

21 A DYNAMIC APPROACH TO CONTEXT IN DIFFUSION RESEARCH: An Actor Network Theory Study of Mobile-TV Service

Su-Yi Lin
Mike W. Chiasson
*University of Lancaster
Lancaster, United Kingdom*

Abstract *Contextual studies of information technology diffusion offer an opportunity to understand both the production and diffusion of IT innovations. Using a case of mobile-TV in the United Kingdom, this paper uses actor network theory (ANT) to render context as the various cross-industry groups and technologies enrolled and translated into the construction and reinvention of the mobile-TV services. By focusing on the various cross-industry actors, context is recast as a dynamic environment composed of other actors' behaviors, and no longer as a set of static factors. Implications for diffusion research and practice are discussed.*

Keywords Innovation diffusion theory, actor network theory, convergence service, mobile-TV

1 INTRODUCTION

Despite a call for more research on the context around information technology diffusion (Fichman 2004), including the technical and social production of IT innovations (Lyytinen and Yoo 2002), few have yet to heed this call. In addition, what context is, and how to address it in information systems research remains an open question (Avgerou 2001; Chiasson and Davidson 2005; King et al. 1994).

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This paper provides a methodological and empirical glimpse into the use of actor network theory (ANT) to address the diffusion context, by recasting it as a dynamic interplay of various actors which affect and are affected by their enrolment into socio-technical relations. The case we examine is a pilot trial of a new IT-enabled service: mobile-TV. Mobile-TV is a convergence service that allows consumers to watch TV on-the-go. A more precise definition is TV viewing from a wireless pocket-sized terminal or phone in public and private environments, both as a personal TV set and as a tool to establish closer interaction with the content (Södergård 2003). Since the context of mobile-TV is composed of a network of actors—users, service providers, technology suppliers, and content providers—mobile-TV is a critical case to explore how various cross-industry actors, both human and nonhuman, enrol and translate interests in the construction and reinvention of an innovation.

The remainder of this paper is arranged as following. First, the literature on innovation diffusion theory (IDT) and on ANT is reviewed to identify both theoretical and empirical gaps. We then describe our methodology for examining a mobile-TV trial. Following this, we present our initial findings, tracing important events back to various human and nonhuman actors, including their partial enrolment into the emerging IT network, and issues that threaten to strengthen or weaken their future enrolment in the network. In the concluding section, we discuss the results and explore how our use of ANT addresses contextual studies of diffusion.

2 LITERATURE REVIEW

2.1 Innovation Diffusion Theory

The term *innovation* is generally understood to mean an idea, practice, or object that is perceived as new by adopters, and *diffusion* is defined as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Rogers 1995, p. 5). Few IDT studies, however, pay attention to the particular institutional context (a social system such as a firm, industry, or society) and how it influences the construction and diffusion of an innovation. Most IDT studies just focus on the process of diffusion and the penetration of innovation (Orlikowski and Iacono 2001).

Reviewing the literature, Rogers (1995) found that more than 70 percent of the diffusion research studied the characteristics of the innovators. Around 1 percent of the research concentrated on the attributes of innovations, but this topic has attracted considerable attention recently (Hackney et al. 2005; Hong and Tam 2006). Of note, three important attributes are considered to explain the rate of adoption: greater relative advantage (perceived need), technical compatibility, and reduced technical complexity (Bradford and Florin 2003). Less than 1 percent of the early literature was interested in the varying patterns of network links among two or more members of a system. Until now, only a few studies have examined the process of innovation diffusion within a changing institutional context (e.g., Geels 2005; Park and Yoon 2005).

Another limitation in IDT is that little research has been done from an organizational or industrial viewpoint. Brown (1981) commented that IDT studies emphasized the

demand side for innovation marketing, and the economic studies of diffusion concentrated on price and profitability, although both supply and demand variables were analyzed. Therefore, growing studies have been carried out on the institutional and market structures that channel new technologies to users (e.g., Chiasson and Lovato 2001; Kodama 2005; Murase 2003). Nevertheless, these studies tend to be performed from the view of specific suppliers or adopters. An exploratory study of cross-industry innovation appears necessary given that the production of complex innovations occurs in alliances across organizations and industries.

2.2 Actor Network Theory

To address some of these limitations in the IDT research, we propose ANT as a systematic framework to analyze how the various actors alter relational ties with each other during the production and initial diffusion of an IT innovation. Unlike other network theories, ANT is known as the sociology of enrolment and translation, during which the interrelated roles of actors and their strategies are defined and negotiated (Callon 1986; Law 1992). Both human and nonhuman actors (e.g., IT artifacts) are treated equally. The temporary “maps of interests” and the “funnel of interests” and the compromises among actors interests, are helpful to understand how IT artifacts are produced and diffused. However, actor networks are unstable, subject to both production and deconstruction, as social orders collapse or reform (Law and Hassard 1999).

A few researchers have employed ANT in their IT innovation diffusion research. They highlight the diverse interests of actors as well as broader contexts on IT diffusion. Walsham and Sahay (1999) learned that the effects of geographical information systems (GIS) for decentralized administration in developing countries was strongly related to the interests of multiple agencies and local social values. Allen (2004) found that the actor networks of two early personal digital assistants (PDA) were not only affected by technologies but also redefined by management and practices external to the PC industry. Unlike the previous researchers, Oh and Lee (2005) examined how cross-industry actors forged alliances and how technology (re)shaped the interaction patterns between banks and mobile service providers. They also demonstrated how research could examine the effects of substitute technologies and customers as contexts on the diffusion of convergence services.

The actor network of convergence services leads to an issue in the linkage of IDT and ANT. While traditional IT innovation is usually developed by research and development designers with intended functions, the companies that produce IT products and services, including the convergence services in this case, often conduct market trials to assess and build the relative advantage of the innovation for adopters. The creation, distribution, and reinvention of innovation between suppliers and customers are, therefore, simultaneous. As recommended by Lyytinen and Yoo (2002, p. 387), “New alliances need to be forged and IS researchers should be actively involved in studies where technologies are being built and tried out—not after the fact when they enter the market.”

This confirms a need to employ methodologies and theories to understand how actors in an industrial chain enrol and translate their diverse interests in the production, diffusion, and reinvention of an IT artifact.

3 METHODOLOGY

3.1 Study Design

To demonstrate the empirical possibilities of an ANT approach to study context in diffusion research, we examine how a new convergence service was shaped by the interaction of actors across time. The current case of a mobile-TV trial in Oxford is a pilot study of a larger research project, which is expected to capture changes in technologies and the market of mobile entertainment, in order to understand what and how the “triple diffusion” of an IT artefact—across producers, producer-to-user, and user-to-producer—occurs.

The case of the mobile-TV trial in Oxford, which is promised to offer 24 hour, live access to 16 TV channels, provides a setting in which to assess an ANT view of context for two reasons. First, the case appears to be the most comprehensive mobile-TV trial in the UK (Table 1). It continues for 6 months with a physical trial plan and provides a complementary result (Figure 1).

The second reason is that the actors in this case are spread across diverse industries. This industrial chain of mobile-TV covers a *network broadcaster* (Arqiva), a *mobile service provider* (O2), a *handset and technology supplier* (Nokia), several *content providers* (16 TV channels), hundreds of *adopters* (375 trial users), and the *digital video broadcasting-handheld* (DVB-H) *technology*. Arqiva and O2 rolled out the trial over the DVB-H technology. Sixteen TV channels were delivered digitally to 375 users who were equipped with Nokia 7710 smart phones for their feedback (Figure 2).

3.2 Data Collection

The data sources of our study include interviews with key participants from July to October 2006, and documentary analysis of news, articles, and company documents. First-hand data was collected from three in-depth interviews with the managers in charge of this trial for Arqiva, Nokia, and O2 as well as two interviews with the customers who

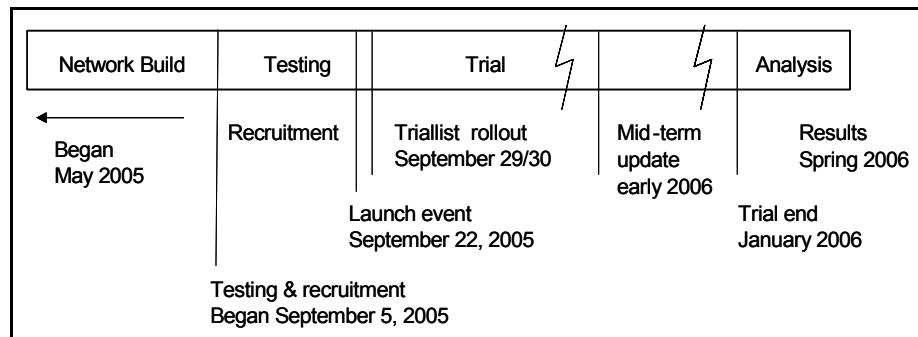


Figure 1. The Timeline of the Mobile-TV Trial in Oxford

(from D. Williams, “Oxford Mobile-TV Trial,” 2005, http://www.o2.com/media_files/oxford_mobile_tv.pdf)

Table 1. The Milestone of Mobile-TV in the United Kingdom Up to 2006[†]

Time	Event	Milestone	Technology
January 2004	4Interactive, Endemol UK, and Vemotion offered end-to-end live programming of a new and round-the-clock show, accessed by some video-capable GPRS handsets.	The first TV-to-mobile service from terrestrial channels.	GPRS (2.5G)
May 2005	Orange launched its 3G mobile-TV service.	The first mobile-TV services using TV streaming via 3G.	3G
September 2005	O2 and Arqiva launched a mobile-TV trial over DVB-H in Oxford. Sixteen TV channels were delivered digitally to 375 users equipped with specially modified Nokia 7710 handsets.	The first trial of multi-channel TV broadcast directly to mobiles rather than one-to-one streaming via the mobile networks. The first trial to provide full-length TV shows.	DVB-H
November 2005	Vodafone UK and British Sky Broadcasting launched mobile-TV with 19 channels. All Vodafone's 3G users could use it free before the end of 2005. Afterward, some channels would be packaged and charged £5 monthly.	The first commercial mobile-TV service available on a wide range of 3G handsets.	3G
October 2006	Virgin Mobile, using BT's system, launches the first commercial broadcast mobile-TV service without charge to its pay-monthly customers whose bills are £25 or more. Pay-as-you-go users charge £5 monthly after the first 3-month free trial. However, only one handset provided by Windows mobile shop was workable.	The first commercial broadcast mobile-TV service.	DAB-IP [‡]

[†]Source: 3G News (2005), BBC News (2005), E-Consultancy (2004), and Meyer (2006)

[‡]Digital-audio-broadcast IP (DAB-IP) is an enhanced system using the same frequencies of digital audio broadcasting (DAB) to provide a limited number of TV channels.

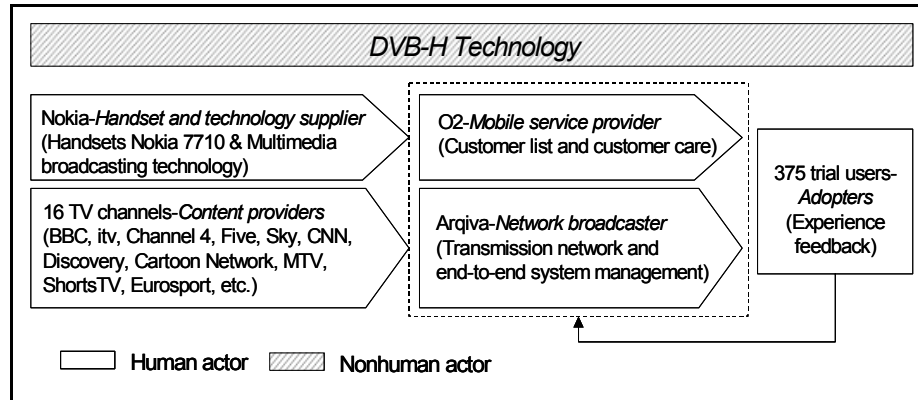


Figure 2. The Industrial Value Chain of the Mobile-TV Trial in Oxford

had experienced mobile-TV through their 3G phones in Birmingham and London. To protect their personal data, interviewees were anonymously analyzed except for those who agreed to disclosure. The managers were contacted via formal customized enquiry letters, while the customers were contacted via a web forum. Semi-structured questionnaires were designed and sent in advance (Table 2). These questions were developed based on concepts from ANT, such as enrolment and translation. The objectives of our research were explained in the letter or during the first visit. Documentary data were gathered from the websites of main companies and the search engine *Google* with the keywords “mobile-TV trial” and “Oxford.”

3.3 Data Analysis

To analyze the data, we looked for statements and events that pointed to past, present, and future possibilities for enrolment and translation across participants. Our analysis disclosed that the interaction among the six actors could be divided into two phases. In the network-forming phase, the role and interests of each actor is identified. In the network-reshaping phase, the challenges and opportunities of actors in the future are analyzed (or predicted). We conclude by discussing further implications for research on the relations among innovation diffusion, actor networks, power, and contexts.

3.4 Method Limitations

Since the findings of this paper are based on a pilot case study, there are three limitations: the number of supplier interviewees, the sample requirements of customers, and the time spectrum of the mobile-TV trial. First, only one person in each supplier group is interviewed, so the interview opinions do not explore the full-range of positions and interests of those in charge of the mobile-TV business. To compensate, we have explore other documentary evidence to determine the interests and positions of the suppliers. Second, because of limited resources, our interviewees represent adopters of 3G mobile-TV users, not the actual DVB-H mobile-TV trial users in Oxford. Therefore, our findings are con-

Table 2. The Semi-Structured Questionnaire for Mobile-TV Suppliers and Customers

Interviewee	Question
Various Suppliers	<ul style="list-style-type: none"> • Does your company have any official definition about mobile-TV? • Does your company position mobile-TV as a mobile service or a member of TV family? • What motivated your company to launch or support mobile-TV? • What are the objectives of this trial in Oxford? • What roles did your company and your partners play in the alliance? Which one was the focal actor in this trial? Why? • Has your company had different or conflicting ideas with your partners? • What is the feedback from the trial users? • How does your company think about mobile-TV over DVB-H, 3G, or DMB? • Have you found any challenge after this trial? Do you have any plan to solve them? • Will you choose exclusive or multiple partners in each function when formal commercial mobile-TV is provided? Why?
Customers	<ul style="list-style-type: none"> • What is mobile-TV in your interpretation? • When and how did you learn about mobile-TV? • When did you first use mobile-TV? Why? • Which company services did you use? Why? Did you like it? Why? What handset did you use? Did you like it? Why? • When, where, how often, and how long did you use mobile-TV? Why? • Do you continue using it? Why? • Have you ever recommended your family or friends to use mobile-TV? Why? • Which score (1-5) do you rank the mobile-TV? Why? • Will you use mobile-TV in the future 12 months? Why? • Which pricing model do you prefer? How much money are you willing to pay? • When you watch TV at home/workplace/outdoors, what is your priority for TV sets, PCs, notebooks, mobile phones, others? • Any suggestion about services, content, and handsets? • What TV programmed genres do you prefer to watch through mobile-TV and TV? • IT usage behaviors and demographic data of interviewee

tradictory to the official results from O2 and Arqiva. Finally, although the mobile-TV trial is 6 months only, the production of mobile-TV and its diffusion among the supplier groups has been in development for years. To compensate, we expand our interviews and documentary evidence to gather additional historical data, consistent with ANT studies. Since we focus here only on these initial findings, we address some of the limitations in this study with continued study of the UK project, and a new project with Taiwanese mobile-TV projects.

4 FINDINGS

4.1 Phase 1: The Forming of Actor Networks

In this section, we use the mobile-TV trial in Oxford to illustrate how actor networks are forming through the enrolment and translation of diverse actor interests. Figure 2 illustrates the influence across suppliers and customers. It serves as a study of diverse participants' actions and reactions to the development and diffusion of an IT service. Table 1 provides a trace summary of the various actors, events, and influences supporting and competing with those involved in the TV trial in Oxford.

Despite the apparent solidarity of Figure 2, each actor group in the trial had unique interests that were enrolled and translated to produce temporary complements in joint action. We start with the DVB-H technology because it was the focal actor in the network of relationships.

4.1.1 DVB-H Technology: Nonhuman Actor

DVB-H is viewed as a broadcast (one-to-many downstream only) technology transmitting digital signals from towers to handsets, following the recognizable principles of digital terrestrial broadcast television. By investing in certain facilities through existing TV broadcast transmission, the actors involved in DVB-H mobile-TV believe that they can offer downstream channels at high data rates without a restriction on the number of concurrent viewers. Hence, the quality of video programs and the network efficiency are promoted as generally better than 3G, a two-way packet system that is considered to have limited capacity and significant transmission delays. As Mark Fowler, the business manager for Nokia UK mobile-TV, said,

With DVB-H mobile-TV network, because it a true broadcasting, the same as the (terrestrial) broadcast TV at your home, everybody in the world can watch the same channels at the same time, but 3G mobile-TV wouldn't.

In this trial, the actors enrolled DVB-H technology to demonstrate its superiority with its potential competitors: 3G, digital audio broadcast over Internet protocol (DAB-IP), digital multimedia broadcasting (DMB), and MediaFLO.¹ However, customers who wished to watch DVB-H mobile-TV required new handsets with the DVB-H chips, so new relations (i.e., networks) were formed from the DVB-H handset suppliers to the trial users to test the new system. Therefore, the question—what “is” DVB-H technology—can be seen as a series of relations between actors. The trial could determine whether and how diverse interests of customers and suppliers are to be translated and enrolled into the DVB-H network. Figure 3 highlights these relations.

¹DAB-IP, DMB, and MediaFLO are other competitive broadcast mobile TV technologies supported by different camps. Please refer to Shin (2005) and Qualcomm (2005) for further information.

4.1.2 Network Broadcaster: Arqiva

Arqiva, one of the two licensed mobile-TV network broadcasters in the UK, initiated the trial. Arqiva acted aggressively because it was hoping to imitate a successful business model in DAB (Figure 4). This business model began in 1998, when Arqiva and GCap Media invested in a joint venture, Digital One, to bid for the sole DAB spectrum license. Digital One then contracted with digital audio providers, wholesaled the digital audio service to interested retailers, and outsourced Arqiva to build and manage the network over the coming years.

Using its relations to exploit economies of scale and speed to market, Arqiva hoped to produce an obligatory passage point. It believed that mobile service providers would be unable to catch up to its existing advantage over the relations with TV channels and infrastructure in Oxford, to form an alliance with 16 TV channels and the mobile service provider O2. It hoped to earn nation-wide attention and recognition for its construction and management of the DVB-H broadcast system. This was a deliberate attempt to weaken competitive network relations, which had enrolled alternative technical standards. To do so, Arqiva needed to enrol other suppliers and customers. These include handset providers, mobile service providers, and content providers.

4.1.2 Handset and Technology Supplier: Nokia

Nokia, one of the largest handsets suppliers and a major promoter of the DVB-H technology, provided hundreds of free handsets and supported the multimedia broadcast technology in the trial. Nokia’s aggressive role in this trial arose from their long-standing

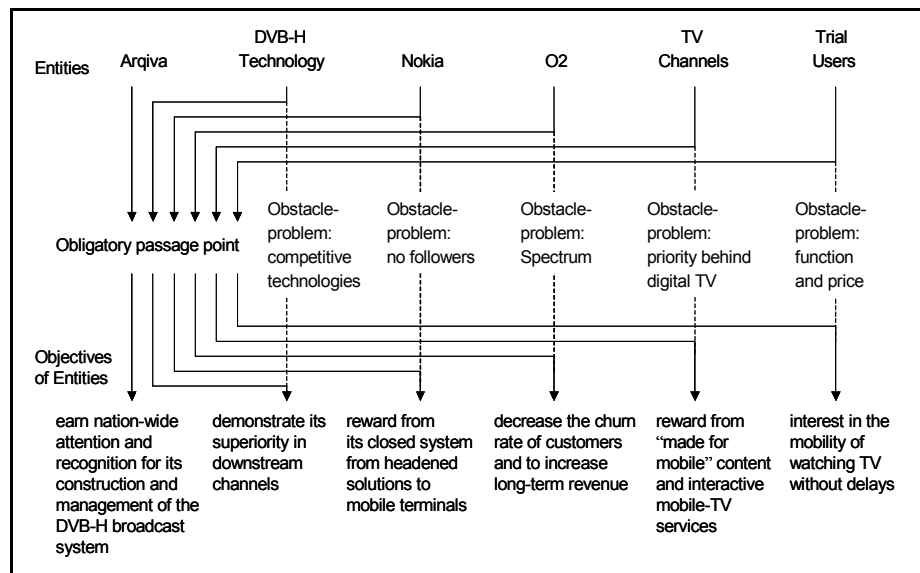


Figure 3. The DVB-H Networks of the Mobile-TV Trial in Oxford in the Network-Forming Phase

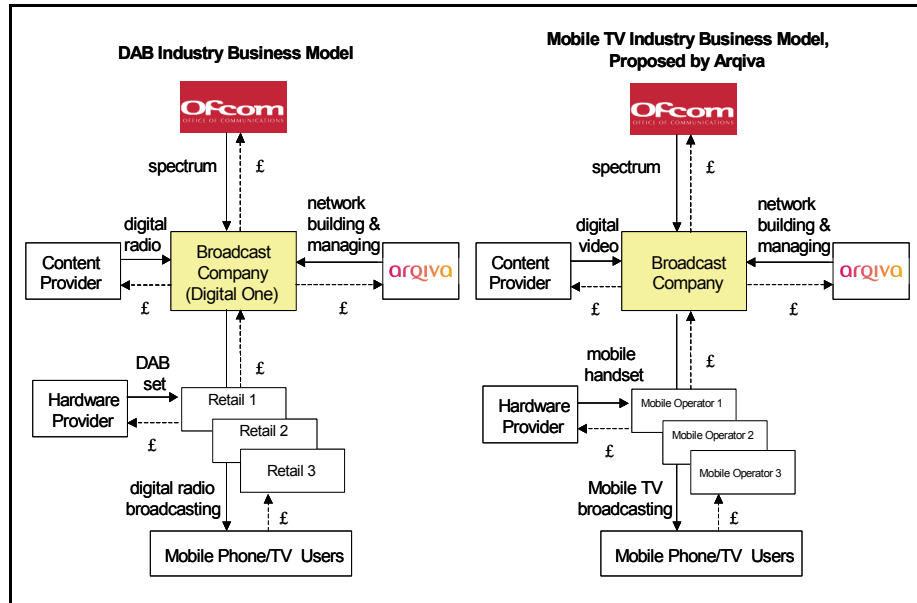


Figure 4. The Business Model of DAB Industry and Mobile-TV Industry Proposed by Arqiva

interest in mobile-TV over a 5-year period, and its all-out effort to back DVB-H against the other competitive technologies. As a the future reward, Nokia hoped that other suppliers and customers would use DVB-H for mobile video because Nokia was well prepared to provide a system from server-side solutions to mobile terminals.

4.1.4 Mobile Service Provider: O2

O2, which had been enrolled by Arqiva into this trial, screened 375 mobile-TV trial users from its customer list. To decrease the churn rate of customers and to increase long-term revenue, O2 was hoping to benefit from content options or handset characteristics that would lock-in customers. Moreover, mobile service providers like O2 treated DVB-H and 3G as complementary delivery mechanisms: DVB-H and 3G for mobile-TV downstream to the mass and niche markets respectively, and 3G for return messages. As a result, mobile service operators may eventually ask handset suppliers to design an affordable handset that would support both DVB-H and 3G technologies for interactive mobile-TV.

Mobile-TV could be helpful to stop churn....In the mobile industry, the cost of acquiring customers is very high, and the cost of losing them is even higher. However, if you ever give your customers the mobile-TV service, the chance they churn away is much less. Broadcast mobile-TV could [also] stimulate 3G business because DVB-H supports downstream transmission, and 3G is good at two-way transmission....When DVB-H TV users want to vote [their favorite participants on the game shows] or send messages [to their friends for real-

time discussion], they have to use the 3G....Hence, mobile-TV might contribute only to mobile service providers, but it could raise in 3G revenue (Anonymous interviewee with Arqiva).

4.1.5 Content Providers: 16 TV Channels

In the trial, 16 TV channels provided free news, entertainment, sports, or documentary content to Arqiva. They were relatively passive participants in this trial because (1) programs are produced from an almost fixed cost, and were then easily digitized to match various platforms, and (2) mobile-TV needed time to get established, as compared with digital TV through terrestrial broadcasting. Thus, they responded to Arqiva's invitation from a lost cost and low benefit position. In the near future, however, content providers might be rewarded with two opportunities: "made for mobile" content and interactive mobile-TV services, which will redesign the process of producing and selling TV programs.

4.1.6 Adopters: Customers

From O2's customer list, 375 mobile phone users living predominantly in Oxford were selected. With free handsets to watch free mobile-TV, the trial users were obliged to participate in the trial and reply with their thoughts via monthly telephone questionnaires, focus groups, and users' daily diary. Without enough data to completely understand the variety of interests and experiences of customers, we conducted two interviews to find out how adopters perceived their experiences with mobile-TV. Our results show that, unlike the positive results released by O2 and Arqiva, our price-sensitive interviewees believed that mobile-TV was only "nice-to-have" on their 3G phones (Table 3).

Beyond sample size issues in explaining the differences, it is possible that the capture and presentation of data is a combined political-technical effect, used for the purposes of enrolling other actors. Further research into the production of evidence in this and other IT production studies is required.

4.2 Phase 2: The Reshaping of Actor Networks

After the trial, the actor networks were altered by three challenges. First, O2 was unsatisfied with the business model proposed by Arqiva (Figure 4), so a conflict of interests was emerging. Arqiva is being forced to change its strategy because mobile service providers are its present and future customers. Now the mobile-TV trial in Ireland is dominated by O2 with support from Arqiva.

The second challenge for mobile-TV at this time is that the government, a new actor, has not allocated the spectrum for DVB-H.

The key requirement is the availability of spectrum in order to operate this broadcast service. In the UK, at the moment, there is no allocated spectrum for DVB-H, and a decision is required from the UK government (Ofcom) about whether and when this will become available....There is a desire to have the spectrum available sooner given the progress being made in other parts of

Table 3. Feedback from 3G and DVB-H Mobile-TV Users

	3G Mobile-TV Users in Our Interviews	DVB-H Mobile-TV Users in Oxford
Whole reaction	Mobile-TV was “nice-to-have” on the 3G phones because the mobile-TV users were price-sensitive and uncertain about its value.	The majority of the users were in favor of mobile-TV, with 83% of them “satisfied” with the service, and 76% prepared to taking the service up within 12 months.
Motives for the first use	They used mobile-TV due to curiosity and free trial. Price was a key determinant on whether users would continue to use it. They were unsatisfied with the existing pricing model and agreed that a monthly fee with unlimited usage would be better.	N/A
Preferred location or time	They seldom watched mobile-TV at home but preferred to use it during the commute, waiting time, traveling overseas, and at lunch breaks.	They used mobile-TV mainly at home, at work and on the daily commute. Traffic demand was highest in the mornings, lunch times and early evenings.
Favorite genre of content	News was the most favorite genre for mobile-TV. The user behaviors of watching mobile-TV and TV were very different.	The most favorite genres were news, soaps, music, documentaries, and sports. During the lunch break, viewers preferred news, sports and their favorite daytime soaps. One third of the users were looking for “made for mobile” programming and even some long-form content (e.g., movies).
Rule of decision-making on continuing usage	The users could give up Vodafone free mobile-TV for O2 low-price promotion of mobile phone. The priority on content variety or system stability was depended.	A wide range of channels and well-known brand channels were wanted. Additional factors were ease of use and high-quality pictures/ sounds.

Source: O2 (2006), Slocombe (2006), and interviews for this paper.

Europe, as the UK could be left behind, although the regulators have been competing demands for the spectrum not only from mobile companies but also from TV channels to offer high-definition TV services (Anonymous interviewee with O2).

The third challenge for DVB-H mobile-TV is the difficulty of reconciling mobile service providers interests in a competing technology to the 2G-3G-4G route. The mobile service providers are the gatekeepers to user access, and most of them have invested significant money in upgrading their system from 2G to 3G, and even 4G. If the 4G technologies are perceived to provide better performance in both two-way data

transmission and mobile-TV broadcasting, they may wish to defer investment and avoid being locked into the DVB-H network.

Finally, the feedback from the trial users is not only an outcome, but also a future influence on the reinvention of mobile-TV. At the same time, customer preferences are produced and formed through trials and initial customer adoption. The joint shaping of both producers and customers suggests that context is a constellation of actor influences and actions, changing as well as being changed by other actor behaviors. This raises new possibilities for the study of context in diffusion research, as discussed next.

5 DISCUSSION

The early IDT led us to infer that the speed and effect of diffusion was determined by relatively static and independent contexts, filled with factors. Our analysis of this case using ANT, however, suggests that the context is composed of various actors, defining their identities and changing their interests. The actor network composition and enrolments are dynamic, thus producing a fast-changing context for any particular actor, resulting in innovation with high uncertainty. A possible implication of this is that closer examinations of the forming and reshaping of actor networks could produce better understanding of how the current and future contexts affect the production and diffusion of innovations. Several substantive issues in our case highlight this possibility.

5.1 Linkages between Context and IT Production and Diffusion

The shape and form of IT production and diffusion depends upon the production and dissolution of actors and their engagement with each other. For example, despite the initial formation of the DVB-H network, its continuance depends on a number of future forces which could dissolve it. An instance is that the relative advantage perceived by suppliers in this trial was mostly the result of downstream speed and the unlimited connectivity of users to DVB-H technology. However, if O2 decides to focus on 4G mobile-TV because of its consistency with 2G and 3G networks, the DVB-H network might dissolve. Other forces like the spectrum lease delay or unenthusiastic user response may also alter the trajectory and continuance of DVB-H network.

5.2 Nature of IT Production and Diffusion Changes as the Actor Network Grows

Even if an IT network doesn't dissolve, its shape and direction changes as new actors are attracted and enrolled into it, their interests both translating and affecting the network composition and direction. For example, if DVB-H becomes more widely accepted and used, DVB-H chip-design companies will become more involved in DVB-H mobile-TV if mobile service providers order customized handsets (e.g., big screen size, long battery life, and easy to use). This could prompt changes in content providers who come to see the medium as a new channel for their programming content. However, as the available content increases, the broadcast approach of DVB-H may become a limit on the available

channels, which will then prompt other protocol suppliers and vendors to address this limitation, and so on.

5.3 Relations between Actors Positions and Relative Power

The positions and material circumstances of key actors determine the relative power of each in the network. An illustration is that content providers have a larger space to wait and see if DVB-H succeeds because (1) they can easily reformat their content for many mediums with low cost; (2) their lead time of producing content is relatively flexible, which allows them to alter ties with the other actors instantly if they change their mind; and (3) the well known content providers, supported by the user preferences for branded channels, acquires even more power to make conservative decisions. Specific events arising from this power relation includes Channel 4 refusal to broadcast live with Virgin Mobile-TV, and BBC's limiting involvement with mobile-TV producers to a year.

5.4 Surprises

ANT approaches to IT production and diffusion would also help in anticipating and explaining unanticipated changes in actor networks. For example, online users broke the separation between users and producers via blog, mobile video blog (MoVlog), or the other interactive and grassroots production systems. It is possible that mobile-TV could be used by amateurs and unknown producers to find audiences for their content through mobile service providers. The combination of voice, short messages, mobile-TV, or location-based services could bring in new approaches to interactive television. These new IT-based activities could churn and transform the contexts around entire industries, and may alter not only the production and diffusion of content but also the attention and interests among actors—customers, producers, and service providers. ANT thus opens up new possibilities for investigating how changes in actor positions and relations produce and render the contexts around IT production and diffusion.

6 CONCLUSION

This paper proposes that an ANT methodology could support two areas in diffusion research: the study of the dynamic diffusion process, and the role of many diverse players involved in the production and diffusion of IT innovations. In addition, the ANT methodology also contributes to our understanding of how adopters perceive their relative advantages in one or more networks, and how their involvement can reinvent the production and diffusion of innovations. To explore these possibilities through empirical data, a study of a mobile-TV trial in Oxford is provided. The findings show that combining IDT and ANT may provide a richer theoretical foundation in studying how the varying relations among actors affect the production and diffusion of IT innovation.

Future research is required to extend the coverage of contexts (e.g., 4G technologies) and actors (e.g., government) that influence the actor networks involved in the production and diffusion of mobile-TV. Furthermore, additional empirical studies could be con-

ducted with other IT products or services, within different industries. Finally, it would be valuable to do a study of how adopters influence the reinvention of innovations by producers.

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About the Authors

Su-Yi Lin is a Ph.D. student in the Department of Management Science at Lancaster University. Su-Yi's research examines the interactions among societies, technologies, and management issues. Her interests include IT diffusion, convergence services, e-commerce, digital content, change management, and the social effects of the Digital Age. Su-Yi can be reached by e-mail at s.lin5@lancaster.ac.uk.

Mike Chiasson is a senior lecturer in the Department of Management Science at Lancaster University. Mike's research examines the relationships between institutional contexts and the development and implementation of information systems. His work includes action research, user involvement, IT diffusion, privacy, outsourcing, and social foundations of IS development and use. Mike can be reached by e-mail at m.chiasson@lancaster.ac.uk.