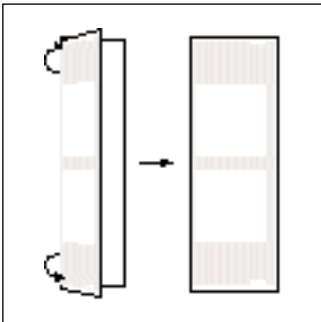
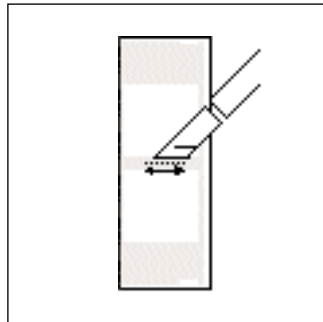


## Construction

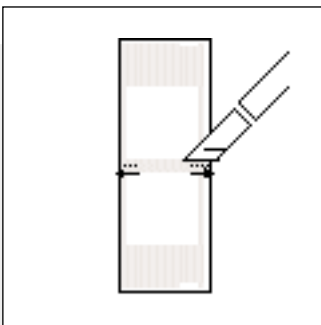
1:



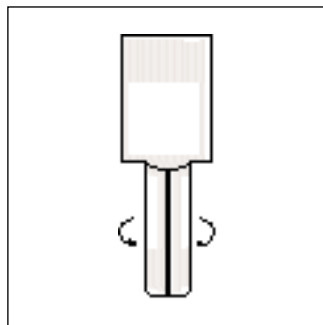
2:



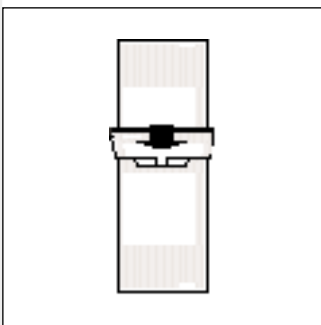
3:



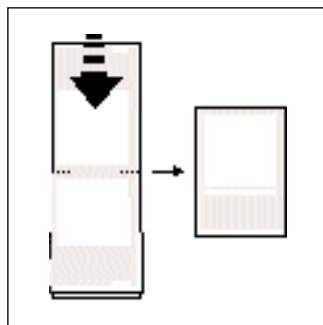
4:



5:



6:



- 1: First, fold each sheet in half along the vertical axis.
- 2: Using a craft knife or scalpel, cut a horizontal slot along the centre dotted line of the first sheet. (pages 1/2/13/14)
- 3: Then cut along the dotted lines on all the other sheets. Make sure to cut to the very edges of the paper.
- 4: Stack the folded sheets in ascending order with the even numbers at the top. Curl the bottom half of the second page (pages 3/4/23/24).
- 5: Thread the curled page through the centre slot of the first page. Repeat this process with the third (pages 5/6/21/22), fourth (pages 7/8/19/20), fifth (pages 9/10/17/18) and sixth sheet (pages 11/12/15/16) with the even pages in ascending order.
- 6: When all the pages have been threaded through, check the pagination. Finally, fold the booklets in half along the horizontal axis.

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technology is innovative or even well designed for that purpose.

The failure of WAP, based around the same GSM infrastructure, to develop a market anywhere near as large as SMS demonstrates that the perceived desire of individuals to connect with information anywhere, anytime is contingent on what kind of information people are accessing, and how. The fact that access is possible does not mean it is desirable. SMS growth has been based on one-to-one chat, not the high-value centrally distributed content that WAP services promised. Interestingly, similar experiments at the start of the 20th Century also failed to turn early telephone networks into successful content distribution systems. The Telefon Hirmondo provided a 'Telephone Newspaper'<sup>(10)</sup> to users across Budapest for a penny a day subscription fee, offering readings

P2P & MOBILITY  
RE-THINKING  
THE ROLES OF  
NETWORKS IN  
CONTENT  
DISTRIBUTION  
Matt Locke

would prohibit voice calls, the second allowing the receiver to delay the reception of a message to a more convenient time. This allows users to route around physical or social barriers to communication, creating a flexible exchange of messages that suits both sender and receiver. But the most interesting factor about SMS usage is that it has grown out of a network that was developed for a completely different purpose. If you were to set out to build a network solely to distribute text messages of less than 160 characters, it would need to be far less sophisticated than GSM, but would appear to have little commercial potential compared to the obvious market for mobile voice networks. SMS is a good example of how users rapidly adopt technologies that closely match their behaviour and desires, regardless of whether the

*Imagine a world in which everyone and everything will be connected to everyone and everything else.<sup>(1)</sup>*  
The fantasy of ubiquitous access to information networks has been a part of every technological revolution since at least the invention of electrical communication. A utopia of instant, unmediated connectivity across distance and time always appears to be at the breaking wave of new technology, and will in turn herald the end of a wide range of society's ills, from the petty annoyances of the workplace to the complex dynamics of political and economic discourse. The technologies imagined in these fantasies share similar themes of mobility, immediacy, and almost transparent interfaces that, taken to its logical conclusion, links communication technology with



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P2P & MOBILITY NETWORKS IN CONTENT DISTRIBUTION

RE-THINKING THE ROLES OF Collaborative Arts Unit for the Digital Economy conference, and is available in downloadable form as a DIFFUSION ebook from the Metamute website at <http://www.metamute.com/mfiles/index.html>

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parallel Victorian fantasies about spirituality and telepathy. In these fantasies the desire for unmediated connectivity is closely linked to the body as a form of conduit, as in this example from the Dundee Advertiser in 1897:

*Two friends who wished to converse at a distance proceeded thus: A piece of skin was cut from the arm or breast of each, and these fragments ‘transplanted’, so that either party had a portion of the cuticle of the other engrafted on his person. When separated from each other, at a given hour one of them traced on the piece of alien skin with a metal point the letters of the words in his message, and his friend could read these letters on his own arm, no matter how far they were separated.<sup>(2)</sup>*

P2P AND ‘CONTENT AT THE EDGES’. Recent innovation in mobile technologies and peer-to-peer networking have shifted emphasis away from the static architectures of client-server relationships that marked the early Internet, towards more dynamic, mobile, ephemeral networks. These

This graphic proposition illustrates the extremes of recurring fantasies about instantaneous communication, but also appears to predict with startling accuracy elements of interfaces that are recognizable in contemporary mobile technologies, such as the Palm Pilot<sup>(3)</sup> or RIM<sup>(4)</sup> BlackBerry. So do contemporary developments in mobile and P2P (peer-to-peer) technologies mean we are closer to this long-dreamt-of communication utopia? Or do recurring fantasies about intimate mobile communication obscure more prosaic truths about how these technologies are changing society?

**Notes**

(1) *The Human Side of Peer to Peer*, Viant Innovation Center, [http://www.viant.com/downloads/innovation\\_p2p.pdf](http://www.viant.com/downloads/innovation_p2p.pdf)

(2) From Carolyn Marvin - *When Old Technologies Were New*, Oxford University Press, 1990

(3) <http://www.palm.com>

(4) <http://www.blackberry.net>

(5) See Clay Shirky - *Content Shifts to the Edges*, <http://www.shirky.com/writings/content.html>

(6) John Perry Barlow - *Napster and the Death of the Music Industry*, [www.technocrat.net/958163435/index.html](http://www.technocrat.net/958163435/index.html)

(7) *The Human Side of Peer to Peer*, Viant Innovation Center

(8) Clay Shirky - *What Is P2P... And What Isn't*, <http://www.openp2p.com/pub/a/p2p/2000/11/24/shirky1-whatisp2p.html>

(9) [http://www.gsmworld.com/news/press/press\\_2001/press\\_releases\\_4.html](http://www.gsmworld.com/news/press/press_2001/press_releases_4.html)

(10) <http://www.ipass.net/~whiteho/telenews5.htm>

(11) <http://www.mediaguardian.co.uk/presspublishing/story/0,7495,407617,00.html>

(12) <http://www.guardianunlimited.co.uk/internetnews/story/0,7369,371124,00.html>

networks are constructed through many-to-many relationships orchestrated between massively distributed clients, a shift from the centralised focus of the DNS (Domain Name System) architecture to 'content at the edges'.

This shift has been identified by Clay Shirky<sup>(5)</sup> as a result of the exponential growth in PC computing power and increasingly widespread broadband connectivity, representing a huge untapped resource at the edges of the network that no longer needs centralised resources to operate efficiently. The most significant application to utilise this power so far has been Napster, the file-sharing protocol that enabled users to swap MP3 music files, and has prompted the music industry to take legal action in order to preserve its status as controller of its distribution networks. Early predictions that Napster would bring about the death of the music industry may be slight-

ly premature, but the conceptual shift that Napster represents has led to predictions of the demise of many aspects of the centralised distribution network that it seems to replace, from the role of intermediaries in distributing creative content to the concept of intellectual property rights in relation to the content itself.

In this P2P future, everyone is both a creator and a consumer, and the issues of intellectual property rights, and artistic or economic values associated with it, are pushed to the edges. Once 'freed' from the hegemony of the corporate intermediary, content can be negotiated dynamically between individuals, rather than centrally administered through organisations such as the Performing Rights Society. In John Perry Barlow's words, content changes from being a 'noun' to a 'verb' ;

power bases like Warner and EMI. These other consequences of P2P will be found by studying the way in which users inhabit P2P networks, and what kinds of 'desire paths' they create. Pekka Sinonen, the Founder of Finnish mobile company Digia, sums up their user-centred approach to service development with the comment: "Behaviour will drive Technology. Not the other way round."<sup>(12)</sup>

Ultimately, the most significant services developed out of P2P might not be involved in constructing the architecture of P2P networks themselves, but in recognising and exploiting patterns of user behaviour across these networks. After all, even in the most decentralised network, everybody could use a map.

P2P undoubtedly represents a radical shift in conceptualising the power relationships at the heart of the Internet, but it remains to be seen whether this will have a similar effect on the creation and distribution of content over these networks. The fantasy of a 'spontaneous and global abundance' of music appearing almost magically in the space between creators and listeners seems as utopian as the Victorian fantasies for transcendent personal communication. In fact, these fantasies might obscure other consequences of P2P technologies that are not as glamorous as the demise of symbolic

power with the users' desires, and exponential growth was virtually assured. What can get left behind in subsequent P2P rhetoric is this symbiotic link between technological opportunity and user behaviour. Innovative networks in themselves are not enough.

*In Napster's enormous room, music will arise in spontaneous and global abundance in the space between creators and listeners so interactively that it will be hard to tell which is which. No longer will we mistake music for a noun, as its containers have tempted us to do for a century. We will realise once more that music is a verb, a relationship, a constantly evolving life form.<sup>(6)</sup>*

The desire for 'spontaneous and global' connectivity in this account seems reminiscent of the transcendent fantasies about mobile technologies described earlier. There is a strong thread in current writing about P2P that sees more in this revolution than simply the reallocation of power within a technological network, and instead imagines a fundamental shift in distribution relationships, a new era of

But are such processes really achievable? Are intermediaries destined to disappear from the landscape of this new connectivity utopia, or are there other locations where intermediaries can reside that have been overshadowed by the glare of recurring transcendent fantasies? One way to answer these questions is to look for activities on networks that are secondary to the networks' primary goals, or to look for patterns of user behaviour that might be classified as misuse in the eyes of network administrators.

communication that is both a result of, and reflected in, new mobile and P2P technologies. The consulting firm Viant use the term 'Thoughtflow'<sup>(7)</sup> to describe this new paradigm, where 'knowledge is generated as a result of people's interaction', and technology facilitates this collaboration through massively distributed, unmediated processes.

11 months of launch.<sup>(11)</sup>

Metro and SMS have both used factors of existing networks to distribute content in ways that they were not designed for, or at least were not designed primarily for. Both examples demonstrate the value of re-interpreting networks in light of user behaviour; the cost of building these networks would have been prohibitive if they were only intended for this secondary use. In the case of SMS, the income to the telcos could be a life-saving factor set against the massive costs involved in setting up third generation mobile networks.

Returning to P2P, it becomes clear that Napster shares this approach. Shawn Fanning understood the strong desire for users to collect and share MP3 music files, and also the latent power available in PCs connected via higher and more reliable bandwidth. Napster simply connected this technological

Underground will have seen that there are nearly always discarded newspapers and magazines on the seats, particularly during rush hour. Newspapers help pass the tedium of daily commuting (and also help the reader avoid contact with other passengers) and the regularity of commuters' journeys meant that a reliable user group can be targeted very easily by concentrating distribution at a few key points. Metro exploits this insight, and distributes its newspaper at train stations around most major UK cities, effectively turning the railway into a highly efficient content distribution network. As the newspaper is free, users habitually leave the newspaper on the train, or willingly pass it on, further increasing its reach amongst the target demographic. This innovative approach has been a tremendous success, with the paper making a healthy profit and circulating over 778,000 copies, effectively making it the 6th most popular UK newspaper, within

SMS & ACCIDENTAL NETWORKS

There are many affinities between P2P technologies and mobile technologies, partly because they currently share the spotlight as innovative concepts in networked computing, but also because they are symptomatic of a shift away from centralised networks towards fluid, dynamic and ephemeral relationships. But despite this, there has been little commentary about the peer to peer qualities of SMS (Short Message Service, or Text Messaging), by far the most significant mobile technology in terms of user adoption, at least among those countries where service providers have adopted the GSM standard.

Of course, according to some definitions, the term P2P is only really applicable to services with 'significant autonomy from central servers'<sup>(8)</sup>, and SMS is far too reliant on telco's infrastructure to really qualify as true P2P. However, it's worth looking at

the meteoric rise of SMS as an example of how users' preference for apparently limited services can quickly outpace more technologically advanced services, such as WAP. The growth of 'accidental' networks such as this reaffirm the influence of users behaviour within distribution networks, but also demonstrate how difficult it is to design effective distribution networks with such an unpredictable user base. SMS was originally developed as part of the GSM (Global System for Mobile communication) Phase 1 standard, primarily to allow engineers to exchange information about the performance of cellular networks. The first text message was sent between a computer and a mobile phone over the Vodafone network in 1992, and since then growth has been exponential, with over 15 billion text messages sent world-wide in December 2000.<sup>(9)</sup> To a large extent,

network of high-bandwidth opportunities, where you are only one click away from accessing your work files or downloading a movie, real users have to contend with the demands of real space, and will want services that recognise this.

Third generation mobile technologies may be able to deliver you digital video as you cross the street, but is this really an appropriate service? Although the technology might not have to discriminate between a library and a road crossing in order to deliver content there, the user has to, and recognises the different ergonomics of each space. Service providers would be better off exploiting these ergonomic differences rather than predicting that technology will ultimately make them irrelevant.

The Metro Newspaper is a good example of this. Anyone who has travelled on the London

this growth has been driven by consumer demand, and usage was already widespread by the time that service providers picked up on its popularity and started to develop information services specifically for SMS. However, despite the growth of commercial services, by far the most popular use for text messaging is personal communication. In fact, SMS seems surprisingly ineffective at distributing commercial content, as the radically mobile and ephemeral nature of the mobile phone makes it difficult to predict user's contexts, and its use creates a closely defended personal space that requires careful negotiation with the user before content is accepted.

But why has SMS exploded on a network that was originally designed for transmitting voice? The ergonomics of the mobile phone are still woefully inadequate for text messaging, yet this doesn't stop

of news, politics, arts reviews and even concerts and opera. Despite limited success, the service ultimately failed, and the telephone's real impact on 20th Century society was as an intimate communication device, not a nascent broadcasting system.

THE ERGONOMICS OF INFORMATION

What SMS, WAP and the Telefon Hirmondo demonstrate is that communication technologies rarely live up to the utopian rhetoric surrounding their invention. Persistent fantasies of information networks that are entirely divorced from the material world may drive pioneers to innovate, but it is usually the relationship of networks to users' real lives that is critical to their success. As communication networks divorce themselves, physically and conceptually, from fixed architectures, their relationship to users' real situations becomes *more* important, not less. Instead of imagining public space as an invisible

many teenagers buying phones for just this purpose. The laborious input method and 160-character limit would seem to mitigate against any widespread adoption of SMS as a communication medium, yet in fact these very limitations have led to practices and languages that actually reinforce and identify SMS communities.

Probably the most important factor in the growth of SMS was the introduction of pay-as-you-go mobile contracts, attracting users to the network who were previously unable to make the financial commitment of a monthly contract. Interestingly, the two main user demographics targeted by telcos – executives and teenagers – share a need for a mode of communication that is more flexible than voice calls. SMS has two significant advantages over voice calls – discretion and storage – the first offering the possibility of communicating whilst in a situation that