A Conversation on Network Histories

Yong Hu, Benjamin Peters

What is network history?

YH: There is no denying that networks have a clear technical meaning: through long-distance communications, they connect related but dispersive elements, be they human or non-human actors. At the same time, network is also a sociological term that refers to social relationships between individuals and relates to the frequency, distribution, uniformity and intimacy of such relationships. Talking about networks in a general sense inevitably leads to ambiguity and misunderstanding. This makes the study of network history a rich field involving clarifying questions, identifying problems and distinguishing differences.

The word "network" has had a powerful ontological meaning right from the start. Its characterization of the essence of things evokes a mental image not of a hierarchical space but a polycentric context, more precisely, it constitutes a topology change in complex self-assembled structures. When it comes to networking, two-dimensional plane thinking or even three-dimensional spherical thinking is impossible. You must realize that there are as many nodes as there are dimensions. This is extremely useful in understanding modern society, because the society we live in is porous, idiosyncratic, collaborative, with distended capillaries, and its properties can never be fully grasped in terms of layers, angles, boundaries, domains, categories, structures, and even systems. When we employ a network framework to critically analyze modern society, we are actually explaining the above-mentioned concepts, yet at the same time differentiating the ontology, topology and politics of those concepts. I believe that it is impossible to understand cohesive social factors without considering the social structure in terms of the facts produced by the natural and social sciences as well as the production of engineers. The only way to do this is to introduce the social, political, and cultural into the network concept.

Therefore, scholarship concerning network history must emerge from diverse disciplinary and methodological traditions, addressing a range of topics, touching on an array of purposes, and also exploring unchartered waters. The point of such work is not just to develop an overall abstract picture (a goal with very limited chances of success), but rather to remind us of the specifics of each situation and see how they compare with others

in terms of the similarities and differences. This can help us reveal contrasting contingencies and different modes of practices, leading to a full appreciation of the political, social, economic, and cultural forces that drive today's network society.

BP: I largely share your vision here. I too see network history as an emerging interdisciplinary field of scholarly inquiry that is usually situated at the intersection of the history of technology, STS, communication and media studies. As this volume illustrates, it promises to be much more as well, intersecting *any* number of potential fields, including the history of business and transportation, political economy, sociology, cultural studies, surveillance studies, urban studies, policy, the philosophy of science, mathematics (networks as topological abstractions), and many others. Networks refer to more than just interconnected devices—they also employ the language of ecosystems, institutions, bodies, and other systems. Perhaps like all interesting topics, network history is bound to include whatever scholars make of it: the more diverse interdisciplinary interests scholars can bring to networks, the richer (and potentially more incoherent) the work will be.

Worth that risk, network history also comes with its own intellectual peculiarities. Namely, networks, unlike many other topics in media history and the history of technology, invite by their nature comparative and infrastructural analysis for one simple reason: collaborations bring networks into being. In other words, all sufficiently large networks exist thanks to preexisting cross-institutional collaborations and infrastructural arrangements. All attempts to build networks build on pre-existing means of coordinating interests across space, time, and society. No new media or computing network can exist, except upon the work of other supporting communication networks. As such, perhaps network history cannot help but be about the ongoing and uneven negotiation of disparate social interests. The history of networks is always already a history of certain kinds of collaboration—and once we have it clearly in our minds that the study of networks is the study of collaboration, the necessary cultural, social, economic, and political contexts you mention come more clearly into focus as well. Taking that peculiarity seriously poses significant intellectual and practical challenges to how scholars talk about networks.

It is also worth noting how frequently networks disobey the designers of their makers. Networks are puckish creatures—rarely do they do what their designers command them to do. Consider the curious fact that, in the age of the petabyte, two of the four largest telecommunication companies in the world still boast the word telegraph in their names (American Telephone & Telegraph and Nippon Telephone & Telegraph) while six of the largest ten claim telephone (AT&T, China Mobile, NTT, Vodafone, América Móvil,

Telefónica). Communication networks have, of course, enabled, speed, and helped generate forms of cultural and commercial creativity for generations. In fact, so essential is network access today that many pay their smartphone carriers before the local grocer. Gazing back on the humble origins of our communication networks, it appears obvious that networks have evolved in ways that no one, then or now, could have predicted. One of the most vital network history questions that strikes me, anyway, is to grapple with (admittedly loaded) questions like these: why do networks keep betraying their best intentioned designs? How and why did certain networks (and not others) transform telegraph wires over a century ago into global computer networks so "smart" they now trade in our thumbprints, profiles, and most intimate secrets without oversight or even much public awareness?

How do we talk about networks? How has network talk changed over time? What role do large countries—the US, China, and the Soviet Union, for example—play in those changing stories? How are network histories investigated in the US and China today?

YH: To begin with, it is important to avoid thinking of "the network" as a unified phenomenon. Measures of the extent of internet use may well be measuring very different things. The Internet includes a range of different technological affordances, social relationships, and cultural forms, each of which should be analyzed in its own right.

Any attempt to study even part of the network faces significant difficulties. The Internet is a decentralized medium that makes it impossible to fully understand all the aspects available online, let alone build a representative sample. This is a constantly changing medium that is always "under construction." As a result, any research must be considered "work-in-progress." Although it is rapidly evolving, network history still lacks shared descriptive and conceptual tools.

As far as the role big countries play is concerned, I would agree with Niels Brügger: "There are multiple local, regional and national paths and a variety of ways that the Internet has been imagined, designed, used, shaped, and regulated around the world." Chinese network historians must bear in mind that their subjects are non-linear and multimodal, they are expected to challenge monolithic and uncritical accounts, explanations and evidence, different cultural forms must not be discussed in isolation from each other, and finally, the Chinese internet is characterized by fundamentally different distinctions and demarcations than those typical of the "Western" internet.

For example, the party-state has implemented an active policy to promote a Chinese-centric web, making it into a cultural resource whose

reach is circumscribed by the state. People living within "the Chinese intranet" seem to experience very different information flows and patterns of cultural consumption. Yet at the same time, Chinese netizens are creating a new political subjectivity that helps them lay claim to and bring to fruition their citizenship. This provides a vivid example of the interplay between the affordances of communication technologies and the way people utilize them for their own purposes.

Ben, you raise a very interesting point about the incompatibility between network design and network operations. Today's Chinese internet users are seldom aware that there used to be a backbone network called China Public Multimedia Network, more often known by its dial-up access number 169, as "169 Network." Back in the late 1990s, the Chinese government endeavored to develop Chinese-only versions of the Internet walled off from the rest of the world. "169 Network" did not provide direct access to the Internet which was restricted to internal IP addresses only, in order to deal with "the shortage of IP addresses, the threat of information security, the large amount of sexual and reactionary information, vulnerability to the attacks of hackers, and the language barrier (most of internet content is in English)." As you might imagine, this vast nationwide intranet did not last long.

BP: This is a key point. There is no single network. Although patterns may obtain, there is no universally typical network experience, as the Chinese intranet and early Soviet computer network cases make obvious.

It may be useful to inject a bit of historiographical contrarianism into much contemporary network talk. I would propose that a sure sign that the future of network history is bright would actually be the *decline* of the term in the present. In other words, it is a given that historians arrive at topics late in the game, or as Hegel put it, in the dusky flight of Minerva's owl. I take this to be, on balance, a good thing: historians should be able to discover much wisdom about the history of networks only after folks are no longer preoccupied with its vocabulary. (How else could wisdom appear except in distinction from the mainstream?) Buzz first, history later.

At the same time, I am not convinced that, at least in my circles, network talk is in decline. Take the term "network" itself: the English word, with origins in the lattice and lacework of pre-industrial England, has certainly enjoyed exponential traction over the twentieth century, picking up a trickle of attention in the interwar period and then spiking steeply since the rise of the internet in the 1980s and 1990s. The bulk of evidence suggests the term remains largely up in the air today: a search for "network" today uncovers headlines about the regular network fare of cable news, sports channels, telecommunication company updates but also intrigues in foreign cyber

attacks, school consortiums, business connections, neuroscience, fungi colonies, and bitcoin currency mergers. The term is far from settled or over: for example, "mesh networks," a term of art for non-hierarchical computing connections as well as a return to the textile origins of the word, is a rather curious redundancy: what else could a network be but mesh? As Bernard Geoghegan has quipped in his own work on the programmable Jacquard loom, there may be more silk than silicon to the computing age, and still, we have a long way to go before network talk settles down.

What are the major challenges facing the writing of network history?

YH: As your point suggests, network historians must constantly revise their definitions of the field and their understanding of the historical dynamics. At the same time, as a new branch of the history of science and technology, network history has to develop new concepts, methodologies, and theories to explain what historians are witnessing right before their eyes. Moreover, they have to think about unprecedented topics such as cloud computing, data flow, cybersecurity and cyber warfare, digital platform, and artificial intelligence, to name just a few.

I actually think researchers should not give too narrow a definition of network history. The field should not be limited to computer networks per se, but also include histories of various network services (histories of BBS, blogging and microblogging, etc.), history of internet governance (Laura DeNardis' work on ICANN is a very fine example), the forming of digital subjectivity (for example, the term *netizen*, or in Chinese, *wangmin*—a portmanteau that literally means "a citizen of the Internet," originating from the U.S. and fast becoming hugely popular in defining China's internet users as though they were members of a "fifth estate," could characterize an interesting discursive approach to network history) as well as the emergence of online civil society (note that civil society has a number of theoretical models from which to develop analyses for particularities and localities). Also, the political economy of internet development should also be part of historiography, i. e., the origin of online public opinion, the evolvement of the concept of information sovereignty, the rise of digital economy and even a history of internet censorship.

Such broad questions require large-scale quantitative and qualitative research. Richer ethnographic research on the characteristics of users (even including non-users) would further aid scholars' ability to understand the long-term implications of online social life.

Another challenge would be, when we analyze network history, we must be specific and careful not to draw too broad conclusions. Today, as the

web has come to constitute an ever more ubiquitous social environment, it is becoming more and more difficult to grasp as an analytical totality.

BP: Here are two challenges for the network historian: one, pressing and political, and the other, conceptual. First, how did the distributed computer network—a technological approach to relations that first promised to bring about global democracy and liberty—end up enchaining the world in surveillance?

Second, here is the conceptual puzzle that eventually connects back to that first question: what is and isn't a network anyway? Perhaps, no one really knows what a network *is*. And harder still, no one really knows what a network *isn't*. In other words, we understand fairly well what makes communication networks work, but no one has an adequate accounting of what a network *is* or of the gaps that make it up. As I argue elsewhere, a network should not be mistaken for its network design, just as one should not mistake hiking a mountain trail for reading its map. "A map is not the territory," in founding semanticist Alfred Korzybski's famous line. Similarly, the documentable experience of a network territory (that is, of a set of assembled relations at work in the world) is far richer and broader than most talk about network designs (e.g., hubs, degrees of decentralization, link analysis, etc.). Network technologists tend to know what makes networks work (many specialize in precisely that). But, since network projects often rise or fall for reasons unrelated to the network itself, network historians may best account for what makes networks *not* work.

Thus, to understand the reasons networks often do not work, a historian should study the worlds they inhabit. Computer networks—because they both build on and, later, support unstable constellations of corporate, state, and institutional infrastructures in the mixed economies of the twentieth century—have proven particularly tricky muses of modern communication over the last fifty years; and there is both an insight specific to networks and a broader lesson to take from the tumultuous history of global networks: the broader lesson is that computer networks—like most technologies in history—consistently counter the fondest wishes of their designers. In the annals of technology, the dynamics of actual organizational behavior carry far more explanatory weight than the far more popular ideals of technological design. The history of networks focuses this general lesson to a specific point about collaborative projects as well: large communication networks, because they are by definition dispersed across many organizations, illuminate the profound power of institutional collaboration in practice, especially from the myriad reasons collaborative network projects do not take shape (Susan Leigh Star's and Thomas Hughes' diverse works on large technical systems are STS touchstones here).

There are, of course, many other more practical challenges that attend the writing of network history, although they are the usual challenges that come with writing history across multiple institutional sources. As you discuss, there is the challenge of defining and managing the scope of the project, which is always ongoing balancing act between not drawing too broad conclusions about the local experience of a network and its ubiquitous media environments (here the framing work of media scholar Christopher Ali on local media policy comes to mind); second, doing so in a way that encourages intellectual coherency around both your specific network project as well as distinctions from other types of network projects, which I think rehearses your point about continuously adjusting and adapting our understanding of what a network is and has been throughout history (perhaps the signal work for me is media historian Sebastian Giessmann's monumental *Die Verbundenheit der Dinge*); and most of all, the often hard-as-nails archival problem of actually accessing and synthesizing partial records distributed across the institutions that support whatever network you are researching. Many network histories, such as my own work on early computer networks in the Soviet Union, default to telling the story from the one or two primarily institutions that granted the researcher access; while this is sometimes inevitable and appropriate when framed as such, there is much to be gained from paying attention to the networks of (sometimes conflicting) records that result in building communication networks themselves: a recent signal network history, exemplary in its attention to globally diverse institutional sources, is historian Simone M. Mueller's *Wiring the World: The Social and Cultural Creation of Global Telegraph Networks* (New York: Columbia University Press, 2016). To twist a phrase from communication scholar Elihu Katz, international communication networks always precede national networks.

What are some of the major opportunities?

YH: Network history has become a research focus in the natural and social sciences, art and humanities, bringing distinct fields into conjunction (and sometimes confrontation) with each other.

Firstly, we could study the technology that comes from the basic architecture and infrastructure of the network. These are visible in the general network structure, the links, and the specific technological affordances of given tools and platforms. Secondly, social contingencies are embedded in user practices: a rich minefield of digital capabilities, usage patterns and networked social relationships. These contingencies can evolve as user practices change. Thirdly, the political and economic

domains of the network will need a great deal of ongoing topographical mapping. For example, our attention could be drawn to the concentration of ownership and the privatization of the open Web, prosumer commodification, platform governance, as well as the evolving relationship between networks and states.

Bearing in mind that political economic dynamics tend to impact on both technical and social contingencies, shaping, for example, the character of specific applications and complex relations of reciprocity.

The past decade has been marked by many important changes in the development of the network, tools are multiplying, platforms prospering, and people's leverage and understanding of these tools and platforms are becoming routine, but all of these point to an unmistakable dynamic evolution toward a fundamental redefinition of the network that goes beyond tools and platforms to reach the core of social arrangements. We will face a conflict of what I called "the old regime vs. the digital revolution." It is for this reason that popular perceptions of and academic discourses about the Internet are shifting from "a longstanding emphasis on possibility, novelty, adaptability and openness, and toward current preoccupations with risk, conflict, vulnerability, routinization, stability, and control." (Leah A. Lievrouw, "The Next Decade in Internet Time: Ways Ahead for New Media Studies", Information, Communication & Society 15 [5]: 616-638, 2012)

This is what I think the basic dilemma of today's digital life is: there are so many people who care about digital wealth, yet so few people who are concerned with the fundamental issues arising in our digital society. Those issues in urgent need of action are complex and difficult, such as the conflict between privacy and openness, security and freedom, government snooping and personal autonomy, protection of intellectual property rights and promotion of creative activities, and the increasingly powerful network platforms and user rights that need to be more extensive.

In the context of all these conflicts, the most important thing is to return to the original starting point and try to figure out a key question: what is the Internet? This is a question that begins simple but becomes complex; it seems to have been answered but never got fully answered.

In my view, there are two ways to deal with this "network question:" first, conceptualizing it; secondly, imagining it.

What is the Internet? How do we understand this ubiquitous and familiar feature in our everyday world? What can the Internet do, and what is new among the things it can do? What new ethical, social and political capabilities has it triggered? Does it make things outdated, problematic, or even impossible? As the world around us continues to reorganize, the social-technical combination we call the Internet poses a key challenge to many of the familiar assumptions and imaginations that make up our presence.

The conceptualization of the Internet is based on what is known; our image of it is based on what we might reasonably expect to see in the near future and beyond. To this end, we need both new values theory (ethics and political philosophy) and new epistemology (theories about knowledge and science). Our thinking about the network will surely reach this final stage at some point: we will start wondering, in a fully networked environment, what constitutes a human? What is human nature?

BP: Many challenges are potential opportunities in need of a thorough rethinking—and networks deserve the full-court press of critical historical attention. Networks—precisely *because* they, once understood as historical objects, offer such challenging and uneven constellations of social and technical relations and power that now rankle the present-day (the surveillance and security issues around the internet of things, net neutrality, cloud computing, mesh networks, etc.)—carry the potential to offer tremendously rewarding for critical diachronic study. Networks now appear the background for the stage on which modern users play out ours lives—or as the choice lens through which contemporary media users most often view and frame our relations; we imagine ourselves, wrongly or rightly, to be linked, connected, and adrift amid uneven hubs of relations. No doubt much of this connectivist language is as useful as it is misleading and shortsighted! Perhaps modern media users should understand the nature of relations not through connection but, to take just one different approach in network history, through gaps, breakages, fissures, and dynamic openings (this resonates with the earlier call to attend to the collaborative social world that often produces network project "failures"). Other metaphors latent in the materials of network history could include the labor and the language of fishing and capture, lace and textile work, city sewers and infrastructure, broadcast channels and mass society. Amid much else, network historians are uniquely positioned to help the reading public rework these and many other differences between rhetoric and reality in the tangled documents of our networked past.

Yong Hu
is the author of *Internet: The King Who Rules* (1997), the first book introducing the Internet to Chinese readers, and *The Rising Cacophony: Personal Expression and Public Discussion in the Internet Age* (2008), documenting major transformations in the Chinese cyberspace. He is professor at Peking University's School of Journalism and Communication, a member of the Steering Committee of Chinese Internet Research Conference (CIRC), and also a member of the World Economic Forum Global Agenda Council on

Social Media, 2013-2016. In 2017 Hu was nominated for the Thinkers50 Digital Thinking Award. In 2018, he was included in the Thinkers50 Radar list of the 30 management thinkers most likely to shape the future of how organizations are managed and led. Tweet @huyong or read more at huyong.blog.caixin.com

Benjamin Peters
is author of *How Not to Network a Nation: The Uneasy History of the Soviet Internet* (MIT Press, 2016), winner of the 2017 Vucinich Book Prize, among others, and editor of *Digital Keywords: A Vocabulary of Information Society and Culture* (Princeton University Press, 2016). He is Hazel Rogers Associate Professor and Chair of Media Studies at the University of Tulsa and an associated fellow at the Information Society Project at Yale Law School. Tweet @bjpeters or read more at benjaminpeters.org.