

## CHAPTER I

# 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.<sup>4</sup> 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.<sup>5</sup>

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).<sup>6</sup> 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<sup>7</sup> 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<sup>8</sup> 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 brings 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 Wolverson (2009) have shown, collecting and organizing knowledge is one of 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.<sup>9</sup> 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.<sup>10</sup> 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.<sup>11</sup> 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.<sup>12</sup> 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.<sup>13</sup> 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.<sup>14</sup> 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.<sup>15</sup> 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.<sup>16</sup>

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*<sup>17</sup> 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)

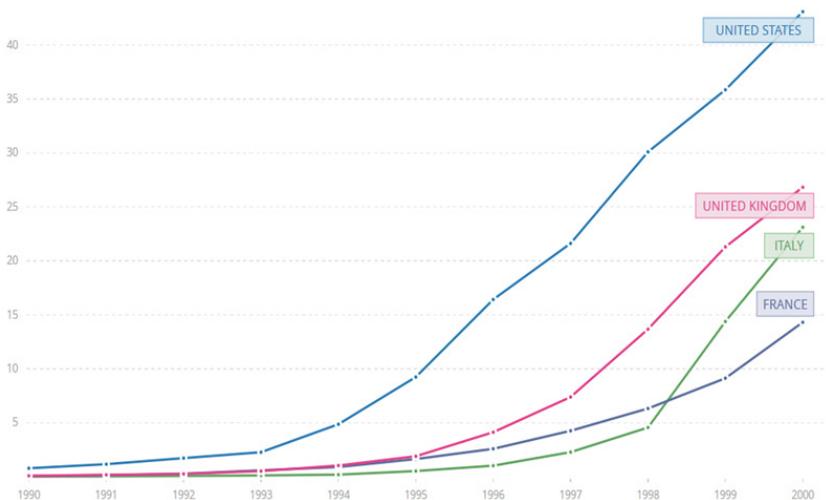
### 1.1.2 *The World Wide Web and the Transition of the 1990s*

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.<sup>18</sup>

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).<sup>19</sup> 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.<sup>20</sup> 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<sup>21</sup>; 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:<sup>22</sup>

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 synthesizes 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.<sup>23</sup> 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 Pалоque-Berges have recently argued:

The gap in this disjoint chronology reflects the messiness of inter-networking. 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 inter-networking 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

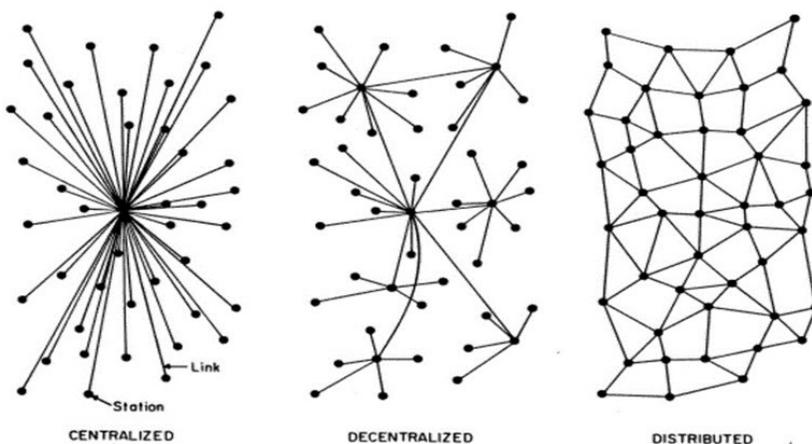
The innovation paths that have shaped networks in Western societies are often mixed with the lives of their inventors. This is a common trope of the US paradigm of Internet history. US scientists have frequently been depicted as heroes who challenged the *status quo*, questioning the theoretical and 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<sup>24</sup>, 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).<sup>25</sup> 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)

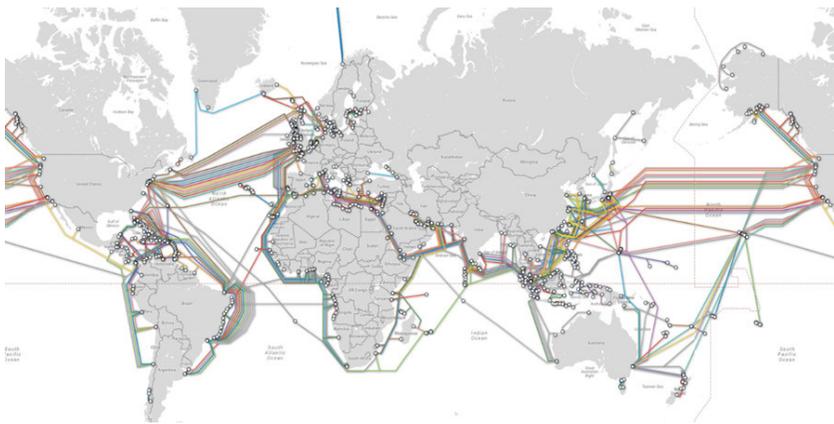
Theoretically, Internet metaphors such as 'cyberspace', the 'information universe' or 'collective intelligence' seem to exclude *a priori* the existence of a material infrastructure necessary to keep networks 'alive'. More ancient myths, like the dreams of the gnostics, refer to a pure intelligence made 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,<sup>26</sup> 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

- <sup>1</sup> 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.

<sup>2</sup> 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).

<sup>3</sup> 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>

<sup>4</sup> 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.

<sup>5</sup> 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 counter-cultural 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).

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> For a compelling analysis of the ARPANet history see the work of Alexandre Serres (2000).

<sup>9</sup> 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).

<sup>10</sup> 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](https://www.w3.org/Talks/9510_Bush/Talk.html) (Accessed 20 January 2020)

- <sup>11</sup> 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.
- <sup>12</sup> 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.
- <sup>13</sup> 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>.
- <sup>14</sup> 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).
- <sup>15</sup> 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>.
- <sup>16</sup> 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.
- <sup>17</sup> 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).
- <sup>18</sup> Source: Internet World Stats, <http://royal.pingdom.com/2011/03/31/Internet-1995/> (Accessed 20 January 2020).
- <sup>19</sup> 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.'
- <sup>20</sup> The structure of this myth recalls an old US mythical space: the Western American frontiers of the Nineteenth Century (Flichy 2007).

- <sup>21</sup> 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).
- <sup>22</sup> 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.
- <sup>23</sup> 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](http://web.archive.org/web/20040911114930/http://europa.eu.int:80/ISPO/docs/intcoop/g8/is_conf_95_gore.pdf).
- <sup>24</sup> RAND is an American think-tank offering research and technical analyses on communication systems to the United States Armed Forces.
- <sup>25</sup> 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).

<sup>26</sup> 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/>.