Internet Predictions

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As Yogi Berra is credited with saying, "Prediction is hard, especially about the future!" The prognostications you'll find in this issue of *IC*, accurate or not, reflect the thoughts, fears, hopes, and expectations of an assembly of Internet digerati. We can view these predictions as a call to arms from people who not only know what they're talking about but who have every intention of bringing their ideas to fruition. No one knows how successful they'll be, but the predictions alone could alter the future.

As we'd expect, the contributions that this issue brings together address a gamut of concerns with the Internet, ranging from technology to policy to applications. Some of the submissions deal with the Internet's inherent participatory nature. Two, by Deborah Estrin and K. Mani Chandy, deal with collaborations among people endowed with pervasive gadgets undergirded by the Internet. Michael Young talks about the future of gaming, beginning with cloud computing to enable realistic experiences and going on to the integration of real and virtual spaces. And Larry Smarr relates the Internet to environmental concerns. Internet technologies consume power and cast a heavy shadow on the environment, but the Internet — as a conduit of knowledge and control — can help reduce the world's environmental footprint.

Andrew Odlyzko argues persuasively for the fundamental importance of connectivity — the essence of any network — over content. David Clark examines

how the future of the Internet is being played out in technology and governmental policy, modulated by economics. He predicts that the ideas of neutrality and control, which currently focus on the Internet's lower layers, will propagate upward into application platforms such as the iPhone and FaceBook. Clark also raises the possibility of data-driven bureaucracies. Should we be afraid?

European Commissioner Viviane Reding addresses matters of Internet policy with regard to innovation, digital rights, and incentives to invest in infrastructure, emerging business models, and the centrality of trust in any kind of interactions over the Internet. Toru Ishida sees the Internet as a vehicle for collaboration across cultures and languages, with language translation as a major enabler of human communication. Sharad Sharma discusses the Internet's business ramifications. He predicts the rise of micro-multinationals and creation networks, fueled by flexible organizations and a move away from top-down control.

Advances in storage technologies give us the ability to store large quantities of information. Even if the hardware to read the information survives, the software to interpret it might not. Vint Cerf discusses the challenges of keeping information alive, proposing the idea of digital vellum: a reliable, survivable medium. Urs Hölzle and Luiz André Barroso consider extremely large-scale computing, which enables virtually all of sophisticated Internet-based services and arguably makes the Internet worthwhile for most people.

The Internet isn't just virtual any more. Increasingly, we think of the whole world being networked, with practically any physical object having a network identity and presence. Geoff Mulligan brings up some of the opportunities and technical challenges inherent to this "Internet of Things," of which privacy is the most compelling, with scary ramifications if violated. Adrian Hooke talks about networking in space, which is important not only in itself but also because delay-tolerant networking, on which it relies, has significant applications on terra firma.

Chip Elliott discusses recent efforts on the National Science Foundation's Global Environment for Network Innovations (GENI) program, conceived of as a testbed that will support an extensive reexamination of networking architectures and technologies. The idea behind GENI is to facilitate research into new families of networking, but Elliott hesitates to make specific prognostications.

Two of *IC*'s columns are aligned with this section. Amit Sheth addresses the prospects of enabling human experience as it will be supported through a nexus of semantics and social computing. Charles Petrie forecasts the growth of emergent collectives as flexible models for the shared development of content and speaks further to its effect on how people coordinate their own interactions to change the very nature of the modern firm.

W e think of the contributions to this special issue as far from being the last words on their subjects. We can understand them best as points of departure for reflection on the important trends in the Internet. No doubt you, gentle reader, will have ideas of your own, and we hope to hear about them from you! ⬚

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S ee *IC*'s millennium predictions in our January/February 2000 special issue.

- "Guest Editors' Introduction: An Internet Millennium Mosaic": http://doi.ieeecomputersociety.org/10.1109/MIC.2000.815848
- "Millennial Forecasts": http://doi.ieeecomputersociety.org/10.1109/4236.815849