Introduction:
The Tributaries and Distributaries
of Computer Network Histories

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Long before the birth of the Internet, before the construction of roads, railways and highways, before the discovery of blood and neural systems, rivers were the main channels of communication and the world's "natural" networking infrastructure. In all continents, rivers were worshipped as gods with specific spirits. They provided water and fertility, like the Nile in ancient Egypt, the Amazon in Latin America, and the Yellow River in China. Rivers are also myths and symbols: they have played a role in the founding mythologies of cities like Rome (the two founders Romolo and Remo were saved by the god of the river Tiberinus) or were symbols of freedom in formative novels like Mark Twain's *The Adventures of Huckleberry Finn*. And, of course, rivers have always acted simultaneously as routes and borders between human communities. As other water gods, rivers are temperamental—sometimes calm, good divinities, sometimes furious and evil destroyers. Just like in our inter-networked world, river societies lived an instable, unpredictable life.

In line with Hu Yong's (2008) suggestion that the Internet and computer networks should be thought of through metaphors and analogies and in line with John Durham Peters' (2015) idea of including natural elements in media studies, we hereby propose that computer and river networks share many common features. Firstly, they are both communication and transportation infrastructures. In their respective realms, rivers and computer networks have been elective channels for the transmission of knowledge, for cultural and economic exchange or, in Harold Innis' terms (1950), means of communication. Furthermore, they are communication networks with hubs, points of exchange and switching and primary and secondary branches. Metaphorically, we browse, surf, and navigate the Web, along those streams that "the network of networks" opened up to human communication only a few decades ago.

Secondly, like many other essential infrastructures such as electricity and gas, rivers and computer networks are mostly invisible, both materially and symbolically. Only a minimal part of their material form emerges

from the ground. Over time, thousands of underground streams generated by sudden rainfall and invisible creeks have stubbornly fed the Ganges, the Rio Grande, the Danube and many small and sometimes even disappeared rivers. Similarly, millions of copper and fiber optic cables running underneath our asphalt roads or undersea in the oceans sustain the global contemporary data network flow, providing societies with the greatest "basin" of information ever seen. They might also be invisible because they go unnoticed. If a river does not flood and a computer network works properly, we do not care about them, they are taken for granted, like the air we breathe. But when something does not work, we immediately take stock of their importance. Indeed, when we lose control over them, rivers and computer networks can create panic, destroying cities or interrupting human activities and communication.

Finally, rivers and computer networks are, at the same time, controlled and unstable. At some point in history, humans started to control rivers, deviate and block their flows and change their final destinations. As a critical turn in media scholarship has recently shown, this same act of "containment" is impacting computer networks. However, as Benjamin Peters claimed during his keynote speech at the *Com*puter *Network Histories* conference (see below), networks remain "puckish creatures, they rarely do what we command them to do." The tension between an "out of control" network and a one whose flows have been interrupted, shaped and driven by private or public institutions has always been part of computer network histories.

This special issue originated from the *Computer Network Histories* conference, held in Lugano in December 2017 at USI Università della Svizzera italiana, incidentally a university located on Lugano's main river, Cassarate. The aim of this conference, generously sponsored by the Swiss Association of History and Informatics, was to gather together a group of scholars who have retraced some key-flows of the tributaries and distributaries of computer network history. Hidden streams, unexpected and disobedient flows enrich this special issue with new contents, characters and local experiences.

Notably, over the last century thousands of computer networks have been imagined, constructed and interlinked at national and international level by governments, scientific institutions and political organizations, or even by small communities and social movements. Like the thousands of small rivers that quenched the thirst of human communities in the past, computer networks provide various societies with unexplored forms of knowledge and information exchange thanks to their technological and infrastructural "nature." At the same time, these histories are not just histories of technologies, but also represent the vast heterogeneity of social,

political and cultural networks that, globalization rhetoric notwithstanding, still characterize and define our times (Bory, 2019; Negro, 2017). The tributaries and distributaries of computer network history—even if at some point of their route these streams were blocked or subsumed by larger organizations and structures—contributed to the way in which today, even in our (partially) interconnected world, societies use, share and imagine technology. In sum, as Internet and Web historians have largely shown, there has never been just *one* internet. Neither is there just one history of the Internet, but rather a range of histories, some of them well known than others (think about the United States) and some unnoticed or still to be written (Goggin & McLelland, 2017).

Providing alternative and unwritten histories of computer networks is the aim of this special issue which includes six papers dealing with network histories from Central and Southern Europe, North and South America, India and South Africa. And there is also a final dialogue between the two conference's keynote speakers: an American scholar who has studied the history of the internet in Russia and a Chinese scholar who has been studying the internet in his own country since the 1990s. In combining different methodologies, sources and geographical case studies, the issue deals with various dimensions of computer networks: alternative visions of technology, political economies of different internets, grass root movements and private sector contributions in the creation of national computer networks. It stresses the importance of socio-technical issues such as encryption, materiality, digital activism and digital rights as well as the role of prominent and visionary scientists like the Italian Robert Fano.

More specifically, in the first article entitled *Thou Shalt Love Thy BBS: Distributed Experimentation in Community Moderation*, Kevin Driscoll provides a social history of the dial up boards system, also known as BBS. Driscoll focuses especially on what he calls distributed experimentation in the moderation of online communities in the 1980s and 1990s. This is a history of the unknown creation of a community infrastructure based on voluntary maintenance and participatory governance that later resurfaced on a mass-scale with contemporary social media.

This is the only United States based paper (after all, there are also understudied histories of computer networks in the US), while all the other papers are non-US based and deal with alternative histories of digital rights, digital network political economies, and finally, mostly unknown actors.

Two papers deal with grassroots actors envisioning alternative computer networks, digital rights and community participation "from below" in Europe and in Africa. Felix Tréguer and Dominique Trudel wrote *From Internet Access Provision to Digital Rights Activism*, a paper analysing the history of the French Data Network (FDN), the first community network

and the Internet access provider open to the general public in France. While the history of computer networks in the country has been studied, especially from the perspective of big state actors (like France Telecom, Ministries of Posts), or champions of digital strategy like Nora and Minc, this article focuses on the role of grassroots actors and the formation of French digital rights activism from 1991 to 2011. In *Hacking Apartheid: Revolutionary Communication and the South African National Liberation Movement* Sophie Toupin examines the creation of an encrypted communication system by South African freedom fighters in the 1980s. This system was used to communicate secretly and transnationally in order to liberate people from apartheid. This case study frames hacking as a political, social and technical practice embedded in a national liberation movement and focuses on the pre-Internet era. Before the Arab Spring, and prior to the Internet being seen as a tool of democracy, computer networks were also tools for political action.

Alternative political economy of digital networks is a second macro-topic of this special issue. When we say alternative, we mean histories of digital networks which are not US-based, and histories of political economy of communication which consider the role of technology and adopt an STS perspective. Computer networks are thus often imagined as digital networks, completely separate from old analogue telephone networks. This is simply wrong and Christian Henrich-Franke in his *Computer Networks on Copper Cables: From the 'Promises to the Public' to the 'Profits of the Providers'* provides a German case study illustrating this. Franke highlights the importance of twisted pair copper cable infrastructures (those of the traditional, 19th century and analogue telephone networks) for computer network history. The copper cable network was indeed the infrastructure on which "the Internet" and "the Web" started to flow into private households and be used by mass audiences. This is ultimately a paper on how 'analogue technologies' have always played a key-role in the so-called digital transformation of our societies (on the relation between analogue and digital media see also Balbi & Magaudda, 2018). In other words, it proposes a new analogue and telephonic history of digital computer networks. Marcelo Savio and Henrique Luiz Cukierman analyse the origins of the Internet in Brazil from the early 1980s to today. Brazil is one of many countries in which computer networks were established in connection with and emulating the United States (and especially ARPANET) but with political, economic and socio-cultural peculiarities. The political dictatorship, first of all, envisioned a centralised and vertical computer network, mainly connecting universities and research centres. Ultimately these connections did not work well, mainly because of a lack of networking standards and because private companies entered the internet business

in the mid-1990s. Secondly, in contrast to the US, in Brazil there was an urgency of international connections right from the start, mainly with other Latin American countries. Early computer network histories are not only national but also, and especially, transnational (as Sophie Toupin's paper shows) and so digital historians should find new methods and sources to enquire into and research international archives.

Benedetta Campanile's paper focuses on a mostly unknown figure in computer network history: Italian-American computer scientist Roberto Fano. In the early 1960s, Fano launched Project MAC at the Massachusetts Institute of Technology and envisioned a new concept of cybernetics: "making the power of computers directly accessible to people." This is a story of the democratization of computer networks, of an alternative paradigm (opposing the centralised and oligarchic use of computers) which emerged in the hegemonic terrain of mainframes, and finally a story of an 'internet for all', far ahead of its time. This paper also offers a methodological insight: computer network historians should also follow people who swim in rivers for short distances. Metaphors aside, biographies are powerful tools with which historians can reconstruct not only personal stories, but especially environments, taken for granted ideas, and status quos that "special people" would like to break and change.

The outlet of this special issue is a dialogue between the two Lugano conference keynote speakers: American Benjamin Peters, who wrote a famous book on the history of the Russian internet (Peters, 2016), and Chinese Hu Yong, probably China's first internet scholars and one of its most important (see Hu, 1997). This discussion addresses relevant issues in the field, questioning and challenging the idea of network history, proposing alternative ways of talking about networks, providing key insights into how these have changed over time and highlighting the contributions of countries such as the Soviet Union, China and the United States. Finally, Peters and Hu stress the major challenges that scholars are facing in writing network histories but also the opportunities for further specific research in this field.

Our hope is that new paths will open up to readers in their mental maps of the networked globe, and that the streams flowing out of this issue may at least partially nourish the already fertile fields of internet and digital media history. Emblematically, any history, like any of the world's rivers, originates from a source and it is the sources of our contemporary networked world that we need to dig for, seek out and aspire to as historians. In order to navigate through this fuzzy present with clear coordinates, we first need to quench our thirst on the networked past.

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