes involve social responsibilities and cultural complexity. This is a key difference between an historical process and self-fulfilling myths: the awareness of the role of multiple factors, in this case the intermedia trajectories and imaginaries, and the importance of specific choices that have driven a technology towards a specific life path.

In a recent interview, Berners-Lee himself has recognized the great importance of complexity and plural histories for a collective understanding of the foundational process lying behind the Web's birth. Even if he keeps the belief that history, as an equivalent of 'destiny', actually chose him to create and protect the Web, Berners-Lee claims:

> History selects people, chooses people to be pivotal in some way, but to a certain extent that's self-reinforcing in that once you get the idea, you have the duty to go and carry it. But also remember that people look at, that society looks at, who is the person? And they interview that person then the name gets attached to it, even though at the time there were lots of other people who had that twinkle and had that sparkle. […] in a way historians with all due respect, can do the world a disservice by only picking out particular people because it makes the history easier to just talk about Benjamin Franklin, Thomas Jefferson. But you have to remember there were an awful lot of people involved. The way ideas transmogrify themselves as they wander through, as they percolate through society is very, very complex. And you're trying to just trace it, you know, just a few threads. I would hope I would be remembered as just a regular ordinary person, totally full of faults just like everybody else. Rather in awe at the process, the sort of this combined creative process, which I have been involved in. (Berners-Lee 2001: 22)

As the Web's inventor highlights, a limited number of sources compromises the possibility of an exhaustive analysis of historical processes; both the

fictional and *functional* dimensions of the World Wide Web risk being impoverished in all the different stages of its path. It is undeniable that societies always have a need for heroes; heroes are reference models, bearers of positive values; they encourage social actions and give people a shared identity and hope for the future. Nevertheless, the transfer and the superimposition of the heroism of Berners-Lee onto a new and predestined technology minimizes the actual potential of human agents to imitate the hero and act independently of technology; in this way technology, conceived as a discourse *intrinsic to technique*, is delegated to act *heroically* in the real world, it becomes somehow self-sufficient.

In order to overcome the monolithic and linear path of the Web, and the ideological consequences of such a partial history, is essential to recognize how this story has been recounted as part of the dominant narrative of Internet history. But, even more important, this history can be challenged, revised and deconstructed in many ways, through a variety of interpretative lenses and thanks to specific case studies (e.g., the study of the multiple local, national, and transnational computer network histories), and by means of alternative, even contradicting, sources. As the next section aims to show, the complex realm of networking histories that led to different forms of network ideologies provides media studies and critical scholars with an essential tool for putting into contention the Internet myth within the contemporary public sphere.

Notes

[1] This anecdote also replicates a symbolic parallelism between the brain system and networking systems that, especially starting from the work of Marshall McLuhan (1964), characterizes media studies in general.

[2] The NeXT computer plays also another important role at the symbolic level: it links the biography of Berners-Lee with the biography of another hero of the digital age, Steve Jobs, who commercialized the NeXT during his 'exile' from Apple in 1990.

[3] The term *metamedium* was coined by the computer scientist Alan Kay in 1977 to stress the ability of computers to simulate any existing media.

[4] For an exhaustive analysis of the competition between Nelson and Berners-Lee, see Barnet 2013.

[5] The literary imaginary has always been at the core of Nelson's thoughts on technology. The name of his software, '*Xanadu*', comes from an idealized place of magnificence and beauty as recounted by the romantic poet Samuel Taylor Coleridge in his poem *Kubla Khan*.

[6] A paper on the functions of *Xanadu* was also presented at the famous Hypertext Conference in San Antonio (Samuelson & Glushko 1991). However, Tim Berners-Lee claims in his biography that the World Wide Web was the only system referring to the Internet presented at this conference.

[7] In describing the process of separation between theatre and cinema as distinct media, the theoretical framework employed by Nelson seems to share several points with the *remediation* theory as exposed by Bolter and Grusin (1999).

[8] In turn, dungeons, like labyrinths, are exemplary models of hypertext environments.

[9] Berners-Lee, T., *Frequently Asked Questions*. Available at: https://www.w3.org/People/Berners-Lee/FAQ.html#Influences (Accessed 20 January 2020).

[10] A few years before Berners-Lee's invention, Steve Jobs compared the imminent success of Apple computers to the spread of telephony in the late nineteenth century. As Jobs claimed in an interview with the US magazine *Playboy*: 'People talked about putting a telegraph on every desk in America to improve productivity. But it wouldn't have worked. It required that people learn this whole sequence of strange incantations, Morse code, dots and dashes, to use the telegraph. […] So, fortunately, in the 1870s, Bell filed the patents for the telephone. It performed basically the same function as the telegraph, but people already knew how to use it. And we're in the same situation today. Some people are saying that we ought to put an IBM PC on every desk in America to improve productivity. It won't work. The special incantations you have to learn this time are "slash q-zs" and things like that. They're not going to learn slash q-z any more than they're going to learn Morse code. That is what Macintosh is all about. It's the first "telephone" of our industry. And, besides that, the neatest thing about it, to me, is that the Macintosh lets you sing the way the telephone did. You don't simply communicate words, you have special print styles and the ability to draw and add pictures to express yourself.' (Sheff 1985: 10)

[11] The media ecology concept entails looking at media as influential environments in which social and individual lives take place. For an overview of the conceptual frame of media ecology according to its theoretical 'father' Neil Postman, see: Gencarelli 2000.

[12] This quote highlights another key issue for the study of the technological imaginary that cannot be analyzed, for space and time reasons, in depth in this work: the extent to which fiction is the result of the narratives professed in scientific production or, *vice versa,* scientific production is oriented and inspired by fiction. I would argue they often co-produce each other (see Bory & Bory 2015).

[13] For a detailed study of the distributed model of the Internet, see the special issue of *First Monday* edited by Francesca Musiani and Cécile Méadel (2016).

[14] On the concept of the Internet as a mass medium see also Morris & Ogan (1996).

[15] Even the new 'Contract for the Web' launched by Berners-Lee to protect and preserve the Web, and to fight digital gaps, inequality and users' privacy needs the support of the very same corporate players (E.g., Facebook, Google) that have long betrayed the Web's ideal. See: https://contractfortheweb.org.

CHAPTER 3

Lost Networks: The *Socrate* and *Iperbole* Projects in Italy

> *Infrastructure is both the thing and the story. It is the transparent and the spectacular. It is seamless in its operation and can be disastrous in its failure. It is something we do not know whether we should want and something we think we cannot live without.*
>
> Lisa Parks (2015: 115)

3.1 The Web Was Not Alone

In the crucial phase of the 1990s, the World Wide Web did not emerge from an empty technological landscape. On the wave of the rhetoric of the information superhighways and the information society, international, national and local projects of networking were spreading in all parts of the globe. Nowadays, many of these projects have been forgotten because they failed or were rapidly surpassed by more efficient and comprehensive systems. On the other hand, a few examples of successful plans, such as Minitel in France, left a precious legacy in terms of cultural memory, social uses, technological infrastructures and digital literacy.

Whether remembered or forgotten, the creators of these projects did not perceive the Web as a technology of the future or as the fulfillment of the network ideology. Indeed, especially before the spread of its commercial use in the late 1990s, the Web was not so relevant to key actors such as telecommunication companies, governments or even scientists. This lack of interest also characterized the geographical area where the Web was built. Even if Tim Berners-Lee was shaping his creature in Switzerland, thus at the heart of the continent, the

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European Union was much more interested in wiring and improving infrastructures and connectivity between member states than in finding a common system for information retrieval.[1] This is crucial, since the material infrastructure on which both the Internet and the Web operate were not always built *ad hoc* for these systems. On the contrary, the Internet and the Web flow through a variety of networks built by the governments and telecom companies which created these infrastructures for different purposes, standards and even for different technologies and media.

In the same period, new forms of civic participation through the Internet were taking place in different cities and regions, especially in Europe. The birth of the first Internet-based civic networks in cities like Amsterdam and Bologna entailed new organizational forms of political activism and citizenship participation. These networks built their own Internet-based systems to promote peer-to-peer communication and the involvement of citizens in local and regional policy decisions.

As this chapter aims to show, the histories of infrastructural projects and civic networks in the 1990s are essential to challenge the common idea that the Web was the network *par excellence* of this decade. In particular, these alternative and forgotten histories are relevant for many reasons. First, they show how global and local imaginaries of networks were merged and integrated, revealing some unexpected and counterintuitive nuances of the network ideology. In this regard, the European role in the construction of the Internet imaginary is usually restricted to the birth of the Web in Geneva, but the European context also contributed to the dissemination of the network ideology through laws, national reports and political visions. Current calls for a European 'intervention' on the Internet and on the data regulatory system testify that this continent and its member states are still crucial actors in the international political and economic ecosystem. This 'European hope' lies in a narrative of the European past according to which Europe is the realm of 'public service' and 'privacy policy'. However, especially starting from the 1990s, European governments and national telecom companies lost their power over the media and communication world because of their internal fragmentation and also because of the failures of national and international projects that tried to weaken the US dominance in the digital market. Overall, European histories of networking show how national and local cultures, political and economic traditions, and media landscapes impacted on the current state of digitization far beyond the Web's invention.

Finally, national and local histories of networking have also been characterized by the emergence of new political and infrastructural visions. In this sense, lost and forgotten networks are 'resilient', as they influence new techno-deterministic ideas, emerging economic and national strategies, and even new forms of political organization that keep on professing the global, European and local variations of the network ideologies of the past.

To exemplify this process, this chapter deals with two networking projects that were not conceived as Web-based systems and that took place in a

specific country: Italy. So far, Internet historians have rarely looked at the Italian technological and networked past, and this chapter aims to partially fill this historical void. But before examining the details of these two specific cases, it is necessary to briefly summarize the background of the Italian networking landscape in the 1990s, and to understand how the Italian path to digitization was characterized by previous projects and actors which contributed to the infrastructural development of its national networks.

3.2 The Italian Networking Landscape in the 1990s

Italy has a long and glorious past in the history of telecommunications. Well-known pioneers and inventors such as Antonio Meucci and Guglielmo Marconi have deeply influenced the global media landscape, becoming fixtures of the social imaginary beyond Italian and even European borders. Throughout the last century, the Italian national telecommunication company SIP (*Società Italiana per l'Esercizio Telefonico – Italian Society for Telephone Operation*)[2] had a monopoly on telephone operators in conjunction with the state company *Azienda di Stato per i Servizi Telefonici* (*State Company for Telephone Services* (ASST)). In 1994, a new national company, Telecom Italia (recently renamed TIM after a merger with Telecom Italia Mobile),[3] was founded in view of the imminent liberalization of the telecommunication market in Europe expected in 1998.[4,5] From 1933 to 1997, Telecom Italia had been part of the STET corporate group (*Società Finanziaria Telefonica S.p.A. – Telephone Companies Holding*). STET controlled eight main companies committed to telecommunication services, infrastructures, research and innovation: *Telecom Italia*, *CSELT*, *Telespazio*, *Italcable*, *Iritel*, *Italtel*, *SIRTI* and *SGS Microelettronica*.[6]

In the 1970s and 1980s, the STET group played an important role in the development of data networks both in terms of international standards and digital infrastructures. For example, during the 1970s, the CSELT (*Centro Studi E Laboratori Telecomunicazioni – Telecommunication Study Center and Labs)* participated with other European telecommunication companies in the creation of the X.25 standard with other telecommunication players involved in the CCITT group (*Comité Consultatif International Téléphonique et Télégraphique – International Telegraph and Telephone Consultative Committee*, now *ITU-T*). The X.25 was the main competitor of the TCP/IP protocol invented by Bob Kahn and Vint Cerf in the same period. STET was at the forefront of digital infrastructure development during the 1970s and the 1980s, especially in the field of fibre-optic cable infrastructure. In 1977 four Italian companies (three belonging to STET – CSELT, SIP, and SIRTI), in cooperation with Pirelli Industries, were the first in the world to connect two local switchboards by optic cables. The wire was located in Turin, the mother city of Telecom Italia, where the company was born and had rapidly grown during the twentieth century (Fig. 7).

In the early 1990s, thanks to these experimental forerunners and to an enduring success both in terms of technological innovation and market penetration,

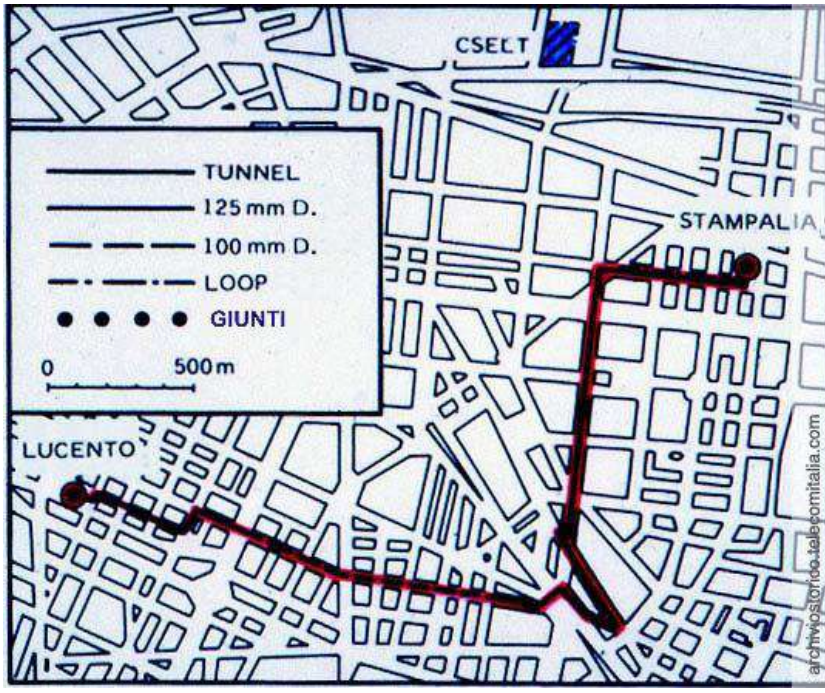


Figure 7: Turin, 15 September 1977. The COS 2 optic cable path between the Stampalia and Lucento telephone switchboards of the SIP network. (Source: *Archivio Storico Telecom Italia*.)

Telecom Italia was one of the most powerful telecommunication companies in Western countries, as testified by the finances of the company. In 1994, the year in which the *Socrate* project was announced, the company was the sixth wealthiest among Western firms in terms of total revenue (26,943 billion Italian lira, around 13 billion Euros); it also enjoyed the highest annual income growth (with a rate of 8.4%) and was ranked third for technical and infrastructural investments (9,655 billion Italian lira, around 4.5 billion Euros), with more than 155,000 permanent employees.[7]

In addition to its healthy and stable condition, the company had a long and successful history of cooperation with other European companies such as *Deutsche Telecom*, *France Télecom* and *British Telecom*. In an age of non-competition, the organization of European monopolies facilitated and promoted cooperation among companies inasmuch as they could not compete or trespass in national markets. As the former Telecom Italia manager Roberto Parodi argues, before the liberalization of the market in the 1990s:

> There was a spirit of strong collaboration between European states and companies. Then, by the end of the 1990s, with the liberalization,

> competition arose with the introduction of third parties into the market. The mobile [phone]was born in a competitive environment, whereas the world of data circulation on public networks was characterized by a strong collaboration on standards. We were a leader in that context. (Roberto Parodi, personal communication, 23 September 2015)[8]

The cooperative approach among European players in the field of telecommunication and data networks was strongly oriented by an imaginary of the future based on the naissance of the so-called 'information society', a term that started spreading from the 1970s as a consequence of the global shift from manufacturing to services and from industry to a post-industrial economic organization of societies (Bell 1974). In 1978, the famous report written by Simon Nora and Alain Minc for the French government, titled *L'Informatization de la Societé* – (*The Computerization of Society)*, stressed the importance of this historical shift from material production to immaterial services. Furthermore, the report anticipated by several years the rhetoric adopted by the US Vice-President Al Gore for the promotion of the information superhighways (Gore 1991). According to Nora and Minc, the global transition to telematics would influence the entirety of European business, politics and culture, laying the foundations of the information society:

> This growing interweaving of computers and telecommunications – which we will call 'telematics' – opens up a radically new horizon. It is certainly not from yesterday that the means of communication have structured the communities: roads, railways, electricity are like different stages of a familiar, local, national and multinational organization. 'Telematics', unlike electricity, will not convey an inert current, but information, thus *power*. The telephone line or the television channels are the premises of this mutation. Nowadays, they are based on versatile transmitters, they begin to connect computers and databases and they will soon have, thanks to satellites, *an imperial tool*. Telematics will constitute not just one more network but a network of another kind able to combine images, sounds and memories: *it will transform our cultural model*.[9] (Nora and Minc 1978: 11–12, emphasis added)

In this excerpt the authors stress two main points: firstly, they somehow *declared* the naissance of a new and hybrid technology able to unify telephony, television and informatics, a phenomenon that would later be renamed 'convergence'; secondly, Nora and Minc highlighted the direct link between these hybrid technologies and an emerging form of political and economic power; the innovative set of digital technologies leading to the new information society was here interpreted as *an imperial tool* able to turn the national and European discourses on technological change into strategic geopolitical leverage.[10] In this regard, it is worth noting that, by stressing the importance of technology

as power, the term 'telematics' was not just adopted to define a newly emerging communication landscape; furthermore, the term adopted a French (but also European) vision of the future, in continuity with the French tradition in telecommunications, to oppose the computer-centred ideology particular to the US imaginary, especially in its Californian identity (Flichy 2007; Turner 2006). In fact, according to Nora and Minc, the term 'telematics' should be conceptually opposed to the US English 'compunication':

> This neologism (*telematics*) is similar to that used in the United States: 'compunication.' The fact that the American term focuses on informatics – computer – and ours on telecommunications is not a coincidence. It expresses a balance of forces, which, in France, favors the latter.[11] (Nora and Minc 1978: 13)

The semantic conflict between different ways of conceiving and interpreting the role of information technologies in this period is a linguistic demonstration of the interpretative flexibility (Pinch and Bijker 1984) of digital technologies in this period of transition.

In Italy, uncertainty about the future application of the digitalization processes is well represented by the struggle between two Italian players around the meaning of another key-term: data. Starting from the early 1980s, the ASST and Telecom Italia struggled for the management of digital packet switching networks, both claiming the right to handle and control the new data transmission systems. As the former ASST account manager Antonio Micciarelli and the former Telecom Italia manager Roberto Parodi argue:

> With the arrival of the packet in 1974, we started to talk about the development of a European network. There was Euronet, which was a European packet switching network. Since we had to enter Euronet as nation states we, as *Poste e Telecomunicazioni (Mail and Telecommunications A.N.)*, created the first Italian Euronet switching centre in Via Trastevere (*in Rome A.N.*). In Italy the problem was that the ministry had kept these communication services and I was the responsible manager, so I was the protector of the data managed by the ministry. We had given the telephony license to SIP, but they said that data was telephony as well. We struggled with this issue until 1988. The ministry had the management of Telex, which was considered the beginning of data transmission in Italy.[12,13] (Antonio Micciarelli, focus group with Roberto Parodi, private communication, 3 November 2015)

> During the 1970s, the word data meant everything and the opposite of everything. In this scenario, packet switching was created and everyone

> was wondering 'What world does this thing come from? Does it come from the world of voice? Or from the telex world instead?' It was something completely new. There was a subtle, ongoing battle with the ministry because we, as SIP, asked to handle the network because it came from the voice and we had to do it, whereas the ministry said 'the network was born as telex and it's our stuff.'[14] (Roberto Parodi, private communication, 23 September 2015)

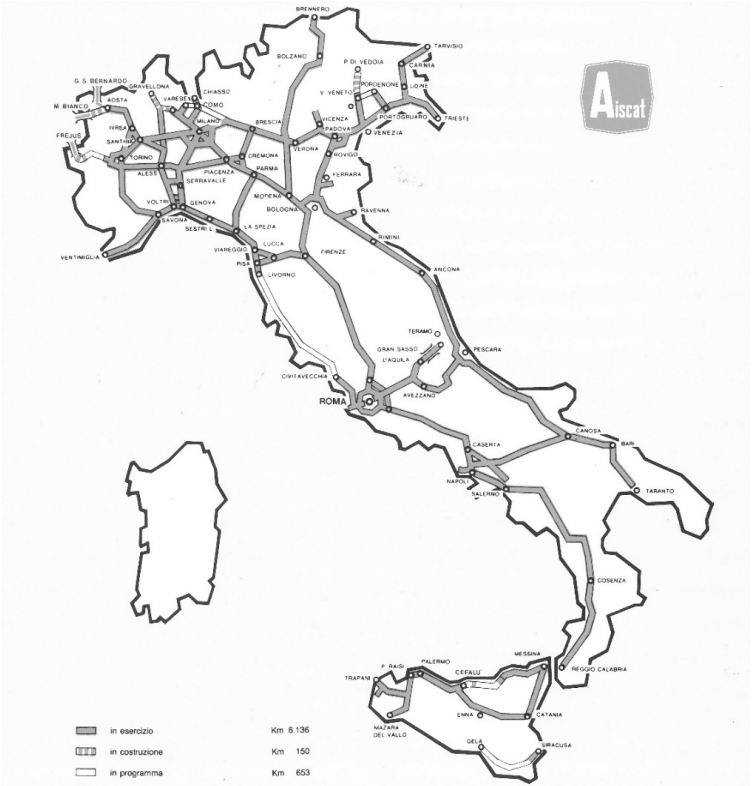
The uncertainty around the meaning of the term 'data' is extremely relevant; the struggle between the two telecommunications players – representing direct and indirect emanations of the government – reveals a peculiarity of the Italian approach to digital media: the dominant focus on infrastructures, and in turn on technical-managerial aspects, to the detriment of a complex and wisely thought-through emphasis on services and content.

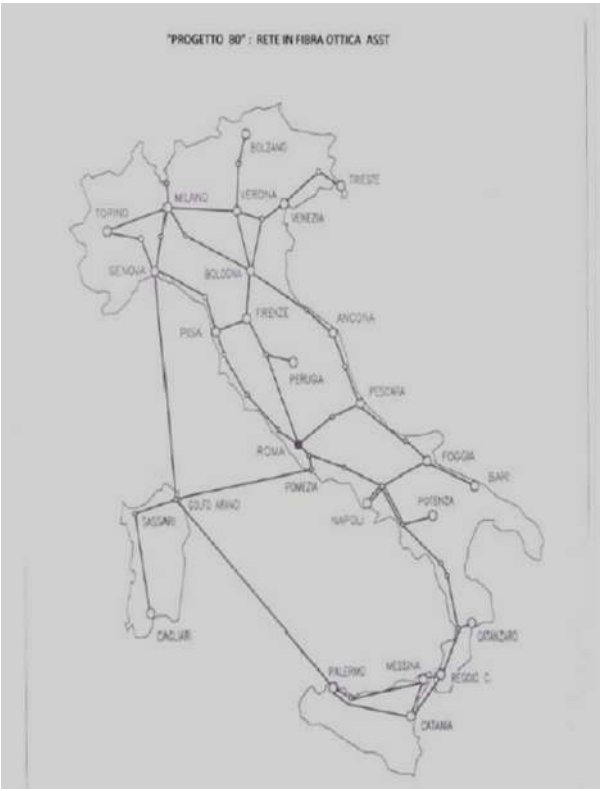
Notwithstanding this ongoing struggle over data transmission management, Italian digital infrastructures grew rapidly in the late 1980s – and early 1990s. For example, between 1984 and 1991, ASST, STET and Pirelli built an articulated long-distance fibre-optic infrastructure with two successful and complementary projects: the first one, the 'Progetto 80' (Figs. 8–9), laid around 6,500 km of optic cables all along the Italian highways; the second one, the project 'Festoni', realized in concomitance with the Football World Championship *Italia 90*, wired the Italian west coast by means of undersea fibre-optic cables from the south to the north (see also: Bordoni 2002: 39–40). As regards the management of digital packet switching, in 1992, after many years of internal dispute, the telecommunication ministry gave charge of the network infrastructures to Telecom Italia. The decision was taken by the Ministry because it did not have sufficient human and economic resources to handle a constantly growing sector which needed more and more experts and permanent employees.

At this juncture, Telecom Italia had almost complete control of the Italian telecommunication system, data networks included, and so took the main responsibility for the national transition to digitalization. It was at this moment that the executive managers of Telecom Italia started to think about a short-distance infrastructure able to connect the long-distance fibre-optic network with households so as to spread the digitalization process all over the country and build up an advanced, competitive digital infrastructure. The *Socrate* project was conceived as the ideal way of realizing this ambition.

3.3 Rise and Fall of *Socrate*

The *Socrate* plan arose in view of the imminent liberalization of the telecommunications market. More specifically, it was conceived and promoted by the new CEO of STET, Ernesto Pascale, a stubborn and brilliant manager considered an enlightened man by his colleagues and even, according to the emphatic





Figures 8–9: 'Progetto 80' and the Italian superhighway network in late 1988.
'Progetto 80' was the long-distance optic infrastructure created by the ASST with SIRTI, Pirelli and STC between 1984 and 1991. As shown in Figures 8 and 9, above, Progetto 80's map follows the same path as the Italian superhighway system. The nodes linked by the two infrastructures highlight the importance of pre-existing networking systems, in this case transportation networks, as simplifiers and indicators of the most relevant communication hubs of the country. (Sources: Archivio Storico Telecom Italia; SpA per l'autostrada Serravalle-Milano-Ponte Chiasso 1995).

description of one of his right hand-men Vito Gamberale, 'the Enrico Mattei of telecommunications' (see Dècina 2015).[15] More specifically, *Socrate* was conceived to set up a fibre-optic cable infrastructure, starting with the total wiring of the 19 main Italian cities (Fig. 10), and subsequently extending to the remaining cities and the less important (from a quantitative but also economic point of view) rural areas. The key idea was to create a broadband network infrastructure capable of supporting the emerging multimedia sector and the challenges of the upcoming information society.[16]

Ernesto Pascale announced the project in Venice, at the annual meeting of *Réseau*.[17] Italian newspapers spread the news by quoting Pascale's words:

> Our Telecom operating company will wire Italy, we will invest ten thousand billion lire and we will provide the country with the 'digital superhighway' it needs.[18] (Segantini 1995: 7)

Figure 10: The first 19 cities wired by *Socrate*.
In Figure 10, the red markers indicate those cities in which the project moved forward quickly, whereas other key cities such as Milan (in black) rejected Telecom Italia and Socrate and supported other wiring companies.

With an expected investment of more than 12 thousand billion Italian Lira (around 6 billion Euros today) the *Socrate* project, along with another project named Fido-Dect,[19] was the most important strategic investment of the company before the privatization process, and *Socrate* is still one of the highest investments in the history of telecommunications in Italy.

It is significant that *Socrate* was developed in the context of a peculiar Italian characteristic: in this country, unlike the majority of European countries, cable television broadcasting had never existed before; as was also the case in Greece, ether-based broadcasting had had the priority in Italy since the very first transmissions. Hence Telecom Italia had to build a new digital infrastructure almost from scratch, even though it could rely on the long-distance optic fibre infrastructure that had already been constructed along the length of the Italian highways and on the Tyrrhenian coast. The *Socrate* project ended up costing only half of the total budget expected by Telecom Italia; around 2.5 billion Euros were spent between 1995 and 1997[20]. The major part of these funds were used to pay for the digging work and the installation of cables in urban areas.

From a technical point of view, the plan contained a peculiar feature: the final path of the network, the so-called 'last-mile' (the path connecting the network cabinets to buildings), was not made of fibre-optic cables but was wired through coaxial cables. In fact, in order to connect the short distance between the buildings and the cabinets, Telecom Italia chose to use the so-called hybrid fibre-coaxial (HFC) structure; this structure allowed a high receiving bandwidth (with a downstream power of around 1.5 Mbps) and a low upstream bandwidth (around 64 Kbps).[21] In this way, any form of connection could receive a huge amount of data rather than sending information through the network.[22] In brief, from a technical point of view, the *Socrate* network allowed only a partial and mainly unidirectional-asymmetric use of the fibre-optic capability because of its slow-upstream speed due to the coaxial cable. Hence, being restricted by this technical aspect and in order to get an immediate economic return, Telecom Italia decided to 'fill up' the infrastructure with a specific kind of content, namely video transmissions. More specifically, a new company founded by Telecom Italia itself and named STREAM was given responsibility for VOD (Video on Demand) data services, with a budget of 2 billion lira (Adnkronos 1993; Fig. 11). In an attempt to lure Italian customers to the new technology, STREAM's business strategy was initially to concentrate on covering football matches, since these are immensely popular in Italy.[23] Telecom Italia's strategy was thus based on a well-known technology (HFCs were already employed for cable television in the US and many other countries) and on a reliably popular content; VOD services were essential to recover a strategic investment that would have allowed the Italian company to control the new national broadband infrastructure for data transmission, even after the liberalization of the telecommunication market. Nevertheless, according to the former

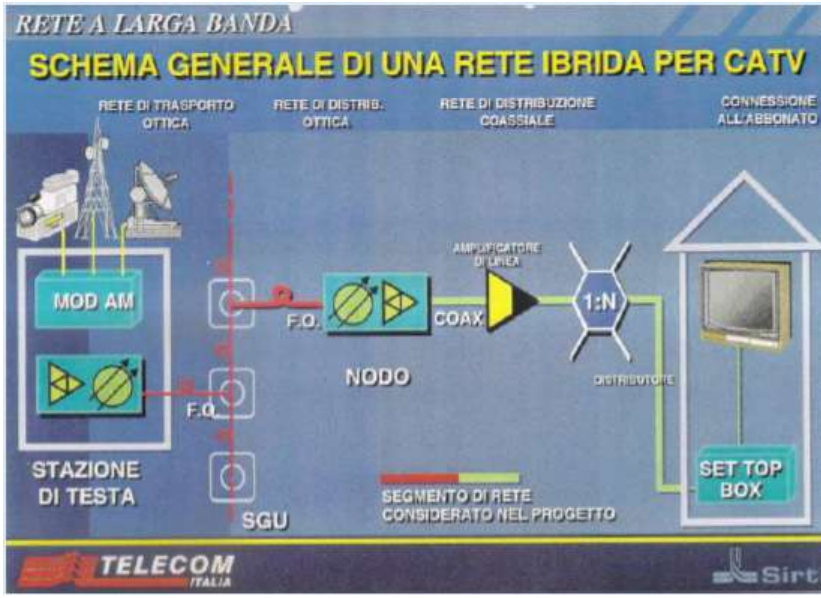
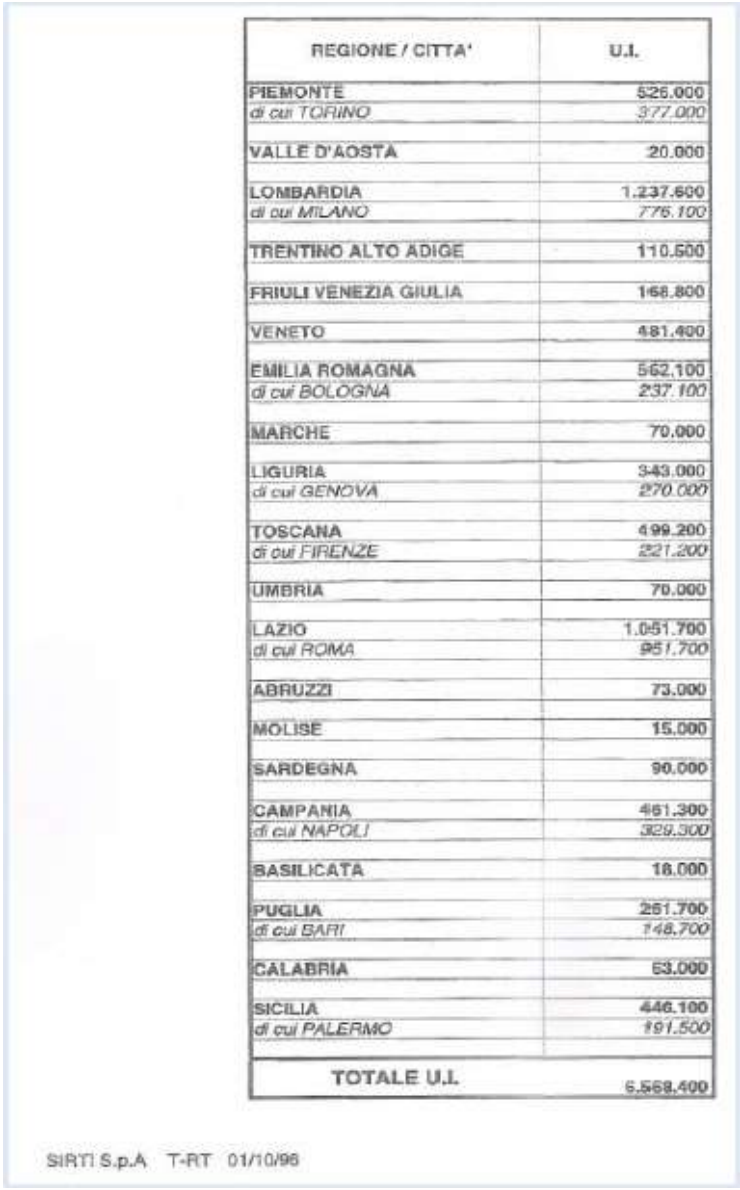


Figure 11: General scheme of broadband network for cable TV in the 1990s. The *Socrate* network was expressly aimed at Set Top Box connection and VOD television. (Source: Archivio Storico Telecom Italia)

co-director of STET, Umberto de Julio, the decision to bet on football matches and broadcasting proved to be a double-edged choice:

> Television meant two things to politics, politicians and public opinion: football and news. Nobody cared about other things, but if you touched these things, it was a serious problem, it meant touching the distribution of contents among TV networks. (Umberto De Julio, private communication, 15 September 2016)

After three years of cabling works and overspending – and coinciding with the delicate and much-criticized privatization of the company by the Prodi government (see Giacalone, 2004: 15–38) – the project was abandoned and Pascale left the company under pressure from the Italian government.[24] According to the Ministry of Communication, in 2002 the overall dimensions of the *Socrate* network were about 4,500 km of optic and coaxial cables, and a total of 2.5 million homes had been cabled out of the 6.5 million expected by 1998 (Fig. 12). In the long history of Telecom Italia – but we could say in Italian history generally – infrastructures and investments had usually favoured the north of the country, thus contributing to the so-called *Questione Meridionale*, namely



REGIONE / CITTA'	U.I.
PIEMONTE	526.000
di cui TORINO	*377.000*
VALLE D'AOSTA	20.000
LOMBARDIA	1.237.600
di cui MILANO	*776.100*
TRENTINO ALTO ADIGE	110.500
FRIULI VENEZIA GIULIA	168.800
VENETO	481.400
EMILIA ROMAGNA	562.100
di cui BOLOGNA	*237.100*
MARCHE	70.000
LIGURIA	343.000
di cui GENOVA	*270.000*
TOSCANA	499.200
di cui FIRENZE	*221.200*
UMBRIA	70.000
LAZIO	1.051.700
di cui ROMA	*951.700*
ABRUZZI	73.000
MOLISE	15.000
SARDEGNA	90.000
CAMPANIA	461.300
di cui NAPOLI	*329.300*
BASILICATA	18.000
PUGLIA	261.700
di cui BARI	*148.700*
CALABRIA	63.000
SICILIA	446.100
di cui PALERMO	*191.500*
TOTALE U.I.	6.568.400

SIRTI S.p.A T-RT 01/10/96

Figure 12: The number of Housing Units (U.I.) to be wired by the end of 1998, according to Telecom Italia. Eventually, the project succeeded more in Southern Italy, in cities such as Naples and Bari. (Source: Telecom Italia).

the gap in terms of infrastructures, employment, and services between Northern and Southern Italy. The case of *Socrate* was nevertheless unique in this sense for two main reasons. Firstly, the south was more open to the cabling. The mayors of cities such as Naples and Bari facilitated the digging phase as the project was seen as a technological advance for these cities. Secondly, Telecom Italia's strategy was oriented towards the promotion and valorization of local competences and infrastructures in Southern Italy. Besides the *Socrate* project, Telecom Italia created a start-up centre in Naples (the city that best represents the problems of the southern regions), and also organized important conferences and public events about technological change throughout the 1990s. Eventually, when *Socrate* stopped, southern cities, more than northern ones, found themselves wired with an almost useless infrastructure. Considered to be one of the major failures of Italian telecommunications history, *Socrate* stopped halfway, during one of the most critical periods of the so-called Internet revolution.

3.3.1 The Uncertain Reasons for the Failure

Two decades after the official end of the *Socrate* project, the reasons for its failure are still uncertain and ambiguous. In its corporate communication Telecom Italia usually avoids naming the project, even in the historical accounts of its long lifespan. Except for in some more recent accounts,[25] the name *Socrate* is absent from the company's corporate communication in the 2000s; this is probably due to the subtle intention of the company to throw into oblivion a wound that could have damaged its public image.[26]

Generally speaking, the accounts of those people who worked or still work for Telecom Italia, the accounts of national newspapers and the analyses of academics and opinion leaders, seem to diverge on many points. Notwithstanding the heterogeneity of these critical stances, it is nevertheless possible to summarize the main explanations of the failure through three broad, even if non-exhaustive, categories: firstly, that it was caused by failing to deal with the materiality of the network; secondly, a purely technological explanation; finally, a cause related to market competition and to the organization of the Italian media landscape.

From a material point of view, the expense of the excavation in the Italian cities was unexpectedly high, especially because of the political (in some cases even ideological) resistance of municipal administrations in some strategic areas such as Milan and Bologna, where the future competitors of Telecom Italia and the administrations baulked at leaving the infrastructure in the hands of the monopolist. Moreover, all the key informants interviewed for this work agree on one major material obstacle for *Socrate*:

> To send cables to houses, we had to dig, and *Socrate* was mainly doing this: digging. The municipalities gave us the permits but asked in return for expensive street renovation works, which caused huge expense. (Maurizio Dècina, private communication, 9 November 2015)[27]

> It was basically digging. There were places like Naples where we found the strangest things underground and where the documentation often did not match reality. There were also improper acts by other companies that destroyed the pipelines we had made before. (Alberto de Petris, private communication, 8 February 2017)[28]

> From an economic point of view, making the network itself was not very costly. What was very expansive was digging! 80% of the requests made to the ministry were to convince municipalities to dig. Digging didn't only involve creating the holes: it meant digging trenches 70 cm deep and putting down the breccia and sand that the cables would rest on. In some places you even had to put protective multi-pipes on the cables![…] It's a lot of money! (Antonio Micciarelli, private communication, 3 September 2015)[29]

These quotes emphasize the key moment in which the materiality of a network is publicly visible: the digging. Whereas phenomena such as the installation of trans-oceanic cables are almost invisible, the visibility and disruption of urban digging not only changes the perception of the cabling process but also potentially exposes it to the interventions of political and economic players such as municipalities, households, public and private companies. In this regard, digging in urban areas has a double-edged effect. On the one hand, it is a public manifestation of something that is changing, of a 'work in progress' that may improve services and everyday life. On the other hand, digging also means disturbing social life and social habits, for instance by rerouting public transport, obstructing access to stores and buildings, or temporary cutting off essential services such as electricity and water distribution. In this regard, the digging process offers special leverage to municipalities, which can ask for 'expansive renovations' and extra works for the city in return for official permits. Furthermore, the digging phase points out another issue: the infrastructural adaptability of networks. Networks must adapt to each other, since new infrastructures should not disturb the old ones such as energy cables and water pipes. The *Socrate* infrastructure was planned on the basis of the copper cable maps of Telecom Italia; however, as the network account manager Alberto De Petris points out, other infrastructures stood in its way. Copper pipes, fibre-optic cables, water pipes and energy wires and cables (what we could call the public service networked infrastructure) all have to adjust to each other in

order to avoid mutually disruptive forms of 'noise' or technical disturbance. Overall, the above quotations stress the importance of materiality, but not only in terms of infrastructure or 'physical presence'; materiality is here also a matter of other material and immaterial resources such as time, money, energy and workforce. Even though not all these nuances of the material dimension of networks are consistently present in the social imaginary, they are deeply rooted in the experiences of telecommunication experts and managers, since they had a great influence on many of the critical decisions taken, for instance, by Telecom Italia's executive board (e.g., the choice of the coaxial cable was also due to its physical flexibility and, not less important, its lower cost that allowed easier and cheaper installation in the buildings when compared to the fragility of fibre-optic cables) (Fig. 13).

The second reason for the failure of *Socrate* is more technological and mainly related to the rapid development of alternative and innovative techniques for data transmission. Starting from 1997, the development of the Asymmetric Digital Subscriber Line (ADSL) allowed a bandwidth much more powerful

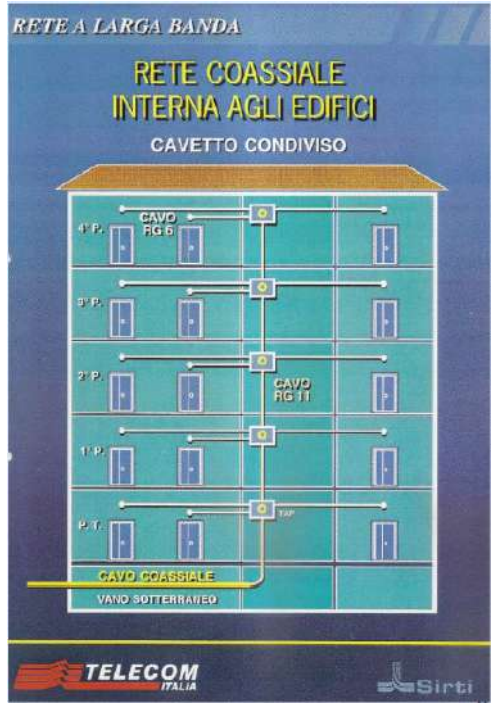


Figure 13: The coaxial network within buildings in 1995.
The elasticity of coaxial cable allowed a simple distribution of connectivity inside buildings. (Source: Archivio Storico Telecom Italia).

than *Socrate*'s hybrid structure.[30] Moreover, the ADSL relied on the existing copper cables, thus it made the technology adopted for the *Socrate* infrastructure suddenly inconvenient both at the economic and technical level. Hence, the ADSL soon became the ideal technology for data transmission as well as for the spread of Internet services to generic users. This technology is still widely used in Italy, and it has sped up the spread of the Internet in Europe generally.[31]

Finally, the failure of *Socrate* can be attributed to the lack of *ad hoc* content and to the unsuccessful investments made by Telecom Italia in the broadcasting media market. Indeed, the new digital broadcasting company 'STREAM' was created to get an immediate economic return in order to recover the huge costs of the *Socrate* infrastructure. Nevertheless, two problems stood in the way: Firstly, the main Italian national broadcasters, especially the public service group of *RAI* (*Radio Televisione Italiana*) and Silvio Berlusconi's private company *Fininvest*, were not interested in switching their show schedules to cable TV, since both the ether and the satellite methods were still more convenient; the ether in particular was well-rooted in social habits, and the advantages of VOD services were insufficient to convince the audience to change technology.

Thus Telecom Italia's dream of a new digital cable network that would also include other broadcasters faded away. Furthermore, the revenue generated by STREAM subscribers did not cover even a small part of the general investment made by Telecom Italia in *Socrate*.

A few years later, in its own historical account, Telecom Italia itself would admit that in that period:

> There was everything but probably what was missing was the market [...]. The technology and the market did not meet each other, because the digital television offer continues to increase thanks to satellites and DVDs, which are available almost in every single block at vending machines or specialized stores. [...] Moreover, to make matters worse, beside this growing amount of contents and supply points, in late 1990s, the Internet came to mix everything up.[32] (Telecom Italia Lab 2004: 149)

Socrate's failure in the media market was due to the weak attraction of Italian customers and users to broadband-based services in general. In this regard, the Telecom engineer Ivano Camerano[33] argues:

> When looking back at the mid-1990s, we now understand that it was too early. First, because technology was not mature enough to provide an infrastructure that could really be useful, beyond any project or dream, to provide a value in terms of broadband connections. Above all, however, the main problem was that we, as Italians and Europeans, were not ready for broadband services at all. Someone claimed, 'We will

> get thousands of information and VOD services,' but in the end the bottom line was that we were not used to it, we lacked the mentality for this approach. In the US, it was completely different.[34] (Ivano Camerano, private communication, 15 October 2015)

The expression 'lack of mentality' summarizes a crucial aspect of the network imaginary characteristic of Telecom Italia and, we can argue, of the overall Italian context during the mid-1990s: the expected use, the future, and thus the *meaning* and *functions* of both computer and digital networks were not clearly understood and anticipated by the different strata of the population, nor by media and business actors. The uncertainty of the 'information age' was in this sense self-evident, as it is a matter of fact that the Internet and the Web, between 1994 and 1997 were not seen by Telecom Italia as the future of communication technologies but only as one of the possible emergent services within the global media landscape. In the meantime, the Internet and the Web were spreading in the US and in other European countries. Nevertheless, while Telecom Italia was investing its energy in *Socrate*, some Italian academic and political players were already paying attention to the growth and the potential of the Internet'

3.4 The *Other* Network: The Internet in Italy

During the 1980s Italy was at the forefront in Europe in terms of Internet connections. Indeed, Italian universities were among the first to get an Internet connection, by linking Italian research centres to the US and to North European countries. On 30 April 1986, Italy became the third country in Europe to be connected to 'the net', after Norway and England.[35] The first Italian Internet connection took place thanks to special funding provided by the US Department of Defense to the research group guided by Luciano Lenzini, professor of engineering at the institute *CNUCE – Centro Nazionale Universitario di Calcolo Elettronico* (*National University Computing Centre),* based in Pisa. During the same period, the interconnection of the Italian university network, named GARR (*Gruppo per l'Armonizzazione delle Reti della Ricerca – Research Networks Harmonization Group*), was taking place by exploiting the power of some key hubs such as the supercomputing centre CINECA in Bologna. Thanks to cooperation among academic, economic and political institutions, the network developed rapidly, and in 1991 a new national infrastructure connected seven Italian universities;[36] a few years later, in 1996, 38 research centres were connected to the Internet, creating a large and well-developed research infrastructure for data transmission (Fig. 14).

Despite the key role played by Italy in the spread of the Internet network in Europe, a proper 'Italian history' of the Internet has been introduced to the public only in recent times. Notably, the anniversary of '30 years of the Internet in Italy' has recently been celebrated by scholars (e.g., Abba and Di Corinto

2017), newspapers (e.g, Cella 2016) and even companies (e.g., Fastweb 2016, Telecom Italia 2016) in conjunction with the political plan *Agenda Digitale per l'Italia (Italian Digital Agenda)* promoted by the Italian government and especially by the Italian Prime Minister Matteo Renzi in 2016. More specifically, the digital agenda is aimed at re-positioning Italy at the top of the European ranking for ultra-fast broadband connections, so as to again play, in the near future, a strategic role in the European digitalization process.[37] Curiously, during the 1990s, far from being interested in promoting these successful events, Italian companies, mass media and institutional actors tended to glorify the diffusion of other technologies, focusing, for example, on the outstanding growth of mobile telephony: the success of an innovation which was in line with the

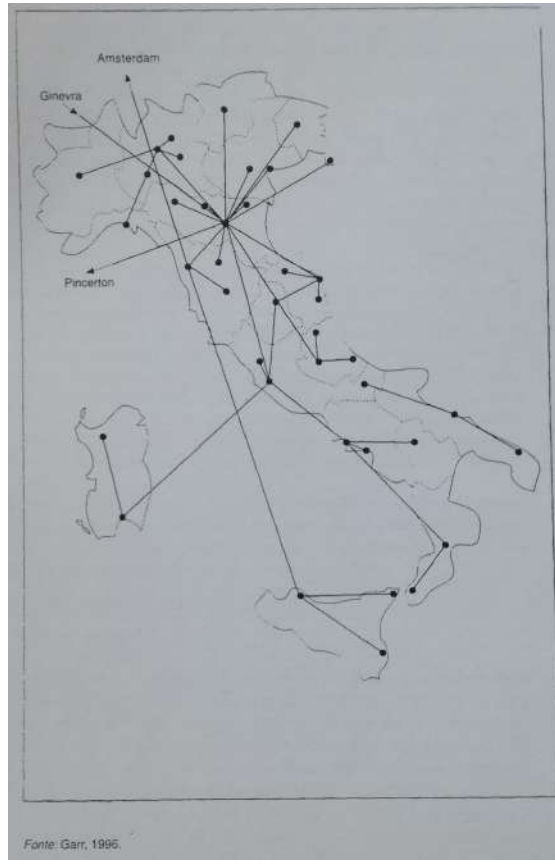


Figure 14: The GARR network in Italy in 1996.
The map highlights the importance of the CINECA supercomputing centre in Bologna. This centre was the main hub of the network, as it was connected both to Princeton University in the US and to CERN in Geneva. (Source: Report Censis 1997: 379).

Italian traditional expertise in telephony, to some extent put the emergence of newer technologies such as the Internet in the background.

Notwithstanding this gap in the public narrative, Italy was conducting a series of fruitful and pioneering experiments on the potential of the Internet. Such experiments concerned market strategies, public policies and more traditional media such as the press. In 1994, the Sardinian editor Nicola Grauso launched the official website of *L'Unione Sarda*, the first newspaper to go online in Europe, and the second worldwide. In the same year, Grauso also founded the first big Italian Internet provider, named *Video On Line* (VOL); VOL did not just provide Internet access to Italian citizens, but was also an example of how media could support digital literacy by means of user-friendly tools such as floppy disks and instruction manuals; these objects were distributed for free with national newspapers and comics.[38] The importance of VOL was later acknowledged by Telecom Italia. In 1997, when the failure of *Socrate* was almost certain, the (at this point ex-) monopolist bought VOL and founded its new Internet Service Provider (ISP) named *Tin.it*. Furthermore, in the same year the Italian entrepreneur Renato Soru founded Tiscali, the first ISP giving flat-rate Internet access to Italian customers. Italy was starting to adjust to the Internet model, even if it was still waiting for the necessary infrastructure to exploit this technology on a large scale.

3.4.1 Iperbole: The Pioneering Italian Civic Network Project

During the digitalization process, one of the most interesting experiments in Italian Internet use was taking place in Bologna where, in 1993, the council member Stefano Bonaga and the philosopher of language Maurizio Matteuzzi created IPerBOLE,[39] the second civic network in Europe and the first in the world providing free Internet access to citizens. The first civic network in Europe was the *Digital Stadt* of Amsterdam, which had been founded a year earlier (see: Alberts et al. 2017; Downey and McGuigan 1999). It is important to note that the *Iperbole* project took place before the commercialization and the consequent spread of the World Wide Web. Thanks to cooperation among public and academic actors,[40] *Iperbole* achieved outstanding success, receiving the attention of international organizations and institutions.[41] In 1996 more than the 15% of the citizens of Bologna had personal Internet access and an email account. Thanks to a free platform they could access the Internet from public computers, discuss with other citizens on forum groups, and communicate with administrative and municipal offices (e.g., ask for information on traffic, health, justice and municipal law issues, see Fig. 15). The list of services included:

- Access to newsgroups (from 1997 'full Internet' access) from public kiosks
- Free Internet subscription for non-profit local organizations and trade unions, plus low-rate personal Internet subscriptions for citizens

- Personal email accounts and communication with municipal services (e.g., asking for information about public services, municipal laws, police stations etc.).
- Discussion groups created by the municipality
- Direct and remote training for 'absolute beginners'
- E-commerce and barter groups
- Users' guides to the platform

Before the launch of *Iperbole*, the municipality trained the staff, even if, according to Damian Tambini (1998: 86–87), the local government had not imagined how difficult it would be to provide digital literacy to the administration. Indeed, the early users of *Iperbole* were mostly young male students and managers, thus already digital literates.

Discussion groups were mainly set up by the municipality itself, but citizens could create their own groups. As the history of ARPANet teaches us, leisure and hobbies can prevail over serious issues. The titles chosen by citizens for discussion groups confirm this tendency: *Bologna by night*, *cooking*, *swap shop*, *sport and jokes exchange*. However, other groups such as *Politics*, *work*, *Metropolis*, *university* and *health* were among the most accessed on the network (Tam-

Figure 15: The navigable map of the civic network platform *Iperbole* in 1997. The figures of each building corresponded to a specific service; the interface was aimed at overcoming linguistic diversities so as to include tourists and migrant citizens. (Source: Maurizio Matteuzzi private archive).

bini 1998: 96–97). In 1997, 200 local organizations promoted their Web pages on the platform, involving citizens in online polls and in collective discussion mediated by the municipality. Nevertheless, the municipality could not handle the growing number of messages, thus slowing down the activist spirit of the network.

The first release of the *Iperbole* project is extremely relevant for the analysis of the network imaginary that characterized a relevant community in Italy. *Iperbole*, in fact, was not only conceived as a public service; it was rather a political project aimed at exploiting the Internet for the proactive and voluntary participation of citizenship. As the founders Stefano Bonaga and Sergio Matteuzzi argued in the first release of the project, dated 1993:

> It must be assumed as a starting point that technology now makes possible a wide range of direct and real democracy applications: direct as it is done in person without the mediation of delegation; real, as its interactive and bidirectional, and not one-to-one. The project not only finds in the Municipality of Bologna a subject interested in technology but also a favorable and natural context for its realization: *the city is, at this stage, the strategic subject indispensable in fostering the takeoff of computer democracy*. In this political context, characterized by the ever-increasing incidence of television power, with the filtering and simplifying of languages on how to conform to democracy, it is of paramount importance that local authorities are aware of the importance of disseminating information and of the widest scope of public debate to become pioneers of democratic bottom-up experiments.[42] (Comune di Bologna 1993: 6 emphasis added)

The idea of a city that plays the role of an intermediary, we could say a *medium*, through which electronic democracy could take place, was particularly innovative and extremely powerful at the time, both in terms of political agency and the construction of a network imaginary. In a later paragraph titled *The democratic city as bottom-up innovation*, the idea of a horizontal citizenship able to share, construct and decide on public issues is stressed in depth:

> The innovation of this project is therefore linked primarily to the active, conscious, and strategic role of the public administration in stimulating computer democracy and administrative transparency and in orientating *the future use of cable communications towards low cost collective participation rather than towards a further articulation of the entertainment and information-entertainment business*. Another innovative aspect, of great political value, is that of users' digital literacy. [...] Being in a democratic local network means not only providing machines and software, but above all spreading literacy, educating, writing, responding, reading, spreading information properly, and searching for it

> effectively. To create a user who is actively conversing in a civil way, who knows how to argue with and search for the right interlocutors. In sum it is all about creating *a form of interactive communication opposed to the television paradigm* in which the citizen is conceived as a passive spectator of phenomena in which he is not stimulated to participate. Only a local democratic institution such as an elected administration and the citizens themselves may have the political will and the concrete capacity to break an obsolete model and develop a real electronic democracy.[43] (Comune di Bologna 1993: 7 emphasis added)

From a theoretical, but also clearly ideological perspective, *Iperbole* was in contrast with the imaginary lying behind *Socrate*. Bonaga pursued a long battle against the centralization of information promoted by Telecom Italia, since the Italian monopolist was following the broadcasting model of television 'in which the citizen is conceived as a passive spectator of phenomena to which he is not stimulated to participate'.

Quite differently, the core idea of the civic network was to use the Internet as an instrument to realize a political transition from representative democracy to direct democracy; from delegation to first-person action, hence from verticality to horizontality.

This vision went far beyond the recurrent idea that cities, and in turn citizens, can become more 'smart' by applying smart technologies to urban life (Mosco 2019). Although the Internet was the chosen instrument for the actual realization of this process, technology was not seen as the primary cause of social change. The Internet was not the 'reference model' for change as it was to the imaginary promoted by Berners-Lee and by the dominant narrative of Internet history in general. The Internet was rather seen as a tool for the realization of a political and cultural process that, especially within cultural and political cities like Bologna, had been at the centre of public debates for a long time. Indeed, throughout history, and starting decades before the birth of the Web, Bologna had played a key role in the construction of an alternative – usually left-oriented – political movement. Starting from the 1960s, local communities had tended to make use of and incorporate mass and telecommunication media such as radio, press and telephony into political processes.[44]

In this regard, a key example is the countercultural experimentation of the 1970s when the pirate and free radio movements emerged in Italy. In 1976–1977 *Radio Alice*, a pirate and 'illegal' experiment of communitarian political participation, gained great attention in Bologna and also aroused the interest of influential intellectuals and opinion leaders such as the French philosopher Félix Guattari (Goddard 2011). Not by chance, at around this time Guattari, with another French philosopher, Gilles Deleuze, redefined the concept of the rhizome (Deleuze and Guattari 1977), providing a theoretical model to contest the dominance of centralized capitalistic power.[45] A key figure of the leftist Italian

landscape, the Italian philosopher Franco 'Bifo' Berardi, was among the founders of the *Radio Alice* project. When recalling *Radio Alice*, Berardi stresses the fact that the rhizomatic network, a theoretical form similar to the distributed network model, was already circulating among Italian activists:

> In 1977, Deleuze and Guattari published this booklet, *Rhizome*, which was to us like Mao's red book. They said that the history of Western capitalism is based on the tree and the hierarchical order, but that it was possible to discover a model of social life based on the rhizome, a totally a-centric system in which each point is the centre of the world. The concept of rhizome appeared to us as the utopian model of the society we had to build, and it was what we were actually doing with the free radios! We said 'we are on the right track!' [...] I came from the experience of the free radio where we had already experienced this issue in Italy, especially with Radio Alice; we always insisted that the radio is a centralizing medium but, with the phone, it can become an a-centric medium. Nowadays, I have understood that we misinterpreted what we saw as the 'sun of the future' that was instead the new stage of the history of capitalism. The rhizomatic form is the form that neo-liberalism has incorporated and the connection between the Internet and the large corporations of imaginary production is now completely realized on a productive level.[46] (Franco Berardi, private communication, 19 October 2015)

According to Berardi, the combination of radio and telephony had already been seen as a possible solution for the realization of the distributed model of communication particular to both the Internet and the Web imaginaries. Nevertheless, the main difference between these imaginaries and those of projects such as *Iperbole* and *Radio Alice* lies in the role, the agency, of technology in this process: whereas the Internet imaginary has historically paid more attention to the *effects* of technological structures and infrastructures on the organization and progress of societies, the imaginaries of these alternative projects were deeply rooted in political and cultural programmes that conceived technology as an *instrument* rather than as a *cause* of social, cultural and political change. This theoretical distance, this gap, also determined in part the failure of *Socrate*. At the same time, vertical power structures and the lack of cooperation among institutional and private actors led to the end of *Iperbole*, at least as it had been conceived by its founding fathers. The resignation of Bonaga from his leading role because of the conflict with Telecom Italia, the lack of competence and of human but also economic resources in the local government, and the progressive loss of users (who migrated to other ISPs, platforms and especially other websites) caused the end of the interactive and participative dimension of the civic network.

3.5 Conflicting Imaginaries: *Socrate* vs. *Iperbole*

Socrate and *Iperbole* represent two contrasting visions of the meaning and the role of networking systems for society. This conceptual distance reflects the different networks of relations and, no less important, the different scale of power in Italy during the mid-1990s. The two models, the vertical infrastructure of *Socrate* and the peer-to-peer network imagined by *Iperbole*, show how technologies can be best understood 'as a focus of social struggle, and not as a predetermined 'given' that creates just one technologically determined future' (Bauwens et al. 2019: 3).

Given this profound divergence in views, it is not surprising that the Bolognese administration and Telecom Italia came into conflict in this period, as shown in an article in the tech-magazine *Internet World* (Fig. 16).[47] According to the assessor Stefano Bonaga, *Socrate* represented an opposite and negative vision of the information society; it was a centralizing and unequal infrastructure based on vertical and proprietary control:

> I stopped *Socrate* in Bologna. I stopped it for years because it was a folly. Bologna was strategic for them because of its geographical position and for the whole topology of the network. You are striking a chord because nobody recalls it but it was a crazy battle. Pascale came by private jet and stepped into my little office to ask to pass the network through Bologna. He came every three days! We did not give him the permit to dig. We proposed an alternative project, *Optubi*, which was the opposite of *Socrate*. The idea was to use sewers and electricity pipes to cut the costs. It was above all for economic democracy, because they could put more cables which would be good for competitors as well, and the municipality could keep control over the territory. The municipality would also earn a lot of money because it provided more than a half of the excavation value. Instead, today we give for free to three private companies the territory for ultra-broadband cables, and the municipality just plays the role of 'facilitator'. The municipality has no political and social control of any kind. I am very fond of this. *Iperbole* is an acronym which stands for *Internet 'For' Bologna and Emilia Romagna*. *Socrate*, on the contrary, reiterated a crime that has been going on for decades in the Italian economy. We have lagged behind for decades because of that failed project that built the same highways of Southern Italy: empty highways.[48] (Stefano Bonaga, private communication, 21 October 2015, emphasis added)

This quote contains two interesting elements. First, it explicates the main matter of conflict between Telecom Italia and *Iperbole*: the control of infrastructure at the private vs. local, political level. Secondly, at the imaginary level, Bonaga subverts the positive meaning of the famous information superhighways

The European Picture

THE NET IS CONQUERING THE OLD WORLD

BY BRENT GREGSTON

CITY GUIDES *The Bologna Freenet, shown above (http://www.comune.bologna.it/bologna/), London Calling (http://www.demon.co.uk/london-calling/), and the Digital City (http://www.dds.nl) guide you around Bologna, London, and Amsterdam, respectively.*

ITALY

Italy's national phone company, Telecom Italia—yes, a monopoly—has purchased the leading Italian provider of Internet access to consumers, Video On Line (VOL). In a press release, Telecom Italia promised to build the "best of all possible networks" by the year 2000. "Internet and centralism," say Italian skeptics, "are an oxymoron."

The city of Bologna is not waiting for Telecom Italia. Using local resources, it is creating a freenet called Iperbole ("Hyberbole"). Fiber-optic cables running through the ancient sewers will link kiosks with keyboards throughout the city where citizens can insert a magnetic card, access the freenet, and interact with one another and the city government.

The card will be a true "key to the city," allowing the user to review databases of information about municipal government, correspond by e-mail with city officials, and take part in public online debates. According to Stefano Bonaga, the project's founder, city politicians are already swamped with e-mail. He added, "We are witnessing the creation of a whole new world . . . everyone should have the right of guaranteed access to it, free and unrestrained, as their birthright."

Figure 16: *'Internet and centralism are an oxymoron'.*
A 1996 article published in the Italian journal *Internet World* opposing Telecom Italia and *Iperbole*. (Source: Maurizio Matteuzzi private archive).

metaphor, a concept largely adopted in the corporate communication of Telecom Italia but also in academic and technical documentation (e.g., Chirichigno 1995; Richeri 1995). In this excerpt, Bonaga compares *Socrate* to one of the worst failures in Italian history, both in terms of road infrastructure and political propaganda. The Salerno-Reggio Calabria highway, which was conceived to connect Southern and Northern Italy, and was thus to be a symbol of the renaissance of the south, has instead become the symbol of the slowness and the congenital backwardness of Southern Italy. Similarly, even though within a less ideological and more pragmatic framework, the *Iperbole* co-founder Maurizio Matteuzzi criticized Telecom Italia's strategy:

> We have never toed the Telecom line. They launched the *Socrate* plan; they did a lot of stuff. They laid the fibre-optic cables but this eventually made the fortune of Fastweb, which bought the cables. [...] Cabling

> was too much important at the time for them; the big mistake, from my point of view, was from a network policy perspective. First they should have thought about services, and only afterwards about cabling.[49] (Maurizio Matteuzzi, private communication, November 2, 2015)

This idea, that *Socrate* was wiring 'empty cables', is also shared by the media scholar Giuseppe Richeri, who worked as research consultant for Telecom Italia during that period:

> The *Socrate* project was guilty of technological determinism. In those years convergence was an ambiguous concept. *Socrate* was mainly based on technology, with the idea that everything can be transmitted using the same infrastructure. There was actually a technical convergence, but few paid attention to the convergence of content services. The main concern was for the container. There was little reasoning about the contents.[50] (Giuseppe Richeri, private communication, October 2, 2015)

However, the deterministic idea based on the motto 'If you build it they will come' (Kozak 2015), thus on a 'natural' and self-fulfilling development of contents and services as direct consequences of the infrastructure's construction, was not a unique trait of Telecom Italia. Notably, the Italian company shared this deterministic vision with other national and international players who were promoting the construction of national infrastructures without providing a reliable guideline for the creation and development of contents.

As the media historian Stephanie Ricker Schulte has claimed, the mental representations of networks were not univocal 'but instead overlapped, contradicted, competed, and dovetailed with one another, sometimes simultaneously' (Schulte 2013: 1). During the 1990s, the European Union was pushing national states to build and connect digital infrastructures able to bear the liberalization of the market; there was a sort of *urgency for infrastructures* to survive the competition and the growing dominance of the US in the new digital marketplace, even if the nucleus of this market was not clear at all. On the very same wavelength, Italian politicians tended to stress this urgency for connectivity, even adopting some suggestive metaphors and analogies from national industrial history:

> The multimedia revolution will not happen spontaneously. There is a need for short-term availability of broadband telecommunications infrastructures, which means achieving simultaneous broadcasting of voice, data and video services, all spread over the territory and accessible at low cost. This infrastructure (which can perform the same

> functions as the railway network during the first industrial revolution and which will represent the distinctive feature of developed countries) is essentially based on the wiring of the territory with fibre-optic cables.[51] (Bosco 1995: 5)

Drawing upon the railway metaphor (rather than on the more common highway one)[52], the Italian government highlighted the importance of fibre-optic infrastructures for the development of the ambiguous 'multimedia market'. Similarly, the CEO of STET, Ernesto Pascale, was certain of the importance of cabling as a key step for the future of the global society:

> Cabling is the technological evolution of telecommunications; we would do it for the phone even without the interactive multimedia market. We are anticipating investments that will stimulate the supply of services over time. [...] I have confidence in the multimedia market, I am sure that we are at the beginning of an era that will change our way of working. I feel 'in my flesh' that this is going to happen; this means greater investment, new subjects and more jobs.[53] (Pascale, audio recording, 1995b)

In addition to this sort of premonition about an irreversible process – 'I feel in my flesh that this is going to happen' – Pascale seemed also to blindly trust that interactive television would be the chosen medium for this epochal transition to the digital age:

> A new revolution is about to start. It will be the interactive multimedia television in 1997; that will be the real revolution. Today we are in a preliminary phase. [...] There will be a chain of exchange, the so-called information society, especially in entertainment. A new TV will be added to the general TV with which it will compete. Tele-market and distribution chains will change. This also applies to banks, tour operators and education. An additional, supplementary, and in part substitute world is approaching, and it offers tremendous opportunities.[54] (Pascale, audio recording, 1995a)

The former STET general co-director Umberto De Julio, when asked about his biographical story as Telecom Italia executive manager, recounts the birth of *Socrate* through the following anecdote:

> Pascale was so determined. [...] I have in mind an episode. We went together to London to talk with Chinese managers about an offer in China. When we went out of the hotel in London we saw a group of workers who were laying cables for an American company. Pascale

> said, 'Do you see it? They will come soon in our homes! Before they do it, we have to do it.' So, *Socrate* happened. 10 thousand billions, to get into 10 million homes. (Umberto De Julio, private communication, 15 September 2016)

According to De Julio, to protect the role of Telecom Italia meant, to Ernesto Pascale, to defend Italy from the US invasion in the digital and telecommunications market. Again, the focus of this kind of discourse was always on the importance of the infrastructure, rather than 'the other market' that the US would soon control: the Internet. When asked about the role of the Internet in that period, De Julio replied:

> It was like the Internet did not exist. I remember when Maurizio Dècina came with Vittorio Trecordi into my office and said: 'I want to show you the Internet'. Trecordi arranged an Internet connection and I remember I felt a mixture of anguish and something else. It was like I was abandoned in the sea. It was like seeing a new dimension was coming up, a dimension that was absolutely unknown at the time. So we knew how to play in the market but there was no such thing as an 'Internet offer' strategy [...]. We were trying to understand; I became consultant for Vint Cerf. I used to visit him every 4–5 months in the US, and then he came to Italy to teach internal seminars because we wanted to get into this world. However, we had just launched *Socrate* and we were in the middle of the outstanding success of the mobile… We had two great paths ahead: the first was the broadband network, and the other was the mobile phone.[55] (Umberto De Julio, private communication, 15 September 2016)

This excerpt contains two relevant points related to both the media and network imaginaries of Telecom Italia during the 1990s. Firstly, De Julio perfectly conveys the feeling of the sublime when he describes the effects his first Internet navigation had on him; it is hard to find a better representation of the sublime in its original Romantic meaning than 'a mixture of anguish and something else. It was like I was abandoned in the sea'. Secondly, however, De Julio subliminally discloses the fact that the Internet was largely overlooked by Telecom Italia, primarily because of the main focus on broadband infrastructures and mobile telephony, but also because of the high risk that an additional investment in a new and unknown technology would have entailed for the future of the company. The differences between Italian and US companies in the reasons for their attraction to the Internet seem to lie in two different market strategies, but also in the different *generations* who played a key role in this sector during the 1990s. Whilst in Italy both technological development and market strategies were dictated by a traditional and vertical structure represented by the managers

of the telecommunication monopoly and its experienced employees, in the US, the growth of Internet-based companies relied on start-up investments and on young project managers who bet on digital innovation. Making a slightly forced analogy with US history, Italy did not bet on Silicon Valley, it bet on AT&T.

3.6 The Ruins of *Socrate*

In 2005, in his commemorative speech for Ernesto Pascale, who had died a few years after his resignation from STET, the former CEO of Telecom Italia Mobile (TIM), Vito Gamberale claimed:

> Ernesto conceived the *Socrate* project, the fibre-optic cabling of the country, in order to provide advanced services and advanced access to the whole country. He proceeded with the courage of the pioneer and with the serenity of reason. In that period the project was firstly criticized and then blocked. Today the country needs it, yet does not have it.[56] (Gamberale 2005)

Gamberale's critical stance against the voluntary interruption of *Socrate* by Telecom Italia should not be seen just as a consideration *post factum*; at the time European countries had a very positive impression of the *Socrate* project. In the mid-1990s, *Socrate* was seen at the national but also at European level as the project that would allow Italy to occupy a leading position in the field of digital infrastructure. Compared to other countries, *Socrate*'s fibre-optic network would be at the forefront, and Italy would have had an advanced broadband infrastructure able to provide a competitive advantage in the digital market and in the digital literacy process. As the journalist Adele Hars wrote in the specialist fibre-optic magazine *Lightwave* in April 1996:

> If the Socrate Project proves successful, Italy could become Europe`s leader in fiber-optic networks. (Hars 1996)

Socrate would not only have granted an immediate advantage to Telecom Italia, but it was also important from a long term perspective; even if the hybrid FHC solution was soon to become obsolete, the coaxial cables could have been replaced by fibre-optic cables, as was actually done in the early 2000s by the new owner of part of *Socrate*'s infrastructure, Fastweb (Maldoom et al. 2005: 179).[57]

Although the material traces of *Socrate* can be considered as enduring resources for the future of the Italian communication system, Italian citizens tend to associate the memory of *Socrate* with the ruins represented by the old

cabinets abandoned all over the Italian territory. A simple search on Google images, using the keywords '*Socrate*' and 'Telecom Italia', calls up a long series of cracked, dismantled cabinets and plenty of broken and hanging cables. The web pages resulting from the same keywords contain several comments written by users and specialists from local communities, specialized forums and blog articles: the majority of these comments complain about the 'waste of public money'[58] or the impossibility of replacing the cables in private buildings because of TIM's excuses such as 'sorry but we do not own the cables anymore, we can't do anything about it'.[59] In southern cities such as Naples and Bari the presence of Socrate cabinets remains pervasive. Just like old technological ruins, these material traces are ancient markers of a past about which most people are completely uninformed; *wreck-nodes* of an invisible and forgotten network.

As tangible and visible objects, the ruins of *Socrate* are signs that Italy has slipped behind in the matter of broadband infrastructure over the last 20 years. In fact, *Socrate* was the last attempt in Italy to create an articulated and comprehensive fibre-optic infrastructure; moreover, the troubled political and economic path of Telecom Italia over the last two decades has also resulted in a high level of fragmentation in terms of infrastructure management and unsuccessful cooperative projects.

The result is that, nowadays, it has become a commonplace to refer to the backwardness of Italy in the digital sector. Notwithstanding the success of technologies such as mobile telephony, it is clear that the country needs to gain ground both in the digital infrastructure field and in Internet use percentage; in these aspects, Italy lags far behind many other European and non-European countries. For example, in 2015, Italy was in last place out of the G7 countries for fixed broadband subscriptions (Tab. 1). In 2018, Italy had one of the lowest rates of ultrabroadband connections in the OECD (Tab. 2). Since 1998, Italy has been last among the G7 countries (Tab. 3), and one of the last among European countries in terms of Internet use; only 66% of Italians uses the Internet every day, while 30% do not use the Internet at all (Tab. 4).

In order to recover from this critical situation, the Italian government has recently made an effort to facilitate the process of wiring the nation with fibre-optic cables so as to align Italy with the European goal of an extended ultrabroadband network by 2020.[60] The new project, called *Open Fibre*, is guided by another key Italian company: Enel, the Italian manufacturer and distributor of electricity and gas. Since Telecom Italia has been sold to foreign investors, Enel is now considered the sole Italian company able to provide the new infrastructure, even if it has to compete with other national and international actors (TIM included).[61]

From a narratological perspective, it is interesting to note that Italian newspapers described the new project by adopting a narrative quite similar to that used 20 years ago when the *Socrate* project was launched. The narrative

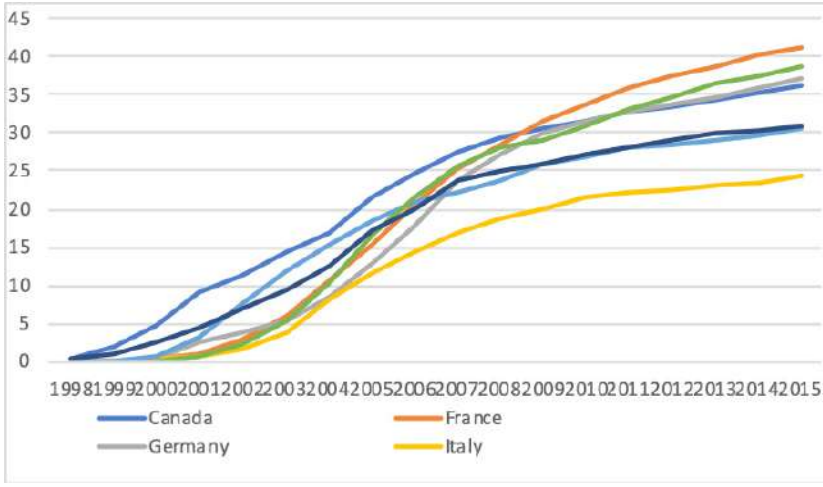


Table 1: Fixed broadband penetration in G7 countries, 1998–2015 (subscriptions per 100 inhabitants).
In 2015 the penetration in Italy was 25% compared to 42% in France, and 32% in the US and Japan. Previous data is not available. (Source: Author's elaboration of ITU data).

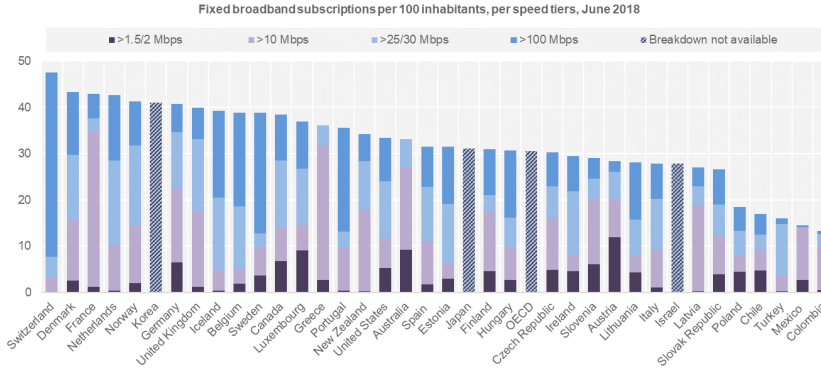


Table 2: Percentage of broadband and ultrabroadband connections.
In 2018 Italy occupied one of the last positions, with only the 3% of FO subscriptions. (Source: OECD Broadband Statistics).

continuity between the two different times is evident if we look at the following excerpts taken respectively from a 1996 article by the leading national newspaper *La Repubblica* and a 2017 article by the magazine *L'Espresso*, ironically titled 'Narrowband' (*Banda Stretta*):

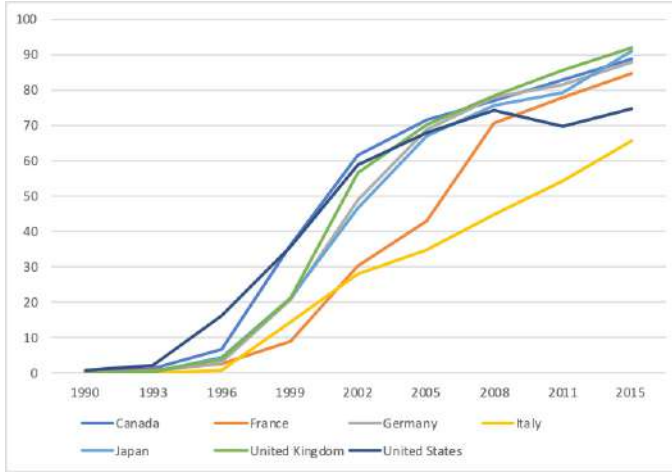


Table 3: Percentage of individuals using the Internet in G7 countries. In contrast to other countries, Italian Internet subscriptions started to grow in the late 1990s-early 2000s. (Source: Author's elaboration of ITU data).

	Proportion of individuals who:			Frequency of use (on average)	
	Used internet within the last 3 months	Used internet within the last 12 months	Never used internet	Every day or almost every day	At least once a week (including daily use)
EU-28	82	84	14	71	79
Belgium	87	87	11	74	84
Bulgaria	59	62	33	49	58
Czech Republic	82	83	13	65	79
Denmark	97	97	2	89	94
Germany	90	91	8	78	87
Estonia	87	88	10	77	85
Ireland	82	83	15	70	79
Greece	69	70	28	57	66
Spain	81	81	17	67	76
France	86	88	10	70	82
Croatia	73	74	23	63	71
Italy	69	71	25	66	67
Cyprus	76	76	23	69	74
Latvia	80	81	17	68	77
Lithuania	74	75	22	60	72
Luxembourg	97	98	2	93	97
Hungary	79	81	19	71	78
Malta	77	78	21	70	76
Netherlands	93	94	5	86	92
Austria	84	85	13	72	82
Poland	73	75	22	57	70
Portugal	70	71	26	60	68
Romania	60	66	30	42	56
Slovenia	75	76	22	64	73
Slovakia	80	83	15	68	78
Finland	94	94	4	85	91
Sweden	93	95	3	85	91
United Kingdom	95	95	4	88	93
Norway	97	98	2	92	96
FYR of Macedonia	72	75	23	61	70
Turkey	58	59	39	49	55

Table 4: Percentage of individuals using the Internet in Europe in 2016. Italy has one of the lowest daily (66%) and annual (71%) rates. (Source: Eurostat).

> Code name: Socrate project. Expected costs: between 10 thousand and 13 thousand billion. Objective: Fibre-optic cabling of the 19 major Italian cities in order to serve ten million citizens in just a few years. The protagonist and sole actor of the operation: Stet-Telecom, *the Italian telecommunications giant*, which, thanks to Socrate, *wants to bring the Bel Paese into the digital era*.[62] (La Repubblica 1996: 29, emphasis added)

> It's been more than a year since, on 7 April 2016, Matteo Renzi announced from Palazzo Chigi his plan *to cable Italy and bring it into the digital era*. The pivot of the project was Enel, *the state power giant*, which, coming out of the natural sector, has to lay fibre-optic cables over the entire national territory.[63] (Piana 2017: 58, emphasis added)

In both cases a national company, a *giant*, takes the responsibility for *bringing the country into the digital age*; in the latter case the *digital age* seems to be something that has still to take place, an historical process still *in fieri,* notwithstanding its redundant persistence in Western vocabularies and debates at least since the early 1990s.

In a certain way, the myth of the digital or network society, and the expectations of the imminent rise of this age, replicate a narrative of the ideal of progress which has permanently characterized the nineteenth and twentieth centuries; it is not by chance that broadband infrastructures recall at a discursive and imaginary level *modern* symbols such as rail networks and highways (information superhighways).[64] Nevertheless, seen from outside, the ruins of *Socrate* differ from the ruins of the industrial age essentially because an important portion of their 'body' is still underground. Whereas factories and rail stations are ruins visible in all their magnitude, the cabinets of *Socrate* recall more the top of an ancient and undiscovered building, an archaeological artefact which is still buried in the ground. Recently, TIM reused the *Socrate* cabinets as new boxes for fibre-optic cables (Figs. 17–18), adopting a strategy of overlapping characteristic of communication infrastructures (Starosielski 2015a). Besides this material overlap between the new efficient and the old failed infrastructures there is also a sort of narrative renewal of the corporate image promoted by the new company; this narrative relies on an 'old' but exemplary figure. Notably, the 2017 commercial for the new TIM brand stars, with a special testimonial, Tim Berners-Lee. The commercial shows a series of technological artefacts (fibre-optic cables, touch screens, digital images and so on) while Berners-Lee talks about positive values such as cooperation, the importance of the sharing of knowledge and the necessity of listening. Whereas the new fibre-optic leader Enel points to the importance of 'getting powerful technology' by making claims such as 'The fibre, in all its purity, gets into your house' or 'Get into the Internet age,'[65] TIM promotes its new brand through the figure of Berners-Lee, the symbol of the distributed communication model which coincides with the Web. The reference to the Web as a bearer of value is clarified by Berners-Lee

Figures 17–18: An abandoned cabinet of the *Socrate* project and a re-used one, in Naples.
A small new cabinet has been added to the old one. The new cabinet is branded with the logo of the optic fibre TIM). Sources: Fig. 17 – https://www.tomshw.it/dal-progetto-socrate-piano-enel-sorte-fibra-75971 (Accessed 20 January 2020). Fig. 18 – Picture taken by the author on 12 October 2018.

himself, who ends the commercial by presenting himself and saying, 'My name is Tim Berners-Lee, I invented the Web' (TIM 2017). Whereas the new leading business player Enel seems to follow an imaginary in continuity with the past and rooted in the past experiences of Telecom Italia, TIM seems to leave behind its material and narrative ruins by turning towards a new narrative based on the horizontal construction of the future.

From a network infrastructural perspective, the strategy adopted by Enel is not surprising; connectivity is here perceived as energy, so it has to be distributed by flows; and flows, especially electric flows, are usually asymmetric and centralized.

3.7 Legacy Systems

In his work on the history of the failed Soviet Internet project, the media historian Benjamin Peters argues:

> Beneath the modern imagination of smooth steel-brushed machines interlinked by wires, signals, and smart protocols pulse the vibrant social networks of relations whose virtues and vices have long been part of the human condition. To understand modern networks is at root an exercise in social self-discovery. (Peters 2016: 203)

Similarly, the French historian Valérie Schafer (2015) has stressed the importance of looking at the histories of networking both as technological and *human* histories in which communities, individuals and organizations play a key role by investing in innovation, selecting business strategies, adopting policies and imagining different applications of both networking tools and infrastructures.

In line with this perspective, this chapter has shown how the Italian network imaginaries are deeply rooted in the social and historical dimensions characterizing social groups, communities of interest, or, in some cases, an entire nation. With regard to the last aspect, it is important to clarify that national imaginaries are not discrete and impenetrable; rather they incorporate some elements from the collective imaginary, an imaginary that exists beyond geographical boundaries. But at the same time, national and local imaginaries are able to reinterpret and reframe collective ones. National companies and city administrations tend to mix the global picture with the local one in the wake of their cultural experiences, traditions or, in other words, histories. It is in line with this idea that the Italian sociologist Alberto Abruzzese claims that in the digital age 'it is impossible to tell histories of the national collective imaginaries, we can tell only national histories of the collective imaginary.'[66] (Abruzzese 2001: 56).

Socrate is an exemplary story in this sense. On the one hand the entire project, and the narrative that Telecom Italia used to promote it, resulted from a vision of the digital age widely shared in Western cultures. This was a vision based on keywords such as infrastructure, multimedia and convergence. On the other hand this narrative was partially reinterpreted and influenced by

Italian technological and cultural history. The broadcast of the *Socrate* network was planned by means of a vertical distribution of infrastructures, of contents and, in turn, of power. This conceptualization of the network was part of an imaginary deeply rooted in the political history of Italy. Furthermore, from a media studies perspective, Telecom Italia's move from telecommunication to broadcasting services revealed the weakness of a company that created an *Italian telecommunication style* (Fari et al. 2014; Ortoleva 2000) but decided to deal with a medium that had never been part of its core business. As the Italian journalist Giorgio Meletti argued just a few months after the failure of *Socrate*:

> The fibre-optic network wanted by Pascale was not like the telephone line, which allows anyone to connect with anyone, but was rather like an aqueduct, with the broadcast signal from above which was then spread to homes through a tree-based scheme. It was another network, with no connection to the telephone line: a cable TV.[67] (Meletti, 1998)

For the analysis of the imaginary, the broadcasting model, which corresponds to a networking model even if different from the distributed one, goes far beyond the narrow utilitarian and functionalist media framework, or, in other words, from the idea of media as mere *means* of communication. Rather, the broadcasting model incorporated in *Socrate* is an organizational and communicative structure that has greatly influenced the Italian path to the Internet in general during recent decades.

In an essay that is likely to become a classic of media studies, John Durham Peters (1999) argues that the history of communication can be summarized in terms of a tension between a model based on dialogue, where Socratic philosophy is the key reference, and a model focused on the dissemination of information, characteristic of Christian philosophy. Semantically switching the role of these two concepts, the missing *dissemination* (the desire to disseminate infrastructure from the top) of *Socrate* can be attributed to a lack of *dialogue* (horizontal exchange) between the different players – political, social and cultural institutions – of a 'national system' that Ernesto Pascale invoked in vain during those years. In sum, Telecom Italia attempted to *disseminate* the network without being able to *dialogue* with the political, economic and social forces of the country: witness the lack of cooperation with some excellent civic networks such as *Iperbole*; the conflict with some 'resistant' key municipalities such as Milan; the lack of agreement with national broadcasters; the conflict between Pascale and the government's political forces; the lack of an integrated effort to effectively spread digital literacy in the country. All these missing forms of dialogue, and thus necessarily of 'network coordination', contributed to decisively stymie the development of digital infrastructures and, in turn, of Internet use in Italy.[68]

Seen in these terms, an ambitious project like *Socrate* does not only represent a failed strategy at the national level, but also represents an imaginary that intertwines different layers of the vast media landscape of our time. As a long tradition in media and sociological studies has repeatedly argued – even if from different points of view [69] – media, and in turn the networking models they represent, rather than being *means*, should be seen as *ways of being*; media incorporate social structures, communicative models and power relations, yet they are at the same time material projections of the imaginary and bearers of collective values. In this regard, the network imaginary of Telecom Italia was based on the dissemination paradigm, which was interpreted as the best and more convenient solution both for the preservation of the company's leadership and for the digital growth of Italy at European and global levels.

A posteriori, Telecom Italia's corporate image, as reflected in the tales of those who lived through the 'golden years' of telecommunications in Italy, is that of a company with a great future behind it. The failure of *Socrate* is just one example among many of how the technological dimension, the political sphere and the imaginary interact with each other. In this sense, taking a step backwards and reflecting on the multiple dimensions of the histories and the imaginaries of networking is not only useful for a better understanding of the continuity and breaks with the past, but it is crucial in order to interpret the present condition and the future role of digital technologies in our societies.

Nowadays, the 'broadcastization' of both network contents and infrastructures is part and parcel of this history. Even if situated in the very specific context of Italy, the histories of *Socrate* and *Iperbole* represent the intrinsic complexity and plurality of network imaginaries, as well as their theoretical contradictions; their histories underline the limits of any deterministic and mono-causal vision of the past, present and future of information technologies. Media and social imaginaries should be in this sense integrated and compared in order to unveil the hidden sides of the histories of networking; these forgotten histories, and in turn the imaginaries that lie behind the conceptualization and the realization of failed, but also temporary successful, digital networks, can reshape and contradict what is taken for granted. Such histories can not only help to avoid the mistakes of the past and to see the reiteration of past visions in the present, but can also keep people informed about the meaning of local, national and international choices, strategies and policies.

It is crucial to reiterate some key assumptions: computer networks did not, and will not, develop 'naturally' as distributed models, and networks are not self-fulfilling prophecies. Networks are, rather, social and historical products rooted in cultural, technological and social histories; they take shape through the balance of economic, political and social forces; they result from a series of strategic choices and greatly depend on the collective awareness of their potential effects, as much as of their potential limitations.

Notes

[1] However, some attempts to create a European system for data sharing were made in the 1970s and 1980s. See for instance the history of Euronet as sketched by Kerssens (2019). Another forgotten history that would need in-depth research is the case of 'Alexandria', Robert Cailliau's attempt to create an European version of the Web at CERN.

[2] The company was founded in 1899 as the *Hydroeletric Society of Piedmont – Società Idroelettrica Piemontese*, and then renamed SIPTel in 1925. In 1964, after a change in corporate structure, the name changed to *Società Italiana per l'esercizio telefonico*.

[3] From now on, I will use the name Telecom Italia to also refer to the SIP period.

[4] The European Directives 90/387/EEC and 90/388/EEC of 1990 led to the abolition of public monopolies starting from 1998 and the consequent opening-up of markets to new operators in the telecommunications sector. Sources: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L:1990:192:TOC (Accessed 20 January 2020)

[5] The following excerpt from Directive 387 is particularly meaningful to the subject of this chapter:

> 'The digitization of the network and the technological improvement of the terminal equipment connected to it have brought about an increase in the number of functions previously carried out within the network and which can now be *carried out by users themselves with increasingly sophisticated terminal equipment*. It is necessary to ensure that suppliers of telecommunication services, and notably suppliers of telephone and packet or circuit-switched data transmission services enable operators to use these functions'. (European Directives 90/387/EEC 387: 26, emphasis added)

[6] For an exhaustive overview of the history of the STET holding see Bottiglieri 1987.

[7] Source: Telecom Italia (1995) *Relazioni e Bilancio al 31 Dicembre 1994*. The data compare the top 20 Telecom Industries worldwide. Nevertheless, a key country, China, is not included in the ranking.

[8] OT: 'C'era uno spirito di forte collaborazione fra gli stati e fra le aziende europee. A fine anni Novanta si sarebbe affacciata la competizione con l'introduzione di traffico di terzi con la liberalizzazione. Il mobile infatti sarebbe nato in un contesto competitivo, mentre per il mondo della circolazione dei dati sulle reti pubbliche c'era la massima collaborazione sugli standard e noi eravamo leader.'

[9] OT: 'L'ìmbrication croissante des ordinateurs et des télécommunications — que nous appellerons la «télématique» — ouvre un horizon radicalement

neuf. Ce n'est certes pas d'hier que les moyens de communications structurent les communautés : routes, chemins de fer, électricité, autant d'étapes d'une organisation familiale, locale, nationale, multinationale. La «télématique», à la différence de l'électricité ne véhiculera pas un courant inerte, mais de l'information, c'est-à-dire du pouvoir. La ligne téléphonique ou le canal de télévision constituent les prémisses de cette mutation. Ils se fondent aujourd'hui dans des transmetteurs polyvalents, commencent à relier des ordinateurs et des bases de données, disposeront bientôt, grâce aux satellites, d'un outil impérial. La télématique constitutera non pas un réseau de plus mais un réseau d'une autre nature, faisant jouer entre eux images, sons et mémoires: elle transformera notre modèle culturel.'

[10] Similar reports were written in the same period in other European countries such as England and Germany. For example, the *KTK Report* written by *The Commission on the Future of Telecommunications in the Federal Republic of Germany* shared several points in common with Nora & Minc (see: Kaiser 1977). Similarly, the Italian telecommunication research centre CSELT followed Nora and Minc's ideas. According to the former managing director Cesare Mossotto, in fact, people working at CSELT 'appreciated the considerations of the *Nora report* on the development of widespread telematics (Videotel) and the role that telecommunications had to play: the emergence of the "network centric" concept was opposed to the "centric host" (it would be better to say "mainframe centric") which was stubbornly pursued by IBM.' (Mossotto 2011: 382)

OT: 'Si apprezzavano le considerazioni del Rapporto Nora sullo sviluppo della telematica diffusa (Videotel) e sul ruolo che le telecomunicazioni avrebbero potuto giocare: nascita del concetto di "network centric" in opposizione a quello di "host centric" (sarebbe meglio dire "mainframe centric") allora ostinatamente perseguito da IBM.'

[11] OT: 'Le fait que le terme américain mette l'accent sur l'informatique – computer – et le nôtre sur les télécommunications n'est pas un hasard. Il exprime un rapport de forces qui, en France, privilégie ces dernières.'

[12] The telex is a switched network of teleprinters similar to a telegraphic network; it was employed in several countries starting from the 1930s.

[13] OT: Con l'arrivo del pacchetto nel 1974 si parlò di sviluppo europeo delle reti, ci fu infatti Euronet che era una rete a pacchetto europea. Siccome dovevano entrare gli stati noi come Poste creammo il primo centro di commutazione a Via Trastevere. In Italia il problema era che il ministero aveva conservato le comunicazioni e io ero il responsabile comunicazione delle Poste quindi ero il difensore dei dati gestiti dal ministero. Noi avevamo dato in concessione alla SIP la telefonia, loro dicevano che i dati erano telefonia e qui c'è stata una lite che è durata fine al 1988 perché il ministero aveva ancora come gestione diretta il Telex che era l'inizio della trasmissione dati.

[14] OT: Negli anni '70 la parola dati voleva dire tutto e il contrario di tutto. In questo scenario nasce la commutazione di pacchetto e tutti si chiedevano

'da che mondo viene questa cosa? Dal mondo fonia o dal mondo telex?' Era una cosa nuova. C'era una sottile battaglia continua col ministero perché noi come SIP chiedevamo di gestire la rete perché veniva dalla fonia e dovevamo farla noi, il ministero diceva la rete nasce come telex dati ed è roba nostra.

[15] Enrico Mattei is a well-known figure in Italian history since he founded the Italian petrol company ENI (*Ente Nazionale Idrocarburi*), contributing to the economic growth of Italy after the Second World War.

[16] The first 19 cities included in the project were (in alphabetical order): Bari, Bologna, Cagliari, Catania, Firenze, Genova, Messina, Milano, Napoli, Palermo, Parma, Pisa, Roma, Siena, Torino, Trento, Trieste and Venezia.

[17] *Résau* (which means 'network' in French) was the first Italian ICT consulting company. Francois De Brabandt, one of the main ICT experts in Italy, funded it.

[18] OT: 'La nostra società operativa Telecom cablerà l'Italia, investirà diecimila miliardi di lire e darà al Paese l'autostrada digitale di cui ha bisogno'.

[19] The acronym DECT stands for *Digital Enhanced Cordless Telecommunication*. The project Fido-DECT (1995–2001) was an attempt to bring telephone coverage out of the domestic wall by means of cordless phones and external repeaters; it was a sort of 'low range' mobile phone. A very similar project, named Bi-Bop (1991–1997), failed in France in the same period. The importance accorded to these projects by telecommunication companies highlights the centrality of mobile telephony for national telecommunication market strategies in the 1990s. According to Pierre Musso (at the time Musso was part of the Board of Directors of France Télécom): 'The mobile phone was at the center of discussion far before the smartphone. France Telecom executives thought that the mobile phone would be the future of communications and did not really believe in the Internet; they considered it an American toy.' (Pierre Musso, private communication, 8 June 2017)

OT: 'Si parlava prima di tutto del telefono mobile ben prima dello smartphone. France Telecom i dirigenti pensavano che il telefono mobile sarebbe stato il futuro delle comunicazioni e non credevano assolutamente in Internet, lo consideravano un giocattolo americano.'

The Italian and the French press have frequently complained about the waste of economic resources and labour due to these projects. For the Italian case, see: http://www.repubblica.it/online/economia/fido/fido/fido.html.

For the French case, see: http://www.lexpress.fr/informations/bi-bop-le-big-flop-de-france-telecom_624438.html.

[20] The two projects *Progetto 80* and *Festoni* placed Italy in an average position concerning long-distance broadband infrastructures at a European level.

[21] One of the reasons behind this choice was that the HFC was adopted in the US for cable transmissions.

[22] At the present stage, even to the generic user, both the down- and up-stream bandwidths would look ridiculous. Nevertheless, a 1.5 Mb downstream connection was considered to represent extremely high performance compared to most European countries.

[23] OT : 'La televisione era il calcio insieme ai telegiornali per la politica, per i politici e l'opinione pubblica. Se toccavi queste cose era grave, delle altre nessuno se ne importava ma se toccavi queste toccavi una ripartizione tra i vari network tv.'

[24] According to Davide Giacalone and Maurizio Matteo Dècina, both authors of critical books about the disastrous privatization process of Telecom Italia, Ernesto Pascale had to leave STET mainly for political reasons since the new Italian establishment needed a more 'loyal' and less independent leadership in the telecommunication sector (Dècina 2013; Giacalone 2004).

[25] In these cases, Telecom Italia subtly claims that *Socrate* failed because of the 'delicate political moment.' See: http://www.telecomitalia.com/tit/it/innovazione/rete/le-prime-infrastrutture.html (Accessed 20 January 2020).

[26] The removal of these troublesome aspects regarding the history of the company recalls what Wilner et al. call the 'pasteurisation' of corporate narratives. According to the authors, thanks to the pasteurization of corporate narratives 'germs are eliminated in the name of a simple, rational and powerful explanation.' (Wilner et al. 2014: 404)

[27] Maurizio Dècina is currently professor of engineering at the University Politecnico of Milan; he was the first Italian to chair the IEEE (*Institute of Electrical and Electronic Engineers*) and he worked as manager and special consultant for Telecom Italia for a long time.

OT: 'C'era il problema degli scavi, per mandare i cavi nelle case bisognava scavare e Socrate scavava. I comuni davano i permessi chiedendo in cambio lavori di ristrutturazione delle strade.'

[28] Alberto de Petris if the former network account manager of Telecom Italia.

OT: Si trattava fondamentalmente di scavare. C'erano luoghi come Napoli dove si trovavano le cose più strane e la documetazione spesso non corrispondeva alla realtà. C'erano attraversamenti impropri di altre societa che avevano distrutto le canalizzazioni fatte da noi.

[29] OT: 'Fare la rete in Italia costa poco dal punto di vista economico. Quello che costava molto era scavare! L'80% delle raccomandazioni al ministero erano per convincere i comuni a scavare. Scavare significava non solo coprire : significava fare trincee di 70 cm, sotto mettere la breccia, sopra mettere la sabbia, sopra mettere il passacavo, in certi posti addirittura la polifera. […] Sono un sacco di soldi!'

[30] Before the launch of the project, the ADSL was taken into account as a possible solution, but the board discarded the idea because the technology was not evolved enough.

[31] ITU statistics calculate indicate that in 2015 that there were more than 118 million subscribers to ADSL services in Europe. Source: elaboration of ITU statistics.

[32] OT: C'era tutto ma probabilmente mancava il mercato. […] Tecnologia e mercato non si incontravano. tecnologia e mercato non si incontrano, anche perché l'offerta del digitale televisivo continua ad aumentare grazie ai satelliti e ai dvd reperibili quasi ad ogni isolato da distributori automatici o negozi specializzati. [...] come se non bastasse a questa crescente abbondanza di contenuti e punti di approvvigionamento nella seconda metà degli anni '90 arriva Internet a rimescolare le carte.

[33] Ivano Camerano wrote his Master's thesis in engineering on the *Socrate* project during the academic year 1994–1995. I found his thesis at the *Archivio Storico Telecom Italia* by pure chance, so I asked at the reception desk if he eventually started to work for Telecom Italia. And indeed, after the completion of his dissertation, he started working for Telecom Italia as an electronic engineer and it emerged that his office was at the second floor of CSELT. Thus we were in the very same building and I had the opportunity to interview him there.

[34] OT: Da un'indagine a posteriori a metà anni novanta si è capito che era troppo presto. Primo perché la tecnologia non era cosi matura da fornire un'infrastruttura che potesse davvero essere utile, aldilà dei progetti e dei sogni, a fornire qualcosa di valore in termini di larga banda. Soprattutto però il principale problema era che noi italiani e europei non eravamo pronti alla larga banda in materia di servizi. Si diceva 'potremo avere migliaia di informazioni e di servizi VOD' però stringi stringi non eravamo abituati, ci mancava proprio la mentalità di questo approccio.

[35] The University College of London (England) and Royal Radar Establishment (Norway) were the first two institutions to be connected with the ARPANet project in 1973 by satellite transmission.

[36] The seven centers constituting the leading group of the GARR network were: Milan (CILEA), Bologna (CINECA-ENE-INFN-CNAF), Pisa (CNR-CNUCE), Rome (INFN), Frascati (ENEA & INFN) & Bari (CSATA).

[37] For an overview of the Agenda Digitale Italiana, see: http://www.agid.gov.it/agenda-digitale/agenda-digitale-italiana (Accessed 20 January 2020).

[38] http://www.telecomitalia.com/tit/en/innovazione/rete/Internet-day.html.

[39] IPerBOLE is an acronym which stands for *Internet 'For' Bologna and the Emilia Romagna.*

[40] *Iperbole* made an agreement to exploit part of the Internet bandwith of the CINECA supercomputing centre. The first ISPs reported the municipality to the authorities for unfair competition, but *Iperbole* won all the trials because the server through which CINECA received its Internet connection was based in Paris, outside Italian jurisdiction.

[41] The *Iperbole* project won several prizes at European and international level, and it was also recommended as a best practice to imitate during the G7

summit on the information society held in Halifax, in 1995. As stated in an official document: 'Bologna, in Italy provides the "Iperbole System" for its citizens. This is a free of charge civic network on the Internet. Iperbole allows citizens to address messages to the city government in a free-form way. […] Thousands of e-mail messages are exchanged daily. There are many active discussion groups. The Iperbole system in Bologna, Italy may be a model for all governments'. (McDonough 1995: 2)

[42] OT: 'Si deve assumere come punto di partenza la constatazione che la tecnologia rende da ora in poi possibile una vasta serie di applicazioni di democrazia diretta e reale: diretta in quanto svolta in prima persona, senza la mediazione della rappresentanza; reale, in quanto interattiva e bidirezionale, e non a senso unico. Il Progetto non soltanto trova nel Comune di Bologna un soggetto interessato alle tecnologie e un contesto favorevole e naturale in cui collocarsi: la città è in questa fase il soggetto strategico imprescindibile per favorire il decollo della democrazia informatica. In questa congiuntura politica, caratterizzata dalla sempre maggiore incidenza del potere televisivo, con is uoi filtir e i suoi linguaggi semplificatori sul modo di conformarsi della democrazia, è di fondamentale importanza che gli enti locali consapevoli dell'importanza della disseminazione dell'informazione e della massima ampiezza del dibattito pubblico si facciano pionieri di esperimenti di democrazia dal basso.'

[43] OT: L'innovatività di un progetto come il presente è legata quindi anzitutto al ruolo attivo, consapevole e strategico del soggetto pubblico nello stimolare la democrazia informatica e la trasparenza amministrativa e nell'orientare il futuro utilizzo delle comunicazioni via cavo verso direzioni di partecipazione collettiva e a basso costo piuttosto che ad una ulteriore articolazione del business dello spettacolo e dell'informazione-spettacolo per profitto. Un altro aspetto innovativo, di grande valenza politica, è quello della formazione dell'utenza. […] Essere in una rete locale democratica significa non soltanto fornire macchine e istruire sul software, ma soprattutto alfabetizzare, educare a scrivere, a rispondere, a leggere, a far girare in modo opportuno l'informazione, a cercarla in modo efficace, a saperla trovare. A creare un'utenza che dialoga attivamente e in modo civile, che sappia argomentare le proprie proposte e cercare i propri interlocutori. In sintesi, qui si tratta della forma mentis della comunicazione interattiva, contrapposta al paradigma televisivo, in cui il cittadino è concepito come spettatore passivo di fenomeni alla cui determinazione non è chiamato a partecipare. Solo un ente locale democratico quale una amministrazione eletta e i cittadini stessi possono avere la volontà politica e la capacità concreta di rompere i lacci di un modello superato, e sviluppare una reale democrazia elettronica.

[44] These processes have also characterized the history of other *alternets* such as radio, telephonic and Internet networks in several countries such as France, England and the US (e.g., Trudel & Tréguer 2016).

[45] In another influential book Deleuze and Guattari list the six principles of the rhizomatic model as follows: '1 and 2. Principles of connection and heterogeneity: any point of a rhizome can be connected to anything other, and must be. [...] 3. Principle of multiplicity: it is only when the multiple is effectively treated as a substantive, "multiplicity," that it ceases to have any relation to the One as subject or object, natural or spiritual reality, image and world. [..] 4. Principle of a signifying rupture: against the over signifying breaks separating structures or cutting across a single structure. A rhizome may be broken, shattered at a given spot, but it will start up again on one of its old lines, or on new lines. […] 5 and 6. Principle of cartography and decalcomania: a rhizome is not amenable to any structural or generative model'. (Deleuze & Guattari 1987: 7–13)

[46] OT: Nel 1977 Deleauze e Guattari pubblicano questo librettino che per noi era come il libretto rosso di Mao, Rizoma. Dicevano che la storia del capitalismo occidentale è fondata sull'albero e sull'ordine gerarchico ma noi adesso scopriamo un modello della vita sociale fondato sul rizoma, un sistema totalmente acentrico in cui ogni punto è il centro del mondo. Il concetto di rizoma appariva a noi come il modello utopico della società da costruire, di quello che stavamo facendo effettivamente con le radio libere! Dicevamo 'siamo sulla strada giusta!' Io venivo dall'esperienza della radio libera in cui il tema l'avevamo già percepito in Italia soprattutto con radio Alice, avevamo sempre insistito sul fatto che la radio è un medium centrico ma con il telefono diventa un medium a-centrico. […] Oggi capisco che noi avevamo interpretato come il sole dell'avvenire quella che era la nuova tappa della storia del capitalismo. La forma rizomatica è la forma che il neoliberalismo interpreta sul piano politico e che la connessione tra Internet e le grandi corporation di produzione immaginaria realizzano sul piano produttivo.

[47] The national press tended to overexpose and intensify this conflict, see: http://ricerca.repubblica.it/repubblica/archivio/repubblica/1996/03/21/scontro-sul-monopolio-stet-il-cablaggio.html

[48] OT: Io ho bloccato Socrate a Bologna. Io bloccai Socrate per anni perché era una follia, per loro era importantissimo passare da Bologna per ragioni di geografia e topologia di rete. Quasi mi emozioni perché nessuno se lo ricorda ma fu una battaglia pazzesca. Pascale veniva in aereo privato nel mio ufficetto in comune a pregarmi di far passare il progetto a Bologna. Ogni tre giorni e noi non gli davamo il permesso di scavare. Proponemmo un progetto alternativo, Optubi, che era il contrario di Socrate. L'idea era usare le fogne, i tubi dell'elettricità per abbattere i costi e soprattutto per democrazia economica perché si potevano mettere più cavi anche per la concorrenza e il comune gestiva il territorio. Non solo, il comune ci guadagnava perché conferiva più di metà del valore dello scavo. Poi il comune oggi regala a tre aziende private il territorio per la banda ultra-larga dove il lui è semplicemente 'facilitatore'. Il comune non aveva nessun controllo

dal punto di vista politico e sociale, di nessun tipo. A questo aspetto sono affezionatissimo. Iperbole è un acronimo di Internet Per Bologna e l'Emilia Romagna. Socrate invece reiterava un reato che è andato avanti per decenni nell'economia italiana. Noi siamo stati per decenni arretratissimi perché è finito quel progetto che era come le autostrade del sud, autostrade vuote.

[49] OT: Noi non abbiamo mai sposato la linea della Telecom. Loro lanciarono il piano Socrate, parecchia roba ne fecero. Posavano la fibra ma questo ha fatto la fortuna di Fastweb che ha comprato i cavidotti. […] … si è data tanta importanza al cablaggio in quegli anni, l'errore dal punto di vista di politica delle reti è che andavano pensati prima i servizi e poi il cablaggio.

[50] OT: Il piano Socrate ha peccato di determinismo tecnologico. In quegli anni la convergenza era un discorso ambiguo. Era basato principalmente sulla tecnologia, con l'idea che sulla stessa infrastruttura si può trasmettere tutto. Era una convergenza tecnica ma pochi avevano fatto una riflessione sulla convergenza della gestione dei servizi. Il ragionamento principale era sul contenitore. Poco ragionamento fu fatto sui contenuti.

[51] OT: La rivoluzione multimediale non avviene spontaneamente: è necessaria infatti la disponibilità in tempi brevi di infrastrutture di telecomunicazioni a larga banda, che consentono cioè la contemporanea trasmissione di servizi in voce, dati e video, diffuse sul territorio e accessibili a costi contenuti. Tale infrastruttura (che può svolgere le stesse funzioni della rete ferroviaria durante la prima rivoluzione industriale e che rappresenterà il tratto distintivo dei paesi sviluppati) è essenzialmente costituita dal cablaggio del territorio con la fibra ottica.

[52] It is not by chance that railway networks in Italy were the most important infrastructures for the inter-connection of the country at the end of the nineteenth century.

[53] OT: Cablare è l'evoluzione tecnologica delle telecomunicazioni, lo faremmo per il telefono anche senza il mercato multimediale interattivo. Anticipiamo nel tempo investimenti che andranno fatti per stimolare l'offerta di servizi. […] Nel mercato multimediale sono confidentissimo, sono certo che siamo all'inizio di un'epoca che cambierà il nostro modo di operare. *Sento nella mia carne* che ciò avverrà, questo significa maggiori investimenti, nuovi soggetti e maggiore occupazione.

[54] OT: Si sta per aprire una nuova rivoluzione. Avverrà nel 1997 con la televisione multimediale interattiva, quella sarà la vera rivoluzione. Oggi siamo in una fase preliminare. […] Si aprirà una catena di scambio, la cosiddetta società dell'informazione, soprattutto nell'entertainment. Una nuova tv si andrà ad aggiungere alla tv generalista con la quale entrerà in competizione. Il tele shopping e le catene di distribuzione stesse cambieranno. Questo vale anche per le banche, per i tour operator e per l'educazione. Si apre un mondo aggiuntivo, integrativo e in parte sostitutivo che offre delle possibilità enormi.

[55] OT: Pascale era molto determinato. […] Ricordo un episodio quando eravamo assieme a Londra per parlare con i manager cinesi di un offerta in Cina. Uscendo dall'albergo a Londra vedemmo degli operai che stavano posando dei cavi per una compagnia americana. Pascale disse "Lo vedi? Questi fra poco ce li troviamo a casa nostra! Prima che lo facciano loro dobbiamo farlo noi" Così parti Socrate: 10000 miliardi per passare in 10 milioni di case. […] Internet era come non esistesse. Ricordo Maurizio Dècina quando venne con Vittorio Trecordi nel mio ufficio e disse "ti voglio far conoscere Internet". Trecordi si connesse e io ricordo che sentii un misto tra angoscia e qualcos'altro. Come se fossi abbandonato nel mare. Vedere questa dimensione che si apriva e che al tempo era assolutamente sconosciuta. Per cui noi ci sapevamo muovere ma non esisteva in quel momento una strategia per Internet offerta [...]. Cercavamo di capire, in quel periodo io feci da consulente per Vint Cerf. Lo andavo a trovare ogni 4–5 mesi negli US, lui venne in Italia a fare dei seminari interni perché volevamo entrare in questo mondo. Però partito il Socrate eravamo entrati nel grandissimo successo del mobile. Noi avevamo allora due grandi strade, una era la rete a larga banda e l'altra il mobile.

[56] OT: 'Ernesto concepì il progetto Socrate, ossia la cablatura in fibre ottiche del paese, per poter dare servizi e accessi avanzati a tutto il paese. Procedeva con il coraggio del pioniere e con la serenità della ragione. Anche allora quel progetto fu criticato prima e bloccato poi. Oggi il Paese ne ha bisogno e non ce l'ha ancora.'

[57] According to the network account manager Alberto de Petris, if the new company TIM were to retrieve the map of the *Socrate* infrastructure, it could benefit from the old conduits for the laying of the ultrabroadband infrastructure (Alberto de Petris, private communication, February 8, 2017). Apparently, TIM is currently following his advice and, 20 years later, 'Socrate lives again'. See : https://www.tomshw.it/fibra-ottica-tim-nelle-arterie-socrate-altro-cicuta-82507 (Accessed 20 January 2020).

[58] See: https://www.tomshw.it/telecom-socrate-fido-dect-denaro-pubblico-sprecato-41191 (Accessed 20 January 2020).

[59] See: http://www.hwupgrade.it/forum/archive/index.php/t-1460494.html (Accessed 20 January 2020).

[60] See: https://ec.europa.eu/digital-single-market/en/europe-2020-strategy (Accessed 20 January 2020).

[61] The Italian Ministry of Economy and Finance holds 23.6% of Enel's shares; therefore it is the relative majority shareholder of the company. The French company Vivendi (23.9%), together with a consistent group of foreign investors (58.13%), currently controls the TIM group, meaning that foreign investors mainly control TIM. Sources: https://www.enel.com/it/investors1/azioni/azionistihttp://www.telecomitalia.com/tit/it/investors/shareholders/shareholdings.html (Accessed 20 January 2020).

[62] OT: Nome in codice: progetto Socrate. Spesa prevista: fra i 10 mila e 13 mila miliardi. Obiettivo dichiarato: cablare in fibra ottica le 19 maggiori città italiane servendo dieci milioni di cittadini nel giro di pochi anni. Protagonista ed unico attore dell'operazione: Stet-Telecom, il gigante italiano delle telecomunicazioni, che grazie a Socrate vuole pilotare il Bel Paese nell' era digitale.

[63] OT: È passato più di un anno da quando, lo scorso 7 Aprile 2016, Mattero Renzi annunciava da Palazzo Chigi il suo piano per cablare l'Italia intera e trasportarla nell'era digitale. Il perno del progetto era Enel, il colosso statale dell'elettricità, che uscendo dal naturale settore di attività avrebbe dovuto posare la fibra ottica sull'intero territorio nazionale.

[64] According to Andrew Russell and Lee Vinsel 'to take the place of progress, 'innovation', a smaller, and morally neutral, concept arose. […] At the turn of the millennium, in the world of business and technology, innovation had transformed into an erotic fetish.' (Russell & Vinsel 2016). In this regard, infrastructures represent the progress that the new fetishist term, innovation, provokes.

[65] See: http://openfiber.it/ (Accessed 20 January 2020).

[66] OT: Non sono praticabili storie dell'immaginario collettivo nazionale, ma lo sono invece storie nazionali dell'immaginario collettivo.

[67] OT: La rete in fibra ottica voluta da Pascale non era come quella telefonica, che consente a chiunque di mettersi in collegamento con chiunque, ma era piuttosto come un acquedotto, con il segnale televisivo distribuito dall'alto e diffuso verso le abitazioni con uno schema ad albero. Era un'altra rete, senza alcun collegamento con quella telefonica: una tv via cavo.

[68] Of course, the failure of *Socrate* is not interpreted here as the sole cause of the digital gap in Italy.

[69] E.g., the works of Walter Benjamin (2008), Cornelius Castoriadis (1978) and Marshall McLuhan (1962).

CHAPTER 4

Challenging the Network Ideologies

L'anima s'immagina quello che non vede, che quell'albero, quella siepe, quella torre gli nasconde, e va errando in uno spazio immaginario, e si figura cose che non potrebbe se la sua vista si estendesse da per tutto, perché il reale escluderebbe l'immaginario.[1]

Giacomo Leopardi, *Lo Zibaldone*

4.1 Imaginary Networks

The narratives surrounding the histories of the Web and *Socrate* bring out the importance of a sort of unquestioned *faith* in and towards networks – historically interpreted as instruments of social progress and liberation – as determining factors of economic growth, as extensive and empowering forms for human communication, and as bearers of a positive, unstoppable cultural change. The ideological force of the Internet myth and network ideologies lies in their simple explanation of networking as a solution to reduce complexity. According to network ideologies, structure, infrastructure and social structure converge in the network ideal.[2]

On the one hand, the World Wide Web, thanks to the biographical accounts on its birth and its inventor, represents a synthesis of an imaginary of the future in which collective and egalitarian values such as cooperation, horizontality and openness can be realized owing to the new revolutionary system. On the other hand, *Socrate*'s infrastructure was narrated as a necessary condition for strategic issues such as the national entry into the information society, the digitization of information and the dissemination of multimedia contents and innovative services. In both cases the network, respectively through its distributed

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and centralized ideal-typical expressions, represented the sublimation of the desire for connectivity; in sum, the network has been interpreted as a primary social need for contemporary societies. Nevertheless, the narratives borne by scientists, futurologists and stakeholders were not realized; it does not matter if these projects were actually completed or not. The distributed model of the World Wide Web and the comprehensive infrastructure of the *Socrate* project remain just two projections of an *imaginary network*, a network that never existed in practice. Nevertheless, the network imaginaries embedded in these projects, as much as the imaginary of the *Iperbole* project, continue to play a key role, since they have changed and shaped the trajectories and the narratives of network history, playing at the same time a crucial part – for better or worse – in its evolution.

The narratives and the imaginaries conveyed by these different stories persist and continue to penetrate the present, but also the imagined future of networked societies. As permeable and enduring stories, both the winning and failed networks are embedded in the contemporary social imaginaries as much as in the material dimension of contemporary networks. Finally, it is because such narratives still have a deep influence on the development and the cultural representations of networks in societies that a theoretical reflection not only on the potential but also on the *limits* entailed in any *retiologic* perspective is much needed. To challenge and question the network ideologies means thus to look also at how specific narratives of networking persist over time, what these narratives tend to conceal from common people and critical thinking, and why they still permeate the contemporary world.

4.2 The Transitory Propriety of Network Imaginaries

Network-centred visions of the organization of society have a long history, which starts a long time before the naissance of modern computing. According to authors such as Pierre Musso (2017) and Armand Mattelart (2000), modern forms of retiology and network determinism originated during the first industrial revolution and then grew exponentially during the last century. Indeed, networks have often been imagined as the chosen models to construct and represent modern societies; physical and immaterial infrastructures such as the circulatory system and the brain, electric networks, telegraphic network, railway networks, highways networks, flight and navigation networks, computer networks, social networks, and, more recently, neural networks, have all been at the heart of political, technological and cultural programmes, deeply permeating collective thoughts and shaping public debates on the local, national and global scales.

However, according to authors such as Pierre Musso, we are currently facing a sort of saturation of the idea of the network as a theoretical reference model; nowadays, Musso says, the network ideology is reaching its final stage, and its

saturation is taking place after a long and circuitous path, characterized by a series of philosophical and ideological degradations:

> Nowadays, beyond the technical issue, the network has become a solution to chaos, to disorder, and to dissipative structures. The network is a safety net that allows people not to think about the great problems of contemporary science. In my opinion, we are at the limit of this thought, which has been very pervasive for a long time thanks to management, which, drawing on the visions of engineering, continues to defend the network idea. In my opinion, however, we are at the limit; nowadays, we need new figures and shapes as references. [...] The network is a safety network, a defence mechanism from uncertainty and a way to understand the complexity of society, the brain, and the body. The network allows us, as Norbert Elias had seen, to tie and separate. It's a way to separate and bind, as Sherry Turkle says, 'alone together'. In order to think about this broken society the net is a useful figure but it has been exploited too much. It is more difficult to think of uncertainty, chaos; it is more difficult to think of complexity. Instead, the network gives order to things.[3] (Pierre Musso, private communication, 8 June 2017)

According to Musso, the network has become at the same time a *safety net* and *a net for capture*; networks are able to protect society insofar as they close the possibilities of critical thinking and, in turn, of an effective and productive imaginary. In a disenchanted world, new social imaginaries are much needed in order to collectively explore and design alternative futures, so as to face and problematize the overgrown complexity and the subtle uncertainty that characterizes our societies; networks, both in their *functional* and *fictional* aspects, provide an all too easy and simple self-fulfilling solution to the organization of complexity in a borderless and hyper-connected world.

The persistence and the influential role of network imaginaries – what we can call the *trans-temporality of network imaginaries* – are still evident if we look at the way in which technological, cultural and political players make use of the very same narratives analyzed in this work. Moreover, network imaginaries also penetrate different environments; an imaginary typically attributed to the academic field, e.g., the ideal of the distributed network among scientists, can also influence market strategies or political organizations; imaginaries, in fact, are not just trans-temporal, they can also cross social and cultural boundaries to permeate a variety of social spaces.

In order to stretch this *transitory propriety* of network imaginaries, two examples seem to be particularly meaningful. First, digital media corporations are a clear example of the trans-temporal dimension of network imaginaries and of their ideological function. Take for instance the corporate narrative adopted by some well-known giants such as Facebook and Google, two companies that have rewritten the history of digital media by replacing the terms Web

and social network with their respective corporate brands (Natale, Bory and Balbi 2019). Facebook's claim 'to make the world more open and connected' and Google's stated intention to be 'the closest thing the Web has to an ultimate answer machine' (Google 2007) are two clear examples of the extent to which the values and the distinctive concepts peculiar to the narrative path of Tim Berners-Lee and the World Wide Web have been gradually incorporated by digital media corporations. Notably, these actors use the same deterministic narrative according to which 'change' is a network/medium-driven process; both digital and physical network infrastructures of course, if handled by these enlightened companies, are the sufficient and necessary conditions for the cultural, economic and social growth of Western societies. What I called the dominant narrative of Internet history – which is based on a linear, positive and progressive evolution of networks – is constantly subsumed by these companies. These actors count on the conceptual fixity, or in Catoriadis' terms the institutionalization, of the Internet imaginary over time. From this point of view, the network of networks seems to be an untouchable and irreplaceable medium, a sort of everlasting, trans-temporal resource, or even, quoting Berners-Lee and colleagues (1992b), a unique 'universal system'. As the critical scholar Evgeny Morozov argues:

> Still, there's something peculiar about this failure of our collective imagination to unthink 'the Internet.' It is no longer discussed as something contingent, as something that can go away; it appears fixed and permanent, perhaps even ontological—'the Internet' just is and it always will be. To paraphrase Frederic Jameson on capitalism, it's much easier to imagine how the world itself would end than to imagine the end of 'the Internet.' (Morozov 2013: 22)

As Morozov and several other critical scholars have shown,[4] the Internet and the Web are gradually becoming the working components of new forms of hierarchy[5] that are able to pragmatically overturn the horizontal ideology of networks while professing those values historically entailed in Internet-based systems. It is not by chance that these actors usually promote themselves as good, not evil ('Don't Be Evil', in Google's terms), promoters of socio-technical change. Symptomatically, companies such as Facebook make use of the same keywords and influential concepts adopted by Berners-Lee and colleagues to promote the Web.[6] In a famous letter addressed to Facebook's investors, the CEO Mark Zuckerberg wrote:

> People *sharing* more – even if just with their close friends or families – creates a more *open* culture and leads to a better understanding of the lives and perspectives of others. We believe that this creates a greater number of stronger relationships between people, and that it helps people

> get exposed to a greater number of diverse perspectives. By helping people form these *connections*, we hope to *rewire* the way people spread and consume information. We think the world's information *infrastructure* should resemble the social graph – a *network* built from the bottom up or peer-to-peer, rather than the monolithic, top-down structure that has existed to date. We also believe that giving people control over what they share is a fundamental principle of this *rewiring*. (Zuckerberg 2017, emphasis added)

Wiring, *infrastructure*, *openness*, *sharing of knowledge*, *bottom-up and peer-to-peer structures*: through these keywords, Zuckerberg promotes Facebook as a horizontal and open world in which *social change* is the *social exchange* made possible by proprietary technologies; the network, again, is the determining variable of this process. Through the network ideology, and by subsuming the Internet myth in their self-referential narratives, corporate actors mask their real goals: profit and control.

It is important to note that this narrative does not apply only to technologies such as search engines and social media. Even artificial intelligence, probably the most discussed innovation of the last and future years, is depicted as a technology that will solve human problems through networks. Corporate players like Google DeepMind depict their AI as a neural network capable of processing and solving complex problems 'through a number of different network layers containing millions of neuron-like connections' (DeepMind 2020). The brain, one of the first and most used analogies of the network ideologies, becomes a new form of objectification of the future; it is the reproduction of the brain, the primary human network, the new 'technology of freedom' professed by the tech giants of the digital market.

At the political level, the contemporary Italian context offers one of the most interesting expressions of the intertwining between the horizontal model of the Web and the broadcasting model of networks entailed in projects like *Socrate*. The 'Five Star Movement' – *Movimento 5 Stelle* (M5S) – is a new political organization, created in 2009, which has rapidly become one of the main competitors of the so-called traditional political parties. Guided by a famous comedian, Beppe Grillo – who, curiously, based his earlier career on television shows – and by the techno-enthusiast Gianroberto Casaleggio, the M5S was founded with the idea that '*The Net – La Rete*' and the people who inhabit its environment have a unique possibility for direct democracy; in this process, the Web (or 'the Net' or 'the Internet' indiscriminately) is conceived as the selected instrument for a cultural revolution (Turner 2013) that will overthrow the corruption of the Italian political system and return decisive power to citizens. Furthermore, the M5S has consistently based its public communication on the contrast between the old hierarchical broadcasting model, represented by vertical traditional parties, and the distributed model characteristic of its

horizontal and bottom-up political organization. As Simone Natale and Andrea Ballatore have shown, this contrast is usually represented through a metaphoric war between the old broadcasting media (read 'old politicians') and the new networking structure of the Internet (read new generations or, 'the People of the Net' – *il Popolo della Rete*) (Natale and Ballatore 2014).

Notwithstanding the undeniable novelty and the initial achievements of the political activities of local groups throughout the territory (Diamanti 2014), the tension between the vertical and the horizontal models of organization has recently turned against the very structure of M5S; in fact, the authority of the top of the distributed network formed by citizens (a theoretical paradox by itself) – represented by Grillo, Casaleggio (who died recently and has been replaced by his son) and those members of the parliament who must take rapid decisions and 'bring votes' for M5S' very survival – contrasts sharply with the direct and participative democratic principles professed by the movement itself. Curiously, the brief history of the M5S includes almost all the characters at the heart of this work. First, one of the biggest enemies of the M5S is Telecom Italia; especially during the first stage of his political career, Grillo criticized and attacked the Italian telecommunication company, condemning its incompetent leadership and its incapacity to provide Italy with an efficient broadband infrastructure.[7] The M5S' criticisms are mainly addressed to the economic *élite* who still control Telecom Italia by exploiting and taking personal advantage of the company's investors. In Grillo's view, the vertical and elitist organization of the company bears the main responsibility for 'disconnected Italy.'[8]

Concurrently, the rhetoric and the narrative of change promoted by the M5S follows quite closely the political discourses of the *Iperbole* founder Stefano Bonaga. Actually, Bonaga has recently claimed that Grillo is bringing back his political programme of the mid-1990s, re-using in a trivialized way a twenty-year-old political paradigm. For his part, Grillo has never completely recognized this theoretical legacy.[9]

As happened to the Web in its late stage, the reticular model of the M5S is now dealing with centralization, a process that characterizes several forms of organization when they turn from an embryonic, chaotic, state to an institutionalized one. Centralization, as authors such as Barabási (2002) and Buchanan (2003) explain, is usually a process that takes place when networks extend and increase their internal complexity and their number of nodes; new strategic *hubs* for decision making are thus created to manage complexity and to organize networks when they extend and multiply their activities. According to these scientists, the more the network increases its number of nodes, the more communication and decision making processes are slowed down.

However, notwithstanding this tendency to centralization, social control over digital, but also political, networks can be still organized in a democratic way. An example is the Spanish city of Barcelona, which is trying to remunicipalize corporate power and protect citizens' and municipal data as common goods, as public digital resources owned by the local and regional governments. These

kind of projects, that share many points in common with the story of *Iperbole* and the story of the *Digital Stadt* in Amsterdam, show that the key issue for local governments is how the complexity of the contemporary digital system can be handled by means of democratic processes and through transparent public decisions oriented towards the common interest. Challenging the network ideologies of our time, these projects show how the network structure is not the determining variable, but rather that social, political and cultural values, as much as more egalitarian and anti-capitalist policies and active citizenship, are the true core of the 'social' network.

In relation to the rapid growth of the M5S, one key question is why the old distributed network rhetoric has had such an impact on Italians. One hypothesis might be that the digital gap in Italy somehow facilitated and preserved the perception of novelty embedded in networking systems such as the Web and the Internet. However, there is another key point of connection between the broadcasting model, deeply embedded in the Italian imaginary, and the distributed one. Beppe Grillo, who came from the TV world, started his political activity using a blog, probably one of the most vertical communication platforms of the Web. According to the President of the Chamber of Deputies Roberto Fico:

> The blog was a form of broadcasting, but it was also an authoritative source of information for us. Without the blog and without Beppe, none of this could have happened. (Roberto Fico, private communication, 24 September 2015).[10]

As this quote shows, a centralized-vertical form of communication and a distributed one still co-exist and shape each other; verticality and horizontality are not mutually exclusive.

These are only two historical examples of how network imaginaries not only contribute to the collective reception and representations of the so called 'new media' and their networking infrastructures, but also to social life, political actions, institutions and business strategies. Moreover, imaginaries are productive and dynamic; they combine elements from the past to create new ideas of the future insofar as they are also 'ways of representing the non-representable' (Klein 2013: 12).[11] In sum, they are powerful and creative, but they can also institutionalize and repurpose the ideas of the past in a different guise and often with a different – whether positive or negative – goal. However, a collective imaginary stubbornly oriented towards the *limitlessness* of networking systems may compromise the collective capacity to change and co-shape the future by means of informed collective and political actions. The supposed limitlessness of networks is the strength but also the Achille's heel of network ideologies. In order to show the weakness of this deterministic stance it is thus essential to recognize the limits of networks so as to be aware of how these limits can be used and reframed to challenge the status quo and the oligopolistic dominance of the Internet today.

4.3 The Power of Limits

In *The Net Effect*, the media scholar Thomas Streeter stresses the deep impact of the network imaginary on the spread of the Internet during the 1990s. According to Streeter, the spread of the Internet was more a *consequence* of the collective imagination than a primary *cause* of change:

> The fact is, the Internet that appeared in 1993–1995 period wasn't just a technology; it was the enactment of a hope. The changes of 1993–1995 were very much *anticipatory*, changes based on what people *imagined could happen*, not what had already happened. In the early 1990s, the Internet did not so much cause new things to happen as it served to inspire people to *imagine* that new things would happen. […] Many of the things said and done in the name of the Internet in the 1990s we now know to be misjudgments, some of them colossal ones; those misjudgments, however, were not random. They were part of a pattern of shared collective vision, and that vision had an impact even if it was based on some shaky foundations. (Streeter 2011: 135)

As this work has tried to show, the imaginative power described by Streeter does not apply only to the Internet or to the Web, but to networks generally. The imaginaries of the Web and *Socrate* include both common and contrasting features, schemes and reference models. However, most importantly, these examples share a common faith in the realization of new societal organizations by means of networking systems and infrastructures.

Starting from the 1990s, contemporary retiologies have claimed that networks – whether we call them the Internet, Web, clouds or even neural networks – cannot be dominated; they will autonomously continue to grow and flow, building up a future of global connectivity among humans. The media theorist Wendy Hui-Kyong Chun has recently taken one of the most extreme stances towards this idea. In her book *Updating to Remain the Same: Habitual New Media* (2016) Chun argues that we live in an individualistic world provoked by networks; the new media *promise* of a better future is interpreted by Chun as a *habitual form of thought* able to prevent alternative collective behaviours and real change. Theoretically, Chun's critical stance can be seen as an extremization of the 'banalization' of the sublime as described by Vincent Mosco, according to whom:

> it is when technologies such as the telephone and the computer cease to be sublime icons of mythology and enter the prosaic world of banality – when they lose their role as sources of utopian vision – that they become important forces for social and economic change. (Mosco 2004:6).

In Chun's terms, technologies like the Internet, rather than becoming banalized, replicate and make *habitual* the sublime, forbidding the emergence of new

forms of resistance to the dominance of a neoliberal thought that exploits the very process of technological sublimation in order to spread endlessly, with no resistance. Although this work tends to agree with this critique, the constant sublimation of networks is interpreted here as a long-term phenomenon related to a network-centrism that is historically rooted in the delegation of power to specific structures and players. Rather than being situated in a recent paradigm, retiology is something that goes beyond the Internet-based media by embedding other media, sciences and societal structures.[12]

When it comes to digital networks such as the Web and *Socrate*, the idea that 'the structure is everything' (Berners-Lee 2000: 13) is combined with the idea that technology is in turn the foundational structure of social life, no matter whether it is centralized, as in the case of *Socrate*, or decentralized, like in the ideal promoted by the Web. In this regard, to look *beyond* networks means to acknowledge the social environments made of institutions, stakeholders, charismatic leaders and common users that create the narrative on which digital networks have been constructed, disseminated and re-interpreted over time. To do so, it is necessary to acknowledge that networks are not endless; they are always imagined and limited by people in different ways, by different socio-cultural and political contexts, and by spatial and time constraints. From a philosophical perspective, when it comes to network imaginaries, it is necessary to stress the seeming paradox that limitations are encompassed in the very idea of the 'unlimited' network. Accepting the infinite extensive propriety of networks means delegating the future to a technological and structural self-fulfillment. When interpreting the role and the impact of technology on society, a collective imaginary that chooses destiny and fate – rather than the complexity and incoherence that is embedded in the case studies analyzed so far – tends in fact *to limit itself*.

According to this perspective, one last assumption should be questioned and challenged to understand the importance of the imaginary for the construction of the network ideology, but also for the potential reinterpretation of the future and the past. It is a commonplace idea that imagination has no limits; nevertheless, human imagination needs to recognize a limit in order to imagine something that does not exist, but can happen in the future. To recall an expression adopted by the Telecom Italia manager Umberto de Julio, to accept the destiny and the self-fulfillment of networks means to leave people 'abandoned in the sea'; but humanity should instead navigate, so as to see, and to cross the horizon.

4.4 Beyond Networks

The 1990s represents a turning point in network histories. Indeed, this decade is commonly perceived as a watershed moment in the history of technology; it was a time when networks, together with computing and digital media, entered domestic spaces (and, in a second phase, individuals' pockets) and changed

drastically our social life. Events such as the birth of the Web and the launch of *Socrate* and *Iperbole* are respectively glorified as forgotten histories of this time. But notwithstanding social memory, they represent theoretical containers in which longstanding ideas of networking co-existed, converged and conflicted, penetrating and shaping both the social imaginary and reality. This process of imaginary appropriation of networking technologies took place thanks to a re-elaboration and a constant dialogue with the past, which in the present work has been illustrated by elements such as the familiar narrative tropes of the hero's journey; the constant reference to old media structures, functions and practices; the superimposition of pre-existing infrastructures upon new networks; the constant conceptual and pragmatic shifts between centralized, de-centralized and distributed models; and, last but not least, the unconditional faith in technology and technical innovation as the ultimate causes of change. However, the latter aspect is not a prerogative of networks. Past and contemporary ages share this belief – the belief in technology (and in turn in innovation and, especially, innovators) as change-makers. Today, this assumption allows big tech companies and powerful political and economic actors to promulgate and legitimize their hegemonic power. Hannah Arendt revealed this phenomenon better than anyone else in her masterpiece *The Human Condition*. According to Arendt:

> […] indeed, among the outstanding characteristics of the modern age from its beginning to our own time we find the typical attitudes of the *homo faber*: his instrumentalization of the world, his confidence in tools and in the productivity of the maker of artificial objects; his trust in the all-comprehensive range of the means-end category, his conviction that every issue can be solved and every human motivation reduced to the principle of utility; […] finally, his matter-of-course identification of fabrication with action. (Arendt 1998: 305–306)

The parallel between fabrication and action is comparable to the equation between networking and social change lying at the foundations of the network ideologies. As media studies have long asserted, communication depends only in part on the capacity of the means to reduce distance, time and the weight of messages. Instead, what network ideologies have professed so far, with the voluntary or non-voluntary contribution of inventors, politicians, scientists and stakeholders, is a world in which connectivity *is* communication and, even more relevant, networking *is* action. To understand the extent to which action has been historically delegated to technological structures and infrastructures is a first essential step towards a renewed human-centred vision that maintains a critical distance from the idealistic utopia of a promised net, an imaginary network that never existed.

There is much work ahead for historians and social scientists, as there is still space for new narratives that will be essential to the construction of an

informed and productive social imaginary. In this sense, an effective study of network histories would feed a renewed perception of the past and the future. An overview of the diverse trajectories of the Web and other network histories, from the very beginning up until their global spread, would provide an interpretative set of tools able to avoid a huge risk: that of losing the collective and individual capacity to re-read history. Thus it should become possible to change, juxtapose and challenge its dominant narratives and, most importantly, to wisely write down the future, and the role, of networking technologies in our societies.

Notes

[1] AT: 'The soul imagines what it does not see, what that tree, that hedge, that tower hides to it, and it goes astray in an imaginary space, and things are formed that could not be if its vision is extended everywhere, because the real would exclude the imaginary.'

[2] In Marxist terms, the base and the superstructure become inseparable.

[3] OT: Oggi, aldilà della problematica tecnica, la rete è diventata una soluzione al caos, al disordine e alle strutture dissipative. La rete è una rete di sicurezza per non pensare ai grandi problemi della scienza contemporanea. Per me siamo al limite di questo pensiero che è stato molto forte a lungo per causa del management, che a partire dall'ingegneria, continua a difendere quest'idea di rete. Secondo me però siamo al limite, abbiamo bisogno di nuove figure e forme a cui pensare oggi. La rete è una rete di salvataggio, un meccanismo di difesa dall'incertezza ed è un modo per comprendere la complessità della società, del cervello, dell'organismo. La rete permette, come Norbert Elias aveva ben visto, di legare e separare. È un modo per separare e legare, come dice Sherry Turkle 'insieme ma soli'. Per pensare questa società spezzata la rete è una figura utile ma per me è troppo utilizzata. È più difficile pensare all'incertezza, al caos, è più difficile pensare alla complessità. Invece, la rete dà ordine.

[4] Besides the works of English-speaking authors, French-speaking scholars such as Benjamin Loveluck (2016), and Italian scholars such as Andrea Miconi (2014) offer interesting and theoretically nuanced contributions to the analysis of power and hierarchical structures embedded in networked cultures.

[5] Authors such as Hindman, Tsioutsiouliklis and Johnson (2003) talk about *Googlehierarchy*.

[6] Almost two decades ago, Berners-Lee himself expressed his concerns about the possible development of the Web, especially towards the possible evolution of the semantic Web, one of the key projects subsumed by Internet giants such as Google. According to him: 'The Semantic Web, like the Web already, will make many things previously impossible just obvious. As I

write about the new technology, I do wonder whether it will be a technical dream or a legal nightmare.' (Berners-Lee 2000: 198)

[7] E.g., in 2006 Grillo organized a campaign to demand the resignation of Telecom Italia's CEO and senior executives. See: http://www.beppegrillo.it/shareaction/ (Accessed 20 January 2020)

[8] E.g., see several posts on Grillo's blog against Telecom Italia written between 2005 and2007: http://www.beppegrillo.it/2006/05/litalia_disconn.html (Accessed 20 January 2020)

[9] A video shared on Youtube shows Bonaga and Grillo debating this issue in Bologna. Grillo claims 'I know you did this stuff, and I'm grateful to you for this. Still, 20 years ago the Internet did not even exist.' See: https://www.youtube.com/watch?v=Xu2aHsYqusA (Accessed 20 January 2020)

[10] OT: 'Il blog era una forma di broadcasting, ma era anche una fonte di informazione autorevole per noi. Senza il blog e senza Beppe tutto questo non sarebbe potuto accadere.'

[11] OT: 'C'est un mode de représentation de l'irreprésentable.'

[12] In the first half of the last century, social theorists such as Georg Simmel (1976) and Robert K. Merton (1976) already tried to highlight the kinky side of modern individualistic cultures based on vertical structures. Even if they did not mention networks – and notwithstanding their antipodal approaches – such scholars criticized the perverse effects that structures such as the networked metropolis and the vertical ideal promoted through the self-made-man model have on societies.

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List of Acronyms

ADSL – Asymmetric Digital Subscriber Line
ARPANet – Advanced Research Projects Agency NETwork
ASST – State Company for Telephone Services
AT – Author translation
CCITT – International Telegraph and Telephone Consultative Committee
CERN – European Organization for Nuclear Research
CINECA – North-East Italy Inter-University Supercomputing Centre
CNUCE – National Institute of Electronic Computing
CSELT – Telecommunication Study Centre and Labs
FIDO-Dect – Italian Digital Enhanced Cordless Telecommunications System
GARR – Italian Research Networks' Harmonization Group
HFC – Hybrid Fibre Coaxial System
IPerBOLE- Internet for Bologna and Emilia Romagna
ITU- International Telecommunication Union
Minitel – French Videotext Online Service
MIT – Massachusetts Institute of Technology
M5S – Five Star Movement
OSI – Open System Interconnection standard
OT – Original text
SIP – Italian Society for Telephone Operation
SOCRATE – Telecom optical-coaxial telecommunications access network
STET – Telephone Companies Holding
TCP/IP – Transmission Control Protocol/Internet Protocol
TIM – Telecom Italia
VOD – Video on Demand
VOL – Video On Line
W3C – World Wide Web Consortium

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'The Internet is broken and Paolo Bory knows how we got here. In a powerful book based on original research, Bory carefully documents the myths, imaginaries, and ideologies that shaped the material and cultural history of the Internet. As important as this book is to understand our shattered digital world, it is essential for those who would fix it.'

Vincent Mosco, author of *The Smart City in a Digital World*

The Internet Myth retraces and challenges the myth laying at the foundations of the network ideologies – the idea that networks, by themselves, are the main agents of social, economic, political and cultural change. By comparing and integrating different sources related to network histories, this book emphasizes how a dominant narrative has extensively contributed to the construction of the Internet myth while other visions of the networked society have been erased from the collective imaginary. The book decodes, analyzes and challenges the foundations of the network ideologies looking at how networks have been imagined, designed and promoted during the crucial phase of the 1990s.

Three case studies are scrutinized so as to reveal the complexity of network imaginaries in this decade: the birth of the Web and the mythopoesis of its inventor; and the histories of two Italian networking projects, the infrastructural plan *Socrate* and the civic network *Iperbole*, the first to give free Internet access to citizens.

The Internet Myth thereby provides a compelling and hidden socio-historical narrative in order to challenge one of the most powerful myths of our time.

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