'Capture it While You Can': Revisiting SIGCOMM 99's Technical History of the Internet

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ABSTRACT

This editorial gives a brief overview of a project historicizing the "Technical History of the Internet," a tutorial held at SIGCOMM's 1999 meeting at Harvard University. Organized in part by the late computer scientist and historian Chris Edmondson-Yurkanan, the tutorial brought together 19 key players from the development of the Internet to reflect on their foundational work. Using both digital and physical records from Edmondson-Yurkanan's archive, we discuss the importance of this event in generating a robust discussion and historical record about the Internet's technical evolution. Historical work about this tutorial also raises important questions on the ways in which records about the Internet's development are preserved or neglected.

CCS CONCEPTS

• **Social and professional topics → History of computing**.

KEYWORDS

Internet History, SIGCOMM99, ARPANET

INTRODUCTION

On Tuesday, August 31st, 1999, nineteen figures central to the development of the Internet would gather in a lecture hall at Harvard's Science Center for the "Technical History of the Internet," a tutorial program preceding SIGCOMM's annual conference. The tutorial, which ran over the course of that day and was open to all SIGCOMM attendees, offered a chance to reflect on where networking had been and how technical debates had evolved and been resolved with those who had the greatest say in them.

Most of all, it offered the opportunity to ask: how did we get here? How had a handful of academic and government projects, whether the American ARPANET or the French CYCLADES, grown into a global, widely-used communication network? Or, as Lyman Chapin and Vint Cerf would put it in an introductory letter for tutorial participants: "The road that has led to today's Internet began long before the term was first used, and certainly no one walking the early stretches of that road imagined the global phenomenon that would be the eventual result of their work". [1]

This year–2019–marks twenty years since those figures gathered to offer their takes on the Internet's technical history, but it also marks fifty years since the first four nodes were installed on the

ARPANET, and fifty years since the founding of SIGCOMM, both in 1969. These anniversaries offer us–whether computer scientists, technology historians, or even just Internet users–a moment to look back. More specifically, looking back to events like SIGCOMM '99 offers insight into how narratives of the Internet's development have shifted over time, how information about the Internet's evolution has been preserved or neglected, and how the events of the Internet's past shape the network as it is now and as it may be in the future.

In these ways, the SIGCOMM '99 tutorial is a unique event for thinking about the Internet's past and has been the subject of a surprising and rewarding research project we have pursued over the previous two years. Here we offer a brief overview of this ongoing project, including a synopsis of the project's development and a discussion of one of the tutorial's central artifacts, the SIGCOMM '99 Tutorial Notebook.[1]

1 PROJECT DEVELOPMENT

We first came across the tutorial while working with the Jon Postel Archives at the University of Southern California. While initially looking for the work of women who had contributed to the development of the Internet in these assorted papers, we soon happened across the name of one instrumental in documenting Internet history: Chris Edmondson-Yurkanan.

EdmondsonYurkanan was a computer science faculty member at the University of Texas at Austin, an Internet historian, a Postel Center Fellow and a longtime SIGCOMM volunteer who had passed away in 2017, just a few months before we discovered her name through these archives. Importantly, she had also been the conference coordinator for the 1999 SIGCOMM meeting and one of the principal organizers of the Technical History of the Internet tutorial. She thus acted as a springboard for our interest in the event.

We were drawn to the tutorial for a number of reasons. First, it represented a comprehensive attempt to foster conversations around the technical history of the Internet. While there were numerous stories of the Internet's evolution that emerged during this time–whether organizational, political, or social–there were few

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[1]In this editorial we have linked to the Tutorial documentation and artifacts if they have been already made available online. As of publication, however, some of the documents have not been published online. Please contact the authors with any questions regarding updates to artifact availability.

accounts that focused explicitly on technical decisions within the networking community. The tutorial created a forum in which to advance these discussions, but also represented an opportunity to gather primary source materials about the technical past. Indeed, a key component of the Technical History of the Internet was the solicitation of primary source materials from the nineteen participants. Hundreds of documents were sent to Edmondson-Yurkanan in the weeks leading up to the event, which were whittled down to just over 600 pages. A binder of these documents–known as the Tutorial Notebook–was then distributed at the August event. Documents were selected for their uniqueness in an effort to include technical materials that were not widely available elsewhere. Some of these materials were also digitized and made available in a publicly accessible web archive organized and hosted by Edmondson-Yurkanan [2].

Second, the tutorial was remarkable because of its relative absence from a broader historical record. While significant for the figures it gathered and the material it generated, the tutorial has received relatively little attention in the twenty years that followed. This stands in contrast to other events that have brought together the group commonly referred to as the Internet's pioneers. For instance, a 25th anniversary event of the ARPANET organized by BBN in 1994 was covered by both popular and industry press and was also memorialized in the 1999 popular press book *Where Wizards Stay Up Late: The Origins Of The Internet* [3].

Last, and perhaps most importantly, the tutorial was significant because it raised questions about how primary source material on the development of the Internet will be preserved for the future. Indeed, as we began digging into Edmondson-Yurkanan's work on the tutorial, we were struck by the closing line of her 2007 Communications of the ACM article about documenting networking history [4]: "History unfolds rapidly," she wrote. "Capture it while you can." Yet we soon came to realize an ironic twist. While Edmondson-Yurkanan had maintained the web-based archive of SIGCOMM tutorial documents through a University of Texas at Austin domain, the site was removed in the years after her retirement in 2007. Fortunately, the large majority of materials originally uploaded there had been captured by the Internet Archive's Wayback Machine[2], but it highlighted the tenuousness of websites as permanent public resources for historical materials. Moreover, though we were able to find a portion of the documents collected for the tutorial through the archived website, this collection did not include a full version of the Tutorial Notebook.

It was not until we were connected to Edmondson-Yurkanan's spouse through the ACM History Committee that we came to understand the full scope of the event. Edmondson Yurkanan's husband generously offered us the opportunity to work with her archive that he maintains at their home in Texas. While there, we found not only the Tutorial Notebook, the contents of which we discuss in the next section, but also videos of the day-long event, which were converted to be once again playable after a number of hours of A/V wrestling. And still, there were records we could not access, whether email accounts or floppy disks.

In sum, this project has made it abundantly clear that, like history itself, records chronicling technical histories change rapidly. These materials are subject to physical degradation, to media obsolescence, and to the constant churn of the web; they may be scattered across multiple locations and may require serendipitous connections to access. It has shown us that the history of the Internet, bound up in these many materials, requires ongoing maintenance and care.

2 SIGCOMM '99 TUTORIAL NOTEBOOK

The SIGCOMM tutorial notebook represents a core contribution of the event. It begins with an introduction by Vint Cerf and Lyman Chapin, who joke that much has been left out of the binder "if only to prevent injury to those of you attending the tutorial" [1]. What remains are those hundreds of pages of material chosen by the nineteen participants, which are organized into the tutorial's five sessions: 'Laying the Foundation,' 'Building Early Packet Networks,' 'Creating the Internet,' 'Fixing the Internet,' and 'Connecting the World.'

The notebook is composed of a mishmash of excerpts from papers, dissertations and reports, with numerous diagrams and a number of photographs. Most participants' slides from the tutorial are included in the Notebook, and documents are often given commentary from the participant who chose to include them. Paul Baran, for instance, provided annotation for early diagrams of survivable, packet-switching networks. Larry Roberts' contribution noted the importance of Leonard Kleinrock's Communication Nets: Stochastic Message Flow and Delay for allowing a leap in his thinking about packet-switching networks in the early 1960s. David L. Mills' slides for "Routing in the Internet Swamp" offered reflective notes on technical details, writing: "Maybe the most important lesson of the Internet was that the technology was developed and refined by its own users." Many contributors included scans of important papers from their own work, whether Leonard Kleinrock's proposal for his 1961 dissertation at MIT or Vint Cerf's inclusion of his, Carr, and Crocker's "HOST-HOST communication protocol in the ARPA network" [5].

Some of the most telling of these documents are the memoranda, emails, and letters that were included. These include dispatches like the 1972 "A Funny Thing Happened on the Way to USC," where John McQuillan writes about solving a strange problem occurring between the IMPs at UCLA and USC. There is the 1977 email from Jim Mathis and Ginny Strazisar to Vint Cerf with the subject "An Internetting Historic Event," noting that the message had been sent from the SRI Packet Radio Van via the experimental PRNET, the ARPANET, and the SATNET. These direct communications within the networking community help to underscore the qualification of the tutorial organizers that these documents and presentations were just one way to represent the "ideas and insights of a very large cast of contributors" [1], a cast that went much beyond the nineteen listed participants.

Importantly, while a number of these documents may today be accessible through a simple online search or through institutional archives, they are notable because they represent something beyond the explicit primary sources themselves. That is, the Tutorial Notebook is a remarkable historical document because it displays how these central figures conceptualized key stages in the Internet's technical development and their own contributions to these stages.

3 CONCLUSION

Whether assessing the defunct tutorial websites, digging in to the robust materials that Chris Edmondson-Yurkanan left behind, or digitizing the Tutorial Notebook and Tutorial videos, the archival work on SIGCOMM 99's "Technical History of the Internet" represents only the first stage in our research project. We are in the process of interviewing those who attended or participated in the tutorial, and are eager to hear from those who were involved. Finally, in this project we follow Chris Edmondson-Yurkanan's observation that "history events energize both pioneer and student" [4], and, as a culminating step, are planning an exhibition of these materials for an upcoming SIGCOMM meeting.

This project has allowed us to consider new narratives about the Internet's technical past. It has enabled us to understand the multiple ways that Internet history might fade away. It has also highlighted the role of ACM, its special interest groups, and its individual community members in maintaining and caring for the stories and artifacts of the technological past. Most importantly, it has allowed us to understand some ways that the Internet–and Internet history–has changed over time, whether in the twenty years since the Technical History tutorial or the fifty years since SIGCOMM's founding and the ARPANET's initial connection. It is events like the Technical History of the Internet–or indeed this CCR anniversary issue–that allow us to reflect on these changes.

ACKNOWLEDGMENTS

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