Chapter 5
Adopting Mobile TV: Technologies Seeking Consumers Seeking Content and Cool

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Abstract This chapter will examine how mobile TV is likely to be used and whether and how the early usage could stimulate widespread adoption. It will also look at how mobile TV's antecedent technologies – television and mobile phones – developed in response to market forces and user adoption issues, and what lessons can be learned from this. The chapter will address several aspects of adoption that are likely to affect the evolution of mobile TV in the USA and internationally, using Everett Rogers' *innovation attributes* as a framework.[1] Finally, it will suggest how interactions between technology, user environment, content options, and service development will shape the new medium, often in ways unanticipated by the initial developers and promoters of mobile TV.

Eyeballing (Not So Clear) Mobile TV

When the advent of mobile TV was first announced a few years ago the health planners in New Zealand were jubilant. It was in New Zealand that the most recent research associating obesity with TV viewing had been completed,[2] and now there was a solution in sight – a form of TV viewing that kept the body moving, even if only at a slow pedestrian pace.

Then came the news from one of the early deployments in Europe that many of the mobile TV viewing sessions were indoors – and lasted 20–25 min rather than a few fleeting moments when changing buses or waiting in line at the grocery store.[3] Unless these longer indoor sessions involved the concurrent use of an exercycle, the possibility that mobile TV promoted physical lethargy could not be dismissed. With mobile TV we could watch television or videos wherever we were in a house or apartment – without even having to walk to the TV room or to search for and pick up the remote. Mobile TV could render us virtually immobile.

This chapter will not investigate the health implications of mobile TV. Still the literally opposite ways in which mobile TV could be used – on the go during short snippets of time or in a slow sedentary manner – reflects the difficult choices that technology developers, service operators, and content providers face in rolling out this new communications medium. These choices involve not only technical

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issues and options – for example, which of several terrestrial mobile TV networks (DVB-H, MediaFLO, T-DMB, or DAP-IP) to rollout – but also issues of adoption, usage, and media evolution.

The chapter will illustrate how technology choices are intertwined with behavioral, economic, and programming ones. As a case in point; will the average viewing session last 40 min, 4 min, or 40 s? There is conflicting evidence, depending on where one looks. Research on early users in the USA and Finland found that most of the viewing sessions were short (and occurred mostly outdoors),[4] while UK, Swedish, and Australian trial results[5] reflected long sessions (many indoors). In Singapore the evidence points to short indoor viewing sessions, mirroring the location of most mobile callers in Asia and, increasingly, in most of the world. Similarly, in Germany much of the early viewing, according to an industry source, lasted less than 5 min.[6] In Japan, where commutes to work are often by train and can last 2 h, a lot of the viewing may be neither indoor nor outdoor.[7]

So does the mobile TV service provider install a network capable of covering the "uncovered" areas of a city or country, so that consumers can have access to television, videos, and video-mail when they are outside of home and office or one that can penetrate buildings, including offices, elevators, and suburban homes, not to mention airports and restaurants?[8] Does the service operator try to mimic or directly retransmit conventional multichannel TV, which users with 40 min to spare may be looking for, or to aggregate video clips through agreements with LiveVideo and YouTube? Does the content provider assume a world of user-generated "programming," soap-opera *mobisodes*, or conventional movies, which the mobile TV viewer will be able to "bookmark" (mixed metaphor, apologies), search, and even re-edit using new handset storage and image manipulation capabilities? Will the top source of mobile video content be *Desperate Housewives* or disparate housewives and other P2P users?

Illustrations of Media Innovation

In fostering mobile TV adoption, technology developers have been very aware of video quality and channel-switching latency issues. Similarly, content providers are beginning to develop new forms of programming that respond to how they believe the new medium will be used. Yet, as the following examples illustrate, despite the best efforts of technology and content developers, the process by which a new media, such as mobile video, is adopted on a widespread basis is not always straightforward.

Early Adoptions of TV and Video

Although new TV transmission technology is continually improving the array of products and services available to consumers, notably (in recent years) HDTV, the impact of such developmental advances are often over-rated as influences on

consumer decisions. For example, NTSC, the oldest and technically the weakest of the TV broadcast standards, nonetheless manages to attract more eyeballs worldwide than do transmissions using technically superior standards such as PAL and SECAM.[9]

There are several possible explanations for the popularity of NTSC, including its legacy status, the more pervasive presence of advertising-supported television (and TV viewing) in NTSC-based economies and cultures, the greater channel and, arguably, greater programming choices available in NTSC markets, and, possibly, the role of large mono-linguistic audiences in the major NTSC markets (notably the USA and Japan). Another possible factor is the number of TV sets available in households in different countries, which can range from one in the living room to one in every bedroom plus living room, den, and kitchen.

There is also an alternative explanation of the relationship between NTSC's poor resolution quality and viewer involvement. It is based on Marshall McLuhan's theory of media development – and of the cycle of *hot* and *cool* media.[10] Lack of definition or poor resolution, according to this perspective, is a core feature of cool media such as television (presumably the NTSC version); this in turn fosters viewer involvement. This type of explanation has not been widely accepted but cannot be overlooked as a source of researchable ideas. The appeal of early mobile phones with limited-resolution cameras and involvement-stimulating procedural challenges (such as figuring out how to store a photo once taken), particularly among young users, provides another example of the theory's potential applicability.

There is another hypothesis that the fewer the number of sets, the greater the viewing of mobile TV indoors, but this does not seem to bear out, as the UK has one of the highest TV set per household ratios.[11] Possibly, the convenience of three or four sets generates a demand for omnipresent TV reception, which only mobile or portable TV can satisfy.

The programming level of TV innovation can also be disruptive and perplexing. Now that Web-based sites such as YouTube and LiveVideo are offering hundreds of thousands of content generators the opportunity to distribute their video clips (whether home- or studio-made or both), the concept of niche programming is gaining currency. But will this be what mobile TV viewers want? When VCRs were introduced in the late 1970s the buzz was that specialty programs – music videos, how-to, documentaries, etc. – would now flourish, as viewers would no longer be shackled by the "lowest common denominator" scheduling of the mass audience networks. Yet for nearly a decade feature films, primarily major studio releases, dominated the video rental market. The economics of early VCR adoption (i.e., a small base of deployed recorders) called for even *more* common denominator programming than did the prime-time TV schedule.[12]

At the same time, the advent of a new TV viewing generation can sometimes be so revolutionary that it effectively determines the next form that the medium takes – and the next business model underlying the medium's evolution. This is what happened at the birth of pay cable TV. The risks of launching Home Box Office (now known as HBO) have been long forgotten but cannot be minimized. After $40 million of investment in the 1970s (equivalent to about $400 million today), HBO was on the

verge of being closed down before it became clear that this would be one of the most successful TV businesses of all time.[13]

Once made available nationally by means of satellite distribution, the service rode the wave of "Yuppies" (young upwardly mobile professionals) who happened to be part of an even larger demographic wave – the Baby Boomers. As these young professionals reached their thirties, married, and had young children, a home-based way to enjoy recent movies well before they appeared on ad-supported television became an essential part of their lifestyles, allowing them most of the benefits of movie theater attendance without the hassles of organizing and paying for babysitting (provided by a younger smaller demographic group) and incurring the costs of two tickets, parking, and sodas and popcorn. Could mobile TV's adoption be driven by a similarly cohesive and growing demographic burst?

Lessons from the Mobile Phone

Mobile phone adoption is equally instructive. Similar to the VCR, which was first used for time shifting and TV program recoding and only later for playback of rented cassettes, mobile phones have gone through several stages of adoption and usage. Initially they were bought by car owners for use during commutes to work and only later became tools of pedestrian communication – on the street and in subways, restaurants, and nearly-landed airplanes. Still later the prepaid formula, along with data and other new applications, allowed a new range of users, from children to migrant workers to anonymity-seeking vendors, to adopt mobile phones. Machine use of mobiles and the transfer of funds in the form of air minutes that can be cashed in, represent a further evolution of the medium.

The adoption of mobile phones was affected not only by the income level of a market but also by the degree of income inequality. Early adoption markets have generally been "vertical" societies, whether the USA, Hong Kong, or Venezuela. Inequality means there is a high-end group that is willing to pay a premium for a new service such as mobile communications. At a later stage of mobile adoption, with prepaid mobile available, more egalitarian markets have achieved widespread adoption – for example, the 100%+ penetration levels in Eastern European countries, their aging populations notwithstanding. By contrast, vertical Latin American markets, despite their large youth populations, have fallen significantly behind.[14]

Another lesson is that price appears to affect usage more than basic adoption. The USA, with the lowest average usage rates in the developed world, has the highest usage.[15] An average mobile subscriber consumes about 1,000 min of air time per month, followed by users in Hong Kong, Finland, and Israel. Still another lesson is that usage is not primarily determined by culture. Heterogeneous Americans, talkative Cantonese and Israelis, and laconic Finns all manage to be high users. On the other hand, some countries where mobile phones are not subsidized, such as Italy and Sweden, have achieved very high mobile adoption rates, while others, such

as the USA and Canada, where aggressive handset subsidies prevail, have below average adoption levels.[16]

There have been some other surprises with mobile phone adoption. One has to do with the possible role of climate – specifically, extreme climate – as an adoption driver. When countries such as Italy, Israel, Singapore, and, more recently, the United Arab Emirates achieved very high mobile penetration rates, the first reaction was that this proved that the role of climate was negligible if not nonexistent. After all, the early market leaders read like the winning entrants in the winter Olympics (Canada, Denmark, Finland, the Netherlands, Norway, Sweden, and the United States); so mobile came to be thought of as a northern communications medium, especially in Scandinavia. Yet the real driver has been *extreme* climate, not just cold climates. In early mobile days drivers could instinctively sense the advantages of mobile phones (over searching – and possibly queuing up – for a payphone) in equatorial heat as well as Nordic permafrost.[17] As suggested below, the adoption of mobile TV may be driven by environmental influences too, though different ones than climate.

Finally, to the extent that TV and video are just applications *piggybacking* on mobile phones, the lessons of "3G" mobile should not be overlooked. When 3G spectrum was first being auctioned in the UK and Germany in 2001 the business models assumed that there would be a dozen data and multimedia apps, multiple "killers" – from music downloading and Intranet access to video calls and location-based social networking. downloading videos on demand and video e-mail were occasionally assumed to generate 3G revenue streams, while the retransmission of existing TV channels (or modified versions thereof) was not projected as a 3G app. It was too mundane to make the list. Yet new media are often used for mundane things – or, as McLuhan put it, their content is the old media.

Deconstructing Mobile TV Adoption

Business discussions of mobile TV tend to focus on three issues:

- How the technology can be made to work better, particularly with respect to signal quality and channel capacity or bit rate
- What kind of content users want – cable channels, P2P, sports or music clips, movies on demand, custom-produced soap operas in mobisode form, or something else. (No one so far has suggested using built-in cameras as video mirrors, which could be checked before sending off personal video mail to a friend or employment recruiter.)
- What the mobile TV business model will be – subscription-based, pay-per-view, ad-supported, transaction-linked, or just fees-for-bits like the postal service and FedEx

In fact, there are many other facets to the question of what form the mobile TV will take as it evolves.

The video quality (frame rate, etc.), screen size and quality (luminescence as well as background light-sensitivity), channel capacity (compression, bandwidth, traffic density, etc.), channel-switching latency, handset design and specifications (including size, weight, and battery life), and digital interface (fingers, not bits, touch screen, 3D, or motion-sensitive) are some of the more obvious elements of what users may – or may not – respond to. What could be more critical, though less obvious (except to those who have studied effective telepresence), are the audio dimensions of the emerging medium.[18]

Good-quality ambient audio can make up for the limitations of a small screen and mitigate poor luminescence, particularly for users familiar with the general format and style of the programming they are watching – or with the person *at the other end* in a P2P context. Clear audio provides a frame of reference and enhances familiarity as well as communication redundancy. Transmitted through a headset, it can also assure privacy in common spaces, whether subway cars, airport lounges, or the back seat of an SUV, allowing the spaces to be shared by mobile TV viewing and other activities.

Across five editions of *Diffusion of Innovations* Everett Rogers developed a framework for understanding innovation adoption that continues to stimulate insights into the complexities of consumer response to new technologies.[19] Rogers identified the attributes of innovations that most affected the rate of adoption as (1) relative advantage, (2) compatibility, (3) complexity, (4) observability, and (5) trialability. Each merits some explanation and application to the case of mobile video.

Relative Advantage

Relative advantage encompasses functional and economic as well as status aspects. Mobile TV's advantages can be benchmarked against those of standard television, standard mobile phones, and standard hybrid or combo communications products, including previous versions of portable TV sets. Against standard TV sets, mobile TV offers great portability, especially as TV sets are once again getting larger (with large screen and HDTV specifications) and more immovable.[20] Compared to mobile phones, they offer video screening, whatever the content – in any case a dynamic add-on to the camera phones that were introduced a few years ago and came to outsell traditional cameras, including digitals. Finally, juxtaposed with portable TV sets, mobile phones with TV capability provide not only a more compact and lighter-weight implementation but also the many features of mobile phones – voice calls, photography, ringtones, texting, games, and phone directories, to mention a few.

Similarly, current and prospective mobile video services can be compared to corresponding multichannel TV distribution services (cable-, satellite-, DSL-, or FTTH-delivered), video-on-demand, open-air ad-supported broadcasting, satellite radio, nonvideo P2P, and so on. Generically, mobile video offers greater ubiquity of access when compared with multichannel video services, and more multimedia

dimensionality (notably moving images, however stuttering or unstable these images may sometimes be – inside or outside buildings) when compared with the nonvideo media, including telephony, whether mobile or fixed.

At the same time tradeoffs need to be acknowledged in mobile video usage, such as potential service interruptions from lack of coverage, battery failure, poor ambient lighting (outdoor or indoor), more limited channel or content offerings, anxiety about self-broadcasting in a video mode (in a messaging or conferencing context), and complex interfacing, whether the bothersome channel-switching latency that technology providers are working aggressively to minimize or the too-many options and instructions that need to be learned to appreciate the full service offering.

More fundamentally, today's mobile TV product is likely to have a number of even more underlying deficiencies, including poor video, poor audio, a small screen, and no stability other than that provided by a loose hand or an object against which the mobile phone (with video capability) is leaned so that the user can experience an uninterrupted viewing experience, while sitting at a desk, in a bathroom, on a train, or in an airplane seat (in which case the object will itself most likely be propped up by the pull-down tray). Finally, another potential comparative deficiency of the mobile TV device is the interruptions it may be subjected to due to the accompanying mobile phone functions – receiving or making a call, taking a photo, texting a message, and so on.

A large component of the comparative advantage of mobile TV and mobile video is the price. Compared to broadcast TV, the price will invariably be unattractive as long as usage of mobile TV calls for subscribing to a platform data or multimedia service, then a package of mobile TV channels, and possibly additional fees for certain channels or VOD programs. However, this may be less so for short-session users, assuming they avoid standard commercials (which could cut 4-min sessions effectively in half) by paying these tiers of fees. For the 20- or 40-min session viewers, able to be couch potatoes anywhere, the price could be unsupportable, unless such ubiquitous *potato*-ness represents a higher state of being – or nonbeing – for which they are willing to pay the equivalent price of a massage.

On the other hand, compared to data access packages, which also cost about the price of a monthly massage (e.g. $60), mobile TV plans can be seen as relatively attractive, at least for users who gravitate to video inputs rather than text. Such plans are migrating to "all you can eat" in some markets but may revert to volume-based fees as the wireless "open access" movement gains traction (building on the "open access" provisions of the recently auctioned US C-block). Best of all would be ad-supported mobile TV, assuming that the ads were not very obtrusive or intrusive, in which case the main price impediment would be the video-compatible handset and add-ons such as specialty channels or major sports events.[21]

Finally, there is the matter of status. This will depend on how the handset and the programming or other content are perceived by the user's peers. For many members of the below 30 generation, using mobile TV to watch conventional broadcast or cable channels, when these are rarely cited as key sources of news and entertainment, could amount to a status-lowering rather than -raising association.

Conversely, for an addict of sports or news TV, the ability to access the latest key plays or announcements could render him or her an *influential* in the two-step process of information flow and status-determination that still governs many 50-year-olds (and above). In fact, we can expect some ersatz versions of mobile TV handsets to appear for status purposes just as in the early days of black and white TV outdoor antennas were sometimes purchased before the indoor sets. It was more important to be perceived as having TV than actually having it.

Compatability

How will mobile TV match our values, life styles, and behavioral patterns and practices? The overall answer depends on whose values and life styles are being talked about. In the USA most consumers continue to watch television at world-class levels (about a third of waking time), even as a growing minority is starting to watch less TV, switching its orientation for news and entertainment to laptops rather than *the tube* and drawing increasingly upon Web-based sources of content rather than upon the traditional networks and cable channels. Largely under 35, this is the new online generation that parents see navigating a new technological world and that teachers worry are losing all reading and writing abilities, even as most read and write more online than their older counterparts do with respect to newspapers and diaries.[22]

Even more interesting, and ultimately, perhaps, more disturbing, is a growing "in-between" group, for which both laptops and TV sets are familiar media. Outside the office and the performance of certain household functions (communicating with adult children, preparing tax returns, etc.), this group, whose members can be aged from 25 to 75, continues to rely primarily on television for entertainment, even though it is a television supplemented increasingly by NetFlix movie rentals (ordered online), VOD and DVD purchases, and TIVO or DVR activation.

The future of television, including mobile TV, hinges largely on how this group's tastes (regarding both media and messages) will evolve over the next 10 years. Will they switch to the laptop and mobile phone for entertainment and news content or will the tube assisted by the remote control and other accoutrements of TV viewing (NetFlix, TIVO, VOD, and possibly a *quad-play* wireless extension of TV) evolve sufficiently to provide a satisfying hybrid experience?

This in-between group – or *betweeners*, as its members can be called – is important because of its numbers (including many if not most Baby Boomers) and the residual strength of legacy technologies in most innovation diffusion.[23] The high numbers of hits attracted by the most popular YouTube videos (on the order of 100 million per day) should be kept in perspective. Each night the TV networks have a similar reach, just at any given moment. And channel clicking with the remote far surpasses the number of YouTube hits; worldwide, it undoubtedly surpasses the total number of hits of all Web sites, as there are close to twice as many TV sets as online PCs – and on average more users per remote than per mouse.[24]

So the legacy impact of traditional TV viewing, channel tuning, and program formatting remains great. Yet the force of new forms of video accessing behavior, including peer-to-peer forwarding of personal video mail (with assorted attachments of copyrighted work), cannot be denied. Nor can the strong attraction of young users to media and gizmos the use of which can be highly personalized along the lines of the iPod, the iPhone, and the Blackberry. Better still is the ability to put the media to use in the creation and cyber-sustenance of a virtual social community – or ecology of communities – of like-minded individuals.

Complexity

What then does a mobile video technology developer or service programmer to do? This is far from a trivial question, as the architectures and production modes involved in mass, segmented, niche (or "long tail"), and P2P video are so different. This also raises the issue of complexity as a key determinant of – in fact, often the major barrier to – adoption.

For the traditional media user, ease of use and simplification are overriding considerations. Challenged for years by the programming of a VCR to tape a TV show for later viewing, *traditionals* are often overwhelmed by PC behavior and find all but simple call placement befuddling when it comes to using a mobile phone. For such users a mobile TV device should ideally have many fewer functions than most current mobile handsets do and should look as much like a remote control as possible, replicating the same channels as are available on the cable set at home. In fact, signing up and billing for the service should be done through the same distribution channel as the user depends on for at least one other existing service and ideally for all services (voice, TV, mobile, and Internet, if any). The pricing should be simple, either fixed or usage-based and definitely not intricate combinations of the two.

For *betweeners* mobile TV can consist of multiple service choices, as it does largely today – with providers such as MobiTV offering multichannel packages and some pay add-ons, though ideally without having to pay the mobile operator for a platform service in addition to the bucket plan to be eligible to subscribe to the TV option; and other providers or mobile operators offering still other options (mobile VOD, ad-supported mobile TV, etc.). Whether most *betweeners* will be ready for an Internet-based version of mobile TV or for the downloading of a wide range of videos remains to be seen. It will depend in part on how streamlined the pursuit of these options can be made to seem and in part on the evolution of the Internet capabilities of this gradually aging segment of the population. Will the new *old* be able to play with the *new* (IP-based) new media? It is not a trivial question.

Finally, there is the always-online segment itself, made up of, what I call, *umbilicals*. This group is growing, though less quickly in the USA than the *betweeners* because of the demographic bulge of the Baby Boom and the limited IP-orientation of some young populations.[25] It is a group for which even the term *mobile TV* is largely irrelevant and has been replaced by *video* or more functional

ones such as news, games, and social network, all with an online and increasingly wireless assumption built-in. Navigating "complex" options and pathways is rarely an inhibitor – and often a stimulus – of adoption. And distribution affinities are somewhere between Google and Facebook, on the one hand, and BitTorrent and YouTube, on the other, with many smaller emerging sites and services, dynamically morphing and evolving, in between.

A recent report from M:Metrics sought to compare the amount of mobile video viewing early adopters of different forms of the medium currently watch. According to their report just 0.6% of US mobile subscribers watched broadcast TV programming on their phones once or more per month last summer. This was partly because only a few phones currently support mobile broadcasts, the report noted. At the same time, the authors suggested that mobile viewers are more interested in bite-sized, YouTube-like clips (which 1% of mobile subscribers watched) as well as in short video messages sent from friends and family (which 2.7% of subscribers watched), not long TV episodes on rigid schedules.[26]

This may or may not represent a full comparison of the three ways of accessing video content over mobile phones, as the 0.6% (over 1 million subscribers, and possibly a major undercount[27]) who subscribe to a rigid-schedule service may watch several hours a week and certainly many hours per month, while their 1% and 2.7% counterparts may not be as routinely tuned to their respective ways of accessing video and may be watching very short clips, though possibly viewing them multiple times. In any case, the different ways (not mutually exclusive) of accessing video content wirelessly while on the go – in the car, on the street, or simply from room to room at home – need to be acknowledged and better understood.

Moreover, the complexity involved in serving each of these major segments is likely to be different, creating in turn immeasurable challenges for the innovation developer and purveyor attempting to serve more than one group with the same product or service. At least initially each of the three groups (or more) should be treated as a separate village in a different remote region of a market about which little is understood. Anthropologists should be sent in to advise the developers on what has a chance of resonating, as they have been sent by companies such as Nokia and Microsoft to India and Africa and elsewhere to determine local mobile and IT needs, requirements, and predispositions.[28] Then product development can begin.

Observability

A rarely examined aspect of innovation adoption is the degree of exposure involved. We know of course that within limits the public promotion of a new gizmo, a new program (or its creator or interpreter), offers a communications shower of hype and cool and buzz – and, in the extreme, frenzy at the nearest site of the product opening, whether iPhone, Indiana Jones 4, or hip-hop megastar Jim Jones. But it is the day to day public exposure – its simple observability – of an innovation that can

in a drip-drop fashion enhance its acceptance and appeal more profoundly than the best of all conceivable promotional campaigns.

So mobile TV would seem to come with a built-in advantage – that of widespread public observability. Others, often many others, will be able to watch the watcher of mobile video – in the street, on the train, at the airport, even in an elevator (ear piece, please). Sooner or later our streets could become moving TV dens, desktop small-screens, and sports bar. We could all become peeping toms one or two or three degrees removed, watching the screen, watching someone watching, watching someone watching someone watching, ad infinitum. All of this would be good for the rapid propagation of mobile video around the world, just as the joggers with their Walkm*e*n helped spread this earlier medium of personal and portable communications.

Why after all have the mobile phone as well as the bicycle outpaced the TV set and the wireline phone in worldwide adoption,[29] even though they are more difficult to use? In part it is their public visibility that has propelled what started as innovations into everyday utilitarian tools. In observability terms, the wireline phone, penned up in the house or office, has a much lower profile than the mobile does, even as it is simpler – and in most countries cheaper – to use. On the other hand, if much of the use of mobile TV turns out to be within the home, the observability impact could be much weaker. The heavy home use that has been picked up by surveys in England and Singapore and elsewhere could slow down the technology's diffusion, whether the signal is delivered by satellite, terrestrial waves, micro-DVD capsules, or carrier pigeon. The only person "observing" the mobile TV user would be his spouse (befuddled by why he was not watching the sports event on the large screen in the recreation room) or a teenage child (befuddled why he was not watching it on his laptop over the Web).

This is not the fastest way to propagate mobile video across the world, yet it may be fostered by technology improvements being worked on in the laboratories and being rolled out in the USA and elsewhere – more powerful building/penetration transmission networks, such as MediaFlo or high power S-band satellites. It will also be fostered in areas of high-density urban living where even today's transmission systems can penetrate into apartments and other dwelling units, especially where these are smaller – and therefore have less space further away from external walls – than in the suburban sprawl of the US market. In short, technology, behavior, life style, and adoption rate are more intertwined than the developers and providers of mobile TV may realize.

Trialability

This brings up the final dimension of Everett Rogers' diffusion framework. How easy it is to be able to try an innovation from a simple accessibility standpoint is critical to its diffusion. Without *trialability* a potential user cannot even begin to

determine whether the new product or service – whether a new form of birth control in India, hybrid corn seed in Iowa, or multimode cooking slicer on late night TV – can provide value, be useable, and be worth the price. In the early days of black and white TV neighbors would gather at the homes of the first TV household on the block; this was trialability at work. In the mobile phone era, a friend or household member lets you try her phone.

Trialability is also affected by price. Once mobile phones became available on a prepaid basis – first in Mexico,[30] then in Portugal and Italy, and now worldwide—they could be tried by anyone with as little as $30 in their pocket.[31] Prepaid removed the constraint of contract commitments and monthly payments, effectively opening up the market beyond the salaried segment of the work force. In many countries this is the great majority of the population. Correspondingly, advertising-supported mobile TV would narrow the *trialability* margin to the price of a handset with mobile TV capability, which could also come down to $30. In Korea ad-supported mobile TV is being used by 9.7 million mobile subscribers, while pay mobile TV reaches 1.3 million.[32]

For the P2P mobile user there is also the matter of virtual trialability (and virtual observability, for that matter). In social networks operating in wireless cyberspace the trial of mobile TV or mobile video begins when a user sends a sample clip to a peer who may not have been previously exposed to the service. This form of trialability has the potential for exponential, viral testing of an innovation, where the new medium may simply be the handmaiden of a smart mob's interest in particular content, whether Paris Hilton's latest escapade or political misbehavior on the primary trail. In fact, the medium may be the message, as in the case of a "try this out" P2P e-mail with a link to a new social video site or new mobile TV offer.

A Fusion of Hand (Touch) and Eyeball (Vision)

We live in an age of fusion. Hybrid forms of music, fashion, cuisine, religion, even politics have been changing the culture since the withering of the age of the generic sometime in the 1980s. Mobile video is hybrid technology meets hybrid media, a hyphenated experience that may leave few as satisfied as when they first heard Elvis or the Beatles but less unsatisfied than when they can only watch television in predesignated spots or only talk or text on mobile phones and not watch. In McLuhan's lexicon mobile video brings a visual (hot) medium in close contact with a tactile (cool) one. It allows the viewer to have television in the foreground or background wherever he or she is – not only while trying to fall asleep in a bedroom or prepare a meal in the kitchen or iron clothes in the den.

Mobile TV also offers a fusion of indoor and outdoor spaces and what we have traditionally done in them. If mobile phones took an indoor activity – making telephone calls from home – public (in the process privatizing public spaces), how much greater might be the effects of mobile TV? The mobile phone migrated a portion of what generally ranged from 100 to 1,000 min of calling per month, depending

on the country, to outside public spaces and other buildings (offices, malls, stores, restaurants, etc.). Now mobile TV could migrate a portion of the 50–150 h (or 3,000–9,000 min) of home TV viewing that individuals in different countries engage in to new outdoor places as well as work locations places inside the home that TV has not penetrated to date. The TV viewing that already occurs in airport lounges – for lack of anything better to do – will now spread across the globe.

In this volatile context, designers of mobile video handsets and services will need to learn how to reconcile the requirements placed on mobile video by a wide range of viewing environments. The phrase "Come on over and let's watch some TV," will come to mean a lot of different things, depending on where the *here* is – a public place, an office, a bedroom, almost anywhere but a TV room or den. Similarly, designers need to account for the interaction of senses involved in the mobile TV viewing experience – the respective needs of eyes and ears and hands and fingers, which will themselves vary depending on whether the user is stationary or moving, standing or sitting, and simply viewing or intricately interacting with their mobile video devices.

Ultimately, mobile video may represent a fusion of the relational, even exhibitionistic need of the *extrovert* to carry on many relationships and those of the peeping, passively inclined *introvert*, interested mainly in reception and not expression. The introvert will be drawn to long-session *mobile TV*, while the extrovert will thrive on short-session, interactive *mobile video*. The former, an old-media traditional, will be disoriented without a host of program options to choose from using mobile phone as both clicker and screen, while the latter, a wireless umbilical, will be lost without the social network-maintaining inclusivity of user-generated and -exchanged video clips and messages. Most of us will fall somewhere between these two prototypical personalities of mobile TV. We will be hybrids seeking fusion.

The digital transmission streams underlying mobile technology allow all of these forms of video – and of engagement with video – to coexist on the same network. Digital is the platform of multimedia fusion. At the same time, service designers and providers face difficult issues in the rollout of mobile TV. For *traditionals*, "keep it simple" is the monolithic guideline – simple to activate, simple to use, simple price plans, simple and recognizable programming, simple channel switching, and simple and straightforward customer care (voice-based) when things go complicated for one reason or another. For wireless *umbilicals*, options, features, personalization, video presence, and ability to generate, store, and manipulate content may be as important as FOX, CNN, ESPN, and The Weather Channel.

This leaves the hybrids and *betweeners*, who sometimes want the familiarity of old-media TV, other times want greater control though VOD and TIVO-like control, and occasionally want to prove to themselves and their children or grandchildren that they can navigate the new cyber-virtual-video universe. Cool, they say, when they manage to do it – and then revert to *John Adams*, episode 5, segment 22, bookmarked on their mobiles; or to the playback of last night's scoring pass, while shaving in the bathroom, their mobile propped up between the soap dish and the ceramic glass stuffed with extra toothbrushes and backup razors. Mobile TV – who would have guessed?

Notes

1. E. Rogers, *The Diffusion of Innovations*, fifth edition, Free Press: New York, 2003.
2. See the study led by Dr. Robert Hancock, as summarized in 2005 in the *International Journal of Obesity*.
3. Trial results from Oxford, UK, as reported by Dave Campbell, O2 executive, at CTIA Wireless 2006, Las Vegas, April 5–7, 2006; 59% of the use was indoors, mainly at home, but also in the workplace at lunch time. Similar results were reported from an early trial in Milton Keynes, UK.
4. See, for example, C. Sodergard, ed., Mobile television – technology and user experiences (Report on the Mobile-TV project), VTT, 2003, pp. 197–198.
5. A Swedish survey of early users found that two thirds of viewing took place at home, mostly during 7–8 a.m. and 5–10 p.m., with sessions typically lasting 30 min. Respondents also indicated that they preferred a flat monthly pricing approach, with no advertising (at least in content they were paying for). See C. Moore, "Swedes prefer to watch mobile TV at home – study," *DMeurope.com*, December 19, 2006.
6. An Ericsson executive reported that 35% of the viewing sessions lasted 5 min or less at CTIA Wireless 2006.
7. This commuting context, combined with a social prohibition of making and receiving voice calls, is one of the reasons the i-modemobile service has been so successful in Japan and not highly successful in most other countries.
8. With ear pieces for audio reception, mobile TV need not disturb passers-by in public places.
9. PAL is in use in most of Europe, with the major exceptions of France and Russia, where SECAM is the dominant standard. NTSC prevails in the United States, Japan, and Korea, among other countries.
10. For a review of McLuhan's classic *Understanding Media* and its applicability to recent media developments, see K. Kalba, "Understanding McLuhan's Media: 40 Years After," *InterMedia*, Vol. 32, No. 3, 2004.
11. Ofcom, the UK regulator, reported in 2004 that more than 80% of UK households had two or more TV sets, including 8% with five or more. By comparison, the Federal Statistical Office in Germany reported that at the beginning of 2004 about 40% of the households had more than one TV set.
12. Eventually Jane Fonda's exercise video broke onto the charts, calling on the widespread recognition of her name and the repeatability of this first successful how-to video. By this point tens of millions of VCRs had been purchased in the USA.
13. Private communication, executive in Time, Inc.'s Video Division, ca. 1974.
14. For a further explanation of why ageing Eastern Europe has out-adopted youthful Latin America, see K. Kalba, "Why Eastern Europe's Aging Population Has More Mobile Phones Than Latin America's Younger One," *Inter-American Dialogue's Latin America Telecom Advisor*, September 17–21, 2007, p. 1. A broader examination of mobile phone adoption factors is provided in K. Kalba, "The Global Adoption and Diffusion of Mobile Phones – Nearing the Halfway Mark," *Draft*, August 2007, Program on Information Resources Policy, Harvard University. See also K. Kalba, "The Adoption of Mobile Phones in Emerging Markets," *International Journal of Communication*, 2008, forthcoming.
15. K. Kalba, "The Global Adoption and Diffusion of Mobile Phones," op. cit., pp. 33–38.
16. Ibid., p. 59.
17. Ibid., pp. 39 and ff.
18. The author first learned of the critical importance of audio to effective TV conferencing in an early demonstration project connecting Harvard and MIT classrooms in 1973.
19. E. Rogers, *Diffusion of Innovation*, fifth edition, Free Press: New York, 2003; see pp. 219–266.
20. Traditionally, TV set product classes have experienced about a 10–15-year time cycle, often overlapping with other product classes. The product classes that can be easily demarcated include black and white sets, console sets (including combos with radios and record players),

color TV sets, small sets (for use in kitchens or other secondary viewing locations), portable sets, large-screen projectors, sets with built-in VCRs and DVD players, and large-screen TVs.

21. There is also some evidence that ad recall is much higher on mobile TV compared to other forms of TV viewing, though this may be a novelty effect. See "U.S. Mobile video flying," *telecoms.com*, June 27, 2007.
22. Not everyone under 35 falls into this group, as a significant number of young Americans do not know how to use the Internet, have little access to it, or have largely given up using it, according to PEW Research Center and other sources.
23. Even *Wired* has acknowledged this residual strength of the old media in reviewing its forecasts of the last 15 years. See "What We Got Right – and Wrong," *Wired*, June 2008.
24. The number of Internet users worldwide in 2003 was 725 million, compared to 1.15 billion TV households (averaging four members), as cited in G. Sciadas, ed., *From the Digital Divide to Digital Opportunities: Measuring Infostates for Development*, ITU and Orbicom, 2005, p. 19.
25. This includes some poor, rural, and/or immigrant youth with limited access to PCs as well as some who have quit the Internet largely to simplify their lives.
26. See D. Frommer, "As AT&T Bulks Up on Spectrum, Another Mobile TV Plan Fizzles," *Silicon Alley Insider*, October 9, 2007.
27. The two major services that offer such broadcast services over mobile report a subscriber base of 5 million.
28. As described, for example, in S. Corbett, "Can the Cellphone Help End Global Poverty?" *The New York Times Magazine*, April 13, 2008, pp. 35 and ff.
29. There are about 1.8 billion households with TV sets and about 2 billion bicycle owners, whereas mobile phone subscribers are edging up towards 4 billion. Certainly the use of TV sets can be shared by the many members of a large household, but in developing markets this is also the case with mobile phones.
30. Prepaid was first introduced (unsuccessfully) in the Mexican market in 1992. They were re-introduced in 1993 as the peso crisis was unfolding and caught on. From there the concept spread to Europe.
31. The author purchased a phone with minutes of use included for this price both in Europe and in the Caribbean last year; the price may be lower in markets such as India and Bangladesh.
32. "Mobile Broadcast TV Users in Korea Reach 11 Million," *Gamdala Mobile TV Blog*, March 25, 2008.