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Peter B. Seel, **Digital Universe: The Global Telecommunication Revolution**, Wiley-Blackwell, 2012, 276 pp., $77.02 (hardcover), $33.42 (paperback), $21.97 (Kindle).

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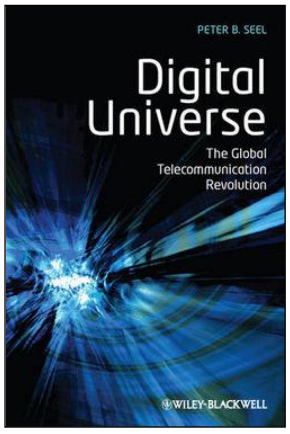

Peter Seel provides an amusing and quite readable cafeteria of lists and historical anecdotes about the evolution of the Internet from the telegraph to virtual worlds in ***Digital Universe: The Global Telecommunication Revolution***. The subtitle should have focused on the Internet or the ICT revolution since telecommunications is discussed only in passing. Nonetheless, Seel describes one technological breakthrough after another and their consequences, both positive and problematic.

The author relies on past and present theorists, especially Neil Postman, Harold Innis, Jacques Ellul, Vannevar Bush, and Paul Otlet, as well as on Stewart Brand, Nick Negroponte, and Tom Friedman's notion of a flattening world. Seel succinctly summarizes their ideas and concerns, without integrating them or adding much of his own thinking to the mix.

In the strongest portions of *Digital Universe*, Seel focuses on technological innovators from Samuel Morse to J. C. R. Licklider, to Tim Berners-Lee and beyond. He tells the stories of their breakthroughs, explains them in clear terms, and then talks a bit about their consequences. Storytelling around innovators can be effective as shown by Tim Wu's *The Master Switch: The Rise and Fall of Information Empires* (Vintage, 2011) that I reviewed in the *International Journal of Communication (IJoC)* last year, but Seel's volume is less successful. Still, the path of the book tracks quite well to the individuals whose photos he includes:

Gordon Moore	Moore's Law (Co-founder of Intel)
Jacques Ellul	Author of *The Technological Society*
Neil Postman	Author of *Technopoly: The Surrender of Culture to Technology*
Paul Baran	Survivable networks; packet switching
Leonard Kleinrock	ARPANET Node 1 1969
Vint Cerf	Co-creator TCP/IP
Robert Kahn	Co-creator TCP/IP
Paul Otlet	Early universally accessible bibliographies
Ted Nelson	Hypertext
Douglas Engelbert	Computer mouse
Tim Berners-Lee	The Web
Samuel Morse	Telegraph
John Perry Barlow	Co-founder Electronic Freedom Foundation

- Jon Postel — Managed IP addresses; took over Net for a day
- Ira Magaziner — Only U.S. government official pictured
- Morton Hellig — Virtual reality pioneer
- Ivan Sutherland — Sketchpad, computer-generated imaging
- Claude Shannon — Defined information theory

Presumably, if an appropriate image had been available, a photo of Licklider would have been included. But it is intriguing to note the absence of corporate and government leaders. Also absent from the discussion are open-source gurus like Richard Stallman and Linus Torvalds who worried more about the software than the technology. And, it is a bit embarrassing that those pictured are all white males. The only two women named in photos are Nedā Āgha-Soltān, the Iranian student killed while participating in street protests in 2009, and Chen Xiaofeng, a Chinese student killed by a drunk driver whose father was a powerful official. Chinese efforts to hush up the incident ultimately failed as the story went viral. Father and son are the only Asians pictured.

The organization is as follows: After a brief overview, Part I introduces Moore's Law and critical perspective of Ellul, Postman, and others. Part II presents a quite useful and readable overview of the Internet and Web history for those not up to pushing through Abbate's more definitive examination. Part III's "Telecommunication and Media Convergence" starts with a chapter on the telegraph revisits the decades old analysis of Harold Innis (who died in 1952) and builds on an uncritical embracing of Thomas Friedman's "10 primary flattening factors." It then moves to discuss the evolution from analog to digital and of five digital attributes (scalability, extensibility, replicability, interoperability, and metadata). In Part IV, Seel jumps to an episodic and incomplete discussion of Internet governance that features the one-day seizure of USC's Jon Postel of control of top-level domains on January 28, 1998, and institutional changes (ICANN) that followed from that. Two further chapters consider case studies of censorship in Iran, China, and the United States, how developing nations have rapidly embraced ICT (which is based mainly on observations by the author and his students "during a semester at sea program in the spring of 2006" (p. 179), and threats to personal privacy. Part V looks at the history of wired telephony and the rise of wireless technology, the social effects of mobile phone use and then at video games, CGI, and virtual and augmented realities, and "the future of the digital universe."

There are some odd omissions here—the breakup of AT&T on January 1, 1984, and the sweeping changes this unleashed worldwide, including the acceleration of the development of the Internet, is never mentioned. Seel discusses coordination in terms of domain names, technical coordination and standards issues, but omits entirely any mention of spectrum, the 1997 Agreement on Basic Telecommunications Services that liberalized and made more competitive international communications, or the international settlements reforms of the late 1990s that made possible cheap international calling and Skype.

In short, one wishes the whole would add up to be more than the sum of its parts. That is not the case here. There are some really nice touches in this book. It is well written. The cases are accessible and relevant. The tables, lists, and some of the figures lucidly present taxonomies and provide chronological information on important topics. But beyond the idea that technological change happens and the consequences are both positive and negative, there is no unifying organization or vision in Peter

Seel's *Digital Universe*. Those involved in this area likely will find tidbits of information that they did not know or had forgotten, but they will not be pushed to rethink any of their basic theories about the past, present, and future state of or consequences of global ICT.

So who should read this book? Those seeking a clear overview of the historical roots of the Internet likely will find pages 43–118 helpful. I can imagine that the *Digital Universe* would hold the interest and provide good background for advanced high school geeks or beginning college students in classes on technology and society. The inclusion of technical engineering figures might also be appealing for an introductory class on the Internet and society aimed at undergraduate engineering and computer science students.