## Backspace



## Padcasting

Vinton G. Cerf • Google

ot long ago, I was chatting with a colleague about the process of media convergence on the Internet. We were talking about "podcasting," and I misheard him as saying "padcasting." When he corrected my misunderstanding, I continued to think about this neologism. As data rates on the Internet increase in both wired and wireless operation modes, and as we move toward an ill-defined but surely real "Internet of Things," it seems apparent that distinctions among various kinds of display devices will continue to erode. Whether we're speaking of a mobile, pad, laptop, television screen, video projector, Google Glass, Oculus Rift, or perhaps even a wristwatch, we will likely see all media becoming available on or through all devices. Where there are mismatches (such as no speaker), we might see automatic provisioning of captions, when available.

In some sense, we could be approaching a sort of "anycasting" moment (not to be confused with IP anycasting), when anything can serve as a receptor for any and all media. Some services already let users move from one device to another while seamlessly receiving the same streaming video or audio. Many of these devices let you read, compose, and reply to email or other social messaging media. Videoconferencing is no longer confined to specially equipped rooms. You can do it from mobiles (when there is adequate capacity), laptops, pads, desktops, and so on. We are also starting to see some devices with cameras interpreting gestures. Holding up a hand, palm out, can be interpreted as wanting to interrupt or ask a question, and the device can flash a symbolic hand against, say, a red background to attract attention.

The presence of cameras and microphones in addition to displays, mice, touch pads, touch displays, styli (the plural of stylus for all you pedants out there), and keyboards on so many devices makes it possible to anycast from anywhere to anyone. The casual use of increasingly rich media for everyday communication seems like a sea change in how we think about our interactions.

There are side effects of this proliferation of opportunities to express ourselves and stay connected. We see the same or similar expressions showing up as tweets, to say nothing of "re-tweeting." Waves of comments, images, and videos show up on Facebook and Google+. It is as if our lives are becoming the subject of commentary and debate, not unlike the formal and informal glosses on the parchment texts of old. The potential permanence and public nature of much of the record has opened up new areas for research and analysis, as we find in studies of the "twitterstream." At the same time, there is no guarantee that anything in the Web is at all permanent, leading to my usual "bit rot" rant about the impermanence of digital information - degradation of the medium, loss of reading devices, loss of correct information about format, loss of metadata needed to correctly interpret the data, loss of websites and inability to resolve URLs, and so on. The Internet Archive (see www.internetarchive.org) represents one among several efforts to preserve digital information for the future. Another is found at Carnegie Mellon University in the form of Project Olive (olivearchive.org), which aims to preserve various kinds of executable code. The irony of these efforts and effects is that the permanent could become evanescent and the evanescent, permanent (or at least preserved) in a sporadic sort of way. In some sense, this isn't new - all older media have shown themselves to be evanescent over varying time periods and have also cont. on p. 95

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shown themselves to be unexpectedly preserved for similarly varying time periods.

What could prove possible as we grow into this digital era is that we might be able to regularize our efforts to preserve digital content in the form of digital objects held in various archives or repositories, such as those contemplated in the Digital Object Architecture developed at the Corporation for National Research Initiatives (CNRI; www.cnri.reston. va.us/papers/OverviewDigitalObject Architecture.pdf).

Padcasting and anycasting have other implications. For one thing, the traditional content consumers have become producers as well, raising the question of whether we can distinguish between these two roles anymore. Despite the cloud's attractions, we can imagine - in a world of symmetric, high-speed Internet access - that users will become both the consumers and the suppliers of content in varying amounts. Business and regulatory models that treat consumers and suppliers as distinct might find it more difficult to maintain the distinction, which

could affect how policy develops for managing and protecting intellectual property.

The 21st Century is getting more interesting by the millisecond!

Vinton G. Cerf is vice president and chief Internet evangelist at Google, and past president of ACM. He's widely known as one of the "fathers of the Internet." He's a fellow of IEEE and ACM. Contact him at vint@google.com.

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