Distance is dead: the world will change

The exponential fall in telecommunication costs will transform our world, probably for the better

In 1930 a three minute telephone call from London to New York cost about \$250 at 1990 prices.¹ Now it costs \$2. By the year 2005 it may cost 10 cents.² In effect, it will be free. This dramatic fall in the price of telecommunication will, predicts the World Bank, have the most profound effect on our individual lives and the world economy.² Many of us will work from home. Offices will shrink or disappear. We will shop worldwide without moving from our homes. Transport will become less important; pollution and accidents will fall. In the developed world we may redisperse from cities to the country, while people in the developing world may not have to migrate to cities to find higher paid jobs. Most importantly, jobs will migrate from the developed to the developing world. In World Bank speak: "An acceleration of the rebalancing of wealth between nations in the various stages of economic development is the fundamental effect."² This redistribution of wealth will do more to improve health than all the world's doctors could ever hope to achieve.

Telecommunication charges have fallen and will continue to fall for three main reasons. Firstly, there is overcapacity in international links, mainly because of the introduction of fibre-optic cables. Price has not yet, however, fallen as fast as cost. In September 1994 a call from London to New York cost 10 cents a minute but the charge to the consumer was 60 cents, a 500% margin. That margin is unsustainable because of the second factor reducing charges: increased competition. The third factor is technical advance, particularly digitisation and, soon, the replacing of wire connections with radio. No need anymore to dig up all those roads or lay cables under the Atlantic.

Telecommuting means working from home or from a local office—a telecottage. By 2004, estimates the World Bank, about 20% of workers in developed countries will telecommute. Once the cost of telecommunication is perceived as being close to zero, half to two thirds of jobs may be held by telecommuters. This may mean that workers can look for jobs far away from where they live, car ownership and use will fall, road building can be suspended, offices will shrink, and corporate overheads should plunge. Offices will become coordination centres for teleconferencing and social activities and "a corporate symbol of visibility."

Up to half of managers' time is spent in meetings and travelling to them, but less than 70% of the time spent on meetings is productive. Videoconferencing—either in a specially designed room or directly in front of your computer at home—opens up huge possibilities for saving. Consider a four hour meeting—and medicine is full of them—with five managers or professionals travelling eight hours each way to the meeting. The savings on that one meeting if it was held as a videoconference are likely to be around \$8000 plus a lot of time. I experienced my first teleconference (without pictures) about 18 months ago: now I do two or three a month.

Soon electronic rather than paper documents will hold businesses together. Electronic files will substitute for trading documents such as invoices and order forms, as well as paper money, books and reports, letters, and memos. These documents need minimal room for storage, can be sent instantly, and can be edited at any time. Physical delivery—with its delays, uncertainties, and high costs—will rarely be necessary. Hammersmith Hospital in London, for instance, is from this year filmless. All images—from radiography, nuclear medicine, ultrasound, or whatever modality—are kept on computer. The result is that physical storage space can

be abolished, digitally archived images can be accessed immediately on the wards and in the imaging departments, and images are not lost. There are also extraordinary advantages in how the images can be viewed. For example, by "subtracting" the heart and blowing up a small part of the chest radiograph, much that could be seen only by the experienced can be seen by the inexperienced (me). Next, the Hammersmith may provide opinions that are cheaper or higher quality, or both, than local opinions on images taken in Wales, Beirut, or Moscow.

Basing organisations on electronic rather than paper documents also means that new electronic communities, or virtual organisations, can spring up. I spend one to two hours a day working by email with people in Australia, Sri Lanka, the United States, Norway, Mexico, and other countries, one of whom—the chief executive of a virtual organisation from California—has hired and fired people he has never met.

Some of the most dramatic effects of videoconferencing and the transmission of electronic documents may be seen in education. Why go to a dud medical school in Drearyville when you can more cheaply access the courses at Harvard? Or why study critical appraisal at Harvard when they have a better course in Nottingham? And why if you are a teacher with a good course restrict yourself to teaching 15 students in Tromsø when you can make your course available to thousands through videoconferencing or the Internet?

Soon, predicts the World Bank, an international tele-economy will appear not only in education but in most activities. Global competition will increase, prices will be forced down, "disintermediation" will be rife as sellers talk directly to buyers or authors to readers (p 1609),³ work forces will be widely distributed, and virtual corporations will form. The logical extension of teleworking is job export. Why pay software designers in Dallas \$1000 a day when equally good designers in Madras will work for \$200? There is no problem getting the work to them, and sometimes they can be doing the work while you sleep. Some American companies have insurance forms processed overnight in India: the service is both cheaper and faster. The World Bank predicts that high level creative jobs and low level processing and clerical tasks will be the first to be exported. Management jobs, particularly those in finance, will be the last to migrate.

The result of all this, predicts the World Bank, will be fewer jobs in developed countries and increased economic power in the developing world. Because neither the economic regimen nor the telecommunications infrastructure are yet in place the major changes will take 10 to 15 years to appear (as Trish Groves explains on p 1606, it still takes more than eight years to get a phone in many African countries). The changes will also depend on further reductions in international trade barriers, an encouragement of free competition and electronic entrepreneurialism, and regulation of global telecommunications. These political and human developments may be hard to achieve, but they are likely to be driven by the simple fact of the unstoppable reduction in telecommunication costs.

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1 Woodall P. The hitchhiker's guide to cybernomics: making waves. *Economist* 1996 Sep 28; World Economy Survey: 8.

2 Forge S. *The consequences of current telecommunications trends for the competitiveness of developing countries*. Washington, DC: World Bank, 1995.

3 Laporte R. Rights, wrongs, and journals in the age of cyberspace. *BMJ* 1996;313:1609-12.