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# Situating technological change within social and business dynamics

by Kevin McCullagh

*While technology does not determine the future of design, as Kevin McCullagh makes clear, it does exercise a significant influence on how businesses design and what they design. McCullagh advocates a balanced approach: the creation of virtual teams supported with face-to-face exchanges and clearly defined protocols; the selective application of realistic digital rendering; and a focus on user-centered, rather than technology-centered, innovation.*



Kevin McCullagh,  
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Can you think of a vision of the future, whether in film or on the printed page, that is not within the genre of science fiction? Difficult, isn't it? Whenever we look to the future, the first place we turn for guidance is technology. The tiny phones in our pockets and the flashy Web sites on our laptop screens are tangible testimony to how much life and business have changed over the past 10 years.

The Internet—"the biggest technological revolution of the latter half of the twentieth century"—is a classic example of looking at the future through the prism of a technology. Remember the heady days of the dot.com go-go years, when every

company had to have an Internet strategy? The dogma that sparked this search for new business models (or were they muddles?) was that "the Internet changes everything." If you are in the business of book retailing or you're running a travel agency, this doctrine may still hold water, but in the cold light of day, how big an impact has the Internet had on the business of design? Without doubt, e-mail has drastically reduced the time it takes to send a message or file, and the Web has taken some of the grind out of research. But, with the exception of Web designers, haven't more mundane technologies, such as desktop publishing and 3D CAD, made more of an

impact on the way we work?

On a more profound level, the rise of branding, innovation, and globalization in the nineties changed the very way we conceived what it is we do. My point? Design strategists must take a wider view of how technology drives change, and they should do so by placing it within the context of social and business dynamics. If they did, they might judge social networks to be just as influential as IT networks, and that sometimes a low-tech approach makes for a stronger business proposition.

To illustrate this, I will discuss two technologies that designers will *use* in the “noughties,” as well as two they’ll be involved in *designing*. The two technologies we already employ in our working lives, but which will become more important, are broadband networks and digital presentation techniques. The two technologies that will occupy many design departments over the next decade are services for mobile devices and “content” for convergence devices in peoples’ living rooms. But before that, I’ll briefly turn to a philosophical concept that is crucial to any clear-eyed view of the future—*technological determinism*.

### Technological determinism

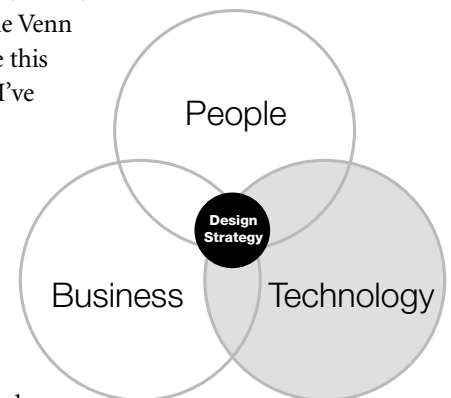
From desktop publishing to virtual private networks, the future of design is all too often understood as being driven by IT. This view that “tomorrow’s world will be molded by tomorrow’s technology” reflects a popular, if unconscious, theory of social change, as it seems to square with the everyday experience of an increasingly technological environment. However, now that walking on the moon has more to do with history than with the future, the follies of this approach should be all too obvious. In the past 50 years, we have supposedly lived through the Atomic Age, the Space Age, the Supersonic Age, and now, we are assured, the Information Age.

Determinism in its widest sense assumes pre-existing and usually “external” conditions that fix the course of some process or event. Technological determinism<sup>1</sup> asserts that changes in society are the product of changes in tools and techniques. Technology is therefore abstracted from its social and economic context and given a life of its own. This outlook results in a rather static view of society, in which the only

thing that changes is the technology, and this change is inevitable. This unconscious mindset understands the future as a matter of simply surfing the wave of technological progress—a wave that rolls on inexorably, independent of human will or business interests. In their book *The Social Life of Information*,<sup>2</sup> John Seely Brown and Paul Dugid call this worldview “tunnel vision.” Tunnel vision leads to tunnel design, which in turn creates technologies that “bite back,” to use Edward Tenner’s term.<sup>3</sup> These are technologies that lead to paradoxical and unintended consequences, such as helmets that make football more dangerous than rugby, and home security systems that police frequently ignore due to the number of false alarms. Brown and Dugid conclude that “the way forward is paradoxically to look not ahead, but to look around.”<sup>4</sup>

The aim of this philosophical digression is to make explicit one of the most common follies of technology strategy and to introduce a founding assumption behind this article—that change in design is driven by a complex and interdependent mix of technological, social, and business forces. I use the Venn diagram at right to fuse this assumption with what I’ve learned from the late Christopher Lorenz’s incredibly insightful but largely forgotten book, *The Design Dimension*.

As far back as 1986, Lorenz argued that if companies wanted to meaningfully differentiate their products, they would have to make all sorts of new connections with the consumer, and that “for these connections to be made successfully requires a team effort in which the industrial designer’s imagination, synthesizing skills and



1. Bullock, A., et al., *The Fontana Dictionary of Modern Thought* (London: Fontana, 1988), p. 847.

2. Brown, J.S. and P. Dugid, *The Social Life of Information* (Boston: Harvard Business School Press, 2000), p. 1.

3. Tenner, E. *Why Things Bite Back: Predicting the Problems of Progress* (London: Fourth Estate, 1997).

4. Brown and Dugid, op. cit., p. 8.

entrepreneurial drive are given as much weight as the tools of the engineer, the financial controller and the marketer.”<sup>5</sup> He pointed out that the industrial designer remains the only person directly in touch with technology and the consumer: “Equipped with uniquely interdisciplinary attitudes and skills, the designer sits at the centre of a multidimensional matrix, with an eye (and an influence) on every dimension.”<sup>6</sup> Having put designers at the conceptual center of product development,

*Change in design is driven by a complex and interdependent mix of technological, social, and business forces*

Lorenz then made a case for some to take on not only product management functions but also roles in marketing and product strategy. He contended that designers’ “ability and versatility to synthesize (or cross pollinate) all sorts of multidisciplinary factors and influences into a coherent whole”<sup>7</sup> was their most fundamental skill. At the same time, he cautioned that “it is not every industrial designer who is capable of playing a central role alongside engineering and marketing in the product development process. Even fewer have the commercial acumen and experience to make a contribution to marketing strategy.”<sup>8</sup>

To summarize: I believe first of all that technological change has to be considered within its social and business context, and secondly that design strategists are well placed to understand its implications.

**Technology we will use**

I now turn to the technologies—those that designers will *use* and those they will be called upon to *design*. First I’ll discuss two issues relating to designers’ use of technologies—virtual networks and digital presentation techniques.

*Socializing virtual teams*

In 1991, a 21-year-old computer science student at Helsinki University named Linus Torvalds uploaded a kernel of an operation system he had written. Torvalds invited fellow programmers to download his program, test it, and improve it. After a slow start, the Linux system, as it became known, evolved into one of the best operating

systems available, and by the end of the nineties it was being touted as a serious challenge to Microsoft. The self-managed Linux community was held up as a new organizational model for the Internet era.

The spread of broadband, Wi-Fi (high-frequency wireless), and third-generation (3G) mobile networks, as well as the rollout of intranets and virtual private networks, invites a wider take-up of virtual working. The vision is that team members will be able to stay in touch when they are away from their desks, whether they are on the road, at home, or down the corridor.

Having managed a design team of “e-lancers” in the mid-nineties and now a global network of design scouts for Seymourpowell, this is a subject close to my heart. The fact is, although our company’s ADSL line is a big step forward from my first 14.4K modem, times have not changed as swiftly as I once believed they would.

I think back to the program of a conference<sup>9</sup> I chaired on the subject of networking design seven years ago, which gushed with enthusiasm fit for the dawn of a new era: “The imminence of ubiquitous computer networks promises to have a profound influence on the whole sphere of industrial design.” It looked forward to “24-hour global design teams working across time zones via the Internet” and network computers (remember them?) that would rely on Java, “applets,” and a fast connection to the “superhighway.” Although virtual working is already a daily reality for millions of software developers, bond traders, and advertising executives, it has not taken off on the scale we imagined in 1996.

In hindsight, this misplaced fervor could be written off as symptomatic of dot.com-era delusion and the naïve swallowing of IT hype. While undoubtedly the telecom industry failed to deliver the “superhighways,” there were and still are real social and business barriers to the adoption of virtual teamworking—it is not just a technological question! Videoconferences,

5. Lorenz, C. *The Design Dimension: Revised edition*. (Blackwell, 1990), p. 11.

6. *Ibid.*, p.152.

7. *Ibid.*, p. 9.

8. *Ibid.*, p. 22.

9. Networking Design, conference at University of Northumbria, March 1996.

voicemail, electronic live-boards, the Internet and corporate intranets, groupware, and virtual team rooms are only part of the equation. Human relationships are still paramount.

Effective teamwork is hard to pull off at the best of times, and if team members come from different cultures and companies and speak different languages, as well as not knowing each other or being able to size each other up in face-to-face meetings, it can prove a nightmare. Consequently, the usual principles of team management apply. I have found that paying special attention to the following four principles helps to smooth the way.

#### *Find ways to build trust*

Lack of trust is one of the biggest obstacles to the use of virtual teams by managers who suspect that such practices are little more than “cyber-skiving.” Despite all the talk of measuring results and not attendance, managers must be confident that remote team members have sufficient motivation, discipline, and structure to work in this way. Even when a virtual-team approach is accepted, trust among team members is still a key issue. People who trust each other work more effectively together. Jessica Lipnack, one of the authors of the book *Virtual Teams*, stresses, “If there is only one investment to make, make it an investment in social capital.”<sup>10</sup>

#### *Kick off with nonvirtual meetings*

If at all possible, time and budget should be allocated to bring all key team members together at the beginning of the project. As well as helping to achieve a clear sense of a project’s context and objectives, team members (some of whom may not have met) will be able to reach a sense of the team’s common purpose and establish their credibility with one another. If it is not possible for the team to meet in person, they should at least exchange get-acquainted messages.

#### *Communicate clearly and regularly*

Making sure that all responsibilities and expectations are written down and conveyed with the utmost clarity plays a pivotal role in successful virtual work. A small misunderstanding between our office and a team member in Tokyo can mean a 24-hour wait. Assume nothing, spell everything out, and keep 5 AM conference calls to a minimum! Also, encourage team members

to keep in touch with one another at least once a day, even when there is no pressing need. Familiarity breeds trust, and remote workers need to feel connected to the central office.

#### *Agree on explicit processes*

The importance of thinking through all the details of how the team will work through the project—and then circulating a process document to that effect—cannot be underestimated. Procedures for revising documents, preparing graphic files, and informing colleagues about decisions should all be set down clearly in rules that everyone understands. We have found deliverable templates a highly effective way of clarifying the form, content, and quantity of work we require from remote team members.

To sum up my experience of virtual teams: They have their limits, and they are hard work! Large teams require a disproportionate amount of meticulous management. Knowledge, especially tacit knowledge, slips away in virtual teams, which also have weak organizational memory, since they tend to disband at the end of the project. That is probably why property prices in Tokyo, London’s financial district, and Silicon Valley—three of the planet’s most “wired” locations—are disproportionately higher than in bordering regions. Why haven’t the bankers, software engineers, and lawyers sold up and moved to palatial broadband-connected country retreats? Perhaps because these concentrations of knowledge provide an intensity of relations and regular opportunities to build trusted relationships through face-to-face contact. Networks can be enabled by technology, but they are held together by social ties.

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10. Wardell, C. “The art of managing virtual teams,” *Harvard Management Update*, November 1998, p. 4.

### Adjusting to digital presentation techniques

After the availability of modems and e-mail accounts, the most important enabler of the virtual design team I set up in 1994 was the fact that the middle and later stages of the design process had become digitized. Where we had once developed concepts on the drawing board and presented them in marker renderings, we were now able to proffer 3D CAD renderings and Photoshop/Illustrator visuals. The various components of a presentation would then be assembled in a desktop publishing package, exported as an Acrobat PDF file, and e-mailed to the client. This became the *modus operandi* for much of the design profession by the end of the decade.

*Designers are still experimenting with an appropriate hierarchy of presentation techniques that better reflect the stage of the design process they represent*

Designers now had a suite of near-realistic techniques they could use for early concepts all the way to final-presentation visuals. However, this created new problems around the issue of client perception. An unappreciated advantage of traditional manual graphic techniques was that they had largely reflected the stage in

the design process at which they were created. Early sketches looked, well, early and sketchy. Final presentation visuals had a polish that only hours of craft, affection, and flair could achieve. Designers learned that it was not necessarily wise to use the new digital tools for showing early concepts, because they could appear “too finished” to the client. This issue became particularly problematic if the client liked a particular concept based on a “photorealistic” visual and requested a rapid move to production. While the rendering might have had a finished look to it, the design it represented was still at the early stages of its resolution.

Designers are still experimenting with an appropriate hierarchy of presentation techniques that better reflect the stage of the design process they represent. The type and level of presentation visual depends on many factors, including time, budget, type of project, the character of the design that is visualized, and the client’s

design/visual literacy and familiarity with the design team. The irony is that the rough and sketchy visual can sometimes take longer to achieve than the photorealistic version. This is as much to do with some concepts lending themselves to rapid digital visualization, as it has to do with the decline of sketching skills. Designers sometimes take a polished computer-generated visual and use it as an underlay to sketch over or manipulate in some way to give it a lower level of “finish.”

In both of these examples of technological change—one that enables designers to work “virtually,” another that helps them develop slicker presentation techniques—technology has not operated in a vacuum. In any implementation of a new technology in the studio, the sooner its place in the world of real human and business needs is identified or, even better, anticipated, the happier the outcome.

### Technology we will design

Designers not only use new technology, they also play a part in creating and shaping it. I will next briefly discuss two growth areas for design strategists in the “noughties”—mobile services and services for convergence devices “in the living room.”

#### *Mobile services for mobile situations*

Seymourpowell designed its first mobile phone for Technophone in 1991. By the mid-nineties, it became clear that the conception of what future mobile products might provide or do—services—could not be separated from the design of its hardware and software. It took the global telecommunications industry somewhat longer to learn this lesson.

Back in 2000, mobile operators launched wireless application protocol (WAP) services across Europe and governments auctioned off third-generation (3G) mobile licenses for tens of billions of euros, in the wake of much excitement over the success of I-Mode in Japan. Magazines overflowed with visions of being able to set baths running, with our mobiles, on the way home from a long day of mobile communicating. Investors licked their lips as they looked forward to fusing the Internet with high-speed mobile phones. More Europeans have mobiles than have PCs! They have them with them all the time! A profitable nirvana of 24/7 m-com-

merce beckoned. Consumers would buy everything from cinema tickets to groceries with their mobile phones.

No sooner had the dust settled after the big European 3G auctions than doubts set in. Just how much real demand would there be for 3G? How much would customers really pay, and for which services? The *Financial Times* later declared that the mobile Internet was “overhyped and underdelivered” and “even if the technology works, it does not create a business in itself. Mobile data require easy-to-use handsets and killer applications.”

The telecom companies and their investors had fallen into the trap of thinking about mobile technologies and services in the abstract, with little attention given to what people would actually want or how they would access or experience them. Handsets were considered technological “black boxes” or pocket mini-computers that could be configured with a cocktail of functionalities and would take over a range of everyday tasks. The economic equation was: The more functions people are offered, the more cash they will spend.

Luckily, real people see things differently—they are interested in the real human benefits of technology, not the features prescribed by techies and marketers. Business and lifestyle needs are equal to techno-push. Dealers and hookers were among the first to realize the benefits of mobiles, the Mafia took to the anonymity of pre-pay phones, and many retailers have earned more from phone covers than from the phones themselves. The Wall St. analysts missed what every teenager knew: Fashion, not functionality, sold mobile phones. Who predicted that teenage smoking would go down as a result of spending on mobiles, or that parents would buy them for their kids so that they could keep tabs on them? Mobile is just as much about social relations as it is about new technology.

The unexpected successes of text messaging and Napster teach us two important lessons. People bend technology to their own needs; and companies *can* develop new killer apps—if only they would get out more. London-based Shazam did just that. They identified a real need and set out to satisfy it. Shazam’s name-that-tune service works across all mobile phone networks in the UK. Users dial a four-digit number into the phone and point it at a source of recorded

music, such as a sound system in a nightclub. Shazam’s system filters out the background noise and compares the audio sample with a database of 1.6 million tunes. The service then fires off a text message to the phone, identifying the artist and track. The service thrived quickly by word of mouth among young music fans, because it hit an untapped need *and* used low-bandwidth voice and short-message-service technology available on all phones, thus avoiding the need for fancy multimedia.

What of high-speed 3G mobile services? They will undoubtedly be behind schedule, and their download speeds will not be nearly as quick as we were first promised. Because 3G handsets will be expensive, bulky, and low on battery life, we might well see this technology embedded in corporate laptops and cars, where fast access to e-mail and video entertainment will be highly valued, before we carry 3G in our hands.

#### *Convergent behavior in the living room*

Seymourpowell Foresight, the research and strategy arm of Seymourpowell, recently conducted a Europe-wide strategy project for a client looking for opportunities in the world of “convergence” devices based around the family TV and personal PC. As has so often been pointed out, the digitization of content—from TV to phone calls—opens up the potential to transmit it all over the same channels or networks and to access it on the same devices.

We began from a skeptic’s point of view. After all, the “nirvana” of seamless TV-voice-data integration is not a new dream—convergence is one of the oldest unkept promises of the IT era. In 1982, John Naisbitt, in his best-selling book, *Megatrends*, claimed that it had already happened: “We stand at the threshold of a mammoth communications revolution. The combined technologies of the telephone, computer, and television have merged into an integrated information and communication system that transmits data

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and permits instantaneous interactions between persons and computers.”<sup>11</sup> Sound familiar?

In the late nineties, convergence moved from the realm of the futurist and the techie into the business mainstream. The seemingly endless opportunities of the Internet, digital TV, and 3G mobile networks generated much heat and investment, but not much light. The story of the heralded AOL-Time Warner merger, a symbol of late-nineties confidence in convergence, reflects a new post-crash realism. The biggest merger in corporate history was the marriage of old-fashioned content—Time Warner encompasses everything from magazines to film studios, recording artists, TV channels, and books—and the biggest Internet service provider. However, the expected synergies have not materialized, and there has been recent speculation about a de-merger.

One point of confusion is the lack of distinction between the method of distributing content and the devices on which this content will be accessed. Just because it may be desirable to bring together content and services at the level of distribution, it does not follow that people want to access all of these on the same device. The history of consumer acceptance of multi-functional devices is not a happy one, with a few notable exceptions such as the radio alarm clock. Much of the early work done on convergence devices amounted to little more than dressing up a PC and sitting it in the living room and, in our opinion, this exhibited a very negligible understanding of how people integrate technology into their everyday lives.

Using video observation techniques, along with a wider literature review and expert interviews, we uncovered a number of surprising insights into how the technological and social landscape of Europe was shifting. The first findings seemed not to bode well; it appeared that the rollout of broadband would not happen as rapidly as most forecasts had led us to believe, due to the sorry state of the telecom industry. We had assumed that new interactive TV (iTV) services would require broadband to be compelling; however, we found evidence to the contrary. In the UK, which leads the world in digital TV, simple interactive games played through remote controls across existing “narrowband” networks have proved to be a surprise hit. The research group Informa has forecast that by 2010, iTV

gaming revenues will be comparable with those derived from console gaming software.<sup>12</sup>

We also uncovered evidence of the slow death of the family hi-fi, as people begin to use their TV audio system to listen to music. A third of the households we studied played CDs on their DVD players. The most interesting evidence of emergent, or should I say convergent, behavior is the growing practice of listening to digital audio broadcasting (DAB) through TV. DAB delivers CD-quality radio and can also display still images and support low-level interactivity. It can be received through DAB players (which are relatively expensive) or through digital TV operators on separate channels placed after the main TV offerings. Although initial interest in DAB was limited, mainly as a result of variable coverage and the high cost of digital radio receivers, consumers have found that they can receive DAB through their digital television (DTV) systems, at no extra cost. As a result, DAB’s popularity is on the increase. DAB is most popular in the UK, where more than one in eight radio listeners now tune in via their TVs, which is partly a function of the breadth of coverage and the penetration of DTV.

So again, just as marketers in 1999 missed the rise of text messaging while they waxed lyrical about advanced WAP services, many of them are ignoring the penetration of TV without pictures as they get carried away with the potential of groovy broadband applications, such as online console gaming or video on demand. ■

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11. John Naisbitt, *Megatrends* (London: Nicholas Brealey, 1982), p. 24.

12. Informa Media, “The Dynamic of Games,” 2002 ([www.informamedia.com](http://www.informamedia.com)).

numerous museum exhibitions, most recently in the upcoming triennial exhibition at the Cooper-Hewitt National Design Museum of the Smithsonian Institution. In addition to his work on various design projects, Henderson will chair the 2003 national conference of the Industrial Designers Society of America, which will be held in New York City in August of this year.

**Vijay Kumar** is an associate professor at Chicago's Institute of Design, where his courses and research focus on strategic innovations, innovation methods, information structuring, and human-centered product/communication systems. He has more than 22 years of experience in consulting, teaching, research, and development worldwide. As an innovation planning leader at Doblin, an innovation strategy firm in Chicago, Kumar spent more than 12 years consulting on customer-centered innovations for companies such as Alamo, Amoco Oil, Cummins Engine, and Wells Fargo. He is the inventor of many methods, frameworks, tools, and software applications designed to extend innovation capabilities. Students, researchers, consultants, and business executives worldwide have successfully used his tools for many years.

Kumar has taught at the Institute of Design since 1993. He is an alumnus of ID's masters program, where his research focus was on information visualization tools for planning; it is published widely. Kumar received his undergraduate degree in product design from India's National Institute of Design in 1979. Afterward, as a principal in Kumar Group, a systems design consulting firm in southern India, he consulted with companies in product design, environment design, architecture, and environmental planning.

**Davis Masten** is a principal at Cheskin, a strategic consultancy with a strong legacy in marketing and design research and innovation. Holding degrees in business and psychology, he joined Cheskin Associates Inc. in 1975, working closely with founder and market research pioneer Louis Cheskin. Masten pioneered the ethnography practice at Cheskin in 1986, and since then the company has completed hundreds of ethnographic studies. For more than 25 years, Masten has created customer-inspired breakthroughs for leading companies, from Hewlett-Packard to

Microsoft and The Home Depot, applying his expertise to projects in retail, packaging, interactive environments, corporate positioning, branding, and industrial design. Most recently, he has helped bring trust to the forefront of business, spearheading one of the first studies of eCommerce Trust in 1999 and continuing with further explorations, articles, and presentations. Masten speaks internationally, and has been quoted or published in many business and trade publications, including the *Design Management Journal*. He has also lectured at Stanford, Berkeley, and Oxford, among other schools. He is a founding member of The Standard for Internet Commerce and was a board member of TRUSTe. He currently chairs the AIGA Center for Brand Experience.

**Kevin McCullagh** is director of Foresight at Seymourpowell, the London-based product design consultancy.

Sponsored by Rolls Royce Aero Engines, McCullagh first studied mechanical engineering before taking first-class honors in product design at Newcastle Polytechnic. He followed this by combining design consultancy with postgraduate research and teaching on the computer-aided, as well as the social, cultural, and business, dimensions of design. Kevin has held positions up to that of design director at four design consultancies. He regularly organizes and speaks at design conferences.

**Carol Moore** works with IBM's global and US clients to transform their enterprises into successful e-businesses. Her current focus is on designing and implementing business transformation around customer brand experiences, integrating business strategy, technology solutions, and experience design.

From 1994 through 1999, Moore started and ran the IBM Web site. She and her team developed the site from a loose affiliation of a few screens to a unified, much-awarded mega-site that came to exemplify the business advantages of e-business and successful digital branding. The site in essence became the vehicle and proof point for IBM's own transformation as the company's central processes moved onto the Web.

Moore was also an Internet event pioneer, responsible for the sites that captured the chess matches of Kasparov vs. Deep Blue in 1996 and