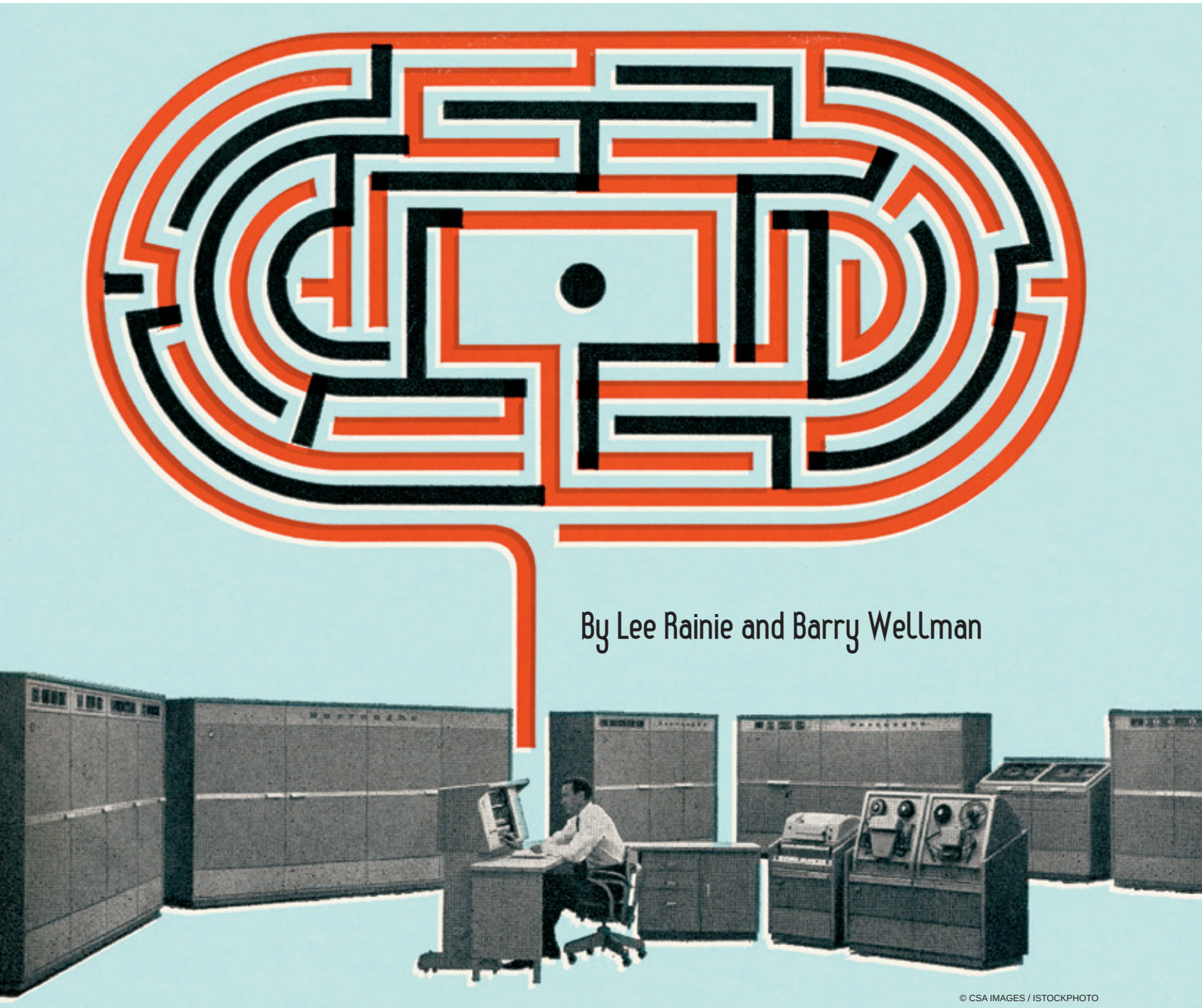
The Individual in a Networked



By Lee Rainie and Barry Wellman

Collaborative agent bots? A walled world under constant surveillance? Two information technology experts parse the future of human–network interaction.

World: Two Scenarios

One of the most useful and formal futurism exercises in recent years was the work in 2006–2007 of the Metaverse Roadmap project. It was driven by John Smart, Jamais Cascio, and Jerry Paffendorf, and originally conceived of as a brief for the future of the World Wide Web as it became three-dimensional.

Once the leaders of the effort began to hear from several dozen thinkers, their own views branched in other directions. They had started their inquiries with the notion of a "Metaverse" that was first conceived by the influential science-fiction writer Neal Stephenson in his 1982 classic, *Snow Crash*. To Stephenson, the Metaverse was an immersive, virtual space with 3-D technologies.

Yet, the Metaverse Roadmap thinkers went beyond seeing the Metaverse as a virtual domain. They saw it as the "convergence of (1) virtually enhanced physical reality and (2) physically persistent virtual space. It is a fusion of both, while allowing users to experience it as either." In other words, it is the connection of the physical and virtual worlds. Although we do not foresee people living mostly in virtual space, the technological directions suggested by the Metaverse Roadmap provide guides for how networked individualism may proceed.

This is a future that has already come to pass in many respects. There is already a mad rush in Silicon Valley to create products to embed social interplay in most kinds of information and media encounters, and it will likely accelerate going forward. Moreover, in coming years a wider Metaverse will emerge as relatively ordinary objects—as well as computers and phones—will become ubiquitously networked with each other, and networked individuals will be able to augment their information through direct contact with databases and objects that have become smarter and more communicative.

Increased computing power may make people's involvements in virtual worlds more immersive and compelling, although experiences to date suggest that people are more apt to use computer networks that integrate with real life rather than becoming totally immersed in virtual worlds—with virtual game players the exception.

Ubiquitous computing, sometimes called "the Internet of things" (or "everyware"), describes human–computer interaction that goes beyond personal computing to an environment of objects processing information and networking with each other and humans. Objects would share information: appliances, utility grids, clothing and jewelry, cars, books, household and workplace furnishings, as well as buildings and landscapes. They would learn additional information and preferred methods of use by gathering data about people who are in their environment. For example, cars could tell each other not to be in the same lane at the same time, and bicycles could tell car doors not to open suddenly when the bikes pass by.

With all these trends rolling along into the future, there is still reason to be uncertain about how the environment of networked individuals will evolve. We offer two different scenarios that seem credible.

Scenario 1: Collaborative Agents In Augmented Reality

Waking up in a networked future, his digital agent's soft voice slowly grows into Harry Sanchez's hearing range. It's been monitoring his sleep rhythms and cross-referencing them with data from his ongoing brain scans to see when it's most appropriate to wake him. After stretching and rubbing the sleep from his eyes, Harry suddenly and happily recalls yesterday's purchase.

He found a collaborative coupon on the Web the other day for a deal on a new pair of augmented reality (AR) contact lenses and the haptic feedback implant that everyone's been raving about. The implantation was a simple and quick outpatient procedure that reminded him more of getting his ears pierced than of surgery. It was performed remotely by a doctor whose robot mimicked his every move. It was not as though Harry could really tell, however, since his AR glasses had "skinned" (covered) the robot with the doctor's virtual image. In this way, the doctor efficiently treats dozens of patients a day, projecting in from his home.

Now that he is awake, Harry eagerly slips in his new AR contact lenses for the first time. They instantly network with his microcomputer, smartphone, and the Internet. His personalized augmented overlay appears in his field of vision: the time and date, the weather and air quality, a few applications he left

open from the previous night minimized into his peripheral vision, a faintly blinking icon notifying him of some messages he missed overnight, an icon notifying him of information updates on news stories aggregated for him by his agent, and an InterFace lifelog update showing what his friends did last night that is cross-referenced with the media they consumed and the tagged conversations they had. He sees a call for participating in a political smart mob in the virtual world, but he tells his agent to disregard it.

His agent also warns him about his health.

Harry hasn't been sleeping well, as his late-night virtual meetings with colleagues in China have taken a toll on his system. Yet, he's happy to not have to fly there ever since they've been able to collaborate long-distance by using the Cavecat productivity system with active walls and tables holding spreadsheets, texts, drawings, and videos.

As Harry settles in at the kitchen table, the surface notices that he's put down his morning cup of coffee. Finally, the news displays as manipulable augmented reality overlays of Harry's social network, with pictures of each network member blinking when she or he posts messages, videos, or lifelog entries.

The new haptic implant gives him a sensory understanding of the news: He can feel the continuing battle in Kabul, experiencing its sounds and vibrations as if he were at the scene. And it now feels as if the computer icons of his various applications have weight and texture. Having not found any urgent messages, Harry's agent organizes his correspondence by topic and relevance. Noticing a conversation he had that he does not want many network members to see, Harry has his agent make the information private across his entire InterFace network. His agent also sends out a quick update to his entire network, letting them know his plans for the day.

Harry is distracted by a knocking sound. His agent informs him that his best friend, Neal, is projecting in for their regular weekend virtual breakfast.

Though Harry and Neal only live 50 kilometers apart, this is a nice way for them to check in on one another and spend some time together. Harry hasn't shaved, and so he puts on his shiny-face skin before he opens the virtual door. He uses his new haptic chip to get the sensation of shaking his friend's hand. It's a little strange at first, since there's nothing actually present to shake, but his nervous system responds as though he had reached out and touched someone.

Harry and Neal chat about how everyone who was at the pub's avatar party last night has shared recordings of the evening with friends. Their agents have already automatically tagged these recordings with relevant information about people and location. Avatar parties have become popular these days. Everyone dresses like their favorite game character; some even come looking like one another. It can be a lot of fun role playing like this, and the collected and tagged videos are highly amusing as people's voices, looks, and even smells can be altered in the virtual world.

After visualizing and flipping through these tags for mentions of his name, Harry updates the conversation file with some witty things he thought of after the fact, and his agent forwards the updates to the relevant people. He also tells his agent to delete information about last night's embarrassing ice-cube escapade at the avatar party, and to ask his friends to delete their versions.

Harry's agent softly chimes in just as he's saying goodbye to Neal, reminding him that he has to meet his sister Merril today. The agents settle on a place downtown. Harry projects himself into the restaurant's virtual space. The restaurant keeps a good online presence, with a nice menu, list of ingredients, health report, and real-time webcam view. It's local and the tables there get automatically reserved.

As Harry gets ready for the day, his agent presents him with a few clothing options. He decides to wear the new trousers suggested by his girlfriend, but calls up another app to make sure his sister would also approve. Harry's girlfriend had tagged the info to the trousers while doing some virtual window shopping and had a pair in his size set aside after asking his belt how big it was.

Not wanting to be late, Harry has his agent arrange a car for him through a collaborative consumption app that recognizes his high trust score. He rarely uses a car, as his fridge automatically schedules grocery deliveries. Slipping his microcomputer into his pocket, Harry goes to the car, has his agent set the restaurant's coordinates, and leans back to check his messages as the car pulls out.

Scenario 2: A Walled and Surveilled World

As Will Li rouses himself from sleep, he walks over to "his" computer to see what he's missed overnight. Truthfully, the computer isn't really his: He owns rights to its usage but isn't allowed to change its hardware or software, or else he'd void his warranty or break the law. His computer is really only an access point, as all his data is in the cloud, yet another thing that's owned—with all the data in it—by a big corporation. Before Will can reach for the cloud, the system completes its mandatory scan of his computer for viruses and copyright infringement.

The price of media access has also spawned its own subculture of media pirates. They usually meet in person, sharing miniature portable terabyte flash drives packed with music, TV shows, movies, e-books, and more. The pirates often get their "warez" from people who collected old computers from trash heaps, recycling centers, and garage sales. They've even developed a code language to arrange meet-ups, but Will hardly keeps up with the ever-evolving lingo.

Leaning over his morning coffee, Will dreams of how nice it would be to have a personal agent, but he's heard most are double agents that also report back to the authorities and sell information to corporations. And he doesn't like the way FaceWall is collecting all the information on him whenever he uses it. He also can't afford to hire the technician it would require to help him set up the devices and access all the fragmented networks of media sites, search engines, and social applications online. Each has a tricky "right

to information" form to sign. So he's reduced his online presence to a minimum, trying to limit himself to good old-fashioned e-mails and avoid social media.

However, Will needs to use FaceWall today to find something. He's forced to wait thirty seconds to let the mandatory ad play. It has his picture in it. CoffeeCo must have bought a recent photo that tagged him on a friend's wall. Will notices that his system slows down as the massive data file from the advertisement clogs up his bandwidth, but since the corporations pay more to guarantee themselves fast access, he endures the wait.

It's almost ironic to see a return to the days of loading screens since the amount of available bandwidth has only increased, but all that bandwidth is auctioned at sky-high prices or owned by a few companies. Finally finding the photo, Will learns he cannot delete it because CoffeeCo now owns it. Perhaps he should make sure no one ever uploads anything about him again, though that would be difficult. Most people seem to put up with these situations because they want to keep going online. Will assumes that from now on he'll get peppered with ads geared to the tastes that FaceWall has observed online—both for him and for all those other 40-year-olds who became unemployed when countries set up their own walled-off Internets, claiming that morality and national security demanded it.

Giving the situation further thought, Will starts to browse his friends' profiles, and finds that his sister Lorelei is earning extra money by selling her personal information to FaceWall, including links to his profile. Maybe that's how CoffeeCo found his photo. He'll ask her when they meet today to never do it again. You can never be quite sure of who's informing on you, only in this case it's not only the state but data-aggregating organizations.

Will remembers from history class how, in the 1960s, FBI Director J. Edgar Hoover had used his dossiers on the Kennedys to keep power. Now, FaceWall has even more comprehensive dossiers on everyone. Doing what he knows he shouldn't, Will reaches for a doughnut. Maybe he can sneak one without his insurance company's sensors registering it. At least Will made the right decision by paying extra for their privacy clause. Otherwise, his health data might have just been sold off to the highest bidder at an info auction. But, since he's not able to see the information himself, he can't be sure.

Will and his best friend, Spider, prefer to meet in person: There is less chance for any number of things happening. They remember how Spider was once duped by someone passing himself off as an online insurance representative to steal private information. The latest scam is reverse-identity theft. The thieves pose as old friends, using detailed avatars whose digital image and voice have been reconstructed from public profiles. Too bad the government killed the trusted identities program. Will shuts off the computer monitor, grabs his phone and his travel pass, and goes out past the security scanner.

After a wait, Lorelei pulls up, giggling about the whole-body security scan at the gate. "Hope they got a better picture this time." She's also worried that maybe the guards had found the incriminating photo of her online. She's already lost one job because of it, even though it was taken without her permission and out of context. They head off for their meal, but arrive just in time to see the last open table become occupied.

The Possible Futures of Networked Individuals

Although present technologies are still far from realizing either scenario in its entirety, each represents a potential evolution from current trajectories. The first scenario assumes a move toward more networked individualism based on continued technological progress and trust in computer and human networks—including the withering of boundaries.

The second scenario assumes more boundaries, more costs, more corporate concentration, and more surveillance. At present, the Western world is trending in the direction of the first scenario, but we would be naïve to think that the second scenario could not happen.

What we call the Triple Revolution—in social networks, in the Internet, and in mobile connectedness—will change but never end in the ongoing turn to a networked operating system. The foreseeable future holds the prospect that individuals will be able to act more independently with greater power to shape their lives, if they choose to do so and if the circumstances will enable them to do so.

Yet, the foreseeable future also contains the burden of knowing that people will have to work harder on their own to get their needs met. Tightly knit, permanent groups will continue to be stable cores for some, and social networks will play greater roles in all human activities. The work of networked individuals is never quite done—and the satisfactions of netweaving are always available. ❑

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