

Carried Away with Convergence

The Merging of Nanotech, Biotech, Infotech, and Brain Sciences

What will the future hold? In popular culture and science fiction, answers to this question have ranged from the dark and dismal *Brave New World* to the dreamy and benign fantasies of *Star Trek* and *The Jetsons*. This spring, the National Science Foundation and Department of Commerce added their

weight to the latter side of the scale in the form of a new report called “Converging Technologies for Improving Human Performance.”

Looking just twenty years into the future, the report has something of the fantastical tone of a 1950s magazine article foretelling the wonders of the year 2000. But this time, we have much more than disposable dishes to look forward to. The report—a collection of various and unrelated statements from an NSF symposium held in December 2001—catalogs a host of new technological possibilities: “brain-to-brain interaction,” “human machine interfaces,” “personal sensory device interfaces,” “war fighter systems,” and a mysterious system called “the Communicator” which, in due time, “will remove barriers to communication caused by physical disabilities, language differences, geographic distance, and variations in knowledge.” And that’s just for starters.

“At this moment in the evolution of technical achievement,” the report speculates, the actual “improvement of human performance through the integration of technologies becomes possible.” Emerging technologies will create entirely new realms of human possibility—in business and in production, in education, in the ways we interact with each other, in competitive sports, in fashion, and even in the humanities. New technologies will enable, ultimately, “changing the societal fabric towards a new structure.”

So what is holding us back from this new world of wonders? A simple lack of cooperation, we are told. Heretofore, science has been hindered by excessive specialization. But in the coming years, the report suggests, the distinctions that separate scientific disciplines will break down, as advances in one field enable new thinking

in others. “The tyranny of reductionism, too long the unwritten law of modern science, is changing, incorporating a more holistic convergent model,” writes Dr. James Canton, one contributor to the report. This new holistic model will combine advances in four different fields—nanotechnology, biotechnology, information technology, and cognitive science (known collectively as “NBIC”)—in order to achieve “a golden age that [will] be an epochal turning point in human history.” So grand is the convergent future that one of the contributors to the report was even moved to poetry (so to speak):

If the *Cognitive Scientists* can think it
The *Nano* people can build it
The *Bio* people can implement it, and
The *IT* people can monitor and control it.

The report claims that this spirit of cooperation will not only characterize the future of the sciences—it will also be reflected in human interaction. “Technological convergence could become the framework for human convergence—the twenty-first century could end in world peace, universal prosperity, and evolution to a higher level of compassion and accomplishment,” the report predicts. (Though with all that peace and harmony, one wonders to what use the weapons described in the report’s thirty-odd pages on “national security” might be put.) Moreover, “humanity [will] become like a single, transcendent nervous system, an interconnected ‘brain’ based in new core pathways of society”—a state which some contributors call “hive mind.”

The divide between man and machine will also be overcome. In a subsection titled “Download yourself into hardware,” we are told that our minds could be “run” “just as

old video games are today.” You might also get a “Ph.D. in Mathematics with ‘one click,’” the report cheerily tells us. Then, there’s the “Solar System Wide Web,” mentioned in one of the report’s summaries, which will allow users to connect to feeds from NASA satellites and traverse the Sun, the Moon, and the stars all from the comfort of home. Of more dubious value are the cosmetics that scientists say will change with one’s mood—perhaps genuinely making the jealous into “green-eyed monsters” or making cowards literally “yellow-bellied.” And positively unpleasant-sounding is the “FastAb electric stimulation workout device,” which will help provide motivation for unenthusiastic dieters.

Many of the writers share a faith in technology which borders on religiosity, boasting of miracles once thought to be the province of the Almighty. Prophesying in Old Testament cadences, they speak of an age when “The sightless ... will see, the lame ... will walk, and infertile couples ... [will have] children.” No word yet on what the lion might do with the lamb. The breathless futurism of it all may be a little off-putting for some, and it doesn’t help that the report’s authors sometimes indulge in the language of science fiction, telling us, for example, to “think Vulcan mind-meld.”

And what of possible costs? The contributors pay lip service to the various “ethical, legal, and moral concerns” related to their research, but as a whole, they are too quick to assume that technology will unequivocally improve human lives. According to one version of the report, the correct way to view the convergent future is through one “pure, uncluttered emotion: hope.” Well.

The report only occasionally waxes philosophical about the potential dangers of the changes it so boldly foresees. Warren

Robinett, for instance, wonders briefly if plugging one’s head into one’s hard drive is such a good idea after all. In a bit of Philosophy 101-style musing on the nature of the soul, Robinett asks, “What is it that makes you *you*? (Is it more than your knowledge and personality?) Is having the traditional body necessary to being human?” But these cursory considerations—if they can even be called that—are only a momentary detour on the way to Robinett’s grand conclusion: “*It could be done.*” Running your brain on hardware, he gushes, will mean immortality, speed-of-light travel, instant learning, self-directed evolution, and so on. Without any serious reflection about the hazards of technically manipulating our brains and our consciousness, one contributor speculates: “What will human-like intelligence evolve into if it is freed from the limits of the human meat-machine, and humans can change and improve their own hardware?”

The report proposes a national R&D initiative to bring this convergent future into being. It will require readying “key organizations and societal activities for the changes made possible by converging technologies,” and a focused effort by scientists and the government to counter citizens’ concerns. In preparation for the NBIC convergence, the education system, some contributors recommend, should be overhauled down to the lowest school levels to bridge curriculum gaps between disparate subject areas, and professional societies should be made to expand the narrow definitions of their fields.

Indeed, the only real danger the authors can imagine is the “catastrophe” which may be unleashed if we fail to implement the report’s recommendations. Early versions of the report warned that “we may not have the luxury of delay, because the remarkable

economic, political and even violent turmoil of recent years implies that the world system is unstable. If we fail to chart the direction of change boldly, we may become the victims of unpredictable catastrophe.” This juvenile analysis of world affairs was wisely edited out of subsequent versions of the report—although the sense that we must pursue the NBIC convergence to avoid impending doom remains.

But a different sort of catastrophe is nearer at hand. Without honestly and seri-

ously assessing the consequences associated with these powerful new NBIC technologies, we are certain, in our enthusiasm and fantasy and pride, to rush headlong into disaster. It’s a shame that the report’s contributors—for all their cross-disciplinary enthusiasm—couldn’t look beyond their converging sciences to the humanistic disciplines of ethics and philosophy, or even more simply to that age-old dissolver of pipe-dreams: common sense.