THE BARRIERS FOR PROLIFERATION OF INTERACTIVE TELEVISION (iTV) IN AUSTRALIA IN THE PERIOD 1999-2007

MARIA J. BORA, THE UNIVERSITY OF MELBOURNE, AUSTRALIA

Abstract: Interactive television (iTV) could well be described as a rising research area. The digitalization of networks, as well as broadband penetration, makes it once again a contemporary issue. However, it can hardly be called an overworked area of Australian television studies. This article assesses multiple reasons behind the Australian failure to adopt this technology in the period 1999-2007. iTV did not open feasible revenue streams for broadcasters. Its role was complementary to the digital TV services offered by current incumbent providers. The interactive potential of the Internet supported by users' engagement started to fulfil the promises of iTV and offered more collaborative service propositions. Still, at this point, neither TV nor the Internet provides fully viable business models for iTV. Instead there has been a flux of online and offline revenue models and continuing uncertainty about the future of media.

Keywords: interactive television (iTV), trails, barriers, regulations, Internet, business models

INTRODUCTION

Defining iTV proved to be difficult assignment. A number of authors (see e.g. Carey, 1997; Stewart, 1999; Van Dijk & De Vos, 2001; Kim and Sawney, 2002) state that there has not been a compromise over the definition of iTV and indicate reasons and consequences (e.g. Galperin, 2002; Kim and Sawney, 2002; Chirianopolous and Lekakos, 2007). The title 'Interactive television' refers more to a historical moment than to the real nature of the media. In general iTV merges computing power, broadcast, mobile technologies and broadband Internet, providing users with on demand interactive content and applications. Thus iTV could now be defined as "interactive audio-visual content" (McQuire, 2009) which is not tied to any service or platform but relates to the users' experience that involves at least one user and one or more network devices (Lekakos et al., 2008).

The concept of interactive television (iTV) is not new in Australia. Academic discussion about iTV started in Australia in the 1980s. Significant technological changes (manifes-

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ted in rapid development of microprocessors, as well as transmission and switching technologies with large storage capacity and low costs) coincided with tendencies toward gradual deregulation of world economies, government reforms and privatization of telecommunications encouraged wider social debate about the Australian role in the future information society (see e.g. Barr, 1987). To keep up with international trends the Australian government in the 1980s initiated a number of reports about videotex (e.g. ASTEC 1983; South Australian Council on Technological Change 1983; Logica 1986) such as those which followed the introduction of Viatel Telecom's public videotex offered by Commonwealth Bank and applications of videotex in agriculture and distance education (e.g. Hosie, 1985; Castro, 1986).

In the 1990s there was a lack of well structured industry reports and studies about iTV as well as lack of locally organized iTV academic conferences which would promote new media and encourage broader academic interests. The exceptions were for example two seminars organized by Network Insight Institute (RMIT Research Group) in 1999 and 2001.Still, the Interactive Television Institute (ITRI) at Murdoch University has produced a number of research projects and theses – such as these about children's interactive programming, digital interactive TV advertising – and applications of iTV on tourism and community services. Despite the Institutes' active participation in a number of digital policy studies and Parliamentary submissions (e.g. ITRI 2005) their primary focus has been on commercial research of consumer behaviour and advertising practices for a number of international clients such as General Motors, Turner Broadcasting, Coca Cola and Nike Inc.

The possibilities of convergence of digital content, broadband Internet and mobile devices and the aspiration of media practitioners to renew their television charters, preserve competitiveness and boost revenue streams, initiated a number of articles and research projects regarding SMS mediated TV events, mobile iTV applications, multiplatform services and video on demand (see Beros 2004; Nightingale and Dwyer 2006; Spurgeon and Goggin 2007).

Overall, interactive TV applications have been discussed in the context of particular formats, levels of audience participation or proliferation of specific services, but not in the context of conditions which need to be met to secure iTV proliferation in the Australian market. Mostly, industry reports on iTV provided a short-sighted analysis of current trends rather than a comprehensive analysis of causes and consequences based on particular theoretical frameworks. As a result an incomplete picture may be gained and possible alternative solutions would be left out.

This article is aimed at achieving understanding of the aspects which influenced the barriers for proliferation of iTV services and applications at the beginning of 2000s. It is comprised of four major sections: the first part briefly describes research methods and data collection.. The second section summarizes iTV trials. The third section of article explains technical, regulatory and financial barriers for proliferation of services. And the forth section analyses influence of Internet on proliferation of iTV.

The conclusion of this article is: The anti-competitive broadcasting policies supported with unsolved technological issues, financial disadvantages and wider proliferation of Internet influenced slow take up of iTV. In general, existing iTV services were characterized by limited interactivity and controlled closed platforms which failed to meet the expectations of providers and potential audiences. Despite advantages in comparison with broadcast offerings, the Internet had not been able to bring TV providers the same amount of revenue, or to ensure quality of content. In general the period under discussion reveals that neither TV or the Internet have yet provided viable business models for iTV.

Research Methods and Data Collection

As a research method I have chosen a survey because of the lack of data about history of iTV in Australia. The survey was conducted in the period between November 2006 and April 2007. The overall purpose of the survey was to examine the perception and attitudes of Australian iTV practitioners and emphasize the need to gain information of a particular "moment" in the development of media.

The survey was carried out within the scope of the Australian Interactive Media Industry Association (AIMIA) membership list which represents a broad spectrum of interactive media providers in Australia. The AIMIA is maybe the only association which currently provides a near-inclusive database of Australian iTV providers, despite the fact that some of the biggest iTV practitioners are not AIMIA members (such as Channel 7 or the Interactive Television Research Institute). AIMIA's directory of iTV practitioners does not completely represent all features of the iTV industry in Australia but provides consistent data which could characterize the iTV sector. The six interviews with non- AIMIA iTV providers have made additional contributions to the realistic picture of perspectives for iTV in Australia.

The questionnaire included 26 closed questions which were sequenced by topics and did not take more than 30-40 minutes for participants to complete. The questionnaire was organized around three topics: driving forces, iTV barriers, and potential users. The barriers to proliferation of iTV were measured through questions concerning the perceived advantages and disadvantages in offering iTV.

An emailed survey was distributed to 122 potential participants. The response rate was about 49%. Data collection was conducted through a self-completion questionnaire with a URL link to the website provided for further information about the project (for greater detail, see Jakovljevic, 2010).

Summary of iTV Trials

The technological, economic and regulatory 'seachanges' embedded in a liberal economic paradigm were gathering international momentum in the 1990s promising modernization and prosperity of cable, satellite and telecommunication systems with progressive encouragement of private investments and capitalization of mergers and transnational corporations. The Australian television industry became more intensely influenced by international acquisitions which as a consequence brought about the introduction of the first iTV trials.

The first trials of iTV (started in 1999 by Austar) were prologues for the commercial launch of iTV services which were supposed to recover newly established pay TV investments, decrease churn, and assist subscription providers to successfully compete with free to air (FTA) offers. At the time the advertising industry saw an opportunity to closely target TV users through iTV, delivering more personalized advertisements and provide more accountability for their advertising campaigns.

By 2005 all pay TV providers (Optus, Foxtel and Austar) conducted their first iTV trials. Not long ago after these trials the biggest pay TV provider, Foxtel, became the dominant provider of interactive applications. The competition was defeated by Foxtel's cooperative activities with Sky Digital and opponents' technological and financial disadvantages. This allowed Foxtel to exercise a monopoly and through market manoeuvres forced Austar and Optus to become only resellers of Foxtel's platform and content.

The commercial and public service broadcasters (PSBs), on the other hand, did not carry out iTV trials, but they were engaged with interactive applications in a financially less demanding manner and from a different perspective than pay TV providers.

Generally, there was a difference between the commercial broadcasters and pay TV and PSBs in their overarching attitude toward iTV: pay operators regarded iTV as an add-on to existing programming and advertising, while commercial broadcasters saw it as a challenge to their business models. In the middle there were PSBs, who showed genuine interest for iTV services. The ABC, for example, has prioritized local content and made some of the most creative interactive programs and the most appealing to a young generation of digital technology savvy users.

In general, investments in iTV trials or only particular applications and services did not bring the expected financial rewards to any of the providers. Instead iTV's role was complementary to the already established digital offers. Further investigation was needed to reveal what were the general obstacles for proliferation of media and where potential opportunities were suited. There are three major reasons for failure of trials: technological, regulatory and financial.

Technological Barriers

Return path and set-top boxes (STBs)

For a platform to be fully interactive it needs to have a return path which allows user data to be sent back to broadcasters and vice versa. A return path enables broadcasters and content producers to generate what they call "interconnect revenues" (Carter and Wright, 2003) through a one-to-one relationship with users. Most STBs deployed in the Australian market at the beginning of the 2000s were either analogue or low-functionality digital STBs. Only a small number of these boxes had a return path which could enable two-way interactivity.

In addition, satellite and digital terrestrial television (DTTV) platforms do not have an inherent return path available for interactive applications. In comparison with cable and xDSL which have return paths as a standard, platforms which use wireless transmission (such as terrestrial and satellite) often use a dial up phone network which is small in comparison with cable and xDSL (Torok, 2004).

Yet it is important to emphasise that the lack of return path did not completely block the appearance of interactivity between programs and audiences. Even with a limited return path, where data is cached using a phone network via a modem in the STB, the interactive viewing experience can be enhanced. However while a dial-up phone network return path provides revenue generation within iTV, it cannot provide advanced interactive applications (see Brown and Pickard, 2004). True interactive services, such as multiple video streaming, are only possible on a terrestrial platform.

The establishment of two-way interactivity using terrestrial STBs has been related to a willingness of all providers to collaborate and work together for mutual benefits. One of the conclusions from the Network Insight 2002 "Seminar on iTV and Datacasting" (Barns, 2002), was that the industry should work together regarding STB issues and understand what is useful for the market as a whole. Developing a centralized iTV infrastructure would be a win-win situation for everyone. Many of the iTV providers were temporarily willing to sacrifice control in exchange for a reduction in costs and the possibility of gaining a wider audience. However, collaboration regarding STBs was adversely affected by a horizontal

pay TV market using technologically advanced boxes, as well as the general stand of Foxtel which did not want to let go of an already established domination of the STB market.

In addition, the failure of the government to promote competition in new digital TV services caused STB manufacturers to wait for applications to be developed before they committed to producing STBs. This caused a so called 'chicken and egg' problem. From one side, development of iTV applications was not financially feasible without adequate STBs, while, on the other side, manufacturers were not willing to start the mass production of STBs until applications were available. As a consequence iTV experiments remained marginal compared to the Internet as a platform for interactive content.

Digital Terrestrial Television (DTTV) platform

The strategies of broadcasters toward iTV are in one way dependent upon their digital terrestrial television (DTTV) platform, the technological characteristics of digital terrestrial platform, and the regulatory provisions surrounding it which helped to shape the optimism or pessimism of providers towards the proliferation of iTV applications. "In general the DTTV platform has been taken up by Australian households more slowly than pay TV or even DVD, although it was less expensive than both" (Jones, 2007). Yet, fewer households had access to a DTTV platform in the period between 2001 and 2005 than was the case for pay TV.

Despite the DTTV platform's obvious advantages over the analogue platform (see Given, 2002), it also has lots of disadvantages in terms of interactivity in comparison with cable and satellite. According to Ian Carroll (in Barns, 2002, p.12) then ABC Head of multichannel TV, the DTTV platform was not well positioned to meet the entry requirements necessary for the penetration of iTV applications because there was no DTTV platform operator to manage and sell extra bandwidth, run back-channels, and the only models for the provision of STB have been via retail instead of platform operators. One year after the commencement of the DTTV platform in 2002, there were no integrated interactive STBs commercially available. Lack of interactivity from the PSBs on their DTTV platform on the other side force them to produce and broadcast interactive digital content on pay TV provider platforms.

Accordingly PSBs turned toward a multiple platforms approach to promote iTV applications and enhanced services. For example ABC's "Fat Cow Motel" (http://www.abc.net.au/tv/fatcowmotel/) created in 2002 was Australia's first interactive multi-platform drama which was broadcast via television, with extensions of the TV show available through its interactive applications on the ABC channel on Austar, on the Internet, email, voicemail and SMS. Marshall (2003) noticed that audiences responded overwhelmingly to the Fat Cow Motel concept, despite a complex technical and narrative focus on interactivity, because they could engage with content as they liked and because the 'reality' of the "Fat Cow world" was maintained across all platforms and throughout the marketing.

Government Regulations

Government regulations have unsurprisingly proved crucial in the development of a commercial environment which can support the production and distribution of interactive services. The introduction of the first iTV trials was parallel with the introduction of the first digital TV legislation in 1998 (see Given, 2003; Bosland, 2006) and its first revisions which in a direct way influenced the deployment of iTV.

The legislation was widely criticised as being restrictive and highly protective of in-

cumbent broadcasters, and not stimulating the introduction of new digital services (see e.g. Papandrea, 2006). The following section will examine major aspects of DTV legislation regarding iTV such as datacasting, competition and diversity and broadband access technologies.

Datacasting

Datacasting in Australia was a special category of service created through legislation (e.g. Datacasting Act 2000). Defined not by technology but by content type, (Morton, 2003), datacasting was something that existing TV broadcasters could choose to do with their digital spectrum, in addition to the digital broadcasting they were required to do, but only if they paid the government extra for it (Given, 2003, p.170). Datacasting, if commercially viable, could provide users with a wide range of information services such as teletext, heath and lifestyle information, traffic and travel, educational material and so on. Equally, the interactivity possible under datacasting could influence changes in viewing habits and overall encouraged development of consumer needs for interactivity across all markets.

However, many datacasting services had a direct relationship with broadcasting services but could not be offered as a standalone commercial offering by new datacasters. The Datacasting Act 2000 legislation did not provide clear guidelines for potential datacasters to distinguish what they practically could offer to the market and what was prohibited (see Given, 2003). Varan (1999) proposed a definition of datacasting based on inherent interactivity which potentially could advance datacasting services. It could also have the additional effect of stimulating Australian iTV production in the emerging international market for iTV content.

Even if datacasting was defined in terms of interactivity, however, datacasting could not be a wise business solution for broadcasters, because of datacasting genre restrictions. "These genre restrictions were deliberately enshrined in legislation to afford a strong degree of protection for the existing traditional free-to-air broadcasters" (Morton, 2003). The types of programs and services that datacasters were allowed to provide were not in direct competition with entertainment-based mainstream broadcasting. They just complemented broadcasting services and provided additional reasons for the audience to convert to digital. Thus harsh restrictions on datacasting held back the marketability of interactive digital services both from a user's and broadcaster's perspective.

All in all, the confusing practical application of datacasting regulations crippled iTV proliferation without providing any difference regarding digitalization of the Australian TV industry. In the end, most of the potential datacasters that originally registered to participate in the auction decided that the imposed restrictions undermined the commercial viability of datacasting, and withdrew from the process. In 2001 the Australian Federal government had to call off the datacasting licensing auction due to a lack of market Interest, especially from potential major bidders such as News Corporation and Telstra (see Datacasting in disarray, 2001).

Competition and diversity

According to Jakovljevic's (2010) survey 53.4 % of her participants believed that stimulation of competition was the preferable government stance regarding iTV. The right mix of iTV services and content diversity with a competitively driven quality of applications should eventually attract the all important consumer base to iTV. Increase in competition potentially could lead to greater diversity of services and the entry of new players which, for many survey participants, is a crucial responsibility of the government.

Without new players, there was limited competition to increase the diversity of new interactive services. However the provisions for the transition to digital in Australia involved the prohibition of new players until 2007 and beyond. The government's explanation for this restriction was "to ensure the commercial FTAs' commitment to quality is retained, and to take into account the expensive transition to digital television" (Alston, 1998). This aspect of the digital decision has been widely criticized (see e.g Papandrea, 2001).

The Broadcasting Legislation Amendment (DTV) Act 2006 later brought reform of media, and some relaxation of cross-media regulations tackling primarily the diversity of media ownership, but also the regulatory power of the Australian Communication and Media Authority (ACMA) and the anti-siphoning regime which protects sporting events for FTA access (see Hitchens, 2007). A common argument saw the liberalization of cross-media rules as appropriate due to the rapid development of new media. By relaxing the restrictions on media ownership, more players will have an opportunity to compete more effectively, and this, in turn, will assist them to promote diversity in market. In iTV terms it means more opportunities for production of interactive content and creative rivalry among iTV providers.

Yet knowing that restrictions on commercial broadcasting services and multichanneling were relaxed three years later in 2009, it is hard to believe that the Government acknowledged that a key driver for the digital take up was a diverse choice of content and widely established competition. Given (2006) insists that new services were not a significant factor in the reform of media and not an important factor for the government to motivate the audience to purchase digital receivers. The improved picture quality was far more important than new digital services or interactivity.

The important segment of the DTV Act Amendment (2006) in regard to iTV was the proposal of two new digital channels – Channel A and Channel B – which were supposed to bring changes to the Australian digital environment and potentially bring interactivity to TV screens. Yet digital Channel A was restricted to niche programming and was only able to offer limited commercial content which was attractive to a broad audience.

On the other side, the flexibility of Digital Channel B depended upon how the content was received by a digital receiver or other devices such as mobile phones. Since there was a lack of control restrictions on Channel B, commercial television licensees simply repackaged old content and, in that way, limited the scope of diversity (see Hitchens, 2007, p.15).

Thus, in terms of diversity of services, DTV Act Amendment did not stimulate production of interactive services. Instead they led to a concentration of main media, and only protected commercial players who already expressed concerns regarding digitalization, multichanneling and, in general, any strategic changes to the digital status quo. Reform of media and relaxation of cross-media regulations were not designed to stimulate new interactive services. Instead, anticompetitive rules continued constraining the wider introduction of iTV services.

Broadband access technologies

Broadband access technologies were major driving force for the current proliferation of iTV services (Jakovljevic, 2010). They are also heavily dependent upon the regulatory regime established by government. "Broadband allows much more content to be delivered over various 'pipes'. This increases capacity, along with the addition of 'back channel' also

greatly increases the scope for interactivity" (Jacka, 2002). Thus delivery of high-speed bandwidth is crucial for the creation of interactive on demand customised applications and services as well as the convergence between television and other media. Broadband implementation depends upon different access arrangements between carriers and service / content providers, as well as the possibilities of users to access a range of services.

When open competition was introduced through the Telecommunications Act 1997 (Commonwealth), Part XIb – The Telecommunications Industry: Anti-Competitive Conduct and Record-Keeping rules – and Part XIc – Telecommunications Access Regime – were added to the Trade Practices Act 1974 (Commonwealth) to underpin open competition (Chavan and Raiche, 2008). Investment by new players in content and broadband was supposed to encourage incumbents to respond to competitive threats, by deploying new technologies such as iTV to protect established revenue streams and open new ones. Without potential competition, incumbents tend to delay the deployment of new technologies for as long as possible to extract the maximum rents from their existing investments. By 2001, new high capacity network such as TransACT fibre to the curb network, were being employed. However this was not without obstacles.

The limited access to broadband networks potentially caused media ownership concentration which according to Owen (2004) causes two broad policy concerns: "(1) the problem of market power, which can reduce output and raise prices, reducing both consumer and social economic welfare and (2) the problem of private restrictions of access by suppliers of content".

Achieving open competition on the broadband market in practice has been a difficult task, due to many regions which are limited in their broadband options but also by the intention of the government to protect incumbent players. This was mostly in reference to Telstra's dominance over the telecommunication infrastructure (see, for example, Centre for International Economics Canberra & Sydney, 2004) and the regulatory access regime's failure to stimulate strong competition and encourage widely beneficial interconnection arrangements between Telstra and other provider..

Thus Telstra's advantages in the broadband market were crucial for iTV deployment because Telstra, through prices and conditions which it dictated to users of its infrastructure, directly influenced the ability of these providers to create iTV applications and remain viable in the face of competition. For example Telstra's high network access costs were a barrier to the proliferation of video-on-demand (VOD) which was considered to be iTV's "killer application" (see Jakovljevic, 2010). Access costs were one of the key reasons why leading UK VOD players, Video Networks Ltd, has not entered the Australian market, despite having spent extensive time and resources on a feasibility study, hiring experienced Australian executives to run the operation and even conduct joint venture negotiations with Telstra (Beros, 2004, p.76).

Telstra has a vested interest in keeping other potential VOD out of the market for as long as it can. For example the ACCC mandated the unbundling of the local loop in mid 1999, but it took Telstra one year to meet this requirement, and then only after the regulator insisted on weekly progress reports (Enright 2000 in Beros, 2004 p.77). Indeed, until third parties get cheap access to the Telstra's local loop and there is real competition in broadband, Australia will continue to pay high prices for broadband (see Ergas, 2004). The unbundling of the local loop reduces barriers to entry to third parties by lowering entry costs into the broadband market. The increased competition in the market and lower prices increase the level of demand for broadband services and provide more opportunities for the

delivery of interactive applications.

Alongside infrastructure, content is critically important to the users' experience of broadband and interactive applications. Foxtel has had a near monopoly over the content market. If niche players are unable to access content on a commercially competitive basis, then players with bigger financial power such as Foxtel can get rid of them from the market on the basis of content. Arguably this has substantially slowed the deployment of iTV services.

Since the late 1990s there have been discussions about the possibility of requiring Telstra to divest its interest in Foxtel as a means of opening up access to its premium content. If Telstra was prohibited from entering the pay television business in 1995 the competitive environment of Australian telecommunications and television industries would be potentially different (see Kelso, 2008). Correspondingly, the consequences for interactive broadband services would have been profound.

The NBN project funded by the Federal Government in 2009 raises the opportunity to undo the mistakes made by previous governments that allowed Telstra to be vertically and horizontally integrated in telecommunication, pay TV and content markets, and to control both the copper network and its retail operations (see DBCDE, 2010). However the Federal Government's decision to publicly fund the HSB network through NBN Co was linked with negotiations with Telstra to join the NBN. Actually the government required of Telstra to take its network infrastructure to reduce the cost of building the network and move its fixed-line customers to the new network for it to be viable (Kruger, 2010a). The same deal allowed Telstra's telephone and broadband customers to migrate to fibre NBN. After complex negotiation in June 2010, Telstra signed a preliminary $11 billion deal with NBN Co (LeMay, 2010). Therefore, Telstra has had potential to be the largest player in the open access network which can contribute to a significantly more competitive telecommunication industry in Australia.

In general, without competitive regulatory policies regarding access to infrastructure and content, iTV will continue to be only an experimental venture or competitive advantage of only privileged providers. Open access to broadband infrastructure and content is a crucial factor for increased competition and the creation of business models which could be beneficial to providers and users of interactive services.

STANDARDS

The crucial issue regarding all iTV platforms is the adoption of standards which would secure cost-effectiveness and assist efficiency of iTV applications. "No standard means no single market for STB vendors; No standard means no single, safe choice for the consumer" (Morton, 2003). All iTV players understand that adopting a single platform standard is the easiest way to make the industry cost-effective and deliver efficiencies and better experience for users. Yet, it is difficult for a small country such as Australia to set standards, hence, the role of the Australian government is limited. "[G]overnments are reluctant to mandate a standard, so there is pressure on the industry to co-operate in determining a single standard" (Budde, 2009, p. 3). Nevertheless, in 2006, there were two major TV standards on the Australian market: Open TV and MHP.

In general Foxtel and Austar accepted Liberty Media's Open TV standard, which was adopted in the UK, and has had a strong connection with News Corporation (see Budde, 2009). The Open TV standard seemed to be the most successful and the cheapest proprietary standard which allows effective diversification in applications and revenues (see Morris

and Smith-Chaigneau, 2005). From the beginning, Optus chose the Liberate system which was developed by Optus's then co-owner, Cable and Wireless (C&W). After Foxtel and Optus's deal in 2002 Optus cancelled their contract with Liberate. Since Open TV offered to recover their costs they decided to follow the Open TV standard.

Australia, like the UK, has adopted the European digital video broadcasting (DVB) standard (rather than the US ATSC standard) which permits the delivery of wide-range content. In order to support interactive applications, DVB-T relies on the non-proprietary MHP middleware which Australian PSBs endorsed in 2001. Already mentioned, MHP is an application programming interface (API) for ensuring the compatibility between programs running on STBs that have different architectures. It is a non-proprietary system, meaning any broadcaster is able to use the technology without paying a licence fee (see e.g. Fötschl and Plösch, 2002; Smith et.al 2003).

The use of an open standard for interactive TV middleware means that receiver manufacturers can target multiple markets rather than developing products to the specification of a particular broadcaster. For example SBS, in partnership with Sun Microsystems, pioneered the first interactive applications using MHP for the 'Dateline' program. They had developed back-end systems that made additional information available for its news bulletins and an interface that allows viewers to send feedback. However a wider introduction of MHP in Australia proved a difficult process.

At one stage there was talk among broadcasters to move to the MHP platform. Yet, the technical characteristics of MHP and different industry interests caused a mixed approach of proprietary middleware vendors and pay TV providers. Despite the fact that both Foxtel and Optus had MHP migration strategies for their products, they are critical of MHP's much higher hardware specifications than existing platforms. MHP works only on more expensive STBs with more memory and processing power than current models offer (see Fischetti, 2001; Hayes, 2001). Another drawback of MHP is large hardware which, in comparison with proprietary middleware systems, has a short life span (see MacKenzie, 2002).

In comparison with proprietary platforms such as OpenTV, MHP was not clearly created for TV in terms of its access sources and user input. For a developer with no prior experience, it is more difficult to learn and maintain due to a distinct lack of resources and lower quality of documentation and tools (Hutton, 2004). In addition it was less efficient at accessing video and audio. Moreover, MHP is a one way service which offers users a variety of ways to access information but no opportunity to communicate with broadcasters – no 'back channel'.

In 2002 Channel Ten proposed one STB with dual receivers for pay TV and FTA. Foxtel strongly rejected the proposal because their OpenTV standard was already dominant on the international and domestic market. In general DTTV is being implemented in a horizontal market which is dominated by an open MHP platform and adopted by Australian PSBs and FTA. Quite the opposite, iTV is mainly implemented in a vertical market, where each pay TV operator has its own STB, middleware and applications and cannot run on another manufacturer's STB. That is the reason why first roll-out of iTV came from the pay TV sector (see Barns, 2002). Foxtel as a major pay TV provider has exercised a monopoly on the market with its Open TV platform which potentially allowed additional revenue streams and at the same time it allowed cheaper STBs. In that way Foxtel economically blocked alternative platforms, supported by a government decision not to impose standards in the belief that the industry should collaborate (see Bryden-Brown, 2001).

Another drawback for MHP was that it was not available on STBs until 2006 due to licensing problems from owner Sun Microsystems. A delay meant that the spectrum granted by the Government was used only for digital broadcasts that could be seen by a few hundred people who spent $700 each for a STB. (MacKenzie, 2002) The implementation of MHP depended on mass production of digital STBs. Only in that case would providers invest in iTV content.

In the meantime, FTA providers such as the Seven and Nine networks were looking at alternatives for iTV application developments which are components to MHP and were able to migrate across different applications but did not have a proprietary migration path. An interim solution was DVB HTML, a component of MHP which Nine, for example, was using in 2001 to develop content "templates" and deliver interactive voting service (Lyons, 2001). The focus was on content that can be replicated, such as sport iTV, which can be applied to various programs. In comparison with the FTA providers who decided to implement some components of MHP before the arrival of MHP itself, SBS and ABC were involved in the Optus Liberate and Austar Open TV trials for the purpose of 'testing the water' and making sure they could manage interactive applications. For both of the trials most of their investments were in partnerships and the production of content, but not development of interactive applications per se which would require massive investments.

Regulatory restrictions, as well as technical obstacles of MHP standard, together with long awaited STBs, forced broadcasters to offer true interactive applications only as an experiment, and postponed the identification of business models for multimedia content. In contrast, the Internet has created participative platforms based on common open standards, simple protocols and easy navigation allowing users to have free access to interactive content. Internet open standards have encouraged the creation of fragmented sub-activities of production and distribution that individuals and collective actors often share without a clear specification of roles. This fluid movement among roles creates contingent configurations of what Bruns (2007) calls "produsage" where use is "the condition sine qua non for people to participate in content production" (Narduzzo and Odorici, 2007, p.15).

Costs

The intensification of globalization, deregulation of the broadcasting industry, and economic rationalism as a framework of television policy caused the broadcasters, especially PSBs, to face declining budgets. As a consequence, they faced reduced government financial support regarding capital investment in new technologies, causing the ABC for example to embrace "one of the most comprehensive outsourcing programs in its history and replace local content with cheaper overseas buy-ins reruns" (Millard, 1999, in Padovani and Tracey, 2003, p.67) and start discussions over alternative sources of revenue. Audience engagement and development of creative applications were the means through which PSBs aimed to secure commercially valuable high ratings which would justify tax payers money and government investments.

Finding the right balance between serving public interests and being commercially feasible is a difficult task which has often had political connotations. The Australian government, with its political measures regarding digital TV policies and funding, impacted indirectly on public broadcasters' engagement with new technologies such as iTV. Securing finances through negotiation with the government became a major obstacle for better exploration of new media by PSBs, and also caused an inability to plan ahead for big projects in general.

With the arrival of the Howard Liberal government (1996-2007) PSBs had a particu-

larly difficult time. "The Howard coalition government's refusal to grant any additional finance for digital production prompted the ABC's 2003 cancellation of its two first digital channels, established in 2002 – FlyTV for young people aged 13–18 and Kids for those at primary school" (Jacka, 2006, p.173). In the UK, by comparison, "the government mandated that 20% of the BBC digital channel must be interactive, insisting that only compelling services will persuade users to switch to digital" (Einev, 2004, p.192). They supported the initial collaboration between the BBC and a number of pay TV providers hoping to kick start the interactive industry, with the aim that later on market and users would begin playing more significant roles in the deployment of services. In comparison with pay television, which was supported by their overseas co-owners aligned with, for example, Microsoft Corporation, the PSBs were silently discouraged from those investments, relying only on their experience and expertise.

In addition, the development of interactive applications involves expensive multidisciplinary software composition, an activity related to the employment of a skilled team of software engineers, applications developers and interface designers who are able to handle the technical complexity of interactivity. In comparison with, for example, Foxtel, which could afford to employ overseas staff, the PSBs could not afford to do the same.

In summary, iTV applications were seen by PSBs as a way to potentially increase ratings and provide additional access to Government finances. Producing original interactive content with limited technical, organizational and financial resources proved difficult for PSBs who have not been encouraged to compete with the commercial sector and prioritise profit over public broadcasting values. Therefore:

> "iTV was just an experiment [...] it is really just to educate the public on the potential of TV and also to really expand our research and development and really engage with the audience in that way" (PSB interviewee in Jakovljevic, 2010 p.62)

The Challenge of the Internet

A "technological push" created by the convergence of different technologies and devices led by the Internet initiated a resurgence of interests in iTV (see Jakovljevic, 2010). Technological reinforcement encouraged providers to be more innovative, flexible and pursue user demand. For many TV providers, online interactivity represented survival, the 'life line' which they needed to follow to continue to be part of the digital business. Therefore many media analysts predicted the 'death of television'. For example Budde (2009) argues that television is an out-of-date medium because all the content is moving online in the hands of users who are becoming creators of content.

The Internet has provided all sorts of solutions once promised by iTV. It is a convenient tool allowing users to create their own interactive content, to "pull" content as they want it, instead of being "pushed" by television program choices and schedules without regard for the usefulness of them or appropriate time of viewing (see Pesce, 2006). Not surprisingly, users are not ready to pay for television content they can find for free on the Internet (see Jakovljevic, 2010, p.45). Yet less payment from users means fewer subscriptions which according to survey participants is a clear indicator of iTV failure.

In general the main advantage of the Internet over iTV is its participatory nature and ability to provide a wide range of content and services and providers. In contrast, iTV has been governed by the traditional economics of broadcasting which prioritises closed platform environments focusing on the content with the widest appeal, and providing only

marginal opportunities for users to participate (see Stewart, 1998).

Therefore there is a growing assumption that the Internet's superior interactivity reduces the need for iTV. However, it may also argued that Internet: "1) taught consumers how to use graphical interfaces; 2) reminded viewers how much they like TV; and 3) showed marketers that advertising is relevant despite the decline of the mass audience" (McQuivey, 2008). According to McQuivey the Internet has not replaced iTV but rather brought a new dimension to it. The Internet brought a high level of interaction with TV content and proved to be a more effective source of revenue for broadcasters and advertisers.

With increasing penetration of HSB and policy reforms today, internet protocol television (IPTV) became an appealing service for broadcasters as well as telecomm and Internet service providers (ISPs) providers. "IPTV provides Pay TV-like quality and additional interactive services…the benefits of traditional broadcasting delivery and the Internet are both present in the provision of IPTV" (ACMA 2008, p.16). Ericsson IPTV and Hybrid TV are examples of providers today, who are finding their place on Australian market.

However in 2006 Australia was a country with relatively low average broadband download speeds and little real-time Australian content on the Internet (Tadayoni et al., 2007). The relatively low cost of Internet content production has not accumulated enough revenue for broadcasters and advertisers in comparison with television. Internet-only broadcasters were reaching a small audience.

Thus the Internet has meant opportunities but also more uncertainty for advertisers and TV providers. Turbulence in traditional revenue flow together with biased regulations has influenced less investment in local content and cheap imports from mostly the UK and U.S (Sinclair et.al 1996; Cunningham and Jacka, 1996). So while advertisers were increasing spending on Internet TV, they were still investing millions to broadcast networks because they delivered relatively predictable audience numbers (see Whaba, 2010).

For advertisers, television has been still a profitable business. The trends in Australian TV Advertising and usage showed that:

> "The average Australian household spent between 3-5 hours watching TV...
>
> Approximately 94% of Australians tuned in to the TV at least once a week...
>
> Spending on TV advertising grows at the steady rate of 5-6% per year" (ROI, 2007).

In addition there was no standard way of measurement of audience engagement, which has been an ongoing source of concern for many companies wanting to advertise and for media buyers seeking to find the best places for their advertisements. In a small market such as Australia the broadband population was insufficient to draw the advertisers that the website's business model was built on. Traditional TV advertising still promised very high reach providing branding benefits, suiting big brand marketers with big budgets. It is still a powerful medium for impact and recall.

So there were no single format and advertising business model dominated. Instead, a combination of old and new business models, as well as interactive technologies and traditional techniques, were seen as the solution for iTV.

Neither broadcasting nor the Internet provided a sufficient source of revenue for broadcasters with minimal costs. It seems that it is too soon to declare the end of traditional TV media, or too early to declare wide proliferation of new advertising formats. Television has been in the state of flux, where advertisers and providers still searching for new means of reaching their audience, and create feasible new business models. The advent of interactive services such as VOD has meant that television will need to continue evolving in the landscape dominated by providers but also "produsers" whose collaboration and sharing content has potential in the long term revolutionize the TV industry.

Conclusion

The research showed significant tensions over iTV deployment between incumbent providers and new emerging models of broadcasting. The first wave of digital television (DTV) regulations has not supported competition and diversity of interactive content and services. Instead, the Federal Government decided to preserve the status quo and continue protecting commercial broadcasters. Restrictions on multichanneling and new players, constrained datacasting regulations and limited access to broadband technologies, in conjunction with concentrated media ownership, all acted to discourage successful commercialization of iTV. In addition iTV in Australia suffered drawbacks caused by a shortage of adequate STBs, lack of standardization in technology, high costs, lack of local content and, perhaps most significantly, the absence of collaboration between providers in establishing infrastructure and rules which would allow easier proliferation of services. Expensive hardware, limited trust in the usefulness of interactivity related to TV, the existence of competing interactive media, as well as failure of the government to widely promote DTV, all made audiences reluctant to pay for iTV services.

The wider exploration of iTV potential is determined by a number of conditions but mostly depends upon more competitive broadcasting policies which would promote diversity of services and providers, and more dynamic relationships between media practitioners. Such broadcasting policies would challenge the traditional status quo in Australian broadcasting and the ongoing privileges of commercial broadcasters which so far have not brought much creativity and innovation to the TV industry in general. With wider deployment of HSB and IPTV it will be interesting to see in the future what kind of compromises the industry and regulators are willing to make to accommodate newly merged models of broadcasting and create profitable revenue streams.

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