Foreword

We learned so much and had such a good time asking experts to predict the future of the Internet in 2002 that we did it again in a survey in late 2005 and 2006. In the intervening period, the business of looking into the future of technology had boomed. There were many more sources of insight—and wackiness—to draw upon. So, the results reported in this volume are somewhat sharper and more pointed than in our first volume. Truth to tell, we learned from our research into the burgeoning field of futurology about how to ask questions more directly.

We also took inspiration to continue this work from the thoughtful and widely quoted epigram of Alan Kay (1989), a brilliant digital innovator: "The best way to predict the future is to invent it" (p. 1). That gave us reason enough to consult as many of the creators, builders, and shapers of the Internet as we could in this next round of work.

We went back to survey those we could find who were in the extensive Imagining the Internet database of expert commentators on the Internet in the early to mid-1990s and those who were added to the list as we conducted the first *Future of the Internet* survey in 2002.[1] We also built the list of respondents by inviting commentary from the membership

of several prominent Internet-related organizations: Internet Society, Association for Computing Machinery, the World Wide Web Consortium, the UN Working Group on Internet Governance, Internet2, Institute of Electrical and Electronics Engineers, Internet Corporation for Assigned Names and Numbers, International Telecommunication Union, Computer Professionals for Social Responsibility, Association of Internet Researchers, and the American Sociological Association's Information Technology Research section.

The results yield a fascinating mix of consensus about the future development of technology and argument about the likely social, political, and economic impact of that development. The nature of this amalgam is captured in several forms.

First, there is considerable expectation that a global, low-cost network will be thriving in 2020 and will be available to most people around the world at low cost and with great potential to improve the lives of many who are now distant from the grid. At the same time, there is notable argument about whether businesses and governments will work and play well with each other and with their citizens/consumers.

Second, despite the growing capacity of technology to assume more and more of the work done by humans, most respondents said they think people will remain in charge of machines. Some fear, though, that technological progress will eventually lead to machines and processes that move beyond human control, in part because human oversight of some technology functions is waning. Others said they worried that the leaders who exercise control of the technology might use this power inappropriately.

Third, many respondents agreed with the notion that those who are connected online will spend more time immersing themselves in more sophisticated, compelling, networked, and synthetic worlds by 2020. This was my favorite revelation in this piece of research, not because it seemed counterconventional, but because it made perfect sense and I had not given it any thought before my coauthor Janna Anderson convinced me to ask the question. After we ventured into this area of inquiry, we also began to pay attention to the growing amount of research devoted to serious gaming and the increasing real-world

applications of gaming "magic" in classrooms and training endeavors. Our respondents agreed with the prediction language that the emergence of virtual worlds will foster productivity and connectedness and be an advantage to many, but there was significant dispute among them about whether some level of tech "addictions" would also show up in the general population.

A fourth major finding in this survey was widely noted in press coverage and somewhat overemphasized. Most respondents agreed with a prediction that resistance to the effects of technological change may inspire some acts of violence. Yet, the more significant argument of these respondents about violence was largely ignored in the first wave of coverage, which left an impression, I fear, that our survey found that a notable class of Unabomber types would become an important part of the cultural landscape. The more salient assertion of this group was that most violent struggle in the future will emerge from classic sources: religious ideologies, politics, and economics. The consensus here was that a cohort of technology refuseniks will emerge between now and 2020 and choose not to participate in the digital communications network, but that this group would not necessarily be linked to any major level of violence.

For me, the "money" question in this survey involved this prediction:

> As sensing, storage, and communication technologies get cheaper and better, individuals' public and private lives will become increasingly "transparent" globally. Everything will be more visible to everyone, with good and bad results. Looking at the big picture—at all of the lives affected on the planet in every way possible—this will make the world a better place by the year 2020. The benefits will outweigh the costs.

A fifth major theme of this survey was that there was such sharp and even dispute in the responses to this scenario. Some 46% of survey takers agreed with the prediction, 49% disagreed, and 5% did not respond. There was nearly unanimous feeling that some level of privacy must be retained, but no firm sense of how that would happen. Some argued that new privacy protections would be built into the law.

Others believed that recalibrated social contracts would be a more likely avenue of privacy protection. There is an expectation in this group that governments and corporations will continue to escalate surveillance and "own" access to information; while they do that, the powerful and privileged will find growing transparency more to their advantage than others in society. In short, there is a cynical sense in this group that the flow of information will trend more heavily in the direction of average people becoming more "transparent" (and less private), while those who have power will find ways to protect their privacy at the same time that they exploit their new insights into others who are less powerful. Some believed technology could help re-right that imbalance and allow individual citizens to become watchdogs in a kind of system of distributed vigilance of the powerful. Still, the pushback against this benign vision of greater transparency was heated and heartfelt.

In the most fundamental sense, these respondents made clear that key elements of the future are up in the air. One way to read into this mixture of hopes and fears is to highlight the critical uncertainties these respondents addressed that hover over the development of digital technologies. The way these uncertainties are handled will determine how technology affects people in the future.

The first uncertainty involves the nature of the Internet itself. The current architecture is seen as inadequate and dangerously vulnerable. When MIT's David Clark, a giant among those who created the first version of the Internet and a leading proponent of building a do-over version, worries about the security and interoperability of the network as he does here, it is important to take note. A related issue involves the struggle for control over the flow of information on the current Internet. Many of the respondents here said they were unsure that the policy climate will be favorable for the kind of improvements Clark is seeking or even for maintenance of the current mechanisms of how material passes its way through the existing Internet. These respondents were anxious about those who build the pipes and control the information spigots and whether they will hurt the way the Internet is, *in principle*, supposed to work as an equitable end-to-end system.

A second critical uncertainty that gets a great deal of attention here is the way businesses and Internet users will treat intellectual property. The majority of respondents believed that the clash over free file sharing by Internet users and copyright holders is unresolved and will play out indefinitely in courts, legislatures, and even on technology platforms. Their bias is against companies that are too stringent in their restrictions and toward users wanting to sample, share, and remix material. And they dread the prospect that businesses will marshal resources to preserve their current advantages. At the same time, the responses of this group indicate there is nothing approaching a consensus position on where a new equilibrium might be struck that would satisfy both camps. They expect conflict, but cannot collectively see how it will end.

A third critical uncertainty rests at the social and cultural level: How will people behave toward each other in an environment where so much more can be known about others and where people have less control over their privacy? These respondents have a clear expectation that people will wittingly or unwittingly disclose more about themselves, gaining some benefits in the process of losing their privacy to varying degrees, as governments and corporations escalate the collection and analysis of personal data. In the process of addressing our specific query about the social benefits and harms of transparency, these experts showed that they expect behavior and interpersonal relations to change. Yet, they are not as clear about the new social norms and elements of etiquette that will emerge.

A final uncertainty relates to how information markets will perform. How will important truths be upheld or discovered when the process of publishing and broadcasting becomes open to all? This group hopes the ever-greater flow of information and communication will bring the world closer to essential truths. Yet, they wonder if an "information market" corollary of Gresham's law will prevail: that bad information will drive out good. As some framed the question, will gossip, spin, disinformation, degraded commercial speech, and the bleating of the ignorant overwhelm serious news and consequential views in the marketplace of ideas?

If we had asked that question directly, my guess is that we would have had a split verdict. In the end, this group has a mixed view of humans themselves. On the one hand, respondents see people as capable of retaining control of the technology they have created. On the other hand, they fret that the human race *in toto* perhaps is not up to the job of living masterfully in the techo-world to come.

That uncertainty is reason enough to continue asking these kinds of questions and eliciting reaction to possible scenarios. By the same token, this book is also meant to provoke your reaction and inspire your own contribution. We invite you to add your own insights to the collective intelligence amassed at http://www.imaginingtheinternet.org. Why bother? Because, eventually, we will be feeling the results.

Lee Rainie, Director
Pew Internet & American Life Project

ENDNOTE

1. The experts and their predictions can be found at Elon's *Imagining the Internet* Web site, available at http://www.elon.edu/predictions/.

Introduction

Respondents Reflect on the Future

Predictions Inspire Lively Discussion About the Future and Allow Stakeholders to Prepare Everyone for Expected Adjustments Associated With Technological Change

Those who think about the future are best poised to influence it. The visionary 20th-century engineer, mathematician, and architect R. Buckminster Fuller said, "We are called to be architects of the future, not its victims."

Those sentiments guide this effort. Many futurists, scientists, and long-term thinkers today argue that the acceleration of technological change over the past decade has greatly increased the importance of strategic vision. Technology innovations will continue to impact us. The question is whether this process will reflect thoughtful planning or wash over us like an unstoppable wave. If the developmental record of 20th-century computing continues for only another 30 years, we will rapidly and permanently move to a different world.

Are we prepared to act and react in ways that will make that world a good one?

How the Survey Originated and Was Conducted

This research project got its start in mid-2001 when Lee Rainie, the director of the Pew Internet & American Life Project, approached officials at Elon University with an idea that the Project and the university might replicate the work of Ithiel de Sola Pool in his 1983 book, *Forecasting the Telephone: A Retrospective Technology Assessment*. Pool and his students had looked at primary official documents, technology community publications, speeches given by government and business leaders, and marketing literature at the turn of the 20th century to examine the kind of impacts experts thought the telephone would have on Americans' social and economic lives.

Rainie's idea was to apply Pool's research method to the Internet, particularly focused on the period between 1990 and 1995 when the World Wide Web and Web browsers emerged. In the spring semester of 2003, Janna Quitney Anderson, a professor of journalism and communications at Elon, led a research initiative that set out to accomplish this goal. More than 4,200 amazingly prescient predictive statements made in the early 1990s by 1,000 people were logged and categorized. The fruits of that work are available at the online site Imagining the Internet (http://wwwimaginingtheinternet.org).

Next, Rainie and Anderson reasoned that if experts and technologists had been so thoughtful in the early 1990s about what was going to happen, they might be equally as insightful in looking ahead from this moment. Thus began an effort to track down most of those whose predictions were in the 1990–1995 database. In 2004 they and other experts since identified by the Pew Internet Project were asked to assess a number of predictions about the coming decade. Their answers were codified in the first report of this effort, *The Future of the Internet I* (http://www.pewinternet.org/pdfs/PIP_Future_of_Internet.pdf).

In late 2005 and the first quarter of 2006, the Pew Internet Project issued an e-mail invitation to a select group of technology thinkers, stakeholders, and social analysts, asking them to complete a second, scenario-based quantitative and qualitative survey about the future of the Internet—*The Future of the Internet II*. Rainie and Anderson also asked the initial group of respondents to forward the invitation to colleagues and friends who might provide interesting perspectives.

Some 742 people responded to the *Future II* survey between November 30, 2005, and April 4, 2006. More than half are Internet pioneers who were online before 1993. Roughly one-quarter of the respondents said they live and work in a nation outside of North America.

The respondents' answers represent their personal views and in no way reflect the perspectives of their employers. Many survey participants were hand picked due to their positions as stakeholders in the development of the Internet or they were reached through the leadership listservs of top technology organizations, including the Internet Society, Association for Computing Machinery, the World Wide Web Consortium, the UN Working Group on Internet Governance, Internet2, Institute of Electrical and Electronics Engineers, Internet Corporation for Assigned Names and Numbers, International Telecommunication Union, Computer Professionals for Social Responsibility, Association of Internet Researchers, and the American Sociological Association's Information Technology Research section.

About the Survey Participants

Many top Internet leaders, activists, and commentators participated in the survey, including David Clark, Gordon Bell, Esther Dyson, Fred Baker, Scott Hollenbeck, Robert Shaw, Ted Hardie, Pekka Nikander, Alejandro Pisanty, Bob Metcalfe, Peng Hwa Ang, Hal Varian, Geert Lovink, Cory Doctorow, Anthony Rutkowski, Robert Anderson, Ellen Hume, Howard Rheingold, Douglas Rushkoff, Steve Cisler, Marilyn Cade, Marc Rotenberg, Alan Levin, Eugene Spafford, Veni

Markovski, Franck Martin, Greg Cole, Paul Saffo, Thomas Narten, Alan Inouye, Seth Finkelstein, Teddy Purwadi, Luc Faubert, John Browning, and David Weinberger, to name a few.

A sampling of the workplaces of respondents includes the Internet Society, VeriSign, BBN Technologies, Fing, Yahoo Japan, France Telecom, the International Telecommunication Union, Nanyang Technological University, the Electronic Frontier Foundation, TDCLA Chile, AfriNIC, Qualcomm, Wairua Consulting, Electronic Privacy Information Center, Universiteit Maastricht, RAND, IBM, the Austrian Academy of Sciences, Sony, Google, Telematica Instituut, Habitat for Humanity, Cisco, Greenpeace, the University of Haifa, AT&T, Unisinos, Goteborg University, Jupiter Research, Sheffield University, CNET, Microsoft, the University of Sao Paulo, Intel, ISTOE Online, NASSCOM, Amazon.com, Walmart.com, Universidad Nacional Autonoma de México, Sprint, Intuit, HP Laboratories, the Centre for Policy Modelling, ICT Strategies, Bipolar Dream, the Benton Foundation, Semacode, Widgetwonder, Curtin University of Technology, the Hearst Corporation, Imaginova, CNN, Adobe Systems, Forrester Research, the Community Broadband Coalition, Universidad de Navarra, The Center on Media and Society, the Association for the Advancement of Information Technology, Massachusetts Institute of Technology, the Institute of Network Cultures, The Institute for the Future, O'Reilly, Yomux Media, Nortel, Radboud University Nijmegen, Disney, Harvard University, the London School of Economics, Geekcorps, Polaris Venture Partners, InternetPerils, Consumer's Union, the University of Copenhagen, the University of California–Berkeley, the Singapore Internet Research Center, Princeton University, the federal government of Canada, the U.S. Congress, several technology policy divisions of the U.S. government, and many dozens of others.

Participants described their primary area of Internet interest as "research scientist" (19%), "entrepreneur/business leader" (12%), "technology developer or administrator" (11%), "author/editor/journalist" (10%), "futurist/consultant" (9%), "advocate/voice of the people/activist user" (8%), "legislator/politician" (2%), or "pioneer/

originator" (1%); the remainder of participants (29%) chose "other" for this survey question or did not respond.

The Scenarios Were Built to Elicit Deeply Felt Opinions

The Pew Internet & American Life Project and Elon University do not advocate policy outcomes related to the Internet. The predictive scenarios included in the survey were structured to inspire the illumination of issues, not because we think any of them will necessarily come to fruition.

The scenarios themselves were drawn from some of the responses about the future that were made in our 2004 survey. The scenarios were also crafted from predictions made in reports by the U.S. National Intelligence Council, the UN Working Group on Internet Governance, The Institute for the Future, Global Business Network, and other foresight organizations and individual foresight leaders.[1]

The 2020 scenarios were constructed to elicit responses to many-layered issues, so it was sometimes the case that survey participants would agree with most of a scenario, but not all of it. In addition to trying to pack several ideas into each scenario, we tried to balance them with "good," "bad," and "neutral" outcomes. History is full of evidence that technology adoption brings *both* positive and negative results.

After each portion of the survey—each of seven proposed scenarios and the question that was really a request to rank priorities for the future of the Internet—we invited participants to write narrative responses providing an explanation for their answers. Not surprisingly, the most interesting product of the survey is the ensuing collection of open-ended predictions and analyses written by the participants in response to our material. We have included many of those responses in this report.

Since participants' answers evolved in both tone and content as they went through the questionnaire, the findings in this report are presented in the same order as the original survey. The respondents

were asked to "sign" each written response they were willing to have credited to them in the Elon-Pew database and in this report. The quotations in the report are attributed to those who agreed to have their words quoted. When a quote is not attributed to someone, it is because that person chose not to sign his or her written answer. To make this report more readable and to include many voices, some of the lengthier written elaborations have been edited.

ENDNOTE

1. Among the reports consulted as background for scenario construction were various documents from the UN/ITU World Summits on the Information Society and from their Working Group on Internet Governance (2005); U.S. National Science Foundation (2005); Kapur (2005); Neild and Pearson (2005); U.S. National Intelligence Council (2004); Institute for the Future (2005); Glenn and Gordon (2005); Dutton, di Gennaro, and Millwood Hargrave (2005); Hoare and Milner (2004); Frey (2004); and Internet Society (2005).