

## Association for Information Systems AIS Electronic Library (AISeL)

---

ECIS 2006 Proceedings

European Conference on Information Systems  
(ECIS)

---

2006

# Interactive digital television and electronic public services: emergent issues

Colin Smith

*Napier University*, [cf.smith@napier.ac.uk](mailto:cf.smith@napier.ac.uk)

William Webster

[c.w.r.webster@stir.ac.uk](mailto:c.w.r.webster@stir.ac.uk)

Follow this and additional works at: <http://aisel.aisnet.org/ecis2006>

---

### Recommended Citation

Smith, Colin and Webster, William, "Interactive digital television and electronic public services: emergent issues" (2006). *ECIS 2006 Proceedings*. 121.

<http://aisel.aisnet.org/ecis2006/121>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2006 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# INTERACTIVE DIGITAL TELEVISION AND ELECTRONIC PUBLIC SERVICES: EMERGENT ISSUES

Dr. Smith, Colin, School of Computing, Napier University, Merchiston Campus, 10 Colinton Road, Edinburgh, UK, EH10 5DT, cf.smith@napier.ac.uk

Dr. Webster, William, Department of Management and Organization, University of Stirling, Stirling, UK, FK9 4LA, c.w.r.webster@stir.ac.uk

## Abstract

*Information and communications technologies (ICTs) have been at the heart of a transformation of public services in the UK, in a process that has seen the emergence of forms of 'electronic public services' (EPS). Policy makers have hoped that EPS will bring about improved, convenient, accessible and cheaper public services. The Internet has been at the heart of attempts to deliver EPS. However, limiting factors affecting user uptake of web-based services, including skills and access issues, have encouraged service providers to consider additional delivery platforms. Interactive Digital Television (iDTV) has emerged as one possible platform, since it brings an interactive capacity to a medium that is both familiar and easy to use. This paper examines the ways in which the capabilities offered by iDTV technology have been exploited by policy makers and service providers. Reporting data from a number of research projects, this paper also explores the extent to which the technology has supported the emergence of high-quality and user-friendly services, and the extent to which users have valued and utilised such services. It concludes that while we now have a significant evidence base of provider and user experiences, the relative immaturity of the technology and the nature of the iDTV initiatives themselves has prevented a full investigation of EPS via iDTV.*

*Keywords: digital television, public services, service delivery.*

# 1 INTRODUCTION

For almost a decade it has been assumed that the future of information-age public services, citizenship and democracy lies in the development and diffusion of the Internet. The Internet, it is argued, can be utilized to provide improved, more convenient, more accessible, and above all cheaper public services. However, over the last few years a new technological medium has emerged, which offers the potential to overcome the main disadvantages associated with the Internet. Interactive Digital Television (iDTV) has the potential to deliver electronic public services directly into service users' and citizens' homes, it uses a platform that everybody is familiar with and which already exists in the vast majority of households. For these reasons it may be credible to suggest that the future of electronic government and public services could lie in the emergence of iDTV. With television penetration rates exceeding 97% of UK households (CITU, 2000), iDTV offers the possibility of bridging the 'digital-divide' by reaching those households that do not have access to electronic public services via the Internet, and encouraging use by those individuals who are apprehensive about using computers. Whilst iDTV offers significant potential for enhancing services and citizenship there are risks associated with its development. iDTV is a relatively immature technology, it is unclear how service users will respond to using their televisions in this way, or what services are best suited to the new medium. There are also technical issues concerning the compatibility iDTV with other platforms, in particular, the potential for sharing information across all electronic service delivery platforms, and especially with Internet based services.

Academic research into iDTV has tended to focus on business, commercial and technical aspects (Carey, 1997), and typically, in depth critical studies have been rare (Kim, 1999; Kim and Sawhney, 2002). This paper addresses this by presenting a critical assessment of the use of iDTV to deliver electronic government and public services in the UK. It is based on research into the planning, implementation and evaluation of a number of innovative iDTV pilot initiatives, including 'INtouch kirklees', 'DigiTV' and the 'Scottish iDTV Pilot'. These initiatives have set out to test the potential of iDTV and to explore the possibility of delivering digital services directly to citizens and service users' homes, thereby making public services more accessible, universally available, and potentially cheaper to administer. As such, these initiatives have sought to harness the innovative potential of new information and communication technologies (ICTs) to modernize public service administration and provision by organizing and delivering services in a revolutionary new way. Not only do these initiatives represent a new service delivery arrangement, they also present a challenge to existing organizational arrangements and the traditional processes and procedures embedded in relations between service providers and service users. In the case of iDTV, institutional arrangements are contested by new ICTs, through the emergence of a new citizen-state relationship and the requirement to share information and information systems across organizational boundaries. The institutional consequences of iDTV are therefore potentially profound and far-reaching.

This paper explores the ways in which the innovative and organizational potential of ICTs, in the form of new iDTV services, have been utilized for the modernization of public administration in the UK. In doing so, it seeks to critically assess existing iDTV initiatives and to examine the institutional meaning of iDTV. The paper utilizes empirical research conducted by the authors as part of a number of commissioned research projects examining and evaluating the use of iDTV for the provision of public services in the UK. Empirical research embedded in these commissioned projects includes detailed analysis of service use, household surveys, interviews and focus groups with service users, and interviews with policy-makers and service providers. This unique research has provided the authors with unrivalled insights into the patterns of iDTV use, service providers and users experiences of iDTV, and of the institutional and organizational impacts of the technology. These research findings provide valuable insights into the extent to which iDTV represents the future of electronic government and public services in the UK.

The paper is split into eight main sections. Following the introduction, section 2 considers the emergence of new electronic, or ‘e-government’, services. Sections 3 and 4 provide a brief overview of iDTV technology, relevant UK Government policy in this area, and the main UK iDTV initiatives. Section 4 also presents an overview of three of the main UK iDTV initiatives, namely ‘iNtouch kirklees’, ‘DigiTV’ and ‘The Scottish iDTV Pilot’. Section 5 considers the aspirations, purposes and innovative potential of new iDTV services. Sections 6 and 7 critically assess the effectiveness and integration of iDTV services, including a critical assessment of its potential. And finally, section 8 offers some concluding comments, including an assessment of whether iDTV will actually become the future of e-government services.

## **2 DELIVERING SERVICES IN THE INFORMATION AGE**

The emergence of new ICTs has transformed the way public services are delivered. New information flows, embedded in, and created by, new ICTs have profoundly and subtly altered relationships in and around the institutions of government and public administration (Bellamy and Taylor, 1998). Of particular interest here are changing relations within the ‘information polity’, that is, changing relations between service providers and citizens, between the different service providers, and within the organizational arrangements of individual service providers (Taylor and Williams, 1991). Whilst ICTs have been credited with transformational qualities, it is also the case that their introduction has been shaped and influenced by existing institutional arrangements and procedures - processes that are commonly referred to as ‘institutionalism’, or ‘new institutionalism’ (North, 1990). So, although new ICTs have revolutionized service delivery, through the introduction of new electronic services and the reinvention of existing services, their introduction has not been independent of existing organizational arrangements, activities and procedures. Rather, it is the case that the long-standing norms and procedures of public administration have persisted and have actually been reinforced with the introduction of new ICTs. In this sense, there has not necessarily been a radical revolution in service delivery, but a more subtle transformation as existing services are ‘electrified’ or ‘informatized’ (Frissen and Snellen, 1990). The argument here is that technologies themselves do not cause or determine changes in governance, instead, it is the interrelated interactions between technology, actors, organizations and institutions that determine outcomes and ‘impacts’. Consequently, the debate between technologies shaping institutions and institutions shaping technologies (MacKenzie, 1996) raises an important concern for the introduction and use of any new technology - namely, to what extent does it challenge, change or reinforce the architecture of government and established norms of public administration. This question is central to this paper and is addressed through a two strand critical assessment of iDTV, firstly, by considering its effectiveness and usability (section 6), and secondly, by examining the extent to which it is integrated into existing systems and organizational practices (section 7).

In recent years the transformational qualities of ICTs have been associated with the term ‘e-government’ and the emergence of the Internet as the dominant platform for delivering e-services. The term e-government is itself often used to denote the application of Internet based technologies in and around government (Chadwick and May, 2003; Edmiston, 2003; Norris, 2005; Tat-Kei Ho, 2002) and is widely credited with improving the delivery of services and empowering citizens (Edmiston, 2003). More often than not, the term e-government is used in relation to the electronic provision of information and services (Horrocks and Hambley, 1998; Norris, 2005), and not broader concerns around governing in the information age, which would suggest that e-government is about the changing informational relations between service providers and a vast array of different stakeholders (Bellamy and Taylor, 1998). In terms of the electronic delivery of services, the application of new ICTs has been utilized in different ways, with different ‘types’ of e-service emerging (Taylor and Webster, 1996). For example, Smith and Webster (2002) distinguish between ‘information’, ‘interaction’ and ‘transaction’ services, whilst Bekkers and Homburg (2005) use a different typology that distinguishes between ‘information’, ‘contact’, ‘transaction’, ‘participation’ and ‘data transfer’

services. For this paper we reject both these typologies in favour of a classification that stresses the ‘interactive’ potential of different e-services. This typology is discussed in more detail in section 3.1.

### **3 IDTV TECHNOLOGY AND POLICY**

The background to the emergence of iDTV is the development of new ICTs and the subsequent convergence of different technologies, including telephony, computing, photography and television. Developments in new ICTs have transformed the way government, public and democratic services are delivered and consumed, they have enhanced existing services and led to the introduction of innovative new electronic services (Bellamy and Taylor, 1998). A central plank of this information age ‘revolution’ has been the emergence of the Internet as the main channel for delivering electronic information and services. However, despite its popularity, household access to the Internet remains restricted to about 52% of UK households (Office for National Statistics, 2005), making the desire for universal household access to electronic public services via the Internet unobtainable. Television is distinct from the Internet in that it is ubiquitous, popular and convenient, and is used by the vast majority of people on a daily basis. Furthermore, the technological shift from analogue to digital television, which is bringing interactivity to television, has resulted in iDTV being recognized as medium with great potential for the delivery of electronic public services directly to all citizens’ homes (Smith and Webster, 2002; 2003a).

#### **3.1 iDTV Technology and Services**

There is no widespread agreement on the definition of interactive television (Carey, 1997; Kim and Sawhney, 2002). The terms ‘iDTV’ and ‘digital television’ are often used interchangeably, yet they refer to different technological capabilities. Digital television, or DTV, refers simply to the digital broadcast and reception of digital television signals, as distinct from the traditional analogue method of transmission. Digital signals are more efficient than analogue signals because more services can be broadcast using less bandwidth capacity, and because digital broadcast offers improvements in terms of picture and sound quality. Interactive digital television (iDTV), on the other hand, involves the transmission of digital signals together with a capacity for ‘interaction’ between the service users and the service providers. Some of this interaction relies upon the existence of a ‘return path’, which enables a two-way communication between broadcaster and viewer, or between service provider and service user. So where DTV relates to the broadcast of digital programs, iDTV additionally supports the transmission of interactive information and services thereby allowing the introduction of new services, such as audience feedback, home banking and ‘video on demand’. The UK is considered to be the world leader in the diffusion of digital television. In just over five years since its launch, 63% of UK homes, which is more than 16 million households, are receiving and have access to digital services (Ofcom, 2005, p3). By 2012, current UK Government policy states that the analogue broadcast of TV and radio signals will be completely replaced by digital transmission, in a process referred to as the digital ‘switchover’ (DCMS, 2005). After the switchover all UK households with a television will have access to digital television.

In the UK there are three main digital television platforms, satellite, terrestrial and cable, each providing access to digital television services. The main digital television broadcasters are BSkyB Digital, providing digital satellite television, FreeView, providing digital terrestrial television, and ntl and Telewest, both providing digital cable television. Each platform employs different broadcasting infrastructure, and consequently different equipment requirements for receiving services. Digital satellite television is received through a satellite dish, digital terrestrial television through a conventional television aerial and set-top-box, and digital cable television through the network operator’s fiber optic network. Only digital cable infrastructure supports full interactivity between service provider and user, as the cable provides the ‘return path’ or ‘back channel’ supporting two-way information flows. To achieve a similar return path, digital satellite and digital terrestrial require the

addition of a separate communications technology such as telephone line or mobile SMS. None of the networks offer total UK coverage. Table 1 provides an overview of the availability of digital television services in the UK and of the main iDTV service providers.

Insert Table 1. here.

A range of public services can be delivered electronically using digital television. While these services can be classified as either 'information', 'interaction' or 'transaction' services (Smith and Webster, 2002), for the purposes of this paper we prefer to offer a typology based upon the extent to which the services exploit the technological capabilities of iDTV, by distinguishing between 'basic', 'extended' and 'interactive' services. This typology is presented in Table 2, and highlights the extent of interactivity supported by each 'type' of service. The meaning of interactivity for television is further explored by Kim and Sawhney (2002).

Basic Services involve the digital broadcast of TV programs and the digital broadcast of public service information from service provider to service user, or broadcaster to viewer. In accessing basic services, the user can select the program or service which they wish to view, but cannot use the system to request particular information streams associated with that service or to make any input to the content provider. The extent of interactivity supported is therefore limited to the viewer selecting a particular program over an alternative. An example of a basic iDTV service is the 'Local Government TV Channel', which was launched on the BSkyB Digital platform in September 2005. The channel features news, interviews, case studies and live coverage of relevant local government events (Information TV, 2005). Basic services accessible via iDTV involve the one-way provision of electronic public information, which the viewer can choose to look at or not. They are therefore not truly interactive.

Enhanced Services are those programs or services accessible over iDTV that make use of embedded technical capabilities to deliver enhanced or personalized information or content. While enhanced services are commonly thought of as an expression of the interactive abilities of iDTV, they are actually still 'one-way' rather than truly interactive services. This is because the data streams that users access when selecting such services are already being supplied to the users' equipment, whether the user chooses to access them or not. In the UK, enhanced services are often associated with the 'red button' on the iDTV remote control, which provides access to the range of services available for a specific program, with such services commonly referred to as 'red button services'. Certain television programs broadcast over iDTV regularly provide viewers with an on-screen prompt to 'press the red button' in order to access further information or alternative broadcast streams within that program. For example, a broadcast news bulletin may prompt the viewer to select further information on a particular news story, information which is then delivered within a text box on the screen, or alternatively, to allow the viewer to select other news stories of more interest to them than the one being currently featured in the program. The viewer is always given the choice to return to the mainstream content of the program at any time. These capabilities are often utilized in broadcasts of sporting events, by offering the viewer a choice of camera angles to watch the sport in progress. In terms of 'enhanced' public services, enhanced iDTV services enable the user to select particular information areas from within the service, allowing a degree of personalization in their use of the service. For example, a traditional broadcast advert about the dangers of smoking could be supported by a red button link to extra information, including contact details of advice and support groups. Enhanced iDTV public services enable the user to interact with broadcast information by allowing them greater personalized control of broadcast content.

Insert Table 2. here.

Finally, Interactive Services allow the user to interact with the service provider in a much more specific and meaningful way. Beyond the selection of digital broadcasts and red button services, interactive services allow the user to communicate - interact - with the service provider by inputting information or making requests for information. This could happen via an on-screen form, email or a keyed selection via a remote control or keyboard. Popular interactive services include online shopping, banking and gambling. Shopping channels, for example, allow the user to purchase a product being demonstrated on-screen, by supporting the actual transaction process, from making the selection, through to inputting payment details. Interactive services are dependant on the ability of the user's equipment to communicate with the service provider via the 'return path'. In terms of public services, all the iDTV initiatives discussed in this chapter use on-screen forms to allow users to submit information, for example, to apply for a service or to complete a transaction. Other interactive features supported by iDTV include the possibility to vote on certain public service issues, to search for information by location or postcode, and to complete payments or bookings for certain services. For public services delivered via iDTV, interactivity refers to the ability of a user to make an 'input' in order to receive a specific requested 'output', where the interaction may involve contacting an official, requesting information, or completing a transaction. Of the three types of iDTV services brought forward here, interactive services offer the greatest capacity for innovative interactions.

### **3.2 iDTV Policy in the UK**

In 1999, the UK Government's White Paper 'Modernising Government' (Cabinet Office, 1999) identified electronic service delivery as a key feature of the 'renewal' and 'reform' of public services, and stated that all 'dealings with government' should be capable of being delivered 'electronically' by 2008 - since revised to 2005. The vision for information age services is further expanded in the Performance and Innovation Unit's report 'e-Gov: Electronic Services for the 21st Century' (PIU, 2000). This report argues that electronic service delivery will transform the way public services are provided, by allowing service users to choose when and where they interact with government, by delivering services through multiple channels, and by reorganizing government to deliver services that are customer focused. In 2000, the Central Information Technology Unit (CITU) published the consultation document 'Digital TV: Framework for Information and Government' (CITU, 2000), and in 2003, the Office of the e-Envoy published a policy framework setting out the potential future for iDTV and e-government services (Cabinet Office, 2003). This framework outlined the government's vision for iDTV and sets out a range of policies for a coordinated way forward. Key developments included establishing a central iDTV presence in the form of UK Online, now Directgov, setting up the Digital Television Project to manage the digital switchover, and encouraging service providers to experiment with iDTV technology. The most important of these are presented in more detail in section 4 below.

The UK Government's vision for iDTV, as set out in these policy documents, is based on a desire to make public services more efficient and more inclusive, and by being able to reach all citizens and service users - "the Government's vision that DTV becomes a means to provide all citizens with access to e-government services" (Cabinet Office, 2003, p3). More than 97% of households possess at least one television set (CITU, 2000), making it one of the most pervasive, familiar and accepted technologies in the home. iDTV therefore provides the potential for government and public service providers to reach virtually the whole population, giving people a new way to access and consume public services. Furthermore, when the 'digital switchover' takes place all televisions will be digital, making iDTV the most pervasive government-to-citizen channel - "DTV represents too great an opportunity for the public sector to be ignored...DTV will undoubtedly become a major, if not the predominant public communication channel" (CITU, 2000, p41). An important driving force behind the emergence of the iDTV platform is the belief it can help overcome social exclusion, by bringing e-government services to people who currently may be reluctant or unable to use them via personal computers. At the moment digital television has a higher household penetration rate than the Internet, especially in the homes of lower income groups, groups who traditionally are

intensive public service users. Central to the Government's vision for iDTV is increasing the take-up of e-government services, however, iDTV is not intended to achieve this alone, but is one of a several channels designed to deliver complementary e-services, in what is commonly referred to as a 'multi-channel strategy' (Cabinet Office, 2002). Possible 'electronic' channels include the Internet, mobile telephony, call centres and electronic kiosks. For Government, iDTV contributes to the objective of making all services available electronically by 2005 and to offer multiple access routes to all services.

## **4 THE IDTV INITIATIVES**

In recent years there have been a number of iDTV initiatives involving a range of public service providers (Smith and Webster, 2002; 2003a). Typically, these initiatives are intended to identify optimal delivery arrangements, gain experience of using the technology, and assess the organizational implications of using iDTV technology. Some of the most significant initiatives include 'INtouch kirklees', 'DigiTV', and the 'Scottish iDTV Pilot', each discussed in more detail below. At the local level a number of local authorities have experimented with innovative iDTV services. Prominent here are Knowsley Council, Newcastle City Council, Kirklees Council, Plymouth Council, the London Borough of Newham and Hertfordshire County Council. Typically, these authorities are using digital television to provide information about council services, and perceive iDTV as a useful mechanism for enhancing citizen engagement and social inclusion. The more innovative services provide opportunities to make payments, submit online application forms, book facilities and services, vote, and send email. Arguably the most ambitious service was INtouch kirklees, which in addition to providing a range of services electronically also provided service users with a degree of influence and control over service content.

### **4.1 INtouch kirklees**

The INtouch kirklees digital television project, led by Kirklees Metropolitan Council, in partnership with Calderdale and Huddersfield Community Health Trust, Artimedia, and ntl, was established to deliver electronic services, via ntl cable infrastructure, to disadvantaged communities in the Kirklees area (Smith and Webster, 2003b; 2003c). This project was particularly innovative, because it utilized iDTV to provide electronic public information and services, and because it sought to give service users the opportunity to shape and influence the content of the service, thereby making it more relevant to their everyday lives. Households taking part in the project were provided with access to digital television and a network of 'community consultants' to ensure they had the necessary skills and motivation to allow them to access, use and shape the range of public services and information available.

The provision of information and services on INtouch was organized around the main public service areas, such as 'housing', 'crime', 'transport' and 'employment'. In addition to the provision of electronic information there was a range of 'interactive' services, such as an 'A to Z' search of services, email, and onscreen forms. There were also sections specifically designed to allow service users to shape the online content. A 'have your say' section allowed users to offer their views on a current topic, a 'neighborhood guides' section allowed users to publish information about local events and attractions, a 'speak to' section allowed users to submit questions to a senior council employee or politician, a 'making choices' section, allowed them to 'vote' on the issue of the day, and a 'reading circle' allowed them to exchange views on books with other iDTV service users. The intention behind arranging the service in this way was to provide a platform for delivering services directly to service users' homes, to design a service relevant to disadvantaged communities, and to identify which iDTV services would actually be used on a regular basis. By giving the service users greater control over service content it was hoped that the emerging service would be relevant and useful, and would be a good indicator of the likely future uses of iDTV.



## **4.2 The National Project – DigiTV**

At the national level the Office of the Deputy Prime Minister (ODPM) supported the development of iDTV by financing trial ‘pathfinder’ projects in Suffolk and Somerset and by making iDTV one of its ‘National Projects’ in its Local Government Online Strategy (ODPM, 2005). The ODPM National Project on iDTV, known as ‘DigiTV’, is being developed by the team that introduced INtouch kirklees, and is using the knowledge gained from the pathfinder trials to help local authorities get a presence on digital television and to disseminate best practice through the creation and diffusion of an iDTV ‘starter kit’ (DigiTV, 2005). The starter kit allows public sector agencies to upload their content onto digital television through a series of generic templates, including one that can be used to create forms. There is also a DigiTV ‘plug-in’ which allows service providers to integrate iDTV services with the back-office systems. Examples of interactive features supported by DigiTV include a ‘Jobs Hotline’ in South Yorkshir, that allows service users to make appointments with Job Centre Consultants, ‘Report It’ forms in Plymouth, that allow service users to report noise nuisance, abandoned cars, fly tipping and graffiti (etc), and a Library book ‘reservation and renewal service’ in Kirklees.

The DigiTV starter kit allows local authorities and other service providers to develop, publish and maintain an iDTV service on all the digital television platforms. It provides a technical platform for delivering iDTV services, as well as the information and training required to get an iDTV service established. It was designed and tested between 2003 and 2004, and so far 68 local authorities have established a DigiTV presence (DigiTV, 2005, p13). The service is managed centrally and local authorities are encouraged to group themselves into ‘clusters’ in order to share the platform access costs, which can be as much as £60,000 per local authority per annum (DigiTV, 2005, p20). Each local authority provides content on its own ‘microsite’, which through the DigiTV interface is then broadcast over the different digital television platforms. In this way contributors do not have to deal with the digital television broadcasters themselves, nor do they have to design their own templates and navigation systems. The main downside for providers is that they are locked-in to the DigiTV templates, which govern the scope and format of content, and which discourages the development of innovative new iDTV service applications and design. They are also locked-in to significant ongoing access charges.

## **4.3 The Scottish iDTV Pilot**

The Scottish iDTV Pilot provided access to electronic public information and services on the BSkyB Digital platform between May 2004 and April 2005 (Smith and Webster, 2005). It was initiated and led by the Scottish Executive’s 21st Century Government Unit, as part of its ‘Digital Inclusion’ program (Scottish Executive, 2001). The pilot involved a partnership between six partner organizations; The Scottish Executive, Dumfries and Galloway Council, NHS Scotland (Health Scotland), StartHere, West Lothian Council and Young Scot. Each partner provided informational and interactive content and participated in project management.

Service content was designed around a set of generic templates, with each service provider providing the relevant content for their section. The different interactive features of iDTV were ‘shared’ between the different content sections. For example, Dumfries and Galloway Council provided tourist information about the region and an interactive form to enter a competition, and NHS Scotland (Health Scotland), provided information about the dangers of smoking, and access to a ‘smoking calculator’, to estimate the annual cost of smoking. Other interactive features incorporated into the service included the opportunity to vote on local environmental issues in West Lothian, online applications for a Young Scot card, and requests for a ‘call-back’ from NHS Scotland or a West Lothian ‘Neighborhood Response Team’, and the opportunity for young people to identify local entertainment and product savings via a ‘postcode’ (zip code) search.

The Scottish iDTV pilot was intended to test the feasibility of delivering public services electronically through iDTV. An important part of this experiment was to capture service users and service providers experiences of and attitudes towards the technology. This, it was hoped, would provide some early indicators as to the likely future use of iDTV. In particular, for service users, the pilot hoped to identify which interactive features of iDTV were most useful, which content most popular, ease of use, and whether users found iDTV to be a realistic or preferable alternative to existing electronic and traditional service mechanisms. For the service providers, it was hoped that the pilot would offer useful insights into providing an electronic service in a partnership arrangement, the organizational requirements of iDTV, and whether the service could successfully be integrated into existing technological and organizational arrangements and service delivery procedures.

## **5 SERVICE INNOVATION THROUGH IDTV**

The aim of all the iDTV initiatives discussed above has been to test the feasibility of iDTV for delivering a range of electronic public information and services. Typically, these projects were orientated towards certain groups within a designated pilot area, such as the disadvantaged in Kirklees, and are focused on particular service areas or user needs. They are innovative because they are intended to explore new ways of engaging with local communities and service users, and because they are explicitly testing a new technological platform, to see if it can be used to provide services (Smith and Webster, 2003a). As such, these services are forging new relations with service users, with the emergent relationships based on the informational and interactive capabilities embedded in the new ICT systems. Their innovative nature also stems from their potential to offer new and complementary mechanisms for the delivery of focused, personalized information and transactional services to recipients, while also supporting varying degrees of interactivity. Beyond technological innovation, the iDTV initiatives discussed here are also innovative in the way they are organized and managed. All of the initiatives discussed in this paper have been delivered via collaborative partnership arrangements, with the explicit intention being to expose as many service providers as possible to the possibilities offered by iDTV, to encourage shared learning experiences, and to assess which services are actually best suited to iDTV. Such arrangements necessarily involve the introduction of new working procedures, such as, weekly cross-organizational team meetings, whilst at the same time exposing the new iDTV services to existing organizational routines, structures and institutional norms.

A discourse centered on the technical capabilities of iDTV has been at the heart of its diffusion. iDTV has been seen as a means to provide all citizens with access to e-government and public services, regardless of their socio-economic status or their orientation towards new technology. The perceived potential of iDTV is based upon its technological capability to support interactive services directly to households, using a medium that has high penetration rates, a high degree of familiarity, and is easy to use. Significantly, for the initiatives discussed here, household digital television penetration rates are highest for those socio-economic groups that are traditionally intensive public service users, but low personal computer users. For these households, iDTV offers a viable alternative access point to services and information delivered via the Internet. For service providers, iDTV offers an alternative way of 'reaching out' to households. In the case of iDTV, new ICTs are facilitating new ways of organizing the primary process of public administration, by acting as a mechanism for integrating service areas around one common delivery platform, and a new electronic service interface between service provider and service user. In so doing, the technology is demanding new organizational arrangements and working procedures, and is forging new electronic citizen-state relations.

The aspiration for iDTV is that it will ultimately become the most pervasive of all electronic service delivery channels. However, the current approach taken by Government focuses on the need for a range of complementary service delivery channels, including, traditional channels and innovative new electronic channels, of which iDTV is just one (Cabinet Office, 2002). Such an approach is driven by the convergence of electronic media realized by the digitization of services. This has

enabled service providers to share information across electronic service delivery platforms, whilst at the same time delivering closely targeted content which utilizes the particular strengths of the different platforms. In this respect, the aspiration for iDTV is not just to deliver electronic information and services directly to citizens' homes, but also to integrate it with existing service delivery channels.

## **6 THE EFFECTIVENESS OF IDTV**

An instrumental assessment of public service iDTV initiatives would focus on whether the services 'worked' and whether they delivered the expected service outcomes. The effectiveness of iDTV is therefore determined by the extent to which iDTV services are used and whether their use has helped bridge the 'digital divide' by making e-services more accessible. However, the iDTV initiatives discussed in this paper were explicitly shaped by an 'action research' approach, where one of the primary goals of each initiative was to develop organizational learning about exactly what constituted possible and acceptable public service applications of iDTV technology. The initiatives are therefore best assessed according to the extent of information produced and knowledge created about the utilization of the technology, rather than on narrow definitions of success or failure. Critical success factors determining the extent of organizational learning from the initiatives included the extent of user uptake and use, the extent of organizational commitment, the quality and reach of the service, and the extent of integration with other service delivery channels.

The existence of a number of innovative iDTV initiatives has led to a growing evidence base of service providers' and service users' views and experiences of using iDTV. Usually in the form of public attitude surveys and in-depth evaluations, this evidence base is being used to inform the development of iDTV in the UK. Some of the most important evidence derives from research into public attitudes towards digital television conducted for the Department of Trade and Industry (DTI, 2004), together with the detailed evaluations of INtouch kirklees (Smith and Webster, 2003b; 2003c) and the Scottish iDTV pilot (Smith and Webster, 2005; Gilliatt and Brogden, 2004), case studies and public attitude surveys conducted by the DigiTV National Project (RBA Research, 2004), public attitude research into the diffusion of digital television conducted for the Department of Culture, Media and Sport (2001), and qualitative research into public attitudes towards digital television services conducted by a number of service providers, for example Suffolk County Council (2002) and West Lothian Council (2001).

### **6.1 Using iDTV to Access Public Information and Services**

The emerging evidence base shows that although access to iDTV services is growing as digital television rapidly diffuses across society, there is currently low awareness and low use of public iDTV services (RBA Research, 2004). All the iDTV initiatives discussed here have reported disappointing usage data. For example, the INtouch kirklees service had on average 222 visits per week and 32 per day (Smith and Webster, 2003c, p27), the Scottish iDTV pilot recorded only 43 visits per week and 6 visits per day (Smith and Webster, 2005, p33), while DigiTV claim that "between 20 and 400 people are using the service a day" (DigiTV, 2005, p3). Furthermore, it is also evident that after an initial surge in use, both INtouch kirklees and the Scottish iDTV Pilot experienced a gradual decline in use over time. Anecdotal evidence suggests that there are a number of factors that might have deterred use, including speed of access, difficulty in finding the service, cost of access, limited awareness of service, and the scope of service content. Despite these low levels of use, the usage data does highlight a number of trends, firstly that service use was highest in the early evening, and secondly, that a typical visit lasted just under 30 minutes. This was the case for INtouch Kirklees, (Smith and Webster, 2003c), the Scottish iDTV Pilot (Smith and Webster, 2005), and the Suffolk iDTV Pathfinder Initiative (Suffolk County Council, 2002). Additionally, the evaluation of INtouch found that although a wide variety of people used the service, there tended to be a dominant user in each household who used the service on average just once a week (Smith and Webster, 2003c, pp.28-30).

Despite the low levels of use, research suggests that citizens and service users are interested in using iDTV to access public information and services (RBA Research, 2004), and that there is an underlying desire to be able to undertake certain transactions via iDTV, particularly in terms of making appointments (eg for healthcare), submitting applications, requesting information, making payments and voting (Smith and Webster, 2003b). The evaluation of INtouch kirklees showed that the most popular iDTV content is local and community information and that service use was highest when service users had a clear reason, or purpose, for using iDTV, and where content is relevant to their lives and up-to-date (Smith and Webster, 2003b; 2003c). However, although most users found INtouch 'easy to use and useful' (Smith and Webster, 2003c, p19), they also reported that the service required greater 'depth', that it should be updated more regularly, that it occasionally suffered from technical difficulties, and that there should be more opportunities for interactivity (Smith and Webster, 2003c, p23).

Central to any measure of effectiveness is whether these initiatives actually delivered electronic services directly to citizen and service users' homes, thereby making public services more accessible and available. Here the research evidence is inconclusive, mainly because of the low levels of service use. Despite this, the evaluation of INtouch found that "the significance of INtouch for the disadvantaged communities targeted by the project is highlighted by the service users positive response to the technology...the majority of service users agreed that technology like INtouch makes it easier to access public services... (makes them) more likely to use public services...(and)...more aware of (the) public services available" (Smith and Webster, 2003c, p6). Whilst research conducted for the DiTV National Project Board found that there was a substantial 'business case' for delivering services through iDTV and that public iDTV services were 'inevitable' despite current low levels of use and awareness (RBA Research, 2004).

## **6.2 New Technology, New Knowledge**

A key feature of all the iDTV initiatives discussed here is the explicit intention to learn about the capabilities and impacts of the technology by testing it in 'live' environments. In this way service providers hoped to gather knowledge about which services were most popular and how the services could be integrated alongside existing technological and organizational arrangements. The importance of the learning process for an innovative new technology like iDTV should not be underestimated. Prior to the initiatives discussed here, very few public service providers in the UK had experimented with iDTV technology, so the introduction of new iDTV services, by definition, involved new activities and relationships between service providers, service users and new iDTV technologies. The extent of organizational learning is demonstrated by the significant differences between the initially planned iDTV services and the services that were actually delivered. Both INtouch kirklees and the Scottish iDTV Pilot were intended to offer comprehensive information about a range of public services and a series of frequently used interactive features. In practice, both services were scaled down when the limitations on the speed of iDTV and the quantity of information that could be displayed became known. For both these initiatives, the capabilities of the technology only became apparent through the processes of design and testing. Also, difficulties associated with integrating iDTV services with existing technological and organizational networks only became apparent once the service providers started to build the systems. For example, although it was initially hoped that iDTV could 'share' information with existing Internet services, in practice, the way in which iDTV information is displayed, formatted and transmitted, made convergence very difficult. Consequently, INtouch kirklees and the Scottish iDTV Pilot, both of which were initially intended to be integrated alongside existing information systems, were actually 'stand-alone' services with specialized dedicated information and information systems.

Although the limited number of service users and the failure to integrate iDTV technology suggests these initiatives did not effectively test the feasibility and potential of the technology, the development of new iDTV services has underpinned significant organizational learning and led to a

deeper understanding of the complexities in developing and delivering appropriate user-friendly public services via iDTV. In this sense all the initiatives discussed here can be considered successful.

## **7 THE INTEGRATION OF IDTV**

The extent to which iDTV is integrated with existing organizational activities is an important indicator of the extent to which existing institutional processes have shaped the emergence of new iDTV services. The key question is whether iDTV has fundamentally challenged the way public services are organized and managed, or has its introduction fitted neatly alongside the existing portfolio of service delivery channels? Institutional perspectives focus on the ways in which existing institutions respond to, and are shaped by, the use of new technology (MacKenzie, 1996). The iDTV initiatives examined here posed a significant challenge to established approaches and procedures for developing and delivering services, and assessing and responding to user needs - primarily through the requirement to converge information and information systems. This is because they encourage new relations with service users, new organizational forms, and the introduction of new working practices and procedures. However, in the case of iDTV, although the technology was initially intended to challenge established administrative procedures, in practice it changed very little. This was partly because most of the systems were organized as 'pilot initiatives' with a limited lifespan, ultimately they were arranged in such a way that their inevitable termination did not adversely affect the providing institutions.

Issues about the integration of iDTV raise important questions about the extent to which the characteristics of the technologies were fully utilized, and therefore fully tested. Although iDTV technology has the capacity to support interactivity, few elements of the initiatives discussed here provide good examples of the use of interactivity in ways that were organizationally and institutionally embedded. Procedures for developing and delivering content were put in place, but were typically ad hoc, labour intensive, inefficient, costly, and un-related to the standard operating rules and procedures of those organizations. Fundamentally, the nature of the iDTV services actually delivered - services that were limited in scope and depth, and not fully exploiting the interactive potential - reflected the institutional shaping of those services. To some extent this was due to the experimental nature of the projects, which saw iDTV services rolled out as stand-alone bespoke services that were not properly integrated with back-end content management systems and with other e-services. Ultimately, this lack of integration prevents a proper assessment of a technology that was intended to be one of a variety of integrated complimentary electronic service channels. Consequently, the potential for cross-channel integration has not been robustly tested.

Despite limited attempts to integrate electronic service delivery channels there is evidence that electronic content has been shared between the iDTV and Internet platforms. For example, services provided for iDTV have not always been designed solely for the iDTV platform and with its strengths, limitations and capabilities in mind. Typically, public service providers have chosen to repackage existing digital Internet content for use on iDTV, despite this content being designed and organized for use with personal computers and not television. This has resulted in the use of text and graphics which may not be best suited to the television medium, and a lack of investment in audio-visual materials which might be more appropriate. The 'republishing' of material across multiple delivery platforms has been seen as a necessary compromise arising from the lack of integration achieved in the pilots, and between the iDTV platform and the 'back end' content management database systems. Such integration depends not only upon the seamless flow of data from back-end systems towards the 'citizen facing' systems, such as iDTV and the Internet, but also the automatic 're-purposing' of that content into a format suitable for the capabilities of each particular platform. The repurposing of content is important because it tailors content, in terms of the size, font, and colour of text and graphics, into a format suitable for each medium, and acknowledges that service users use the mediums in different ways. For example, iDTV service users typically use their remote control to navigate the service and sit some distance from the screen, unlike personal computer users who

typically use a keyboard and sit very near to the monitor. The different nature of these human-technology interfaces suggests service content is provided in different ways.

The process of actually developing and delivering new iDTV services has brought the limitations of iDTV technology to the fore. In terms of service content new iDTV services have presented service providers with a number of difficulties in developing content suitable for television screen formats and resolutions. Techniques for user navigation have had to be developed reflecting the norms of iDTV user-technology interaction - typically with a user sitting some distance from the television, and reliant on a basic remote control handset and on-screen prompts to navigate around the service. Also, the processing power contained in the set-top-box in the users homes, has proved to be inadequate for supporting the delivery of data rich graphic materials. Compounding these problems are the raised expectations of service users who are familiar with the scope, speed and interactivity of services delivered via the Internet.

## 8 CONCLUSIONS

iDTV potentially represents a revolutionary new way to deliver electronic services and instigates a new interface between service providers and service users. Consequently, the introduction of iDTV technology could be responsible for forging new relations between citizens, service users and public service providers, where these new relations are embedded in the technological capabilities of iDTV systems and services. Beyond the creation of a new channel for delivering service, iDTV could also initiate the modernization of public services by encouraging the convergence of ICTs and the sharing of information across organizational boundaries, in a way that supports the electronic delivery of services. In this way, and along with other ICT systems and e-service channels, iDTV could be seen as a driving force for organizational change. However, evidence from the UK iDTV initiatives discussed here suggests that the lack of integration with traditional institutional activities and other e-services, as well as the problems and limitations of the technology, mean that the true potential of iDTV has yet to be tested fully, and that although we now know e-services can be delivered via iDTV, we still don't know if this can be done in a sustainable way. Despite these concerns the development of innovative new iDTV services has provided a thorough learning opportunity about the limitations of the technology and the pitfalls associated with developing an iDTV service.

The iDTV projects discussed in this paper have explored the feasibility of providing electronic public services using the iDTV platform. These innovative projects should be regarded as 'pilots', designed to test the technology and to see if there is any user demand for services over this medium. An initial assessment of their success shows mixed results. Although the development of iDTV initiatives has demonstrated that it is possible to deliver electronic interactive public services via the television, the current provision of iDTV is not yet sufficiently advanced to support widespread provision and use. The evidence base emerging around existing iDTV initiatives suggests that citizens and service users are interested in using iDTV to access e-government services, in particular when there is a clear reason, or purpose, for using iDTV, and where content is relevant and up to date. The emergent evidence base also suggests that the most popular iDTV content is local and community information and the ability to undertake certain transactions, particularly making appointments, submitting applications, requesting information, making payments and voting.

The rapid increase in the number of households with access to digital television represents a unique opportunity to deliver electronic services directly into citizens and service users' homes. Moreover, the take up of digital television, the forthcoming digital switchover, the development of government policy and services in this area, and the emerging evidence base from a number of iDTV initiatives, points to iDTV being an important complimentary medium for the future delivery of electronic government and public services. Although the provision of public services via iDTV is still in its infancy, it can reasonably be expected to expand rapidly over the next decade as more service users have access to and experience of digital services. Despite this likely expansion, it is still far too early to predict if iDTV will be the future of e-government and e-public services.

## References

- Bellamy, C. and Taylor, J. 1998. *Governing in the Information Age*. Open University Press; Buckingham.
- Bekkers, V.J.J.M. and Homburg, V.M.F. (Eds.) (2005) *The Information Ecology of E-Government*. Amsterdam: IOS Press.
- Cabinet Office. 1999. *Modernising Government*. Cm 4310. Cabinet Office; London.
- Cabinet Office. 2002. *Channels Framework: Delivering Government Services in the New Economy*. Office of the e-Envoy, September 2002. Cabinet Office; London.
- Cabinet Office. 2003. *Digital Television: A Policy Framework for Accessing E-Government Services*. Office of the e-Envoy, December 2003. Cabinet Office; London.
- Carey, J. 1997. *Interactive Television Trials and Marketplace Experiences*. *Multimedia Tools and Applications*, Vol.5, pp.207-16.
- Central Information Technology Unit (CITU). 2000. *Digital TV: Framework for Information Age Government*. Cabinet Office; London.
- Chadwick, A. and May, C. (2003) *Interactions Between States and Citizens in the Age of the Internet: "e-Government" in the United States, Britain and the European Union*. *Governance*, Vol.16, No.2, pp.271-300.
- Department of Media, Culture and Sport (DCMS). 2005. *A Guide to Digital Television and Digital Switchover*. 1 June. DCMS; London. Available at URL: [http://www.digitaltelevision.gov.uk/pdf\\_documents/publications/guide\\_dtvswitchover\\_june05.pdf](http://www.digitaltelevision.gov.uk/pdf_documents/publications/guide_dtvswitchover_june05.pdf). Accessed on 23 August 2005.
- Department of Media, Culture and Sport (DCMS). 2001. *Digital Television 2001: Final Report*. MORI, June 2001. DCMS; London.
- Department of Trade and Industry (DTI). 2004. *Attitudes to Digital Television: Preliminary Findings on Consumer Adoption of Digital Television*. The Generics Group, January 2004. DTI; London.
- DigiTV. 2005. *DigiTV - The New Citizen Channel for the Digital Age: Delivering Local Government Services on Digital Interactive TV*. Local e-gov: National Projects. Available at URL: [http://www.digitv.org.uk/content\\_images/Digitv\\_finaldoc\\_tcm2-568.pdf](http://www.digitv.org.uk/content_images/Digitv_finaldoc_tcm2-568.pdf). Accessed on 9 November 2005.
- Edmiston, K.D. (2003) *State and Local E-Government*. *American Review of Public Administration*, Vol.33, No.1, pp20-45.
- Frissen, P.H.A. and snellen, I.Th.M. 1990. *Informatization Strategies in Public Administration*. Amsterdam, Elsevier Science.
- Gilliatt, J. and Brogden, J. 2004. *21st Century Government: Interactive Digital Television (iDTV) Pilot*. December. Lambda Research and Consultancy, The Scottish Executive; Edinburgh.
- Horrocks, I. and Hambley, N. 1998. *The 'Webbing' of British Local Government*. *Public Money and Management*, Vol.18, No.2, pp.39-44.
- Information TV. 2005. *Information TV and the Local Government Channel*. 26 September. Available at URL: <http://www.information.tv/News/?id+19>. Accessed on 20 October 2005. Local Government TV Channel URL: [www.thelocalgovernmentchannel.com](http://www.thelocalgovernmentchannel.com).
- Kim, P. 1999. *Deconstructing Interactive TV Networks*. *The Public-Jounost*, Vol.6, No.3, pp.87-100.
- Kim, P. and Sawhney, H. 2002. *A Machine-Like New Medium - Theoretical Examination of Interactive Television*. *Media, Culture and Society*, Vol.24, pp.217-33.
- MacKenzie, D. 1996. *Knowing Machines: Essays on Technical Change*. London; MIT Press.
- Norris, D.F. (2005) *Advancing E-Government at the Grassroots: Tortoise or Hare*. *Public Management Review*, Vol.65, No.1, pp.64-75.
- North, D. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.
- Office of Communications (Ofcom). 2005. *DigitalTtelevision Update: Q2*. 15 September. Ofcom; London. Available at URL:

- [http://www.ofcom.org.uk/research/tv/reports/dtv/dtu\\_2005\\_q2/q2\\_2005.pdf](http://www.ofcom.org.uk/research/tv/reports/dtv/dtu_2005_q2/q2_2005.pdf). Accessed on 8 November 2005.
- Office of Communications (Ofcom). 2004. The Ofcom Internet and Broadband Update. May. Ofcom; London. Available at URL: [http://www.ofcom.org.uk/research/telecoms/reports/bbresearch/int\\_bband\\_updt/may2004/#content](http://www.ofcom.org.uk/research/telecoms/reports/bbresearch/int_bband_updt/may2004/#content). Accessed on 8 November 2005.
- Office of the Deputy Prime Minister (ODPM). 2005. National Projects: At the Heart of Excellent Services. Local e-Gov, ODPM; London. Available at URL: <http://www.localgovnp.org.uk/default.asp?sID=1>. Accessed on 9 November 2005.
- Office for National Statistics. 2005. Internet Access. Available at URL: <http://www.statistics.gov.uk/CCI/nugget.asp?ID=8&Pos=1&ColRank=1&Rank=176> Accessed on 6 April 2006.
- Performance and Innovation Unit (PIU). 2000. e-gov: Electronic Government Services for the 21st Century. Cabinet Office; London.
- RBA Research. 2004. Evaluating DiTV: Interim Report From Research Carried Out on Behalf of the DiTV National Project Board. May-June 2004. RBA Research; Leeds.
- Scottish Executive. 2001. Digital Inclusion: Connecting Scotland's People. September. 21st Century Government Unit, Scottish Executive; Edinburgh.
- Smith, C. and Webster, C. 2005. Final Report: Review of interactive Digital Television Pilot. The Scottish Executive (Finance and Central Services Department); Edinburgh. Not yet published.
- Smith, C.F. and Webster, C.W.R. 2003a. What's on the Box? Electronic Public Services and the Future of Television. Paper presented at the European Group of Public Administration (EGPA) Annual Conference, Oeiras, Portugal, 3-6 September.
- Smith, C.F. and Webster, C.W.R. 2003b. Final Report on the INtouch kirklees Digital Television Project. August 2003, Kirklees Metropolitan Council.
- Smith, C.F. and Webster, C.W.R. 2003c. Initial Report on the INtouch kirklees Digital Television Project. April 2003, Kirklees Metropolitan Council.
- Smith, C.F. and Webster, C.W.R. 2002. Delivering Public Services Through Digital Television. Public Money and Management, Vol.22, No.4, pp.25-32.
- Suffolk County Council. 2002. Attitudes to Digital Interactive Services – Qualitative Research: Key Findings. Research study conducted for Suffolk County Council, Ipswich Borough Council and Babergh District Council. MORI, June 2002.
- Taylor, J.A. and Webster, C.W.R. 1996. Universalism, Public Services and Citizenship in the Information Age. Information Infrastructure and Policy, Vol.5, No.3, pp.217-33.
- Taylor, J.A. and Williams, H. 1991. Public Administration and the Information Polity. Public Administration, Vol.69, No.2, pp.171-190.
- Tat-Kei Ho, A. (2002) Reinventing Local Governments and the E-Government Initiative. Public Administration Review, Vol.62, No.4, pp.434-444.
- West Lothian Council. 2001. Interactive Digital TV Pilot Project: Feedback from Focus Group Consultation. Cunningham, L., West Lothian Council, October 2001.



Service Platforms	Main Service Providers	Service Use – Households (million)	Market Share (%)	Penetration(% of UK Households)	Annul Increase (04-5) in Penetration (% of UK Households)
Digital Terrestrial Television (DTT)	Freeview	5.7	36	21	6.7
Digital Cable Television (DCT)	ntl and Telewest	3.3	17	10	0.4
Digital Satellite Television (DST)	BSkyB	7.4	47	32	2.0
Totals		16.4	100	63	9.2

Source: adapted from Ofcom, 2005.

*Table 1. Digital Television Services in the UK*

Type of Service	Description of Service	Public Digital Television Service Example	Extent of Interactivity
<b>Basic Services</b>	The broadcast of digital programmes.	The Local Government TV Channel.	User selects programme to view from the different channels available. No additional capability than that offered by analogue TV, except in the range and quality of channels available.
<b>Enhanced Services</b>	Digital broadcasts with additional programme content. Viewers may select from a range of additional text, programme information, and viewing streams. Additional services often accessed via the 'red button' on the remote control and usually relate directly to the programme being broadcast.	'Red Button' services providing additional pages of information, possibly including; the location, opening times and contact details of service providers, and possibly more information about services available.	Enhanced services offer the user greater control over programme content, but are 'one-way' services in that the user selects additional services from content already being delivered to the set-top-box.
<b>Interactive Services</b>	Interactive services combine digital broadcast with interactive two-way communication between the service user (viewer) and service provider (broadcaster). Interaction is supported by a two-way communication channel known as the 'return path'. Users interact by; completing forms, sending email, or making selections via their remote control.	Beyond the digital broadcast of programmes and information, interactive services may allow users to; submit a form to apply for a particular service or to make an appointment, send an email to a local representative or service provider, conduct a personalised post-code search of local services, make payments, and vote on issues of public concern.	Interactive services offer the user digital broadcasts, enhanced service content and the capability to electronically interact with service providers. Interaction may take a variety of forms including access to information and services, and the ability to make service transactions.

Table 2. A Typology of Electronic Public Interactive Digital Television Services