Primary Source Collection #6: *Cyber Space*

Introduction

Included in this source collection are three sources relating to cyber space. The first is an Initial Public Offering (IPO) letter written by the founders of Google – Larry Page and Sergey Brin – to potential shareholders in 2004. The source lays out Page and Brin's vision for the company, and the internet at that time. The second source is the text of the High-Performance Computing Act, introduced to the the United States Congress in 1991 by Senator Al Gore, and the third is an article written by founder of the Institution for Women and Technology, Anita Borg, addressing the problems plaguing women in the field of computer science. Together, the sources provide a view of the optimism and challenges of the early internet era. Discussion questions are also provided for each source to help guide your reading.

PRIMARY SOURCES

2004 FOUNDERS' IPO LETTER

HIGH-PERFORMANCE COMPUTING ACT OF 1991

ANITA BORG, WHAT DRAWS WOMEN TO AND KEEPS WOMEN IN COMPUTING?

Primary Source 1: *2004 Founders' IPO Letter*

Sergey Brin and Larry Page

The 2004 IPO letter drafted by Larry Page and Sergey Brin, the founders of Google (now Alphabet), contains all the idealism, optimism, hubris, and short-sightedness of the early internet era. By 2004, Wall Street and the public at large had adjusted to massive IPOs (initial public offerings) from internet companies, but after the recent decline of old internet giants like AOL, Yahoo, and Netscape, it would have been understandable if some people remained skeptical about the young upstart Google. The company, which ended up cornering the growing internet search market and expanding into many different fields, won over skeptics, however, as it continued to produce new products and grow its revenue. Larry Page and Sergey Brin, who famously founded Google, Inc. from colleague and fellow computer scientist Susan Wojcicki's garage in 1998, had already steered the company toward early success by 2004. Despite growing criticism of a Google monopoly on search, as well as questions regarding data security and privacy, the company continued to grow over the ensuing couple of decades.

Source: Page, Larry, and Sergey Brin. "2004 Founders' IPO Letter." Alphabet. [*https://abc.xyz/investor/founders-letters/2004-ipo-letter/*](https://abc.xyz/investor/founders-letters/2004-ipo-letter/).

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Discussion Questions:

- In what ways did Sergey Brin and Larry Page present the internet and Google as positive or ameliorative forces? What type of future did they envision for humanity online?
- Think about some information that does not appear in this letter, like how the company makes money. What topics were they avoiding and why?
- As to what they were not saying: where does privacy fit into a business model that relies almost entirely on ads? Why did they make avoiding evil a part of their corporate mission?

Google is not a conventional company. We do not intend to become one. Throughout Google's evolution as a privately held company, we have managed Google differently. We have also emphasized an atmosphere of creativity and challenge, which has helped us provide unbiased, accurate and free access to information for those who rely on us around the world….

Google's logo, 2013-15

Serving end users

Sergey and I founded Google because we believed we could provide an important service to the world-instantly delivering relevant information on virtually any topic. Serving our end users is at the heart of what we do and remains our number one priority.

Our goal is to develop services that significantly improve the lives of as many people as possible. In pursuing this goal, we may do things that we believe have a positive impact on the world, even if the near term financial returns are not obvious. For example, we make our services as widely available as we can by supporting over 90 languages and by providing most services for free. Advertising is our principal source of revenue, and the ads we provide are relevant and useful rather than intrusive and annoying. We strive to provide users with great commercial information.

We are proud of the products we have built, and we hope that those we create in the future will have an even greater positive impact on the world.

Risk vs reward in the long run

Our business environment changes rapidly and needs long term investment. We will not hesitate to place major bets on promising new opportunities.

We will not shy away from high-risk, high-reward projects because of short term earnings pressure….

We encourage our employees, in addition to their regular projects, to spend 20% of their time working on what they think will most benefit Google. This empowers them to be more creative and innovative. Many of our significant advances have happened in this manner. For example, AdSense for content and Google News were both prototyped in "20% time." Most risky projects fizzle, often teaching us something. Others succeed and become attractive businesses….

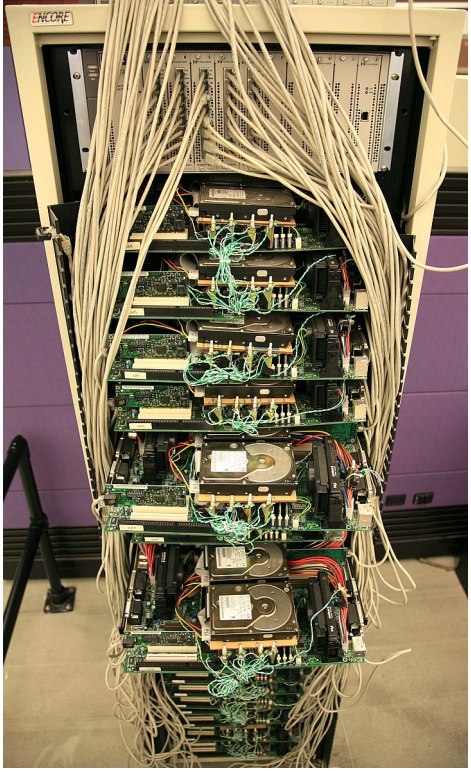
Larry Page and Sergey Brin, 2003

Googlers

Our employees, who have named themselves Googlers, are everything. Google is organized around the ability to attract and leverage the talent of exceptional technologists and business people. We have been lucky to recruit many creative, principled and hard working stars. We hope to recruit many more in the future. We will reward and treat them well.

We provide many unusual benefits for our employees, including meals free of charge, doctors and washing machines. We are careful to consider the long term advantages to the company of these benefits. Expect us to add benefits rather than pare them down over time. We believe it is easy to be penny wise and pound foolish with respect to benefits that can save employees considerable time and improve their health and productivity.

The significant employee ownership of Google has made us what we are today. Because of our employee talent, Google is doing exciting work in nearly every area of computer science. We are in a very competitive industry where the quality of our product is paramount. Talented people are attracted to Google because we empower them to change the world….



Google's first production server, c. 1999

Don't be evil

Don't be evil. We believe strongly that in the long term, we will be better served-as shareholders and in all other ways-by a company that does good things for the world even if we forgo some short term gains. This is an important aspect of our culture and is broadly shared within the company.

Google users trust our systems to help them with important decisions: medical, financial and many others. Our search results are the best we know how to produce. They are unbiased and objective, and we do not accept payment for them or for inclusion or more frequent updating. We also display advertising, which we work hard to make relevant, and we label it clearly. This is similar to a well-run newspaper, where the advertisements are clear and the articles are not influenced by the advertisers' payments. We believe it is important for everyone to have access to the best information and research, not only to the information people pay for you to see.

Making the world a better place

We aspire to make Google an institution that makes the world a better place. In pursuing this goal, we will always be mindful of our responsibilities to our shareholders, employees, customers and business partners. With our products, Google connects people and information all around the world for free. We are adding other powerful services such as Gmail, which provides an efficient one gigabyte Gmail account for free. We know that some people have raised privacy concerns, primarily over Gmail's targeted ads, which could lead to negative perceptions about Google. However, we believe Gmail protects a user's privacy. By releasing services, such as Gmail, for free, we hope to help bridge the digital divide.

AdWords connects users and advertisers efficiently, helping both. AdSense helps fund a huge variety of online web sites and enables authors who could not otherwise publish. Last year we created Google Grants—a growing program in which hundreds of non-profits addressing issues, including the environment, poverty and human rights, receive free advertising. And now, we are in the process of establishing the Google Foundation. We intend to contribute significant resources to the foundation, including employee time and approximately 1% of Google's equity and profits in some form. We hope someday this institution may eclipse Google itself in terms of overall world impact by ambitiously applying innovation and significant resources to the largest of the world's problems.

Googleplex Headquarters, 2016

Primary Source 2: *High-Performance Computing Act of 1991*

Al Gore

Contrary to some glorified narratives, the internet did not develop organically through the agency of individual creators, though those creators certainly played their part. The internet was carefully constructed and supported by government agencies, independent capital, and user interest. The High-Performance Computing Act of 1991, which Senator Al Gore of Tennessee sponsored, called for an across-the-board investment in networking and computing. Many people also point to the government sponsored ARPANET, or the Advanced Research Projects Agency Network, which came to life twenty-five years earlier as one of the earliest precursors to the modern internet. If ARPANET brought the internet to life, the High-Performance Computing Act of 1991 brought it to the world. The 1990s marked the beginning of the internet boom with the expansion of cable and server infrastructure, the growth of service providers, and the rapid growth of dot com websites.

Source: Congress.gov. "S.272 - 102nd Congress (1991-1992): High-Performance Computing Act of 1991." December 9, 1991. https://www.congress.gov/bill/102nd-congress/senate-bill/272/text.

Discussion Questions:

- What was the purpose of the High-Performance Computing Act of 1991?
- In what ways did the federal government support the growth of the internet and high-performance computing? Which agencies were instructed to digitize and how might the digitization of those agencies have encouraged further digitization around the country?
- How did Al Gore and other supporters of the bill justify increased spending on networking and computing?

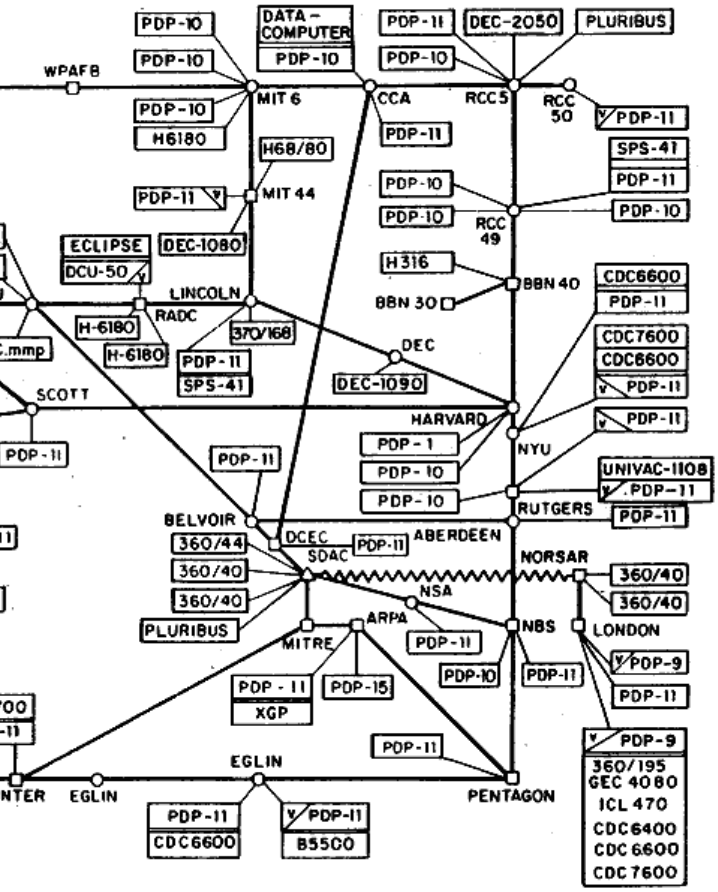
An Act

To provide for a coordinated Federal program to ensure continued United States leadership in high-performance computing.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SEC. 2. FINDINGS.
The Congress finds the following:

(1) Advances in computer science and technology are vital to the Nation's prosperity, national and economic security, industrial production, engineering, and scientific advancement.
(2) The United States currently leads the world in the development and use of high-performance computing for national security, industrial productivity, science, and engineering, but that lead is being challenged by foreign competitors.



Detail of 1977 ARPANET Logical Map, precursor to the modern internet

(3) Further research and development, expanded educational programs, improved computer research networks, and more effective technology transfer from government to industry are necessary for the United States to reap fully the benefits of high-performance computing.
(4) A high-capacity and high-speed national research and education computer network would provide researchers and educators with access to computer and information resources
and act as a test bed for further research and development of high-capacity and high-speed computer networks.
(5) Several Federal agencies have ongoing high-performance computing programs, but improved long-term interagency coordination, cooperation, and planning would enhance the effectiveness of these programs.

SEC. 3. PURPOSE.
The purpose of this Act is to help ensure the continued leadership of the United States in high-performance computing and its applications by—

(1) expanding Federal support for research, development, and application of high-performance computing in order to—

(A) establish a high-capacity and high-speed National Research and Education Network;
(B) expand the number of researchers, educators, and students with training in high-performance computing and access to high-performance computing resources;
(C) promote the further development of an information infrastructure of data bases, services, access mechanisms, and research facilities available for use through the Network;
(D) stimulate research on software technology;
(E) promote the more rapid development and wider distribution of computing software tools and applications software;
(F) accelerate the development of computing systems and subsystems;
(G) provide for the application of high-performance computing to Grand Challenges;
(H) invest in basic research and education, and promote the inclusion of high-performance computing into educational institutions at all levels; and
(I) promote greater collaboration among government. Federal laboratories, industry, high-performance computing centers, and universities; and

(2) improving the interagency planning and coordination of Federal research and development on high-performance computing and maximizing the effectiveness of the Federal Government's high-performance computing efforts.

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TITLE I—HIGH-PERFORMANCE COMPUTING AND THE NATIONAL RESEARCH AND EDUCATION NETWORK

(c) OFFICE OF MANAGEMENT AND BUDGET.—(1) Each Federal agency and department participating in the Program shall, as part of its annual request for appropriations to the Office of Management and Budget, submit a report to the Office of Management and Budget which—

(A) identifies each element of its high-performance computing activities which contributes directly to the Program or benefits from the Program; and
(B) states the portion of its request for appropriations that is allocated to each such element.

(2) The Office of Management and Budget shall review each such report in light of the goals, priorities, and agency and departmental responsibilities set forth in the annual report submitted under subsection (a)(3)(A), and shall include, in the President's annual budget estimate, a statement of the portion of each appropriate agency's or department's annual budget estimate relating to its activities undertaken pursuant to the Program.

(a) ESTABLISHMENT.—As part of the Program, the National Science Foundation, the Department of Defense, the Department of Energy, the Department of Commerce, the National Aeronautics and Space Administration, and other agencies participating in the Program shall support the establishment of the National Research and Education Network, portions of which shall, to the extent technically feasible, be capable of transmitting data at one gigabit per second or greater by 1996. The Network shall provide for the linkage of research institutions and educational institutions, government, and industry in every State.

President Bill Clinton and Al Gore install computer cables on NetDay at Ygnacio Valley High School in Concord, California, 1996

(b) ACCESS.—Federal agencies and departments shall work with private network service providers, State and local agencies, libraries, educational institutions and organizations, and others, as appropriate, in order to ensure that the researchers, educators, and students have access, as appropriate, to the Network. The Network is to provide users with appropriate access to high-performance computing systems, electronic information resources, other research facilities, and libraries. The Network shall provide access, to the extent practicable, to electronic information resources maintained by libraries, research facilities, publishers, and affiliated organizations.

(d) DEFENSE ADVANCED RESEARCH PROJECTS AGENCY RESPONSIBILITY.—As part of the Program, the Department of Defense, through the Defense Advanced Research Projects Agency, shall support research and development of advanced fiber optics technology, switches, and protocols needed to develop the Network.

(f) USE OF GRANT FUNDS.—All Federal agencies and departments are authorized to allow recipients of Federal research grants to use grant moneys to pay for computer networking expenses.

TITLE II—AGENCY ACTIVITIES

(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I—

(1) the National Science Foundation shall provide computing and networking infrastructure support for all science and engineering disciplines, and support basic research and human resource development in all aspects of high-performance computing and advanced high-speed computer networking;
(2) to the extent that colleges, universities, and libraries cannot connect to the Network with the assistance of the private sector, the National Science Foundation shall have primary responsibility for assisting colleges, universities, and libraries to connect to the Network;

(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the National Science Foundation for the purposes of the Program $213,000,000 for fiscal year 1992; $262,000,000 for fiscal year 1993; $305,000,000 for fiscal year 1994; $354,000,000 for fiscal year 1995; and $413,000,000 for fiscal year 1996.

United States Capitol, 1991

Primary Source 3: *Anita Borg, What Draws Women to and Keeps Women in Computing?*

Anita Borg

Anita Borg, the computer scientist and founder of the Institute for Women and Technology, drafted the following short essay in 1999. In it, she outlined problems plaguing the field of computer science as well as her early efforts to organize and offer support to women in the field. Many of the trends that she observed, such as the decreasing percentage of women pursuing computer science degrees, continue to this day. Computer science has become a highly masculine space, and this has greatly influenced the "culture" of the internet and many online communities. Reports of so-called boys' clubs and toxic work environments has limited the ability of women to carve out a space for themselves. Anita Borg, who passed away in 2003, was one of many who attempted to reform the institution and open the space for others. This work continues today through the advocacy of the renamed Anita Borg Institute and many reformers in the present.

Source: Borg, Anita. "What Draws Women to and Keeps Women in Computing?" Annals of the New York Academy of Sciences 869, no. 1 (1999): 102-105.

Discussion Questions:

- What led to the decline of women in the fields of computing and technology? What impact has this had on both the new technologies that are produced and gendered social dynamics?
- What did Borg mean when she wrote that women spend a lot of time switching between their professional and female selves?

I would like to describe a bit about my background in order to give some perspective to my remarks about women in the computing workplace. During my nearly 30 years in the computing field I have worked for small, medium and large companies and have taught at two colleges. I have been "girl Friday," programmer, systems designer, manager, and for most of the past dozen years, a researcher. In addition, my personal experience has been considerably augmented by connection with many other women. In 1987, I started a small Internet mailing list for women in computing. Today, *systers** is a virtual community of more than 3000 technical women in the computing field in 25 countries. The membership consists of the full range of technical women, from undergraduate majors to retirees. The discussions on *systers* reflect the full range of the issues that women have as participants in the computing field.

* *Systers* still exists today. For more, view their website: https://www.systers.org/.

GETTING INTO COMPUTING

As many of you are aware, decreasing numbers of women are choosing computing, whether science or engineering, as an educational and career path. Today the numbers of women going into computing is consistent with that of women in the hard sciences and engineering—the percentage of CS and CE bachelor's degrees achieved by women is below 20% of the total. However, unlike other fields, in 1984, nearly 40% of these degrees were granted to women. In order to change the current situation, we must ask not only "What is the problem today?" but "What was the situation then, how is it different now, and what can we (in all science and engineering fields) learn from it?"**

Specialist for typesetting technology, 1983

Women who received their bachelor's degrees in 1984 spent the 1960s and 70s growing up, learning about the world, reacting to stereotypes, and making decisions that would influence their educational and professional decisions. The information age had not yet arrived. Two implications are particularly important.

First, computers had not yet become commonplace in homes and schools. Girls and boys got through most of secondary school without experiencing unequal participation with computers. Today, there is both an imbalance in the availability of software that appeals to girls and few attempts to address boys' tendencies to "hog" the computer. Girls get to the point of choosing a field of study or a professional direction with less experience and the belief that they are behind.

Second, culturally pervasive stereotypes of the computer professional did not exist. There are two particularly damaging aspects to the stereotype: the image of the nerd or hacker and the pervasive belief that 60- to 80-hour work weeks are required. Neither stereotype is universally true. Both impact young women who rarely identify with the unwashed, Twinkie-eating, socially incompetent nerd stereotype and often hope to be able to balance work and family life.

Shelley Lake working on a computer-generated element for the film The Last Starfighter at Digital Productions, 1983

** According to the NSF, women received 19.93% of the bachelor's degrees in computer science and 21.58% of doctorate degrees in 2018. Compare this with the 26.98% receiving a BA and 16.32% receiving a PhD in 1998. See, NSF, "Field of degree: Women, Computer sciences," *Women, Minorities, and Persons with Disabilities in Science and Engineering*, https://ncses.nsf.gov/pubs/nsf21321/report/field-of-degree-women#computer-sciences.

In the 60s and 70s, young women got to college without either rejecting computing because of the stereotype or feeling that they were disadvantaged. They gave it a try and they liked it! The situation today is vastly different.

The stereotypes continue to impact young women while they are in college. One anecdote will serve as an example. A young relative of mine is a freshman at UC Santa Cruz, a school that actually has a fair number of women in computing. She took a computer science course to explore the field, though her intention was not to major in the field. One day the professor introduced a video with great excitement, indicating that it was going to show what computer science was really like. The implication was that the students would be drawn to the field as the result of watching the video. The tape, "Triumph of the Nerds," has also been widely shown on PBS and is featured on PBS's technology web site. It is all about founders of Apple and Microsoft and the "guys" in Silicon Valley. Technical women are almost entirely absent, with the exception of Adele Goldberg, a fine computer scientist. It does not in any way represent the richness or breadth of participation of women in the computing field. My cousin was quite upset, saying that if she had been considering a computer science major, the video would have convinced her that neither she nor any other woman was appropriate for or welcome to the computing field.

In order to reverse the downward trend, we need change negative stereotypes and assure that girls can have access to and experience with computers.

STAYING THERE

Increasingly pervasive stereotypes also impact the retention of women, as do some aspects of the reality of work in computing. These have been discussed frequently, and I will not go into them here. Yet, there is an aspect of professional life in computing and other technical fields that is important to understand as we think about transforming the workplace to encourage female retention. It was pointed out to me over lunch with Kathy Richardson. Kathy is a Ph.D. engineer at Compaq whom I have known for many years. At that lunch she said, "I want you to know that the first time I met you was the first time in my life that I ever felt like I was both a woman and an engineer at the same moment."

Adele Goldberg

The statement rang true, and my unscientific survey of women in computing and related fields leads me to believe that it rings true for many women. Female engineers and scientists spend their lives flipping between their professional and female selves. When we walk into the office or the lab, we have to turn off a chunk of ourselves. A rich and creative part of us is all too often left at the door. On the other hand, because of other stereotypes and expectations, we all too often cannot hang onto our brilliant professional selves when we are in a social situation. This is an unstable and uncomfortable situation requiring tremendous energy and sapping women of their full creative potential. In fact, this happens to men as well, but to a somewhat lesser degree. We are best able to exercise our full creative potential when our emotional and intellectual powers, our full personality, is fully present.

WHY DO WE DO WHAT WE DO?

For many years, I have been concerned with trying to increase women's participation in computing and to retain those women who are in the field. My rationale was primarily that I wanted more company! I also had a vague sense that things would be different if half of the people creating technology were female. Recently, my reasons have become clearer, and my vague feeling more concrete. This change resulted in part from reading an extraordinary book, *The Futures of Women: Scenarios for the 21st Century* by Pamela McCorduck and Nancy Ramsey.

The book explodes the myth of inevitable progress with respect to increasing equity. If you do the numbers, whether with respect to women in computing or women in business or women in government the story is the same. The myth that if we just keep doing what we are doing equity will be realized in our lifetimes, or at least in our daughters' lifetimes, is just that, a myth. The numbers in computer science are only the most obvious example. In fact we must act, and we must act very, very forcefully in order to drive toward equity.

We all know that the future will be unimaginably impacted by developments in science and technology. McCorduck and Ramsey make clear that the impact of new technologies will not necessarily be positive for the world's women. If women's needs and situations are not taken into account, the world could be a very much more difficult place for women. However, if women's genius and brilliance are encouraged and used, if women are full partners in creating the future, then there is a possibility that the technology of the future can have a positive impact for all of us.

At the Institute for Women and Technology, a new nonprofit currently supported by Xerox and Sun Microsystems, we are working toward both of these ends. Our mission is to increase the impact of women and technology and to increase the positive impact of technology on the world's women. Our two goals are two sides of the same coin. By tying them together, we may be able to interest a much broader range of women to participate in the creation of technology. We may make it possible to bring our whole selves and our whole needs, the needs of our families and communities, and our concerns into the workplace. The philosophy of the Institute is that it is time to open up the possibility of women doing the science, engineering, and technology that we want to do. That it is time for us to rearrange the rules, for our passions and interests and genius to drive us toward a better world. The Institute will work with women, communities, industry, and governments to make clear the value of women's full and rich participation. We will also work to identify ways to allow women to experience working on things that they and other women really care about.

Group collaborating at the Grace Hopper Open Source Day, 2013

Image Citations:

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