NETWORKED INTERPERSONAL COMMUNICATIONS: THE CONVERGENCE OF TECHNOLOGY
… with what?

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Abstract

We consider some of the range of technological, sociological and infrastructure issues pertinent to the future development of networked interpersonal communication devices and their applications.

Keywords: interpersonal communication, network computers, mobile computers, handheld devices, human-computer interaction (HCI), Internet.

Introduction

Computers were originally going to be a minor event, and it was predicted that very few were needed, mostly for serious numerical work, such as ballistics calculations. When the J. Lyon's company brought LEO into life on 29 November 1951 for its business operations, it started a new era [1]. LEO was initially used for bakery valuations, but it attracted outside interest and was even used for ordnance calculations, as might have been expected from the original visions of computer use.

The proliferation of computers, however, was not anticipated. Computers became much smaller, and became available as personal items, at personal prices. The purposes to which computers were put changed radically. Although some of the first computer programs played noughts and crosses, ironically the scale of the computer games market was not anticipated. The 'failure' of the first pay-per-play Atari is well known: it stopped working because it was full of coins from excited players!

Yet while computers seem remarkably successful, problems have come to light. With few (though significant) exceptions, computers do not have a productive impact [2]. Undeniably, their impact is trivial compared to their potential. The industrial revolution was based, let's say, on a speed up in maximum transport speed: which at best was less than a factor of 50. Computers have speeded up, and increased memory, and increased reliability, and so on, much more than this: yet where is the revolution?

The most optimistic reading of the situation is that we do not yet know how best to use computers.[†]

Computer technology is very successful in telecommunications, in certain areas of business, such as stock control and payroll, and in their original area of calculation, such as meteorology and military applications. In other areas, we see the PC as having many times the power of earlier computers, but being left idle most of the time because their operator is not there. The user interface, and more generally the task-fit, of computers is notoriously poor. A visit to any high street computer shop shows computers sold as small office machines with multimedia power that makes them better suited as multimedia games machines — in short as fashion accessories. In support of Landauer's claims [2], note that most such shops also sell condescending books to help users make some sense of the bad user interfaces.

There are wider issues, such as the use of robots in factories, the use of information systems by governments, and world wide communications. These are already causing

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[†] It's not surprising that we aren't using all of the technical capability of computers. Human brains have been around a lot longer, and we are still only using a third of our brain capacity. As the joke goes, what are we going to use the other half of our brains for?

massive social change; as Edward Tenner puts it [3], things bite back. In other words, the poor usability of PCs is unavoidable. When user interfaces were designed, we had no idea what PCs were really for.

Consider the use of motors. The industrial revolution was brought about, let's say, by the steam engine. The steam engine permitted factories, and conjures up images of dark mills with overhead power drives and pulleys with fixed machinery. The electric motor was invented, and it changed very little. It was used in 'the obvious way' to substitute for the large steam engines. Only much later was the modern use of the fractional horsepower electric motor seen: each machine could be separately powered. Had the small electric motor been used as it now is, it is arguable that factories would not have dominated urban areas as they did, and cottage industry may have prospered [4]. Instead it died out. We now have large unemployment, partly because of the conceptual concentration of industry into factories. We have road and rail transport problems partly because of factory-mentality distribution problems. And we have a social structure that took hundreds of years to get where it is now, and it won't change again very fast. (We also have a stock market run by computers that benefits from exploiting small variations in the status quo — and will the first adopters of NCs be gadget-inspired City folk?)

Issues For Networked Interpersonal Communications

Now let us turn to the topic of this meeting. Various technological developments — microelectronics, the superior reliability of ram over disc, cheap communications — make network computers feasible. Various social developments — notably the world wide web and other network utilities — suggest sustained uptake of network computers is likely. Therefore they will be built, and they will be used.

The questions for today's colloquium are to ask whether network computers are going to go the way of the video telephone (technically feasible, over hyped, but not socially successful) or the way of the computer game (ignored at first, but now a major driving force behind hardware and software developments). Those, however, are vague questions. They illustrate the scale of the issues, by analogy, but they are not focused. More specific questions include:

1. Network computers will clearly benefit communications operators. What tariffs will be imposed, and what sorts of activity will flourish under the economic regimes? Conversely, what economically important activities will flourish in other countries with different strategies, perhaps influenced by national regulation or subsidy?

2. Network computers will clearly benefit software providers. Piracy may be reduced, and 'pay per use' may encourage users to migrate to occasional use of more powerful packages, rather than continuous use of cheap packages. Thus, will we see standardisation on major packages? Or will the easy and cheap delivery of small software components drive the development of diversity — and far better task fit for users who will essentially 'mix and match' to obtain far better productivity than is possible with common off the shelf software?

3. Purchasers will be buying hardware and will be buying software services, rather than software per se. The idea of a mass market for software upgrades will evaporate. Users will expect, and will be legally entitled to, better service than is the norm for current personal computers. Does this mean that quality will improve? Or will the ease of upgrading just mean it will happen faster than it does at present?

4. Network computers are only one device. There are other technologies. The TV, the fax, the voice telephone, the PC, the ticket machine, game consoles — to say nothing of satellites, GPS or cell radio. Network computers are not just network computers but are part of a large technological infrastructure. They may end up driving technology, or they may end up being 'compromised' to take advantage of a niche already carved out by other technology, such as ATMs.

5.	Just to throw in a dampener to the enthusiasm. The main reason why computers are not effective in certain areas is usability [2]. To what extent are the optimistic visions of network computers predicated on glossing the challenges to usability? We all know that designing a good user interface to DOS is not easy. Today's best NCs will be tomorrow's DOS, and do we want to be stuck with them? (And before you say it can't happen, remember that DOS was a 1980s *solution* not a problem.)‡ Never before have user goals and manufacturer's goals coincided.

6.	Network computers, if they are only fractionally successful, are going to require educated users. Whether these users train themselves, or are trained by others; whether software suppliers train them, or training companies spring up; whether standardisation makes training 'trivial' (e.g., as today's Web obsoleted Gopher, FTP, etc.); or whether component software makes automatically configured training essential [5] … who knows?

7.	How will networked interpersonal communicators take advantage of distributed application software? Will the user interfaces of a distributed application adapt and harmonise with the capabilities of portable devices, or will other techniques be necessary to ensure compatibility between devices' interfaces. Will we get 'lock-in' as happened with the PC/Mac/Acorn/Unix worlds?

8.	How flexible will networked interpersonal communicators themselves be? Will they permit users to operate off-line or will they become dependent upon service providers to access and update even the simplest personal information. What implications does that have for interface developers and devices users? What about service providers (and we note that the World Wide Web, after its initial promise, is seeing major advertisers withdraw their operations).

9.	How will network computers be tied to other social developments? For example, national IDs could be used to identify users. Network computers might then become ubiquitous; they would not just be 'set top boxes' to be kept at home on top of domestic TVs. Network computers could be small and mobile (we already see convergence in mobile phones and personal organisers), suggesting very personal ownership — but isn't that at odds with the non-local storage of information and the motivation of communications companies' profit? Who will own the information? Will non-standard facilities lock-in users with particular providers, or will standardisation encourage mobility? We note that Rheingold's enthusiastic book [6] ends with a dark analysis of social issues. His issues weren't hypothetical; they were already happening — in 1994.

10.	The models presented that motivate network computers are business and domestic. What of the ignored areas? We can mention just two here:

	10.1.	Soon there will be more old people in this country than it can pay for on current assumptions. If these 'retired' people have access to the communications infrastructure, and have an economic impact commensurate with their numbers, what consequences will this have on employment? If it is said that nobody on the Internet knows you are a dog, certainly nobody will know if you are deaf, arthritic, or took early retirement.

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‡	The Java VM imposes a particular security model, based on current network use. If Java uptake is commensurate with its hyperbole, then soon we will have a change-inspiring technology that securely embeds obsolete assumptions about the nature of its use. DOS was always, at least in principle, optional. NC hardware will either become upgrade-consumable or will entrench current practice.

10.2. On current trends of miniaturisation the present physical size of network computers is large. We already embed electronic tags in race horses and cows. Just as we all carry credit cards, and soon smart cards, we will soon be carrying embedded network computers. What will we do with them? What will other people do to us?

11. If networked interpersonal communicators do become ubiquitous, what regulatory infrastructure would have been developed that supports business, domestic and mobile computing across international boundaries? Satellite communications systems would be costly and that might fuel the development of an adaptive communications protocol to select the appropriate communication technique: local area network, intranet, internet, telephone or satellite depending upon location. Who knows? But we can be fairly certain that necessary regulation on standards, legislation on cryptograhy, and so forth, will make the ultimate success of NCs dependent on social, not technical, factors.

Conclusions

Today we will have had a very interesting colloquium. There are very interesting technical questions, and very interesting questions of whether we can foresee enough up take to make the technology viable. If it is, we can also anticipate enormous social consequences. We had better get the technology 'right'!

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