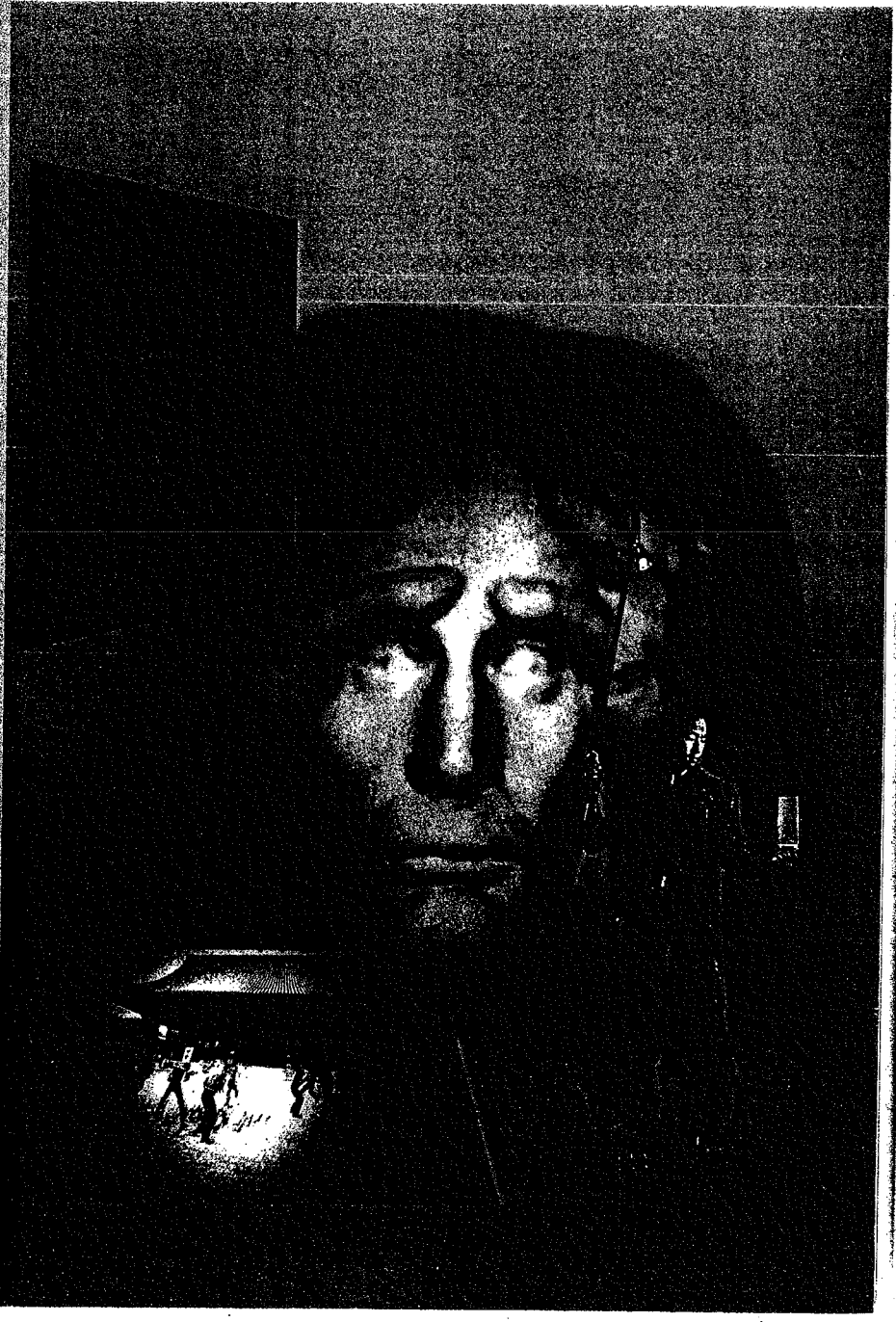


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See Rebecca Coyle's review "Is It Art Yet?" Art in Holography, Take 2'.

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Convergence of Media, Machines and Messages

The Case of the Time Warner Full Service Network

Norbert Mundorf, Lutz Kolbe' and Walter Brenner

In *Convergence* 1, no. 2 a number of contributors explored the nature of interactivity in the new media product - Philip Hayward looked at music through the Internet, Ralph Schroeder at VR games, Alan Dyer at academic hypertext theses - and did so from the 'consumer's' point of view. However, as Alexis Weedon pointed out in *Convergence* 2, no. 1, before the new product can be brought to the consumer a business infrastructure has to be created to bring together previously competing supplier or distribution systems. Thus interactivity in the form of technological compatibility of communications systems is a prerequisite for these new media products and the convergence of previously separate and perhaps competing business interests is also necessary before the consumer market can be accessed. And while the extent of that market may be determined by the 'user friendliness' of the product, the delivery system also has an effect on the customers' perception of the value of the product. Therefore it is vital that the business equation is optimal - that both the product and the delivery infrastructure combine to create the interactive experience which will appeal to the market. In order to achieve this convergence both old technological and business barriers have to be overcome.

In one experiment, which predates the rapid growth and current dominance of the Internet as a carrier, Time Warner and partners constructed a full-service network to provide home entertainment and communications to a test group of homes in Orlando, Florida, USA. This experiment, which is still on-going, illustrates the willingness of industry players to build successful partnerships while raising important issues about predicting supply and demand and the problems facing content providers and carriers.

The case of Time Warner's Full Service Network (FSN)

In the early 1990s USA cable providers and regional telephone companies announced a large number of interactive media trials. The motivation for the telephone companies was the expansion of 'unregulated' services in the face of stagnant revenues. Revenues from conventional telephone services were limited due to regulatory constraints and market saturation, while new competition threatened the market share of the former monopolies. With a slow-down in the number of new cable subscribers cable companies also foresaw their revenues levelling off. Due to competition from home video, growth in

premium services and pay-per-view has been slow, if not static. Like on-line services in the 1980s and Internet services today cable providers wanted to get their 'foot in the door' with the new technology.

The wave of interactive pilots peaked in 1993-94 with announcements of several mega-mergers between Regional Bell Operating Phone Companies (RBOCs) and cable Multiple Systems Operators (MSO), most notably Bell Atlantic/TCI, which were expected to lead to the rapid implementation of broadband services and interactive hybrid cable-telephone systems across the USA. However, there was little evidence of strong consumer demand for interactive services which suggests that the decision to implement interactive broadband trials was by and large driven by suppliers. Although the Bell Atlantic/TCI and other mergers have since been cancelled and the accompanying hype subsided, corporate convergence is still very much in evidence.

Time Warner is a good example. While the merger of publisher Time Inc with the movie/cable empire in fact left the new company burdened with differences in corporate culture, Time Warner were nevertheless quick to evolve a corporate image. And since part of that image positioned them at the cutting edge of media developments, the Orlando FSN trial was expected to become one of the most influential interactive pilots, providing a major push towards interactive cable with Time Warner as the industry leader.

Thus, unsurprisingly, the interactive TV trial in the Orlando suburbs Seminole and Orange County received considerable media coverage.² It was to be run by Time Warner Cable, the second largest cable TV operator in the USA, in conjunction with Silicon Graphics,³ and approximately 4000 households were expected to be involved when the full pilot study began in 1994. The Orlando area was chosen because of its promising demographics, i.e. it has a high percentage of children, together with high educational and income levels. In addition, after a fibre upgrade in 1993 a significant amount of fibre was already in place. In comparison to other projects the Time Warner Full Service Network (FSN) was very ambitious because of its advanced technology featuring the asynchronous transfer mode (ATM) protocol for high-speed multimedia applications. Furthermore, numerous content and service providers, as well as hardware and software companies, collaborated to bring the new media technologies into Orlando homes. After a delay of 12 months the projected 4000 households were connected in December 1995.⁴

The Orlando pilot represents an effort to implement four levels of interactivity.⁵

1. *Modified programmes:* two or more channels show the same programme, but under different conditions, such as a football game from different points-of-view. In theory, this could be achieved through analogue technology. However, digital compression makes

it possible to increase the number of available channels, thus facilitating transmission of multiple versions of a programme.

2. *Additive TV:* in addition to the analogue programme, digital information can be downloaded. For example, a route map may complement a travel show. This basic type of multimedia requires a higher level of selectivity than is necessary at the first level. Traditional broadcast/cable transmission technology has to be supplemented by digital components.⁶ Also, the viewer needs a narrowband upstream channel to access the digital information.
3. *Media-on-demand:* viewers may access digital audio or video whenever they want to, although a high level of convergence is necessary. To make media-on-demand feasible on a broad scale, information storage, transmission and retrieval have to be digital. The viewer will access content using a highly complex (and expensive) set-top box which is essentially a PC. More recent models have explored WWW access over cable systems.
4. *Fully communicative TV:* this allows the consumer use of interactive services, such as shopping, combined with levels 1-3. Households can, for instance, interact with other households by video phone. They may also participate personally in interactive movies or talk directly with a sales clerk. This level requires two-way channels with considerable upstream capacity, consumer equipment capable of receiving as well as producing and sending messages, i.e. the combined functionalities of a PC and a TV set. Also, since the content will probably reside in remote locations, transmission is dependent upon the telecommunications network. Finally, large servers (i.e. powerful computers) utilising novel technologies (such as massively parallel supercomputers) are needed to satisfy programme requests of thousands of consumers. This level of interactivity is available to a very limited extent on a narrowband basis (e.g. picture phone), but has not become an integral part of this or any other of the major trials.⁷

An interactive TV-network architecture such as the FSN outlined above employs a range of components from different suppliers who – as already indicated – must work together to make a compatible system. The Orlando trial demonstrates collaboration at two levels. Firstly, competitors in the same sector of the industry have to work together. Silicon Graphics and Ikonik, both in the high performance graphic business, had to agree on the hard- and software for a three-dimensional user-interface.⁸ And secondly, companies from completely different areas within the technology field – like the USA Postal Service and the video server manufacturer MIPS Technologies – had to agree on requirements and performance of the central storage capacity. In a similar manner Toshiba, Silicon Graphics and Scientific Atlanta collaborated to provide the set-top boxes needed to decompress digital

video and audio streams into analogue signals for the TV set. The boxes also required the capability for picture processing, security functions (decoding) and real-time video under a multi-tasking operating system. Even in the days of mega-mergers such cross-industry cooperation is a complex and challenging task.

Another critical feature of interactive broadband services is 'user-friendly' software navigators to help consumers find their way through the vast array of choices available. The user-interface was designed to be simple and intuitive, a step ahead of current PC interfaces, while the graphical navigators (called 'Carousel' and 'Omio') have real-time three-dimensional animation of real-world objects. If, for example, the consumer wants to select video-on-demand, the videos on offer are presented as rotating video cassettes with covers which the consumer will recognise. The consumer then manipulates the video via a remote control which has buttons and functions similar to those of an actual VCR remote. Outside the home a media server is required to manage the thousands of data streams, connections, accounts and access requests, as well as the entire media library, quickly. Acceptable delays for the user are thought to be no more than one or two minutes.

Interactive applications and multimedia data streams require high bandwidth and fast response times. Therefore Time Warner decided to use a hybrid fibre-coax network. The central data flows through fibre-optic trunk lines to blocks of 500 households where further distribution to individual homes takes place via coax TV cable. This system, provided by AT&T Network Systems, is called 'Fibre-to-the-Neighbourhood' in contrast to 'Fibre-to-the-Pole' proposals of some telephone companies which would bring fibre closer to the home, but would increase upfront investments significantly. While Time Warner has coaxial inroads into the home as a cable company (MSO) and favours a hybrid fibre-coax architecture, the model of combining fibre and copper lines is becoming more appealing to the telephone companies for two reasons. Firstly, fibre-to-the-home will not be implemented in the near future, and secondly, digital technology known as Switched Digital Video (SDV) enables increasingly advanced uses of the installed copper base. In this context, the Orlando trial represents the cable industry's model for an interactive broadband network as opposed to the fibre-copper-centred one of the telephone companies. Trials elsewhere in the world - in Germany,⁹ for instance - are focusing on either a combination of fibre-coax or fibre-copper.

The services actually on offer in the Orlando trial are:

- Distance learning providing interactive educational instruction, real-time or digitally stored.
- Interactive games which can be played with any other user in the system.

- Interactive shopping offering access to a wide range of merchandise, with immediate ordering by remote keypad.
- 'Home of the Future', a version of the 'smart house' which integrates in-home hardware and services delivered through FSN to provide a wide range of entertainment and information (from a home movie theatre and a home office to a children's area with numerous educational and play applications) to all family members.
- Video-on-demand with a choice of 100 movies.
- Health services, such as information about health care, preventative medicine, fitness advice, and provider's directory.
- News-on-demand.
- Pizza delivery.

The rationale for the Orlando trial from a business standpoint is to assess the potential for interactive services to supplant more traditional forms: video-on-demand versus the US\$1.4 billion video rental market, or teleshopping versus catalogue shopping sales of US\$7.5 billion a year.¹⁰ At the time the trial was implemented there was a general perception, shared by Time Warner, that entertainment applications were the driving force behind the development of new information technologies.¹¹ But complex services like medical monitoring¹² and popular services like Internet access are to be introduced into the Time Warner trial. As yet, however, Time Warner has not released any data about service or application usage in the trial nor about the economic feasibility of its full-service network as a whole (this is, of course, unsurprising given the strategic value of such information).

Analysis of interactive trials

Since the initial announcement of the Orlando trial, a number of factors have drawn attention to problems with the server technology, the ATM network and other concerns. For instance, only five of the projected 4000 households were fully operational when the trial began late in 1994.¹³ Other trials such as that by AT&T¹⁴ have produced similarly small numbers, i.e. ranging between four and 1000, and often use employees as a sample. In addition, although all 4000 households were operational by late 1995, little tangible information regarding user acceptance of the Time Warner trial is available. And even before the trial began, advertisers demanded a reduction in the fees required for participation in the trial from US\$200,000 to US\$50,000.¹⁵

Time Warner conceded that only a relatively small number of households (for a mass media product) had been involved in the trial, but pointed to the novelty of the project and its enormous future potential. Jerry Levin, Time Warner's chairman, pointed out that compared to the Internet, FSN's full-motion video was much faster and for that reason would be more appealing to regular users.¹⁶ Two main

factors account for the limited nature of the trial: the cost of supplying the services and the question of demand from private households.

Supply factors Interactive broadband networks and components turned out to be far more costly and technologically complex than initially expected. Thus the speed of development in this area has not been as fast as predicted, with considerable technical hurdles slowing down installation (and at the same time less costly alternatives have emerged, notably through the World Wide Web). The RBOCs' video networks are, for instance, still in the experimental stage. Although earlier forecasts projected hundreds of thousands of users by now,¹⁷ most market trials have been scaled back. US WEST's trial in Omaha reaches only 135 households and the company is expecting to initially provide only a conventional cable service, while other trials reach even smaller numbers. Two RBOCs have even withdrawn their Federal Communications Commission (FCC) applications to construct interactive networks, and a third has abandoned its plans altogether.

Furthermore, cable providers lack switching capabilities, while telephone companies lack the bandwidth needed for interactive video. Cable television utilises a tree-and-branch architecture with one-way (one-to-many) capability. The telephone network which is a switched one-to-one system utilises 100% copper wire for the last mile to the customer. Widespread installation of fibre optic cable is still a long way off. Therefore the expected drop in prices has not materialised as quickly as expected and the estimated price of connecting a home has risen to about US\$2000.

More recently, the Telecommunications Act of 1996 has permitted increased competition in local phone services and RBOC entry into long-distance services. The RBOCs are thus depending on long-distance telephony to offset possible losses in local markets. At the same time cable operators have had to face rate controls, which has affected cash flow and limited resources available for new projects. Consequently RBOCs have begun to focus on providing conventional cable television service and on entering the long-distance voice market, both of which have predictable returns on investment, while revenue from interactive services is largely subject to speculation.

Demand factors It is open to question whether consumers are willing to increase the proportion of the household budget they currently allocate to electronic entertainment and information. Video-on-demand was thought to be a 'killer application', saving consumers the trip to the video store and the disappointment of not finding the movie they want. Evidence suggests, however, that although a desirable convenience, consumers are unlikely to pay a significant surcharge for it.¹⁸ Nor is it a large revenue spinner for the immediate future since consumers spend less than US\$150 per year on home video (at a rate of one rental per week). Although this produces a market worth US\$14 billion, as noted above, even if

consumers switched over totally to video-on-demand, profits would not justify the enormous investment required.¹⁹

Moreover the convergence of both technology and business interests has already created serious competition for and alternatives to interactive full-service networks. Other popular interactive applications – such as video, CD-ROM, CD-i, games, encyclopedias, educational and self-help materials – are already available and easily accessible on stand-alone equipment. Over the past three years the Internet has also become a significant and relatively low-cost provider of a wide range of interactive entertainment, information and educational materials. In addition, on-line services provide user-friendly home-shopping and banking, while digital satellite receivers provide some interactive viewing options. Yet on-line connectivity remains limited, despite the fact that around 30–40% of all households in the USA have PCs. Although this has allowed media companies such as Bertelsmann to focus on the exploitation of the off-line market in the short term,²⁰ the Internet and its various services are undoubtedly growing in importance.

Thus, as a self-sufficient content provider the Full Service Network will find it difficult in the long term to compete with the Internet, but it could act as a complement. It can, for instance, provide high-speed access to the Internet via cable modems, bypassing the local telephone network. Indeed, it has been suggested that the Full Service Network could represent the future of the Internet, a future where two-way bandwidth is unlimited. But the question remains: are there applications for which users are willing to pay a premium?²¹ Although such applications probably exist, evidence from the Orlando trial suggests that only a fairly small segment of the market is interested in and willing to pay for one particular application (e.g. on-line grocery shopping). Probably only a wide range of shopping options (the 'electronic mall') will create sufficient overall demand to make electronic shopping feasible and profitable. Other uses of interactive services may require the sharing of costs between the end-user and another party. For instance, employers may be interested in paying for the use of broadband cable for telework; health insurers or local hospitals may pay for telemedicine in order to save the time and money required for access to specialists; colleges may reach underserved populations through distance learning; and realtors or car dealers may look for access to distant customers. However, none of these are mass-market 'killer-applications', instead they are partial uses which may help make a full-service broadband service profitable in the long run as these uses require a critical mass of customers to justify the time and effort required to set them up.

FSN's advantage is that it can give access to and provide additional usages for its Time Warner's vast holdings of existing content. But most current media content is not interactive and as a result, interactivity is mainly limited to the *selection* of content: viewers can pick movies from a list and view them at their leisure, parents can select educational

programmes for their children, or consumers can choose commercials if they are in the market for a particular product and make a purchase.

Conclusion Although FSN represents a new delivery medium, the content is often not novel. This is the case with most new media: CDs deliver content previously available on vinyl, videotapes carry content formerly available in cinemas, and most of the content on the USA's 60-channel cable systems is repackaged broadcast-TV programming.

This raises questions about the benefits of FSN for both the consumer and the provider. How much added value will the consumer derive from the new technology? Will the technology be convenient and appealing enough to warrant a significant increase or shift in household spending? Are there certain aspects of the technology which will generate significant savings in time or money? If there is a killer application, will alternative technologies soon provide it at a lower price? Are consumers willing to give up tried and tested service providers and replace them with new ones (e.g. in the area of telephony over cable)?

In the case of the Orlando project, advertisers became disenchanted with the prospect of reaching only a relatively small number of consumers, and pressured the service provider into substantially lowering the fees for participation in the trial. Currently, advertisers are still unsure about the effectiveness of interactive media as an advertising medium, since there is as yet no clear indication of how and to what degree shoppers use such services. Although it is similarly difficult to measure the effectiveness of advertising on the Web, companies are increasingly drawn to it since it has become the fastest growing medium.

Nevertheless, Time Warner are continuing to develop their FSN. Since March 1996 visitors to Disney World can, for instance, access and try out all the services offered in the Orlando trial. And Time Warner have announced that Singapore Telecom will also be piloting FSN technology in household trials. Furthermore, Time Warner expects to upgrade 80% of its network of 12 million cable customers to the interactive technology by the end of this decade.²²

Making interactive technology run outside a laboratory-type environment and gauging consumer preferences is a complex task, one that involves both challenge and chance. Despite difficulties in the early stages of the project Time Warner has benefited from both. Due to its 1994 start date²³ the Orlando project was well established before the 1996 Telecommunications Act and the developing Internet hype refocused market development strategies on telephony and data services. Consequently, while most other interactive TV trials around the world have lost executive support, resulting in postponement or cancellation, the Orlando trial was carried through to completion. And in spite of its relatively limited scale, the trial proved useful as a testbed for the transition from traditional cable services to advanced interactive

networks. Even though the Internet has taken centre-stage in most discussions of new media technologies, media consumption in the near future will in all likelihood remain a predominantly 'passive' pastime for the majority of consumers. Consumers will look for 'enhancements', such as those offered by Time Warner's FSN, but only a system able to offer 'added value' for significant segments of the market at a reasonable cost – and at the same time compatible with conventional modes of media consumption – will be able to generate the demand.

- Notes**
- 1 Insights that led to this article were gained by Lutz Kolbe when he was a visiting research scholar at the University of Rhode Island, Research Institute for Telecommunications and Information Marketing (RITIM), Kingston, USA. The co-author acknowledges the Leisler Kiep-Foundation for supporting his research.
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