

Who Needs a ‘Killer App’? Two Perspectives on Content in Residential Broadband Networks

Catherine A. Middleton

Schulich School of Business
York University
Toronto, Canada
Email: cmiddlet@yorku.ca

Abstract

This paper describes the deployment of residential broadband networks by relating two parallel but contrasting stories. Story 1 considers network providers’ search for a killer application to drive demand for broadband networks, while Story 2 suggests that consumers have already found a killer application in e-mail and basic connectivity. It appears that residential broadband networks are currently being developed with a Story 1 perspective in mind. Story 2 should be assessed in the context of its historical persistence and significance. The implications for future development of residential broadband networks are considered when both stories are accepted as plausible.

Keywords

residential broadband networks, case study, socio-technical systems, actor-network theory

INTRODUCTION

Around the world, telecommunications and cable companies are providing broadband connectivity and services to consumers in their homes. Although there is no widely recognised killer ‘app’ that will convince reluctant consumers of the value of broadband connectivity, the demand for such services is projected to grow steadily. This is despite the fact that trials of residential broadband services have consistently failed to deliver services that are appealing to consumers or that take full advantage of the potential of broadband connectivity. Instead, there is evidence that what consumers find most valuable is e-mail access and the basic connectivity among communities of users that it enables. What is interesting about this finding is that it is often dismissed as trivial, or explained away by noting that the services available to users in the trials were not particularly compelling, or that once the technology improves more interesting services will be available. There seems to be an unwillingness to accept that connectivity, in and of itself, without additional services, may be valuable to consumers.

Using an analytical framework drawing upon on social construction of technology and actor-network theories, and applying it to data from Netcom (a Canadian residential broadband network trial), this paper explores resistance to the conclusion that users find value in connectivity alone. Two perspectives on residential broadband network deployments are offered here. The first is consistent with the belief that broadband networks have enormous potential to offer value to users once appropriate content is developed and delivered. The second perspective shows that the value for users does not come from the technology itself, but from its enabling features that allow users to generate their own content and develop their own communities. It concludes by noting that these two perspectives have co-existed when other communication technologies have been introduced, and briefly discusses the implications

if the dominant viewpoint were to shift from the first perspective to the second, as history would suggest.

Residential Broadband Networks

In the past few years, cable and phone companies throughout the developed world have invested heavily in upgrades to their physical plant and equipment (Ims et al., 1997; Shelanski, 1999). By means of existing copper phone lines (using DSL -- digital subscriber line -- technology), cable modems and satellites, internet service providers are delivering internet access at speeds between 1 to 3 Mbps, as well as other broadband services (e.g. entertainment, shopping, news on demand) to consumers in their homes. Although precise figures showing consumer adoption rates for residential broadband connectivity are hard to find, and growth rate predictions vary, analysts agree that there has been and will continue to be substantial growth in demand for residential broadband¹ on a worldwide basis (Anonymous, 2000; Business Wire Staff, 1999; Clark III, 2000).

There is not much academic literature that looks at usage of broadband services from a consumer perspective. In the early to mid-1990s, broadband services were only available in limited geographic areas, usually on some sort of trial basis (see Bartsch & Auer, 1997; Brodeur & Agarwal, 1996; Di Concetto et al., 1999; Dixit, 1999; Falkus, 1997; Maddox, 1994; Rath et al., 1997; Zahariadis et al., 1997, for discussion of these trials). Most of what has been published about broadband trials focuses on issues related to the technology and technical platform required to support residential broadband connectivity (e.g. Hernandez-Valencia, 1997; Humphrey & Freeman, 1997; Khasnabish, 1997; Washburn & Perrin, 1996).

The lack of academic commentary on user aspects of the trials is due in part to the proprietary nature of many of the trials. They were often funded by corporate sponsors (e.g. Time-Warner's Full Service Network trial in Orlando, Florida) who wanted to keep their findings about user behaviours to themselves. However, the limited analysis that is available on the consumer aspects of residential broadband does indicate that the services offered did not fully exploit the technological capabilities of the technologies consumers were using, and that there did not seem to be a single killer application² that would drive consumer demand for residential broadband networks (Di Concetto et al., 1999; Snoddy, 1995; Zahariadis et al., 1997). As Akimaru and his colleagues note, "The *need* for broadband integrated services simply did not seem to exist, and the pilot studies of the day showed that customers were not willing to pay the extra price for new services." (1997, p. 84). This perspective is echoed by the business press, who branded the broadband trials a failure (Mason, 1997).

There is No Killer App - Or is There?

This author's own research at the Netcom residential broadband network trial³ reached similar conclusions, in that there didn't seem to be a single broadband application that was widely used by trial participants. It should be noted though that the Netcom trial did not set out to find a killer application for broadband networks. As the trial director said, "we held the heretical notion that instead of designing the content from the perspective of solid business

¹ In this paper 'broadband' refers to downstream bandwidth of 1 Mbps or more, which can be provided by cable modem or DSL connections to the home. Some would argue that true broadband connectivity requires bandwidth of 10 Mbps or greater, but the definition used here reflects the marketplace operationalisation of residential broadband networks.

² The term killer application, or killer app, is used widely to signify a product or service that will drive demand for, or increase sales, of a related product or service. Searches for compelling applications that legitimise or justify the adoption of particular technologies have been recognised in the computer industry for many years (see Bragitikos, 1996; Moore, 1994, on this point).

³ Please contact the author for references.

cases, we should present users with a great variety of applications that might be of interest to them, including community services, education and information”.

Not finding a killer app for broadband in a trial that didn't set out to develop one isn't a result worth mentioning. But there is still a story worth pursuing here. It turned out that there was a killer application in the Netcom trial, but one that didn't require broadband networks. That killer application was e-mail, and in particular, the listserv that was set up for exchange of information among the wired homes in the Netcom community (more on this point will follow). This was an exciting result for the trial researchers, as it confirmed their belief in the value of allowing users to determine how network connectivity could suit their own needs. But some consortium partners (the trial was developed by a broad based consortium of public and private sector partner organisations) were not convinced that this conclusion was an accurate one. From their perspective, this meant that the trial had been a failure, yet they felt that had the trial been able to deliver all the services that were planned, the findings would have been different. Audiences beyond the trial also reacted to these findings with scepticism, dismissing the conclusions as trivial, or countering with hypotheses suggesting that a) e-mail was the only viable service offered to users (thus the conclusion was obvious); b) the findings would be different if there had been 'real' broadband content like video on demand, or c) as the technology improved and users became more sophisticated things would change.

There are no doubt ways in which the research results could be presented more convincingly, but setting aside the issue of how the findings are packaged, it is argued that there was still an underlying reluctance to accept as legitimate the conclusion that connectivity itself was important and valuable. It is in investigating this denial of legitimacy that some underlying assumptions inherent in the development of residential broadband networks and services can be unearthed. Understanding why this finding was an uncomfortable one for some participants in the trial helps elucidate two strikingly different perspectives on the deployment of broadband networks and services. These perspectives are explored below.

A Theoretical Framework

The interpretive method used here draws from two related bodies of theory, namely the social construction of technology (SCOT) (e.g. Bijker et al., 1987) and actor-network theory (ANT, see Law, 1991). A social constructionist perspective can account for “both success and failure of technology within the same theoretical framework” (Lea et al., 1995, p. 464). ANT is harder to define. Walsham observes that “actor-network theory is not a stable and unified body of knowledge which can be drawn on by researchers, since its developers frequently revise or extend elements of the theory” (1997, p 468). Indeed, one of the founders of the theory confirms Walsham's observation by writing recently “there are four things that do not work with actor-network theory; the word actor, the word network, the word theory and the hyphen!” (Latour, 1999, p. 15). This makes it difficult for a researcher to know exactly how to use ANT as an interpretive tool, or to determine whether its constructs are being appropriated faithfully. However, the usage of ANT in the information systems (e.g. Boland & Schultze, 1996; Monteiro & Hanseth, 1996; Somerville, 1997; Stalder, forthcoming; Tatnall & Gilding, 1999; Vigden & McMaster, 1996; Walsham, 1997; Woolgar, 1991) and organisational literatures (Lea et al., 1995) show its value in “provid[ing] a very good way of telling stories about ‘what happens out there’ that defamiliarizes what we may otherwise take for granted” (Calás & Smircich, 1999, p. 663).

The approach here, (following Lea et al., 1995) is to draw upon SCOT and ANT constructs of multiple narratives (Boland & Schultze, 1996), interpretive flexibility and closure/irreversibility to explore the nature of residential broadband networks and their deployment as a socio-technical system. Two narratives, well supported by data, but offering quite different perspectives on residential broadband networks, set the stage for further analysis. The

narratives show the interpretive flexibility inherent in residential broadband networks, meaning that “the technology is open to more than one interpretation; it can mean different things to different individuals or different groups” (Lea et al., 1995, p. 463). Over time however, the interpretation of most technologies and the socio-technical systems they are embedded in becomes stable, abandoning interpretive flexibility and reaching a state of closure or irreversibility (Callon, 1991). As such, it is important to understand the relationships among actors in the socio-technical system (known as the actor-network), and to consider how they might be affected as the relationship becomes irreversible. In this case, the actor-network includes the broadband network itself, the content and services delivered over it, and the users. These actors are equal participants in a negotiation that may result in closure around a particular interpretation of the technology.

In the following section, the two interpretations of a Canadian residential broadband network trial are presented. An analysis of the actor-networks underlying each interpretation is set forth, showing the competing assumptions each interpretation makes about users, technology and content. Neither interpretation has yet become irreversible, but the implications that would arise from achieving closure around one or other interpretation are considered.

THE NETCOM RESIDENTIAL BROADBAND NETWORK

In late 1993, the Netcom⁴ consortium was formed to build and operate a broadband network, on a trial basis, in a new housing development not far from a major Canadian city. The consortium included telecommunications companies, computer companies, systems integrators, health care providers, government agencies, libraries, real estate developers, multimedia content developers, colleges and universities. The consortium members agreed that the trial would be user-centred, have a strong research focus, and be pre-competitive and non-proprietary (i.e. in the trial environment competitors would work side by side and share research results). Membership was open to any interested organisation or individual who paid the membership dues. The trial plan outlined the objectives:

Netcom is a consortium of public and private organizations who share the goal of shortening the implementation time for full service broadband networks in [Canada]. Netcom is testing the city of tomorrow today. It's a broad bandwidth network complete with user access appliances, multimedia content and servers and information gathering that will result in a blueprint for living and working in a connected community. (Netcom, 1994)

Planning for the trial was under way by early 1994, but delays in constructing the homes meant that the first users were not connected until December 1996. More users were added as people moved into their new homes. Although the network could have served many more users, usage peaked at about 200 users (in approximately 70 homes) in 1998.

A symmetrical HFC (hybrid fibre coax) network provided broadband connectivity at speeds up to 10 Mbps. Services available free of charge on this broadband network included videophones, CD-ROMs on demand (e.g. games, entertainment, educational materials), music on demand (a jukebox-like service where users could create their own play lists), high speed internet access, e-mail and a community listserv⁵. All of these services were accessed through home computers. Users could connect to the network from multiple access ports in their homes (although only one computer could access the Netcom network at a time).

In early 1998, the consortium had announced that within the next year it would be able to offer services to upward of 3000 users, by extending the network into the local community

⁴ Netcom is a pseudonym. Other research teams have used different pseudonyms for the trial (e.g. Hampton, 1999), and some research has been published using actual names and locations.

⁵ Note that collectively these services and applications are described as network ‘content’.

(Netcom, 1998). As 1998 went on however, circumstances changed and a key player in the consortium announced that it intended to withdraw at the end of that year. An effort was made to keep the consortium going without this partner, but by this point residential broadband services were becoming available in some markets on a commercial basis, so the value of the Netcom trial as a research site was diminishing. The cost of continuing would have been high, so the decision was made to end the trial in December 1998.

This decision created an uproar among the users, who felt that they were part of a five year trial of broadband services, not a two year trial. What was most upsetting to many users was that there was no option to continue to receive service by paying for it. The consortium had decided to decommission the network completely, rather than operate it on a fee for service basis, leaving users with the choice of internet access by cable modem or by dial up modem (the area was not served by DSL at the time). The consortium did provide free dial up modem service for some months after the trial ended, and arranged for the community listserv to be transferred to a new owner. All other services were discontinued, and the HFC networking equipment was removed from the community in early 1999.

Several research initiatives were associated with this trial, and data were gathered in a variety of forms for different purposes. The results and analysis presented here draw from multiple sources, including trial documentation, focus groups conducted with users in July 1997 and June 1998, field notes from visits to the trial site and attendance at trial meetings, archives of the Netcom community listserv, and a series of 34 in-depth interviews with infrastructure providers, content developers and others involved in establishing and operating the trial.

Story 1

Although it was noted earlier that the trial's objective was to offer a wide variety of services to users, many members of the Netcom consortium expressed disappointment that they had been unable to provide truly valuable services to users or to fully exploit the potential capacity of the broadband network. This is the central theme that is explored here in story 1. Space limitations preclude detailed discussion of the data that support this theme. As a (poor) substitute for such discussion, representative quotations are offered to summarise the key sentiments consortium members expressed when interviewed about the outcomes of the trial.

The real estate developer notes the inability of the consortium to deliver content and services that were valuable to the users.

If we had services that were truly valuable to the customer I think it would have been a different -- a very different story. The problem that we always had and still have until the last day of the trial is that consumers -- we could never really describe to consumers what it is that all of this really meant to them and how does this really make your life better?

These sentiments are shared by other consortium members, as the following comments show.

We had a responsibility to make sure that the content was compelling, that it was constantly being refreshed, that there was always something new, because the interest was there. We just, I think we let them down, on our end, as a consortium, yeah, I really think so. It's unfortunate.

Content is what consumers want to see. They want to see a value proposition. And access alone is not a value proposition. Or it's a value proposition that can't be sustained. I mean after a while, consumers want more than just access. ... So what I'm saying is access alone is not a sustainable value proposition. Sooner or later you gotta put compelling content and applications in front of consumers to retain them, to get their loyalty, and they never, they never did that.

...the Netcom trial, or ADSL, or the cable modems, I mean this is the platform to the home of the future. And, you know, everything, all the future services will be riding on that platform, and that technology. And it's a battle, it's a battle for the family room. Because that's where, you know, and I say that, I don't really mean just the family room, but it's a battle for the family room with respect to who's going to be the company that's going to be delivering those new services to the new consumer.

There was no doubt that Netcom's technical platform was excellent, "a fantastic hardware platform to work on". In another member's words, "It was really good. It was a great service, for the customers. It was reliable, it was very, the way we provisioned it was very customer friendly. A lot of bandwidth available to a limited number of customers. And we didn't have too many problems, at all, really." But the network's technical excellence led to more frustration on the part of consortium members as they were not able to obtain content that fully exploited the HFC broadband network's potential capabilities.

We tried to hard to increase the video content, but again, we couldn't get anyone to, even though we had carefully built the infrastructure that would support a lot of video, including links with [a partner] with their massive storage, and getting hooked up onto the internet backbone so we could actually move data files around etc. And we really wanted to explore what everyone talked about, which was quote unquote convergence. The union of TV and PC, which we really did have the ability to do.

A housing sales person explains part of the sales pitch as "talking about the technology and the opportunity, tomorrow's technology today", but then remarks, "we never had, the reality of what we had to offer was never quite as good as the story. And I'm not sure that the reality that existed in the purchasers' homes was ever as good as the story", again reinforcing the notion that there was a lot of unrealised potential in the trial.

From a technical perspective, the trial was characterised as a series of missed opportunities.

Well I think there was a lot more that we wanted to do. I think there were a lot more things that we could have done that would have been fascinating, that would have been extraordinary results for our members. Home automation, new applications development, streamed video. I think there was a lot more we could have done there, that would have been of extraordinary benefit. Shopping applications, e-commerce applications, we never go into any of that.

In summary, this story is one of unrealised potential. Consortium members recognised the technical value of the HFC network, and were frustrated that it was not used to the full extent possible, in terms of delivering services like video that could only be made available on this a high bandwidth network. There is value in broadband, but to fully realise that value the broadband network must be used to deliver engaging content and services to users. Despite consortium members' best efforts, there was not enough content available at Netcom to demonstrate the value of broadband connectivity, or to find out which services really were preferred. There was a strong sense of failure in terms of delivering content, but also an underlying belief that had the problems in getting content been overcome, the outcomes would have been quite different.

Story 2

This story is told in the same way as the first one, by piecing together quotes. In this story though, users have centre stage, and their comments are as important here as those from consortium members. This is a story of community and connectivity, not of technology and content. A good starting point for this story is the following message that was posted by a user to the community listserv, after it was announced that the trial would be ending.

I'm a home owner [here] and I've been weeding through all of the chafe on the mailing list with regards to the end of the Netcom Trial. This has led to a discussion at my office and an idea that could benefit, my company, my neighborhood ... We are in the process of packaging a product specifically for online communities. It just so happens, I live in one. Well for the time being anyhow. Besides the free Internet access we're enjoying, I think what the residents here have become most attached to, is the online community. This is why they are irate at the loss of their wired community, to them it's like ripping apart the neighborhood. I am emersed [sic] in email all day long and should be sick to death of it, but I'm going to miss it too. I think this is something that is not easily measured by the people studying the trial, one because there's no previous data on it, but mostly because it's an emotional attachment.

Other users expressed similar thoughts on the listserv about the strong attachment they felt to their community. One wrote, "I have walked around the neighbourhood a lot lately and I have

noticed a few things. I have noticed neighbours talking to each other like they have been friends for a long time. I have noticed a closeness that you don't see in many communities.” Another person wrote,

My family enjoyed being on the trial. We had access [sic] to free internet, free health nurse and free games for the kids. We got a good deal on a computer, which we would not own now if it were not for Netcom and we now own a free telephone. We did not buy our house because it was a smart home, but look at the computer system as a bonus that came with our house. We live in a great community, have the chance to talk to all of you through a community e-mail, and have contributed to a worth while study.

A consortium member's comments on the winding down of the trial reiterate the strong sense of community that it engendered.

I must say that they [the users] don't need us anymore. What they're doing was e-mail for the most part, they can continue to do. We haven't been giving them any good content for the last year and a half, that's been anything that's new and radical. Yes, their internet access will be slower for a while. But once they get onto [an ISP] or wherever they're going to go, even if they're on dial up, they can create a community mailing list exactly as they have now, and they just plain don't need us.

This attachment to community was widely recognised by the consortium members. To some it was a surprise, to others it was consistent with the trial's user-centred approach.

I actually think we succeeded in community and that wasn't part of what we had planned. At least it wasn't something that I had really thought about. And so, for me, just to realize that the basic connectivity, just being connected and having an easy way to reach one another was really important, and really allowed, and mundane stuff, I mean, I'm surprised at what goes on in those e-mails. It is everyday, mundane stuff but it's really important, compared to some of the other stuff, 'oh, well we're going to concentrate on this, all they want is games, well no, they want garbage pickup'.

I'd personally like to have experienced it myself, actually live in a community where I could get these services. ... I've seen a community grow, and stand together which I never thought would have happened. Just the e-mail itself has united the community and made it stronger which is kind of weird because when we went to, they invited us once, to a community party once, I did not expect the turn out, all the people who were using our software were all friends and that was very incredible.

But again, one of the things that struck me was the way the whole package worked, which was part of the theory behind Netcom at the outset, that it was the whole shopping basket of human activity that would generate the dynamic interest, and not a single specific application that we generated. The way, the presence of the network, and the existence of the trial, acted as a community catalyst, to me was one of most extraordinary, fundamental results of the trial.

Many consortium members were delighted that the community aspect of the trial had become so strong, and didn't hide the fact that this didn't require the broadband network the trial had built. In the words of the trial director, "the listserv had become the number one application of community use, and what was of interest to us of course was that it was a low band application and did not require the expensive network that we built". One consortium member observed that "the low tech side of it, the community side of it, was really vibrant", while another noted "the high speed thing was all just window dressing. The meat and potatoes of connectivity is sufficient to produce something interesting".

Some other observations supplement this story line, showing that users wanted to have control over how they used the network, rather than being on the receiving end of someone else's content. A consortium member developing health care services makes this point.

I made a mistake, in the sense of assuming that people wanted a lot of information and what they wanted to do was talk to each other. So when you take a broader view of health, you know, from a health promotion clinic -- standpoint, the real beauty of it came from self-help, came from finding babysitters, you know, organizing around the teachers' strike. You know, it was bottom up stuff. I mean, we know this. ... not this barrage of information and music and this and that and you know. And how arrogant, and I'm including myself in this -- that's why I can say it -- to think that you know, you know what people need and want and how they are going to use it.

The music on demand service enabled user control of content, as one of the trial's programmers explains here.

And to tell you honestly, I really enjoyed the music part. It wasn't too long ago we got it going but I really enjoyed the music part because I could put it in the background and listen to it. And the best part about it is that I can create my own play list. I don't have to listen to a whole album, I can just pick out the things that I like, it's like creating your own tape.

Another interesting part of this story is that the Netcom network was designed as a symmetrical one, meaning that users had almost the same bandwidth out of their homes as into them. A consortium member explains the significance of this network design.

And in fact that is not the way the industry is going, they're with something that is quite asymmetric, which is people want way more in than they want to put out. I think [the decision to make the Netcom network symmetric] was perhaps a decision that happened years and years ago. ... That was a very critical thing because you go and say "hey listen, on this network you are a peer to the broadcaster, you are a peer to other things, you, the homeowner, could be providing things at high speed as well", which actually led to some very interesting stuff you know. Some of the people that wanted to join the community were ones who wanted to become internet service providers. So I will provide a service based out of the community, because I know it will have infrastructure to do that.

In summary, this is a story of community and connectivity. Users valued their connections to each other. They were not particularly interested in content developed by others, they were more interested in the content they were creating themselves through the development of their own on- and off-line community of neighbours. In this story, the technology had no residual value, it was of use because it provided a conduit between community members, all of whom could send and receive messages and other content as equals on the network.

DISCUSSION AND CONCLUSIONS

The key to understanding the differences between these two stories lies in the assumptions made in each about content. A dictionary definition of content as "what is contained in something" is helpful here. In both stories above, the broadband network contains something, the difference is in what is contained, who provides it and what value is ascribed to it. The differences between the two stories can also be seen when describing broadband networks as socio-technical systems (Bostrom & Heinen, 1977). The technical part of Netcom's residential broadband network is easy to identify, it is the hybrid fibre coax network built by Netcom. Netcom's social component is the users. But it is less clear where content fits in. In story 1, the success of the technology is linked to the existence of content. Without content, which story 1 defines as something (e.g. applications and services) that is delivered to users over the technical network, the technical network is not successful. But in story 2, users are not dependent upon the network to deliver content, instead they generate their own content by using the network as a tool for communication and connectivity. Content is a part of the social component in Story 2. The positioning of content in each of the stories is shown graphically in Figure 1. The left side of the diagram shows how content originates as part of the technical system and is then sent over the network to users. The right side of the diagram shows content originating with the users, and then being sent to the network, which is seen as a communications tool.

The Netcom Residential Broadband Network

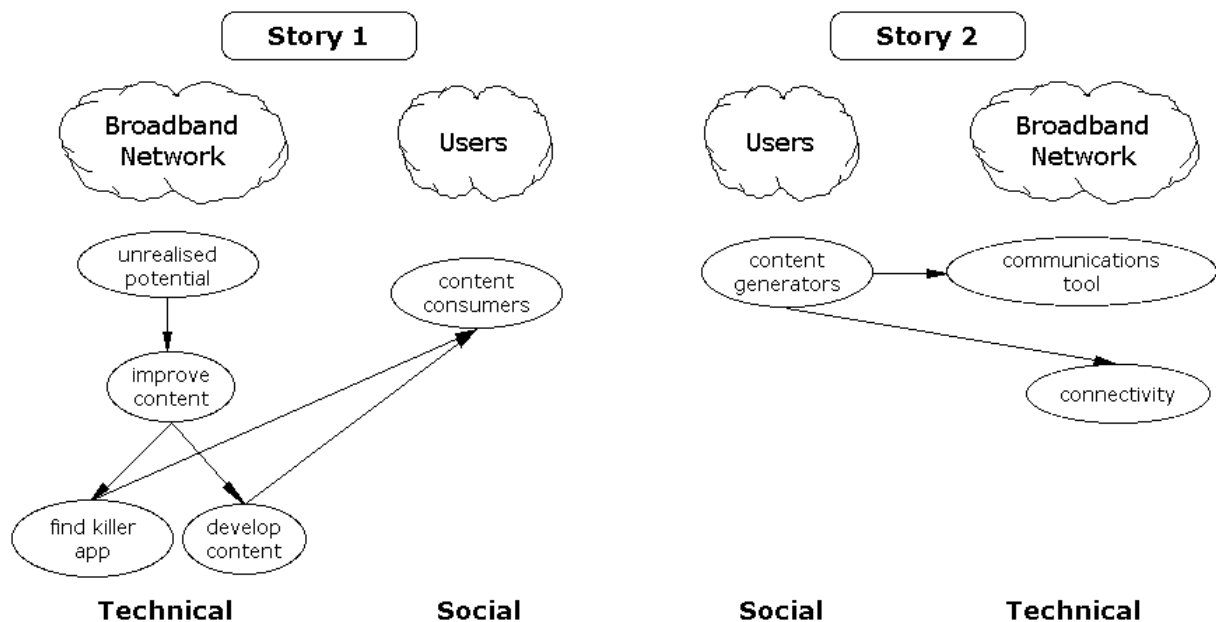


Figure 1: Graphical Comparison of the Netcom Stories

The differences between the two stories are summarised in Table 1 (on next page). Shading is used to show the positioning of content. As diagrammed above, in story 1 content is tightly linked to the technology, whereas in story 2 it is linked to the users.

The Implications of Interpretive Flexibility and Irreversibility

The analysis above indicates that at Netcom, the residential broadband network did not reach a state of irreversibility or closure. The data presented show that there was not a shared understanding of how the residential broadband network could be used or what it was about, instead the co-existence of the two stories demonstrates interpretive flexibility. Thus any analysis of the Netcom trial should acknowledge that although the killer app required to justify the usage of broadband connectivity did not exist, this did not mean that the trial was a failure. The trial showed the value of empowering users as content generators, and providing them with connectivity.

Because they had different perspectives on the trial, Netcom consortium members (the people and organisations who built the network and developed content and services) were not included in the diagram showing the two Netcom stories. As might be expected, the consortium members could be divided into three groups: those whose interpretation of the trial was most consistent with story 1; those whose interpretation was most consistent with story 2; and those who could identify and articulate both stories. Because the trial ended when it did, it is unclear whether the presence of two interpretations

	Technology	Content	Users
Story 1	<ul style="list-style-type: none"> valued for technical capabilities, but content essential to provide value to users capacity to transfer data at rapid rates <i>to</i> users 	<ul style="list-style-type: none"> tightly linked to technology content makes the technology valuable 'appropriate' content uses full capacity of technology few content providers, content often controlled by owners of technology 	<ul style="list-style-type: none"> consumers of technology-content package revenue source for technology providers as consumers of content recipients of content, not contributors
Story 2	<ul style="list-style-type: none"> valuable only as a means of connecting users, technology is a pipe must support data transfer between users, with users having full capacity to send <i>and</i> receive data 	<ul style="list-style-type: none"> generated by users many content providers content is independent of technology 	<ul style="list-style-type: none"> content generators full participants in exchange of content

Table 1: Assumptions about Technology, Content and Users Embedded in Netcom Stories

would have become problematic as the trial continued. This is an important question however, as commercial internet services providers are now offering broadband network connectivity to consumers, and the two interpretations of what the networks are about persist in their commercial deployment.

It is very easy to find evidence of the story 1 interpretation of residential broadband in the commercial deployments. This is the dominant story, one that has been accepted and is continually reinforced by the business press. For example, Ford Cavallari, a US based internet consultant, was recently quoted by both *Forbes* ASAP and *Fortune* magazines. He says "Applications are going to be the regulator and demand creator for broadband ... Broadband is never going to take off without them." (Zerega, 2000, p. 111) "Customers are looking for the application that makes the broadband world touchable and believable to them, that underscores its benefit. And that application does not yet exist." Corporate press releases also confirm the belief that demand for broadband will be driven by killer applications delivered to consumers by their network providers.

ATLANTA, GA, June 7 1999 /CNW -- iMagicTV will showcase live, interactive TV services, including unlimited channels, video-on-demand, Internet access and e- mail services, over copper telephone lines throughout several Supercomm booths here this week. Using its DTV Manager software, iMagicTV will highlight the compelling business case these applications present for telcos to implement residential broadband deployment, diversify their business and provide subscribers with features that transform their televisions for the digital age. (Canada Newswire, 1999)

"LOS GATOS, Calif., March 21 2000 /PRNewswire/ -- solopoint.com, inc., a provider of advanced Internet access and communications services for the broadband market, announced today its new service initiative, called Connectivity for Living, that will help ISPs create demand for broadband DSL and cable services in the residential market." (PR Newswire, 2000)

There is much evidence to suggest that network service providers (e.g. cablecos and telcos), broadband content developers and telecommunications equipment manufacturers believe that the story of residential broadband will be that demand is created and sustained by the delivery of the content they choose to provide over high bandwidth connections into consumers' homes (e.g. interactive television, videos on demand, and other entertainment services). Based on this evidence, it is easy to understand why some Netcom consortium members and others outside the trial were reluctant to accept research findings that indicated users didn't want content pushed at them but wanted to control and develop it themselves.

The history of technology indicates that most technologies do achieve irreversibility (Callon, 1991; Latour, 1987). Over time, multiple interpretations of the technology disappear as a common understanding of what it is about emerges. The question that arises here is what the common understanding of residential broadband will be. Based on a reading of the dominant perspective, it suggests that residential broadband networks will be controlled by service providers who develop and deliver content to users. If the alternative view, which is contrary to the fundamental assumptions and values of those developing residential broadband services at present, is accorded validity, then it calls into question the entire underpinnings of the industry and the fundamental nature of many businesses involved in developing consumer based broadband networks and services.

There is no crystal ball to show which perspective will be the one that persists in the long run. Indeed, there are likely other perspectives and interpretations of residential broadband that have yet to emerge. What is known however, is that with other communications technologies, including the telephone (Fischer, 1988) and teletext (Allen, 1988; Devon, 1991; Lea, 1992), the user-based, story 2 perspective defined the way in which the technologies were adopted. With residential networks, the Netcom trial does not provide the only evidence to suggest that what users want most is connectivity. Hidden behind the dominant perspective there is evidence to suggest that connectivity is more important than a content-driven killer app (Bragitkos, 1996; Kraut et al., 1999; Lyman, 1996).

Perhaps residential broadband networks are different from other communications technologies, and they will be successful in creating demand based on a 'content delivered to users/killer app' model, as outlined in story 1. But it is possible that residential broadband networks aren't different from earlier technologies, and that the 'user in control' model outlined in story 2 will prevail. This does not mean that there is no market for residential connectivity, but it does mean that its nature needs to be reconsidered. In this case, the implications of the question 'who needs a killer application' must be understood by anyone wishing to succeed as a provider of residential broadband connectivity.

REFERENCES

- Akimaru, H., Finley, M. R., and Niu, Z. (1997) Elements of the Emerging Broadband Information Highway, *IEEE Communications Magazine*, 35, 6, 84-94.
- Allen, D. (1988) New Telecommunication Services: Network Externalities and Critical Mass, *Telecommunications Policy*, September, 257-271.
- Anonymous. (2000, 28 March) Huge Growth Predicted for Broadband in Asia. *Asian Wall Street Journal*, pp. 4.
- Bartsch, F.-R., and Auer, E. (1997) Lessons Learned from Multimedia Field Trials in Germany, *IEEE Communications Magazine*, 35, 10, 40-45.
- Bijker, W. E., Hughes, T. P., and Pinch, T. J. (eds.) (1987) *The Social Construction of Technological Systems*, MIT Press, Cambridge, MA.
- Boland, R. J., and Schultze, U. (1996) From Work to Activity: Technology and the Narrative of Progress, in W. J. Orlikowski, G. Walsham, M. R. Jones, and J. I. DeGross (eds.), *Information Technology and Changes in Organizational Work*, Chapman & Hall, London.
- Bostrom, R. P., and Heinen, J. S. (1977) MIS Problems and Failures: A Socio-Technical Perspective, Part 1 - the Causes, *Management Information Systems Quarterly*, 1, 3, 17-32.

- Bragitikos, M. (1996, 6 December) Just What Will Take the Net from a Novelty to a Necessity? *Wall Street Journal Interactive Edition*.
- Brodeur, R., and Agarwal, K. (1996, December) Bell Canada Trials Provide High Bandwidth for Interactive, Multimedia, and Internet Services. *Telesis*, 41-42.
- Business Wire Staff. (1999, 6 December) One in Three Europeans Will Embrace a Digital Lifestyle by 2003, According to Forrester. *Business Wire*.
- Calás, M. B., and Smircich, L. (1999) Past Postmodernism? Reflections and Tentative Directions, *Academy of Management Review*, 24, 4, 649-671.
- Callon, M. (1991) Techno-Economic Networks and Irreversibility, in J. Law (ed.), *A Sociology of Monsters: Essays on Power, Technology and Domination*, Routledge, London, 132-161.
- Canada Newswire. (1999, 7 June) iMagicTV Showcases Live Interactive TV Services over Copper Telephone Lines. *Canada Newswire*.
- Clark III, P. C. (2000) Long-Delayed Broadband Boom Could Come in 2000. *Communications Today*, 6.
- Devon, T. (1991) Interactivity and the Popular Support for Telidon, *Canadian Journal of Communication*, 16, 2, 307-311.
- Di Concetto, M., Pavarani, G., Rosa, C., and Rossi, F. (1999) AMUSE: Advanced Broadband Services Trials for Residential Users, *IEEE Network*, 13, 2, 37-45.
- Dixit, S. (1999) Data Rides High on High-Speed Remote Access, *IEEE Communications Magazine*, 37, 1, 130-141.
- Falkus, D. (1997) How Attractive Is Interactive?, *Communications International*, 24, 6, 39-42.
- Fischer, C. (1988) Touch Someone: The Telephone Industry Discovers Sociability, *Technology and Culture*, 29, 32-61.
- Hampton, K. N. (1999) Netville Online and Offline: Observing and Surveying a Wired Suburb, *American Behavioral Scientist*, 43, 3, 475-492.
- Hernandez-Valencia, E. J. (1997) Architectures for Broadband Residential IP Services over CATV Networks, *IEEE Network*, 11, 1, 36-43.
- Humphrey, M., and Freeman, J. (1997) How XDSL Supports Broadband Services to the Home, *IEEE Network*, 11, 1, 14-23.
- Ims, L. A., Myhre, D., and Olsen, B. T. (1997) Economics of Residential Broadband Access Network Technologies and Strategies, *IEEE Network*, 11, 1, 51-58.
- Khasnabish, B. (1997) Broadband to the Home (BTTH): Architectures, Access Methods, and the Appetite for It, *IEEE Network*, 11, 1, 58-69.
- Kraut, R., Mukhopadhyay, T., Szczypula, J., Kiesler, S., and Scherlis, B. (1999) Information and Communication: Alternative Uses of the Internet in Households, *Information Systems Research*, 10, 4, 287-303.
- Latour, B. (1987) *Science in Action*, Harvard University Press, Cambridge, MA.
- Latour, B. (1999) On Recalling ANT, in J. Law and J. Hassard (eds.), *Actor Network Theory and After*, Blackwell, Oxford, 15-25.

- Law, J. (ed.) (1991) *A Sociology of Monsters: Essays on Power, Technology and Domination*, Routledge, London.
- Lea, M. (ed.) (1992) *Contexts of Computer-Mediated Communication*, Harvester Wheatsheaf, New York.
- Lea, M., O'Shea, T., and Fung, P. (1995) Constructing the Networked Organization: Content and Context in the Development of Electronic Communications, *Organization Science*, 6, 4, 462-478.
- Lyman, P. (1996) Access Is the Killer Application, *The Journal of Academic Librarianship*, 22, 371-375.
- Maddox, K. (1994, 21 March) Setbacks on the Superhighway. *Advertising Age*, 65, IM2.
- Mason, C. (1997, 15 November) High Hopes Drowned in Dollars. *America's Network*, 16.
- Monteiro, E., and Hanseth, O. (1996) Social Shaping of Information Infrastructure: On Being Specific About the Technology, in W. J. Orlikowski, G. Walsham, M. R. Jones, and J. I. DeGross (eds.), *Information Technology and Changes in Organizational Work*, Chapman & Hall, London.
- Moore, S. (1994, 23 May) The Killer App Crew. *Computerworld*, 145-146.
- Netcom. (1994) *Trial Plan Draft*.
- Netcom. (1998) *Minutes of the Annual General Meeting*.
- PR Newswire. (2000, 21 March) Solopoint.Com(R) Announces New Communications and Internet Content End-to-End Service Initiative. *PR Newswire*.
- Rath, K., Wanigasekara-Mohotti, D., Wendorf, R. G., and Verma, D. C. (1997) Interactive Digital Video Networks: Lessons from a Commercial Deployment, *IEEE Communications Magazine*, 35, 6, 70-74.
- Shelanski, H. A. (1999) The Speed Gap: Broadband Infrastructure and Electronic Commerce. (the Legal and Policy Framework for Global Electronic Commerce), *Berkeley Technology Law Journal*, 14, 2, 721.
- Snoddy, R. (1995, 8 June) Internet Finally Earns Stamp of Approval in US. *Marketing London*, 5.
- Somerville, I. (1997) Actor-Network Theory: A Useful Paradigm for the Analysis of the UK Cable/on-Line Sociotechnical Ensemble, *Proceedings of the AIS - Americas Conference on Information Systems*, Indianapolis, 110-112.
- Stalder, F. (forthcoming) Emerging Patterns: Reading an Actor-Network of Electronic Cash, *The Information Society*.
- Tatnall, A., and Gilding, A. (1999) Actor-Network Theory and Information Systems Research, *Proceedings of the Australasian Conference on Information Systems*, Wellington, NZ, 955-966.
- Vigden, R., and McMaster, T. (1996) Black Boxes, Non-Human Stakeholders and the Translation of IT through Mediation, in W. J. Orlikowski, G. Walsham, and M. Jones (eds.), *Information Technology and Changes in Organizational Work*, Chapman & Hall, London, 250-271.
- Walsham, G. (1997) Actor-Network Theory and IS Research: Current Status and Future Prospects, in A. S. Lee, J. Liebenau, and J. I. DeGross (eds.), *Information Systems and Qualitative Research*, Chapman & Hall/IFIP, London, 466-480.

- Washburn, B., and Perrin, S. S. (1996) Residential Broadband, *Telecommunications*, 30, 6, S33-S36.
- Woolgar, S. (1991) Configuring the User: The Case of Usability Trials, in J. Law (ed.), *A Sociology of Monsters: Essays on Power, Technology and Domination*, Routledge, London, 58-99.
- Zahariadis, T., Rosa, C., Pellegrinato, M., Lund, A. B., and Stassinopoulos, G. (1997) Interactive Multimedia Services to Residential Users, *IEEE Communications Magazine*, 35, 6, 61-68.
- Zerega, B. (2000, 21 February) Highway to Nowhere. *Forbes ASAP*, 111-112.

COPYRIGHT

Catherine A. Middleton (c) 2000. The author assigns to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The author also grants a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the author.