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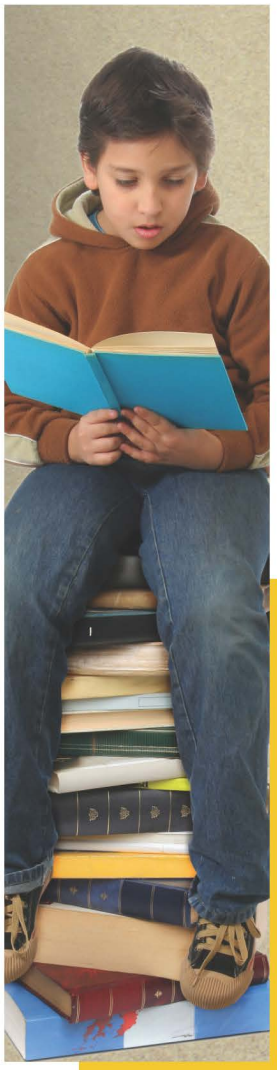

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THE CHALLENGES OF CONNECTED TV

NOTE

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CULTURE AND EDUCATION

THE CHALLENGES OF CONNECTED TV

NOTE

This document was requested by the European Parliament's Committee on Culture and Education.

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Abstract

At the convergence of broadcast and broadband, Connected TV offers opportunities to drive growth, and enhance social inclusion for all European citizens. In order to remedy lack of interoperability, some stakeholders are developing ecosystem strategies to enter new areas of content aggregation and non-linear distribution, while legacy linear TV is demonstrating considerable resilience. Several EU directives are relevant, but the time is not for a deregulatory 'big bang'. EU Premium content remains strategic and requires long-term incentive policies.

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LIST OF ABBREVIATIONS

3DTV	Three-dimensional television
3G	Third generation of mobile systems
ADSL	Asymmetric digital subscriber line
API	Application programmes interface
ARPU	Average Revenu Per User
AVMS	Audio Visual Media Service (EU Directive)
BBC	British Broadcasting Corporation
DSL	Digital subscriber line
DTT	Digital Terrestrial Transmission
DVB	Digital Video Broadcast
DVR	Digital video recorder
EPG	Electronic Program Guide
ETSI	European Telecommunications Standards Institute
HbbTV	Hybrid Broadcast Broadband TV
HDTV	High-definition television
IP	Internet protocol
IPTV	Internet protocol television
LTE	Long-term evolution
Mbit/s	Megabits per second
MHP/ DVB-MHP	Digital Video Broadcasting. Multimedia Home Platform
OFCOM	Office of Communication (UK regulator)
OIPTV	Open Internet Protocol Television
OS	Operating System

OTT	Over The Top
ROI	Return On Investment
RTTE	Radio and Terminal Telecommunications Equipment
RWD	Responsive web design
STB	Set up Box
TELCO	Telecom operator
UGC	User Generated Content
VOD	Video On Demand

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EXECUTIVE SUMMARY

Connected, Smart, Hybrid

With today's fast moving convergence, there is widespread confusion about the meaning of the expression "Connected TV". Many understand it to apply to "technologies that use a broadband connection to deliver catch-up, on-demand and over-the-top content, as well as applications and interactive features, to television screens", while others - maybe more sensitive to changes in patterns of consumer use – prefer the notion of "Multiscreen TV". The common feature is that the screen used to view a television programme (broadcast) also has the possibility to interact, through the open Internet (broadband) or through a closed network, with a service provider's platform or a web site.

Technological Mapping

This connected, multi-screen, universe is characterised by a high level of fragmentation in technological solutions and standards, product of complex factors and interaction between markets and technologies. Amongst the actual technology standards in current use in the European Union for Connected TV are HbbTV, Freeview in UK and MHP in Italia. These standards have to compete or to deal with other standards like Android or iOS which are embedded on various tablets, cell phones and TV sets and other bespoke standards such as X BOX 360, and PS3, which are reaching millions of users[1] with game consoles already TV compatible. However, legacy linear TV is demonstrating considerable resilience in the face of the expanding multi-screen paradigm, and will probably remain a key feature of the content delivery landscape for a very long time to come, even if access to the broadcast signal might in future be through a click on an app, rather than a channel number.

Standards and interoperability /multiscreen

Growth opportunities are hampered by the proliferation of proprietary solutions, lack of common standards, asymmetric levels of infrastructural and technological developments across the EU. The consumer's increasingly fluid perimeter of content consumption and mobility is at the centre of the battle for the control of the convergence space by the major stakeholders in the roll-out of connected TV. The lack of interoperability obliges every operator to develop specific interfaces for different devices. However, the three European standards (HbbTV, Freeview and MHP) embedded in TV sets may be compatible with HTML5 and proprietary systems.

Market

By the end of 2012, the world's installed base of smart TVs had reached 104 m, of which 22.7 % in the big five European countries (no figures for EU27). On average only one third of Smart TV households are effectively connected to the Internet and used as "smart".

[1] 91 million in 2012 according to Vgchartz Ltd.(UK).

The connected TV 'food chain'

The cross-over between stakeholder sectors of connected TV is multi-directional: whilst audiovisual content groups are increasingly pushing to integrate vertically into all stages of the economic cycle of content, from development and production, to editoralisation and distribution, telco's and ISPs are integrating horizontally into content publishing, retail and distribution. Simultaneously, some of the OTT online video brands which confined themselves to high volume, low-value user-generated-content (UGC) or specific genres in their start-up years, are consolidating their presence in the market for packaging and distributing professionally-made premium content. OTTs and ISP are entering new areas of content aggregation and distribution in the convergent connected TV space.

These movements of content integration within the connected TV hardware involve the development of new types of partnerships between manufacturers and other stakeholders, including producers, distributors, broadcasters, or OTT services with VoD offers, etc. In essence, the partnership model gives all stakeholders, including the larger conglomerates, opportunities to meet several strategic objectives at once, e.g. rationalisation of R& D, development of a consumer base and increase in the ARPU.

The gradual shift to non-linear consumption will impact content financing

The trend towards increased non-linear consumption will continue, with significant differences between European countries, reflecting asymmetries in levels of broadband infrastructure developments and cultural habits. Consumption of video content "on demand" including UGC, VoD, and catch-up TV has become increasingly important thanks to the roll out of universal broadband and Internet use: by far the most significant share of non-linear viewing on today's connected TVs is captured by linear broadcasters' catch up and complementary services. However, in due course, the overall market impact on the audiovisual value chain of the combined viewing of services by pure OTT players not affiliated with broadcasters might be much stronger than their share of audience. These developments may impact the revenue flow of linear broadcasters and their capacity to invest in content.

Consumer take-up and consumer experience

Viewers are increasingly using the second screen (or third) to stream or download content which originates from – or might iterate to – the main screen. In response to this important behavioural development, both traditional and new media conglomerates are developing new applications for tablets and smartphones to permit the seamless transfer of content from first to second screen and back.

Regulatory challenges

There are a number of regulatory issues which are linked to the European development of connected TV:

- Issues related to EU citizens fundamental rights and consumer protection: amongst those are, protection of minors which is the most consensual, consumer information, privacy and personal data, right of reply, right of correction, defamation, or slander, libel.
- Issues related to EU policy and, in particular, Single Market and cultural policies: technical standards, interoperability, access to technology (e.g. DRMs), promotion and financing of European works, equal access to legitimate content, must carry.

- Issues relating specifically to Internal Market regulation, anti-trust and competition: monopolies and abuse of dominant position, discriminatory pricing, competitive bottlenecks for content distribution, content discoverability on search.
- Several directives (AVMS, universal service, e-commerce and distance selling, Citizen rights and electronic communication, Radios spectrum, Access) could be impacted.

Conclusions

Proprietary applications are not the dominant model but only one of the strands of the connected TV experience. Linear broadcasting retains a powerful hold on the consumption pattern of the average European user. Connected TV stakeholders are developing ecosystem-building strategies based on partnerships and/or mergers and acquisitions in which European SMEs can play a role. These consolidation strategies enable stakeholders to package cost effectively the entire range of applications meant to convert the consumer to the connected TV experience.

Connected TV offers an outstanding opportunity to provide a solution to issues that limit the circulation of European works, the educational dimension of television, the interactive enrichment of content, and the dissemination of multilingualism. Connected TV will offer unprecedented possibilities to enhance access to culture, education and information for all European citizens suffering from physical or cognitive disabilities and thus will contribute not only to Europe's economic growth but also to its social cohesion and general well-being.

Recommendations

The time is for neither a 'big bang' style de-regulatory push nor a standstill. Instead, targeted regulatory adjustments may be appropriate in areas where such intervention may help drive innovation, ensure competition on fair terms and protect the consumer.

For premium content, the European creative community may require ongoing, long-term incentive policies to remedy persistent market failure and the uneven playing field with content offers from third countries. Such incentives should be accompanied by rules of engagement which will ensure that this content will be discoverable, identifiable and their original format respected, with no third party able to monetise add-ons around their content without consent.

There may be a locus for limited review of relevant aspects of existing directives, to ensure the fitness to purpose of EU regulation in relation to the development of this cutting edge sector. Of particular and specific relevance are the AVMS, Universal Service and e-commerce directives (see p. 29 for a synoptic table of potentially relevant directives).

Owing to the number of directives potentially linked to the issues raised by connected TV, it may be advisable for the EP to commission a separate briefing note focused specifically on the legal and regulatory aspects (e.g. from consideration of strategic regulatory challenges, down to specific articles of relevant directives, etc.).

European Parliament has a positive role to play in fostering consultations between stakeholders, to ensure that equal access for all European citizens remains at the heart of the development of connected TV.

1. INTRODUCTION AND DEFINITIONS

This briefing is designed to provide an overview of the complex factors which affect the development of connected TV (also known as Hybrid TV or/and 'Smart TV') in the European Union and provide legislators with keys to understanding where and how the EU legislative and regulatory framework may be relevant to its evolution. Connected TV sits at the confluence of multiple trends in media convergence. Its successful deployment in the European consumer market is dependent on a variety of intersecting factors: technological standards,[2] user interface, consumer behaviour, market forces and the law. Although these issues are covered in distinct sections of the briefing, the fact is that they are intimately interrelated: whilst markets are dependent on technological breakthrough, technology is also dependent on market factors to hug the innovation curve, and both are affected by regulatory factors, etc.

This briefing note is based on the most recent available research and surveys and original interviews. There is presently no overarching body of research covering the EU's 27 Member States. The bulk of available data is overwhelmingly focused on the larger EU markets (UK, Germany, France Spain and Italy), where broadband infrastructure is maturing fast and consumer uptake of connected TV is growing. There is still a yawning gap in the availability of harmonised data for the entire EU and market indicators on this sector are scarce (e.g. no data available from the European Audiovisual Observatory) or not always reliable.

Connected TV covers many different technical realities and many different devices. The common feature is that the screen used to view a television programme also has the possibility to interact, through the open Internet or through a closed network, with a service provider's platform or a web site.

This "return channel", as it was called in the early days of "Interactive television", allows two different, though sometimes complementary sets of activities:

- an extension of the old teletext services to new content services. As they are no longer dependent on the limited bandwidth of a broadcast signal, these services can be incomparably richer and diverse, including music and video services, etc. Those services are linked to existing broadcast services and have opened the field of what is called "second screen" applications. These are rich interactive services which take advantage of the better interface of tablets or smartphones: touch screens as against the now almost antiquated technology of the remote control handset.
- on demand access to programmes, extending the functionality of the old video recorder (cassette or disk based). Generically, this development has enabled the growth of "catch up television" and branded VoD services.

Additionally, connected TV enables consumers to personalise the viewing experience, especially for advertising, with all the data collection opportunities this represents.

[2] See Annex I - Comprehensive definitions/glossary based on Ofcom [UK telecommunications regulator] definitions.

Connected TV also provides a new way to offer and to deliver AV programs (Internet TV), independently of existing broadcasting channels, with all the associated facilities such as content discovery engines (corresponding to the EPG of broadcast channels) or content protection (DRM-digital rights management, conditional access).

In some brands and models, connected TV also provides generic access to the World Wide Web. It should be noted however that such access, though common on personal computers, smart phones and tablets, has so far had a very limited usage on connected TV sets and early models often made Net surfing and navigation by the consumer too cumbersome.

The increasing integration between audiovisual broadcast services and a diverse range of on demand services, and the emergence of on-demand-only Audiovisual services, are challenging the very concept of a 'TV channel': if the viewing of the programmes is no longer limited to "what is on" at a particular moment in a linear schedule, but includes what was on earlier, additional programme features - on demand or on other linear channels -, and multiple forms of interaction with the offered content - from quizzes to games, to extra information – the "channel" becomes a content consumption ecology in need of radical redefinition.

1.1. Terminology

With today's fast moving convergence, there is widespread confusion about the meaning of the expression "Connected TV". Many understand it to apply to "technologies that use a broadband connection to deliver catch-up, on-demand and over-the-top content, as well as applications and interactive features, to television screens",[3] while others - maybe more sensitive to changes in patterns of consumer use – prefer the notion of "Multi-screen" TV.
Other expressions are also used to describe the same reality:

- Hybrid TV, which originates from the STB and TV set manufacturers and highlights the fact that devices may have to be compatible with two different types of networks, the DVB linear networks on the one hand, the interactive Internet Protocol based networks on the other.
- Multi-platform TV, which originates from the world of telecommunications and considers the link between the head-end/source, the transport network and the terminal.

For the avoidance of doubt, the term Connected TV will be used in this briefing in reference to connected TV sets, and Multi-screen TV shall be used for "TV usage through any connected device" including tablets, smartphones, and other portable appliances.

1.2. A growth market

The public launch on December 27th, 2007 of the BBC iPlayer and its catch-up service can be considered the birth date for connected TV, if not connected TV sets: for the first time "normal" TV programming was available to the public on demand, without having to specifically record or request the recording of this or that programme. Leveraging the increasing transmission possibilities of the Internet (broadband) and its interactivity, the initial iPlayer co-opted the personal computer into the television world (and some did connect their PCs to the TV set); today of course, iPlayer is available on multiple non-TV screens (mobile phones, tables, PCs) as well as on TV screens directed connected (smart

[3] Ofcom definition.

TVs) or connected through ancillary devices (set top boxes, game consoles, Blue Ray disk players, Internet media players).

2007 also saw the launch of the US subscription and advertising-supported VoD service Hulu, by a coalition of large media groups.[4] By the first quarter 2013 Hulu registered over 1bn views and an advertising turnover of $695 million, while leading conglomerates were ready to compete to buy a service which has become a household brand just six years. Elsewhere, the success of the Apple TV set top box, now in its third generation, and the 2010 launch of Google TV also evidence the consolidation of global media into non-linear services which will contribute to the value proposition of connected TV in years to come.

1.3. The relevance of regulation

From a regulatory perspective, this briefing note will consider the entire gamut of EU directives and other regulation which touch on the multi-faceted issues relevant to the connected TV domain. The AVMS Directive regulates content (which is now viewed on multiple devices and screens) and not TV sets (which are however subject to some very limited technical regulation in the Universal Service[5], the Access[6] and the RTTE[7] directives, and indirectly through the "list of non-compulsory standards and/or specifications" that is managed by the Commission to encourage a harmonised provision of electronic communications services).[8] It must be noted that some aspects of access to (meaning conditional access, EPGs, APIs, "must carry") "television services" (i.e. only linear AV services) are also regulated by the Access and Universal Service directives.

4 NBC Universal, News Corp, Disney.

5 Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users » rights relating to electronic communications networks and services as amended by Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009.

6 Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002, as amended by Directive 2009/140/EC.

7 Only when connected to a public telecommunications network, « Directive 1999/5 of the European Parliament and of the Council of 9 March 1999, on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ».

8 As foreseen in article 17 of the « Directive 2002/21/EC of the European Parliament and of the Council, on a common regulatory framework for electronic communications networks and services, as amended by directive 2009/140/EC and Regulation 544/2009 », and Commission decision of 11 December 2006 establishing a list of standards and/or specifications for electronic communications networks.

2. TECHNOLOGICAL MAPPING

The prognosis most often heard for the future direction of convergence technologies, is that Internet TV will come to replace linear TV globally over the next two decades. Apps will replace channels, while the remote control will disappear, to be replaced by more user-friendly interfaces capable of responding to the proliferation of screens in consumer homes and shift content seamlessly across devices".[9]

This view is shared by many in the industry. In particular, there is a growing consensus that apps as substitutive to TV channels are a natural evolution, as it will provide coherent branding and smooth user interface across the different associated services.

However, legacy linear TV is demonstrating considerable resilience in the face of the expanding multi-screen paradigm, which mixes both linear and non-linear experiences. It seems therefore extremely probable that it will remain a key feature of the content delivery landscape for a very long time to come, even if access to the broadcast signal might in future be through a click on an app, rather than a channel number.

Reed Hastings, the CEO of Netflix – one of the world's most successful OTT online services for movies and TV content – has identified ten main trends which will contribute, amongst other things, to the shift towards connected TV:[10]

- "The Internet will get faster, more reliable and more available;
- Smart TV sales will increase and eventually every TV will have WiFi and apps;
- Smart TV adapters (Roku, Apple TV, etc.) will get less expensive and better;
- Tablet and smartphone viewing will increase;
- Tablets and smartphones will be used as touch interfaces for Internet TV;
- Internet TV apps will rapidly improve through competition and frequent updates;
- Streaming 4K video will happen long before linear TV supports 4K video;
- Internet video advertising will be personalised and relevant;
- TV Everywhere will provide a smooth economic transition for existing networks; and
- New entrants like Netflix are innovating rapidly".

2.1. Current formats and standards

This connected, multi-screen, universe is characterised by a high level of fragmentation in technological solutions and standards. Amongst the actual technology standards in current use in the European Union are:

[9] Reed Hastings, « Netflix Long Term View », letter to shareholders of 24 April 2013, http://files.shareholder.com/downloads/NFLX/2446738440x0x656145/e4410bd8-e5d4-4d31-ad79-84c36c49f77c/IROverviewHomePageLetter_4.24.13_pdf.pdf

[10] Reed Hastings, cit.

- HbbTV – (Hybrid Broadcast Broadband TV) is used in Spain, Germany, France and a number of other EU countries. This is a broad standard for multimedia and interactive services. HbbTV is an open standard which allows the integration of television services via a broadcast signal and broadband Internet-delivered services. The actual 1.5 version is going to be replaced by version 2, HTML 5 compatible.
- DTG DBook 7, Freeview standard, launched by UK broadcasters, is a standard as well as a platform, which is based on HTML 5 and retains compatibility with MHEG5, adding some elements from OIPTV. It is hoped that the DBook might converge with HbbTV in a future evolution of standards.
- YouView – used by UK telcos. This solution also retains compatibility with MHEG5 but is based on HTML4, allows for the integrated delivery of broadcast-signal based services and those delivered through the Net and branded apps.
- MHP, DTT Platform for the Italian market also known as 'HD Book', an earlier European standard for interactive television, based on the JMF (Java Media Framework).
- Others like Android or iOS which are embedded on various tablets, cellphones and TV sets.
- Other bespoke standards such as those for the game consoles X BOX 360 from Microsoft, PS3/PS VITA from Sony, or Wii and Wii U from Nintendo. They are reaching millions of users[11] thanks to game consoles already compatible with online TV.

The fragmentation is the product of complex factors:

- Differences in technological parameters. They include differing standards of user interfaces (UI), [screen sizes, input methods (e.g. touch screen vs mouse and keyboard), graphic 'grammars' for navigations and display, etc.];
- Differences in the technical performances of the underlying hardware (processing power, graphics processors, memory) which is compounded by their constant evolution which adds an issue of backward compatibility;
- The necessity for tight integration between software and hardware to extract maximum performance from the device, which is still an issue for all, except for the personal computer thanks to its higher hardware specification and more expensive chipsets;
- The differences in the operating systems (OS) and application program interfaces (API), often reflecting the diverse origins of the players in this convergent arena (TV and STB manufacturers, network operators, computing industry, new entrants).

The lack of common standards results from the dominant strategies of device manufacturers, which consist in creating proprietary and competing ecosystems, both as a way to differentiate themselves from competitors and maintain a capacity for innovation, and to derive income stream from the services delivered within that ecosystem. Some new entrants are trying to create autonomous ecosystems limited to one or a limited number of devices, and strongly linking the hardware provision to the aggregator function.

[11] 91 million in 2012 according to Vgchartz Ltd.(UK).

On the one hand, a level of fragmentation is virtuous in the sense that it helps drive investment and competition in order to deliver a better consumer experience, with a wider, more flexible choice of pricing points and increasingly fluid user interface. On the other hand, fragmentation creates problems for all the stakeholders involved: the lack of standardisation means that one manufacturer, solving one technology problem might create new problems elsewhere when systems will have to inter-operate. Furthermore, the multiplication of closed ecosystems breaks the market into smaller segments lacking the critical mass to generate sufficient return on investment to fund further technological R&D.

For operators or aggregators, fragmentation also means that they are compelled to adapt their branding not only to each class of devices but to different manufacturers within that class, a factor which adds to their cost to market. Broadcasters and platforms must also engineer a multiplicity of software and apps in order to adapt. Fragmentation also fundamentally goes against the consumers' increasing expectation that the content should play and display interchangeably on any device, regardless of the manufacturer's brand.

Stakeholders in the marketplace are gradually testing and deploying different solutions to try to reduce fragmentation:

- Some manufacturers are offering over their entire range of different devices increasingly similar software[12], in order to have a strong user interface to deploy on multiple devices, from TV sets to tablets, etc.
- Some IPTV operators are agreeing on a 'tool box' standard OIPTV, (a collection of specifications, of which a limited number is used in actual 'over-the-top services ['OTT'] deployment), which allows manufacturers to produce STBs for the different operators, and let the operators personalise the user experience, and, perhaps more importantly, to optimise those STBs for use on their networks. The dominant look and feel is that of the operator, not that of the video service provider.
- Aggregators such as YouView in the UK, or Google (with GoogleTV) define a full STB or integrated TV set, including the hardware characteristics and the user interface, which prevent manufacturers from innovating on their own.
- Some traditional broadcasters offering a guaranteed unhampered access to the Internet connection and the control of the user interface when an application is launched from within a TV signal. This is achieved by them using the existing toolbox, standard MHP, or through the new HbbTV standard.

2.1.1. The search for common standards

It should be noted that those strategies do not depend on using an officially recognised standard or not (even the private ecosystems are most of the time based on open standards), but match the business strategies of the stakeholders based on open or closed ecosystems.

The leading technology standards for connected TV, MHP, YouView, OIPTV, HbbTV share many common elements. The promoters of these standards agree on the necessity in due course to converge towards Web standards. They differ only on their need to be backwards compatible with standards operating in the existing inventory (e.g. MHP in Italy, MHEG5 in the UK) and in the time scale envisioned for this convergence.

[12] E.g. Apple and the convergent evolution of iOS and Mac OSX; Samsung's recent acquisition of Boxee.

Fragmentation has been far less consequential in the personal computer environment. Not only the flexibility of the input devices (keyboard, mouse, track pad), but also the greater processing power and memory available, and the experience of the users, have contributed to simplify the issues. The challenge was largely limited to ensuring compatibility with the different browsers (Internet Explorer, Safari, Chrome, Opera, etc.). The evolution towards HTML 5 (the latest iteration of the standard language of the Web) should ensure immediate compatibility of applications with any browser or computer in near future.

Furthermore, the increased processing power of devices such as connected TVs points to the possibility to deploy HTML 5[13] browsers on all of them (power consumption permitting). If that objective is reached, it is likely that, fragmentation will be an issue of the past. HTML 5 also allows what is known as 'responsive web design'. Responsive Web design allows content to reformat itself automatically to adapt to the connected device. Although this technology is not yet mature, the expectation is that it will be widespread within a few years.

2.2. Market penetration

By the end of 2012, the global installed base of smart TVs had reached 104 m. In leading markets like the US, household penetration now exceeds 20 % (Table 2 - Annex II).

Global recessionary factors, combined with relative consumer confusion over novelty of the technology means the growth of connected TV as a mass market product, has so far been unreliable. Global TV shipments fell by 6.3% to 238.5 m units throughout the world in 2012, according to figures compiled by IHS iSuppli.[14]

Shipments will remain flat in 2013 at around 240 m units. Manufacturers are counting on several innovations to counter this volume stagnation: OLED displays, ultra high definition capability (2k-4k) and of course connected TV sets to drive a renewal process. Already today, connected TVs represent about one out of four of TV set shipments; this proportion is growing quickly and should reach a one in two ratio in 2016.

The accessibility of content and broadcast services,[15] has been critical to the development of connected TV. This factor has helped propel penetration in Europe and Japan. In China, the availability of attractive free content on the internet has had a similar effect. Connected TV's shares of TV set shipments were 26% in China and 34% in Western Europe in 2011. In 2012, it has grown to more than 40% in both regions. Japan has the highest penetration with more than 55%.

There is no publicly available information on the installed base of Connected TV in Europe. But according to Strategy Analytics, the installed base in the big 5 European countries by end 2012 was 23.7 million, or 29.15 % of the overall installed base (table 2 - Annex I).

2.3. Open competition for proprietary solutions

The most salient issue for the development of the connected TV market is the lack of common standards and the proliferation of proprietary solutions (see Current formats and standards 2.1). Europe's three leading standards mentioned above also compete with

[13] E.g. Panasonic has recently changed for HTML5 for new Connected TV sets.
[14] Worldwide Television Market Tracker report. Growth is forecasted in the following years, but the 2011 level will not be reached again until 2016.
[15] NPD DisplaySearch, *Quarterly Smart TV Shipment and Forecast Report*, Santa Clara, California, October 17th, 2012.

proprietary solutions, including highly successful ones such as iOS and Windows. Growth opportunities for manufacturers are also hampered by asymmetric levels of infrastructural and technological developments across the EU.

2.4. Latest developments in user/consumer interface

The first quarter 2013 saw launch of the new Samsung F8000.[16] The new model is an example of what manufacturers are doing in trying to meet the consumer's demand for quality, personalisation and seamlessness of use: full HD (next step Ultra HD), with motion and voice control (i.e. asking for a film with a particular actor), recommendation from the TV set for a programme based on personal viewing habits, the Samsung VOD and app store, Internet surfing and multiple (connectivity Ethernet, Wi-Fi, DLNA compatible, chatting with friends or family via integrated Skype and webcam), and finally 3D availability.

This approach is emblematic of a new paradigm being trialled not just in user interface (e.g. gestural and voice remote control which makes utilisation more seamless), but also in search, discoverability and tailoring of audio-visual content to specific user tastes and interests. The objective is to familiarise the consumer with the connected functions, rather than making use of this technology as mere visual amplification of the viewing experience of linear 'scheduled' legacy television, in order to speed up a slow take up rhythm.

This issue has been a challenge in a number of markets. An NDP Group Study conducted in the United States in May 2013[17] found that as much as 31% of Smart TVs in US households are not connected to the Internet. Although this percentage is shrinking, it is indicative of the need for manufacturers to bring technology, services and content closer to the end-user in fostering the multi-screen experience. The situation is even worse in Europe where almost one consumer in two (43%) does not use connected TV facilities (Table 3 - Annex II).

A further trend in interoperability and seamless integration is the development of TV manufacturers' remote control apps for Smartphones and tablets which may serve as flexible alternatives to the remote control handsets supplied by the manufacturer.

Panasonic's new *Shift and Share* application, applied to the manufacturer's latest connected TV set, gives users the opportunity to shift a program seamlessly from the big screen to the tablet. This would enable a viewer, to finish watching in bed a piece of content he started viewing in the living room, with one tap. This follows the lead of e.g. Apple's AirPlay and Samsung's ShareCast, and might be indicative of another important shift.

The consumer's increasingly fluid perimeter of content consumption, from the living room to the bedroom, to the car and the second home, is at the centre of the battle for the control of the convergence space by the major stakeholders in the roll-out of connected TV. Until the recent past, the battle lines could be drawn crudely between the Broadcast and the Broadband camps. The pressure for convergence means market leaders increasingly operate on both sides of the divide. Many businesses built on 'legacy' broadcasting are now consolidating aggressively in the broadband non-linear content and services sector. Whilst some high growth new entrants such as Netflix and Amazon are exclusively broadband

[16] Advertising pages from Samsung (Inflight magazine Airfrance, June 2013).
[17] Cited in 'TV Manufacturers are blowing a huge built-in advantage in a big, difficult market', Ed Wallenstein, Editor-in-chief, *VarietyDigita*, May 2013.

players for the time being, further consolidation may result in structural changes which could see increased integration between broadcast and broadband offers.

2.5. Multiscreen and interoperability

One of the current limitations to the development of connected TV is the low interoperability due to proprietary systems and the development costs they are associated with it. Over the past three years, the Franco-German channel Arte has developed Arte+7, a platform that offers programmes in a 7-days' catch-up cycle. Although this platform is available on TV, it cannot be accessed from tablets, all of which having different interfaces. The lack of interoperability means every operator has to develop specific interfaces for different devices. Whichever open standard wins the European race, (HbbTV, DTG, MHP based, or other) it will have to include middleware to ensure interoperability. However, the three European standards embedded in TV sets may be compatible with proprietary systems that can provide value to consumers.

2.6. State of intra-EU broadband infrastructural deployment, spectrum and access

The successful growth of multiscreen video is entirely dependent on the development of the broadband infrastructure in years to come. Intensifying competition between broadcasters who are rolling out new packages such as DTT offers (i.e. full HD and complementary channels), telcos and ISPs entering the content services market, and OTT brands, means demand for broadband capacity to accommodate these services is at a historic high.

Connections in Europe are growing and getting faster,[18] and video is taking a growing share of the data capacity. According to the Cisco Visual Network Index Forecasts,[19] Internet video traffic will grow 3-fold from 2012 to 2017 in Western Europe, reaching 9.3 Exabytes per month and video will account for 68% of all Internet traffic in 2017, up from 47% in 2012 excluding IPTV. Video is considerably bandwidth-hungry and its exponential increase therefore raises the potential challenge of infrastructural saturation in the medium term. The situation has not gone unnoticed by European institutions. In July this year, European Commissioner Neelie Kroes, Vice President of the European Commission,issued a stark warning: "The EU is teetering on the edge of network collapse. Global mobile traffic is predicted to grow 66% a year, smart devices are everywhere and people want to watch video on those devices. Without more spectrum being made available the whole thing falls apart".[20]

In order to deal with such a historic quantum of increase in demand for bandwidth, telecommunications operators will need to upgrade their networks and make room for more capacity. Although price per megabit carried is decreasing it is far from certain that the present regime of "peering" (one in which there is essentially no cost for the video publisher associated with the final delivery of its content) will remain in place.

The business model for on demand might be negatively impacted if some form of additional delivery fee is to be introduced. Whilst it may not necessarily undermine the development of online video, it might contribute to reinforcing one of its under-valued aspects: connected video, to a great extent, is used to watch live television (see table 6 - Annex II).

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18 *The European Broadband Scorecard*, Ofcom, March 5th, 2013.
19 http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html
20 http://europa.eu/rapid/press-release_IP-13-742_en.htm

The growing availability of the wireless radio spectrum could contribute to infrastructural growth and create more space for the development of high-speed wireless Internet services. These will help deliver on the 'digital dividend' and address the digital divide which prevents social inclusion in the EU. In *Digital Dividend for Europe*[21] the European commission has estimated that "the value of electronic communications services depending on radio spectrum in the EU currently exceeds €250 billion. The Commission also considers that "it is vital that the next opportunity to provide the much needed wireless bandwidth, the 'digital dividend', is managed as efficiently and effectively as possible to ensure the maximum benefit for all".

Through its Radio Spectrum Policy Programme (RSPP), the European Parliament and Member States have mandated the opening of the valuable 800 Mhz spectrum to create enhanced capacity for new services. The authorization process is being carried out by Member States since January this year (2013), with a specific derogation regime also in place. 4G mobile services are also being rolled out in many Member States. Although such developments raise issues of technical coordination, they are helping address the challenge from increase bandwidth use by video-hungry consumers.[22] These developments increase spectrum abundance and efficiency, supporting the delivery of content and services at relatively low cost and creating the technological space for media pluralism and cultural diversity to flourish.

Mobile capability is especially important in the context of the development of new high speed content offers. It also facilitates the adaptation of linear TV broadcasters to growing consumer demand for access to TV content on the move, through mobile devices (especially tablets and smartphones (see table 4 - Annex II), by enabling access to IPTV or catch-up services.

21 http://ec.europa.eu/digital-agenda/en/delivering-digital-dividend

22 A cost-based example comes from a US construction company that uses 4G to send vast quantities of critical data collected in the field back to base in real-time. Using a 4G mobile application, it has been able to reduce project completion times by as much as 30 percent, saving $1,000 a day. Arthur D. Little, *The business benefits of 4G LTE* , a survey for EE UK (London, November 2012).

3. MARKET MAPPING

The connected TV market faces complex interrelated challenges. Technology, content generation, aggregation and packaging, shifts in consumer behaviour, and integration between linear and non-linear offers are not successfully manageable in isolation, even from companies enjoying integration and scale on a global level.

The leading economist James F. Moore posits that, far from functioning in a self-sufficient iteration inside a specific sector, companies belong to porous business ecosystems in which a complex interplay of both cooperation and competition results in the ability to "co-evolve" industrial and business capabilities around a new innovation: this fluid *modus operandi* helps "support new products, satisfy customer needs, and eventually incorporate the next round of innovations".[23]

The eco-systemic, co-evolutionary model is especially well suited to the world of connected TV to the extent that all actors tend to innovate and expand their activities to areas that are not at the heart of their business models, in order to capture the consumer with attractive products and applications. With the market in a state of evolutionary flux, not even the most established media conglomerates can be guaranteed success in all areas of the emergent ecosystems (See Appendix III for analysis of strengths and weaknesses of sample of stakeholders) In the connected TV space, stakeholders are expanding their business through partnership agreements in the three most strategic areas, which are content, distribution and access.[24] They do so in order "to scale–up the supply with partners and to achieve maximum market coverage".[25] Content production or distribution, interactivity with the consumer, mobility and monetization of data, are now at the heart of any stakeholder's strategy especially the larger ones. The cross-pollination between sectors is exemplified by Microsoft's recent decision to fully-finance a high-end drama series directed by Steven Spielberg as a means of supporting the launch and global roll-out of its new Xbox. The international OTT SVoD platform Netflix is also moving upstream into premium content development and production, some of it in partnership with Hollywood studios, while traditional broadcasters are now designing and launching branded applications for tablets and smartphones. The traditional value chain – which for so long had rested on a rigid and linear media chronology - is becoming too basic an analytical concept to grasp the reality of this fast mutating sector.

3.1. The connected TV 'food chain'

The cross-over between stakeholder sectors of connected TV is a multi-directional phenomenon: whilst audiovisual content groups are increasingly pushing to integrate vertically into all stages of the economic cycle of content, from development and production, to editoralisation and distribution, telco's and ISPs are increasingly integrating horizontally into content publishing, retail and distribution (e.g. Orange France, or the UK's BT Vision). Simultaneously, some of the OTT online video brands which confined themselves to high volume, low-value user-generated-content (UGC) or specific genres, during their start-up years, are consolidating their presence in the market for packaging and distributing professionally-made premium content (e.g. the evolution of the YouTube model). OTTs and ISPs entering the content services market are making the connected TV

[23] James F. Moore, 'Predators and preys. A new ecology of competition', *Harvard Business Review*, May-June 1993 p. 76.
[24] Assises de l'audiovisuel français. Serge Schick, Introductory address, June 5th, 2013.
[25] Op. cit. p.77.

universe more open and competitive than was the case during an analogue era during which spectrum scarcity encouraged a more oligopolistic market structure. Connected TV opens a new market environment beyond the traditional intermediaries (free-to-air TV channels, pay-TV, cable and satellite operators). Within this novel space, application stores as an alternative mode of access to content and services may become a defining feature of connected TV's success in due course. Consumers have already become familiarised with the app store concept in the mobile telephony and tablets ecosystems. However, all the present evidence points to a slow start for the TV-as-app and branded VoD app in consumers' current usage of connected TVs. Old habits die hard and there is a slow adaptation of the consumer away from legacy patterns of TV use into new patterns which would make full use of the connective and interactive functions built into today's hardware. Once the app store becomes more central to the connected TV experience, the development of web apps based on HTML 5 will ensure that bottleneck issues which arose with the traditional app stores, will not re-occur.

These movements of content integration within the connected TV hardware involve the development of new types of partnerships between manufacturers and other stakeholders, including producers, distributors, broadcasters, or OTT services with VoD offers, etc. From the manufacturer's point of view the integration of certain 'must have' apps based on existing popular brands (e.g. free-to-air broadcasters' catch-up apps, or popular VoD OTT services), are one of the ways in which it can achieve differentiation from competitors in the marketplace. Apps which require payment from the user , which are increasingly familiar to users of smartphones and tablets, can also become a source of additional revenue stream for the connected TV manufacturer, with revenue-split deals now the norm. From the content industry's perspective, integration of offers in a popular manufacturer's devices is fast becoming a strategic necessity in the struggle to revive brand exposure, maintain existing audiences/subscribers and attract new ones. However, whilst app use is a well-established pattern on mobile devices, it is still largely under-developed in the case of connected TV, where consumers still overwhelmingly confine their usage to traditional linear channel viewing.

Some manufacturers have begun to offer pay TV operators the opportunity to develop - and build-in - bespoke apps to facilitate access to their services from the connected TV device, thus obviating the need to use a dedicated set top box. The STB-free formula effectively packages the pay-TV operator as an app. The connected device integrates all STB functionalities as 'in-device' software. The product preserves the look and feel of the pay operator's own STB. The device can then be configured so that the app loads up automatically in place of the manufacturer's own interface. This premium service offers the pay-TV operator the advantage of savings on the R&D capital costs involved in developing and retailing its own STB. From the manufacturer's perspective, the integration of pay-TV avoids a situation in which the end-user effectively disconnects from the device's other functionalities and uses it as mere screen to display pay-TV services received through an autonomous STB. In December 2012, Samsung, the market leader in the manufacture of connected TVs launched such a service in the Scandinavian market, servicing the Nordic multicast streaming pay service Telia Sonera.

In essence, the partnership model gives all stakeholders opportunities to meet several strategic objectives at once:

- Rationalisation of R&D and product/services' development costs;
- Supply of new services to an expanding market;
- Mutual brand expansion to quicken reach to the critical mass of consumers;

- Fostering increase in the ARPU.

In 2012, Microsoft boasted 15 partnerships against Samsung, 9 making them the leaders in this particular race.[26] All these partnerships may vary from one geographical area to another and depending on the objectives.

3.1.1. Original content: the new gold

In today's competitive picture, television broadcasters, both public and private, remain popular brands, both in linear patterns of consumption and non-linear catch-up or bespoke VoD services. To this day, the overwhelming bulk of content investment in the EU continues to come from broadcasters: Youtube's worldwide investment in content for its 100 channels is around the $200 m.[27] This is less than the annual budget for a start-up secondary digital channel on the French broadcast market. The ability to finance the development of production costs of content also affords these legacy organisations the opportunity to move into the new digital markets through the direct control of rights. The challenge for broadcasting organisations is in moving towards control of the "full screen" (to avoid monetization of the broadcaster's content by intermediate third parties but also to ease the access to broadcasters' web pages or portal).

OTT branded services which have so far relied on acquisition of content for secondary exploitation from legacy players, now face the uphill struggle of investing in, and controlling, premium content as competition hardens. The list of top tier talent who are now hired by OTTs to produce series and premium content is expanding rapidly. Whilst some are prophesising a significant power shift away from broadcasting and towards the leading OTT broadband-exclusive services,[28] others predict the transition will be longer,[29] with 'traditional' broadcasters also able to make full use of their established brand advantage and to transfer assets and know-how in order to capture a significant share of the non-linear usage amongst connected TV, tablet and mobile users.

The dynamic evolution which sees stakeholders developing new strategic alliances to integrate technology systems and access to content, is driven by clear evidence that the consumer increasingly sees connected TV's value proposition not in the attraction of the technology itself but in the self-empowerment and enjoyment which result from being able to help himself to a wider array of quality content and services. 'Smart TV' heightens the consumer's expectations of content choice by an unprecedented quantum, challenging all stakeholders to meet a new standard of diversity and quality.

The re-aggregation of programmes already shown elsewhere or the re-running/retailing of old broadcast repeats which characterised much of the offer on the historic wave of digital linear 'side channels' in the previous decade, is not a sustainable proposition for the age of the connected device. In an era when it is the content that sells the device, fierce competition between key players will, paradoxically, usher in new architectures of collaboration to develop, produce and make available exclusive content capable of leading the consumer to the technology and the hardware. Linear broadcast television channels are continuing to play a pivotal role in driving the ecosystem of connected TV. In the EU especially, legacy broadcasters remain for the time being, the unchallenged powerhouses in the financing of high cost/high value programming with control over the lion's share of advertising and subscription revenues. Whilst convergence phenomena such as connected

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26 *Informa telecoms and media*, 2012.
27 http://www.digitaltrends.com/home-theater/youtubes-200-million-60-new-channels/
28 See Reed Hastings, cit., p. 8.
29 Deloitte, *Technology and TV: The continuation of a beautiful partnership,* Report for the IBC Leaders' summit. Amsterdam, September 6th, 2012.

TV have begun to open up the Internet ecosystem to new competitors, services programmed by the still dominant local (national) PSB and pay-TV brands remain the preferred choices on TV for most viewers in most places, whether or not their devices are connected to Internet.

3.1.2. The growth of non linear viewing

The advent of digital technologies has resulted in rapid growth in the number of audiovisual services. According to the European Audiovisual Observatory, there were 3000 of those in the 27 countries members of the Council of Europe in 2012. The numerical increase has resulted in rising average viewing time and, with a small but growing proportion of content now being consumed in a non-linear form.

According to recent research by Informa[30] the trend towards increased non-linear consumption will continue, with significant differences between European countries, reflecting asymmetries in levels of broadband infrastructure developments and social/cultural habits:

Table 1: Non-linear viewing as % of total television viewing

Country	2013	2017
UK	17%	21%
Germany	7.5%	14%
Netherlands	7.5%	14%
Sweden	7.5%	11%

3.2. The gradual shift to non-linear consumption will impact content financing

Consumption of video content "on demand", including broadcast TV catch-up services, has become increasingly important thanks to the roll out of universal broadband in many EU countries and the generalization of Internet usage. According to CISCO Internet video to TV will continue to grow at a rapid pace, increasing fivefold by 2017. Internet video to TV traffic will be 14 percent of consumer Internet video traffic in 2017, up from 9 percent in 2012.[31]

Consumer Internet video Traffic now accounts for 51 % of consumer traffic[32] and may rears. Content occupying the bandwidth is of three broad varieties: UGC, VoD, and catch-up TV. In the UK, 20% of the viewing time for drama (including soap operas) is now on catch-up TV.[33]

By far the most significant share of non-linear viewing on today's connected TVs is captured by linear broadcasters' catch up and complementary services. However, in due course, the overall market impact on the audiovisual value chain of the combined viewing of services by pure OTT players not affiliated with broadcasters might be much stronger than their share of audience. Owing to the increase of attractive non-linear offers, whether pay or

30 « Private Television in Europe: Connecting to the future » conference, April 19th, 2013, at the Center for Studies on Media Information and Telecommunication (iMinds-SMIT)of the Vrije Universiteit Brussel.
31 CISCO VNI. Forecast 2012-2017.
32 Op. cit.
33 Yougov for YouView, March 2013.

advertising financed, the shifting pattern of use towards non-linear will probably reduce the present viewership for existing broadcasters. The increase of competitive nonlinear offers from ISPs, OTTs and other entrants to the digital marketplace, may eat directly into broadcasters' revenues and put pressure on them to adapt. Original production financing being one of the more flexible adjustment variables, there is a very real risk in a middle long term that legacy broadcasters will have to reduce their production investments if their market share should decrease consistently over time. The alternative will be for these organisations to build partnerships with newcomers to co-produce and co-exploit premium content.

One of the key areas for strategic prediction is the extent to which pure OTTs will step into the content financing arena on a scale sufficient to substitute for the potential relative decline in legacy broadcasters' investment. In spite of recent anecdotal evidence to suggest the larger OTT will become significant players in the content financing field, e.g. Netflix, Microsoft), several factors suggest that this is not a foregone conclusion:

- In national legislatures where media companies have regulatory obligations to invest in local content (e.g. France or UK), emergent local OTT services may be captured by the regulation. However, many OTT pure players are often incorporated and established in third countries where they would not be subject to such local content obligations (or to the *de minimis* obligations in the AVMS directive).
- OTT players need to have the ability to secure exclusive deals on premium content in order to gain market share and have a strong presence in the connected TV ecosystems – however, the content development/financing/acquisition strategy on an exclusive basis has a high price attached to it and is a high-risk strategy.

Non-linear options on the connected TV have grown in large part owing to the OTT's relatively low cost base in communicating content. However, whereas OTT services only average 10% of European traffic[34] the prophesied increase in the use of VoD on connected TV will transform the economic calculus for OTT services, who will face pressures from telco's and infrastructure providers to share in the rising costs of developing broadband bandwidth.

3.2.1. Content rights: acquisition and control

The 2012 study on *Technology and TV* by Deloitte, quoted above observed that: "For tech companies, TV content is a dilemma. No device, no matter how elegant, is worth much without the content that makes the device complete. Similarly, one of the principal reasons for the existence of networks is to distribute content, and the best content is the most distributed, legally or otherwise".[35]

The most salient long term issue for global companies such as telco's or OTTs has to do with the acquisition of rights on – and control over – premium original content. In the convergence environment within which connected TV exists, a number of trends can be observed:

[34] MCG. Percentage based on Comscore data (2012), 'Time spent by viewers: on line video/ linear TV/ others'
[35] Deloitte, cit., p. 12.

- Content production is a highly differentiated business characterized by high sunk costs and fixed costs, including R&D expenditure (which often includes the production of pilots[36]), a high failure rate, due in large part to the fact that every new film/ TV series, etc., is a stand-alone prototype (even in television, the product rarely achieves standardization), and rising marketing costs.
- For these reasons, the premium content market tends to favour powerful conglomerates with the concentration of capital and infrastructure required to vertically integrate alongside the development/production/distribution axis or working with agile subcontractors in the independent sector.
- The stakes for technology companies (including new OTT content distribution platforms) trying to consolidate into the production and financing of content are very high indeed. Not only is it not their core business, but the barriers to entry are substantial.
- Some OTTs and ISPs are gradually gaining control of content development (e.g. Orange in France) and production in spite of the risks involved. The strategic underpinning for such decisions is based on a number of potential advantages:
    - Quality control: gaining control of high-value original content at project development stage ensures the entrant has an influence on the creative/editorial choices and can make those resonate with the brand – this is the manner in which the pay-TV operator HBO historically developed its own identity through investment into new content designed primarily for premieres on its own network; Europe's Canal Plus has also followed this evolutionary path more recently, launching a strategy of win-investment in high TV series such as *The Borgia;*
    - For OTT players operating internationally, the strategy of upstream control of content at development stage also facilitates the pre-acquisition of global distribution rights which support their ability to release content 'day and date' (during the same time period) across the various territories in which their services is available. The approach may be less onerous than having to acquire third-party content by clearing rights individually for each of the distribution territories;
    - Upstream control also enables this generation of new entrants to drive subscription uptake through releasing exclusively on their own platform(s). This was the case earlier this year when Netflix released its own-produced event series *Game of Cards* across the world. The novelty of the multi-territorial 'day and date' pattern, combined with the stellar cast of the series and the availability of all 12 episodes at once, combined to make a news event of Netflix's original release strategy as much as the series itself.

At this stage, connected TV manufacturers have abstained from entering the content business in any direct way (e.g. through taking stakes in significant content companies or developing their own content divisions). Although it is plausible to predict this picture may change over time (c.f. the move by Japanese consumer electronics manufacturers to acquire Hollywood studios during the 1980/90s), the core business of device manufacturing is enormously capital and labor intensive and consolidation into content would represent a

[36] 'Pilots' are commissioned as initial stand-alone programmes by broadcasters, in order to test the audience interest in the concept and style of a series. This practice is predominant in the US television industry and has developed in the EU market over time. It requires considerable R&D costs, given the fact that a proportion of the projects will not live past the pilot stage and will therefore be written-off by the commissioning source.

significant strategic departure. Manufacturers are chiefly concerned with ensuring they can integrate the content of premium aggregators and platforms into the very core of their devices. For instance, their efforts to integrate the functionalities of STBs from branded pay-TV operators directly into the device, shows their concern with associating the device with the high-value content.

The Deloitte study referenced above also notes that: "limiting premium content to one manufacturer's device may not be the best commercial option". The growth in demand for premium rights creates the prospect of stronger returns on investment on rights' inventories by increasing price competition as maturing ISPs and OTTs begin to offer exclusive deals on content (the pioneering stage in the online content economy has been characterized by non-exclusivity, with the same content made available to competing platforms). Rights owners and aggregators, such as football leagues and clubs, could equally benefit.

The large number of different standards for which content needs to be encoded in EU markets also has an impact on the cost of rights' exploitation, bearing in mind the consumer's rising expectation of being able to use content from a variety of devices and while on the move.

3.3. Consumer take-up and consumer experience

The historic switch of the television set from 'dumb' to "smart" is an adaptive challenge for the majority of viewers outside the minority of early adopters and tech enthusiasts. The current discrepancy between the market penetration of the connected 'smart' TV and actual connected usage by the consumer tells the tale of a difficult transition in this segment of the mass market for audiovisual hardware. A 2013 NDP Group study observed that only 47% of all home-entertainment devices (including Blu-ray players, video game consoles and streaming media devices) – are connected to the Internet in the U.S. Many European users also continue to use their smart sets to view television content in the traditional way, with only limited and occasional use of the connected features, apps and services. An installed base of connected TV does not necessarily correlate with consumer usage of the connected and 'smart' functions (See table 3 - Annex III).

Daniel Danker general manager of On Demand at BBC, noted in March 2013[37] that « Success or failure is determined by adoption rates – and on this basis, connected TVs are not currently succeeding."

The TV manufacturing industry is trying to address this issue through various promotional and consumer information campaigns. In Germany, where Smart TV sets now equips over one third of households but with less than 45% of those actually using the connected features at all, the industry rolled out the "Smarter Fersehen" initiative in July 2013 in a bid to convince users to connect and go online through their TV sets.

[37] April 2nd 2013, "Outlook for connected TVs bleak, delegates at TV Connect told", http://www.apb-news.com/news/news-views/item/1403-outlook-for-connected-tvs-bleak-delegates-at-tv-connect-told.html

Through his connected TV, the viewer is confronted with a complex navigational challenge which – up until this point – has not necessarily be made easier by the crudeness of some manufacturers' interface technologies. The consumer is also easily confused by the effect of intense competition between stakeholders (manufacturers, ISPs, OTT, channels, etc.) with different offers and search engines crowding the marketplace, many of which are competing for the same screen. Each in order to win the competitive battle for the control of the screen and the consumer's rapture, stakeholders must be able to offer the viewer the best ergonomics of navigation and the most exciting and relevant content.

In a bid to get closer to the habits of viewers, Dailymotion and Youtube have recently been offering a 'lean back' functionality. This application allows the viewer to consume a succession of content automatically selected by the platform according to an ongoing analysis of user taste and preferences based on prior consumption data. The video stream is interspersed with targeted advertising. The traditional broadcast stream is automatically re-processed to produce a bespoke 'schedule' based on individual viewer profiling. Although this development is undoubtedly attractive, it also raises complex issues around privacy and personal data collected by the operators and manufacturers.[38]

Whilst the second screen is not within the scope of this briefing, it is important to bear in mind that viewers are increasingly using the second screen (e.g. tablet, smartphone), to stream or download content which originates from – or might iterate to – the main screen as demonstrated by the BBC iPlayer monthly usage report (Table 5- Annex II). In response to this important behavioural development, both traditional and new media conglomerates (e.g France Television TV, HbbTv, Panasonic) are developing new applications for tablets and smartphones to permit the seamless transfer of content from first to second screen and back.

The impressive growth of mobiles (tablets and smartphones) and the stagnation of connected TV sets are mitigated by the perceived quality of the viewing experience. A good indicator is the completion rate by device, i.e. what proportion of a requested video is actually watched; (Table 6 – Annex II) the hierarchy between devices is clear: connected TV sets definitely lead, with only the tablet as a close follower. As the tablet market is growing quickly (55% of Europe's broadband connected adults will own one by 2017, up from 14% in 2012[39]), it might become the dominant device for online video including long form programs.

[38] Olivier Cousi, Head of new media Gide Loyrette and Nouel.
[39] According to Forrester Research, quoted by Techcrunch, Feb 20th, 2013.

4. REGULATORY CHALLENGES

The connected TV and 'smart' TV phenomena are a central component in the complex and formative architecture of media convergence. Its rapid development as converged media offering increasingly fluid interplay between traditional, signal-based content services, and Internet-based online services, begs a strategic question as to whether or not some areas of EU regulation require review in order to be fit for purpose in view of technological and market advances, and address fresh challenges. This question is at the heart of many current discussions across Europe, involving stakeholders as well as communications regulators, law makers and governments.

There are a number of regulatory safeguards which are linked to the European development of connected TV in a manner which would support a level plain field for stakeholders, viewers and citizens.

- Issues related to EU citizens rights and consumer protection: amongst those are, protection of minors, consumer information, privacy and personal data, right of reply, right of correction, defamation, or slander, libel;
- Issues related to EU policy and, in particular, Single Market and cultural policies: technical standards, interoperability, access to broadband connectivity, use of technology (e.g. DRMs), promotion and financing of European works, equal access to (legitimate) content;
- Issues relating specifically to Internal Market regulation, anti-trust and competition: monopolies and abuse of dominant position, discriminatory pricing, competitive bottlenecks for content distribution, content discoverability on search engines, Must Carry/ Must offer/non discrimination.

This section considers only some to the more salient issues as they may relate to connected TV within a wider a framework of issues linked to media convergence as a whole.

For ease of reference, Annex IV provides a more comprehensive inventory of key issues under consideration by policy makers and legislators at national and EU levels.

4.1. Consumer and citizen issues

With connected TV, consumers may have unfettered access, through their remote control or more advanced consumer interfaces, to both over-the-air services and Internet and on-demand services. Several principles must be taken into account according to the various possibilities to access any kind of content and the use of Internet through the TV set or any other device.

There is a generic need to provide consumers with information sufficiently ahead of time so they may make prior informed decisions regarding the content they want to watch, and other issues linked to Internet use.

4.1.1. Protection of Minors

This issue must be considered not only from a device or technology point of view (TV set or boxes parental access control), but also from a service point of view. The same content and programmes will be increasingly available on a multiplicity of platforms. All OTT

services such as ISP like Hulu, NetFlix, Itunes, Microsoft, are in the process of developing professional content. These newcomers in the content market will have to take into account and incorporate regulation and standards concerning the protection of minors in their approach to content production and packaging/distribution, as is already the case with linear broadcasters operating within their remit and under external watchdog oversight.

The Euro Dig Conference, held in Lisbon in June 2013, concluded that child protection was a priority issue for the regulation of the connected domain. There is a growing consensus that the relative 'safe haven' that linear TV was considered to be offering to families, needs reframing for the more complex and more porous domain of multiple-device convergence and Connected TV. In particular, policy makers and stakeholders are considering the adaptation or introduction of the type of labelling and age rating systems already implemented successfully by terrestrial broadcasters, whether as voluntary systems, co-regulation or a legislative approach, or both.

4.1.2. Personal Data protection

Viewers with access to connected TV are generally requested to provide personal data. The legitimate demand of consumer organisations and governments is that viewers must be able to become aware of exactly what kind of personal data are collected when their TV set is connected to the internet and when they are using their ISP services, and what the intended usage may be. Prior consent at every stage is the guiding principle.

The development of connected TV will stimulate a blossoming of services based on the collection and use of the consumer's personal data. Data harvesting is getting increasingly complex and granular. It is no longer confined to basic metrics such as name, address, date of birth, and gender but also extends to information regarding the consumer's taste and preferences, viewing habits and transactional decisions, etc. Obtaining such behavioural data is more sensitive and protocols have to be arrived at to ensure the consumer is aware of how data may be utilised, including by potential third parties, and that prior consent remains foremost.

At this stage, much of the usage/behavioural data is in fact collected through cookies and through other software-based monitoring technologies; manufacturers may need to integrate privacy protocols in the way they are designing the technology e.g. the need for in-built privacy options empowering the consumer to admit or deactivate cookies, or other monitoring technologies.

4.2. Cultural Diversity

The Audiovisual Media Services directive contains obligations for EU broadcasters to dedicate a majority proportion of their schedule time (minus certain categories of low-shelf-life programming such as news), to EU-originated content (Article 16) and a *de minimis* proportion (10%) of content acquired form 'independent producers' (Article 17), either as a proportion of air time or programming budgets. These local content and anti-monopoly dispositions have been designed to be the same for all broadcast platforms, on a technologically neutral basis. Article 13 of AVMS also provides for a softer obligation for online services to "promote, where practicable and by appropriate means, [...] the production of, and access to, European works".

New Article 13 was introduced in 2007 when the audiovisual online economy was nascent and its content translates the concern of EU legislators not to impose onerous regulatory burden on a start up industry. Consumption trends on connected TV, especially with regard to the catch-up services of major national broadcasters, suggest European original works are holding their own in viewers' preferences, against imported content from third countries. This is in large part linked to the resilience of remit-based PSB broadcast television services in carving out a significant share of media consumption time in EU households.

Some pure OTT services reach the consumer through broadband Internet from legal establishment outside EU national legislatures. Consequently, they may not be subject to national law implementing measures for AVMS Article 13, leading other stakeholders competing for the connected TV screen to point out that the playing field is not quite level. This issue is a potential challenge for EU institutions to consider in their drive to identify a legitimate *locus* for regulatory review, as they consider the need to maintain a framework of obligations fit for purpose in the convergence ecosystems and one that ensures, in particular, that inward investment continues to flow into high quality European content.

If the issue should be considered sufficiently strategic by EU institutions, the search for a political and regulatory solution to this complex issue would necessarily need to involve intra-EU as well as international cooperation between the EU and other trading blocs. One possible approach may be a fiscal accord to permit the levying of bespoke taxes on operators benefiting from a Member state's infrastructure and access to its consumer market. Such levies are already in operation in some Member States and the European Court of Justice recently upheld the legality of the French tax on telecom operators, which was introduced in 2009 to compensate for a ban on advertising on public television after 8pm.[40]

4.3. Gatekeeping/ Interoperability

As outlined in previous sections, the connected TV universe is characterised by a profusion of competing and incompatible proprietary systems and technological solutions even if many integrate public or open standards such as Android, Java or HTML. The connected TV market's lack of interoperability is a feature shared by the rest of the market for connected devices: on tablets or smartphones, embedded software such as iOS, Android or Windows 8 are all proprietary or customised, and interoperability is either limited or non-existent. Individual connected TV manufacturers negotiate bespoke agreements for display and carriage of services and content brands with rights holders (broadcast channels, VoD OTTs, distribution companies, and even some art-house film exhibitors now all embed branded apps in the connected TV set at point of sale of the device to the consumer).

4.3.1. Access to/discoverability of PSB content and services

The most pressing bottleneck/gatekeeping issue is the ability for users to find the content they are looking for. If the content is not displayed prominently or within easy reach first (typically on the first few pages of a browser of EPG), cultural and media diversity may suffer accordingly as integrators (e.g. manufacturers in bespoke deals with branded content and services) will tend to push the premium content most likely to attract critical mass of use, or content to which they may be associated inside a vertical integration model.

[40] ECJ Ruling 26/06/2013.

The question of discoverability and prominence is being raised acutely in the context of adapting policies to ensure the permanency of public service content in the age of converged media, unlimited bandwidth and a multiplicity of viewing options. The EU PSB Broadcasting sector produces premium, high-cost programming around which it is relatively easy to attract the consumer inside a connected TV ecosystem with many competing offers (e.g. Italy's RAI TV's flagship drama series *Commissario Montalbano*, or sports events of national/international significance such as France Televisions' Tour de France). However, the overwhelming bulk of PSB programming output has a more discrete impact and often caters (as the public service remit dictates) for more minority tastes and interests. In the connected TV ecosystem, there is a perceived risk that such content will become marginalised and will fail to serve informational, educational or socially-cohesive functions which are an important dimension of the public interest.

Conversely, some stakeholders now argue that sheer competitive forces in the open-ended connected TV proposition will ensure degrees of specialization in content offerings, with both commercially-driven and designated PSB platforms reaching specialised segments inside an increasingly targeted and atomised consumer market. Exponents of this model believe therefore that market dynamic alone will take care that a critical mass of PSB-style content will be available to the connected TV user and easily discoverable, based on monitored individual tastes and interests. The European Broadcasting Union has identified this principle among several other key ones which they believe should guide market developments and regulators[41] in shaping the connected TV ecosystem in a manner which will allow public service content to compete with commercially-available content for the consumer's attention.

4.3.2. Must carry/Must offer /Must-be-found

Article 31 of the Universal access directive allows member states to oblige both broadcasters and pay-TV operators to ensure carriage and prominence of public-service and other channels on grounds of public interest.

The question of *must-carry* has considerable contemporary relevance. The terms of the debate are now evolving as the issues of monetization and competition gain more profile. The issue has become intense as the technology markets and business models continue to move towards convergence. PSBs are increasing their efforts to control and aggressively promote their content as it iterates through the online ecosystem. Several key parameters need to be considered as the media landscape moves towards a generalization of dual offers, with broadcasters offering an array of Internet services:

- Integration by TV manufacturers of all services and content brands on a non-discriminatory basis;
- Criteria for the selection of broadcast channels which should continue to benefit from 'must offer' rules as they currently apply to cable operators, in the new connected ecosystems;
- Rules for the display of broadcasters' interactive services on the STBs of cable operators[42] and OTTs.

41 EBU principles for internet connected and hybrid TV. Brussels seminar, March 8th, 2012.

42 Numericable the leading cable operator in France is carrying but does not display HbbTV interactive services and the subscriber does not receive the full service or some subscribers are receiving this signal when they are connected through ADSL or satellite dishes but the option does not exist with the connected TV or cable.

In the connected TV framework, the novel concept of "must-be-found" is added to 'must carry'. This means that the original broadcaster's content must be easily found by viewers using the connected TV' search and discoverability interface. 'Must-be-found' will be the object of stakeholders and regulators' debates for such time as the connected TV market demonstrates it capacity to respond to consumers' concern with easy discoverability and access in the new technology and services paradigm.

4.4. Other relevant regulatory issues

There are a number of other issues which will attract scrutiny amongst regulators and industry in years to come.

4.4.1. Equal Access

Connected TV will be able to offer a growing array of services and technological solutions to bear on the issue of accessibility. These solutions and services will multiply opportunities for people with visual, hearing, or cognitive disabilities to access content accessible to unimpaired viewers. These developing technologies include audio description tracks, special accessible formats of content for deaf persons, subtitled or dubbed versions in all 28 EU official languages, voice recognition , voice control, text-to-speech, etc. Access to content and services by disabled communities and cultural minorities, has already improved markedly, with the ability to synchronise the video signal with the subtitled or linguistic versions that are available on the Internet. Some institutions such as the International Telecommunications Union (ITU)[43] are working to resolve these issues through the adoption of standardised solutions developed elsewhere (OIPTV, DTG, EBU, etc.). The potential regulatory issue may lie in how to ensure that this accessibility of content and services on an equal opportunity basis is built into the product development process of device manufacturers and the editorial policies of aggregators and content providers.

4.4.2. Advertising and editorial content

The 'overlay' of additional content over a piece of programming is a fast developing practice in the connected TV environment. Overlay is used to promote products and services not necessarily linked to the owner or supplier of the original programme being broadcast or consumed online.

In order to ensure that the viewer can enjoy the content, both linear and nonlinear, according to his expectations, he should be able to know in advance about the nature and amount of overlaid content, in order to make informed choices before ordering or sitting through the content. This connects with cancellation rights as a sub-issue.

Overlay offers the technical possibility for third parties to insert advertorial or advertising features alongside the main content as it displays on the connected TV frame. Adding such features may require reducing the full frame normally occupied by the content the viewer will have selected to consume, thus potentially diminishing the value of the experience, whilst also enabling a third party to monetise the stream, playback or transmission. The originators of the content are concerned that the practice culls revenue away from them and redirects it towards intermediaries whom they see as cannibalising their content for their own commercial profit.

[43] ITU working group 6.

4.4.3. Media literacy

Developing the ability of young people to learn more from screens is deemed a public interest issue, as is the part of media literacy which concerns itself with equipping younger viewers with critical discernment and an ability to navigate coherently between features and programmes. Children and adolescents consume ads, often indiscriminately, without necessarily being cognitively or educationally equipped to understand and contextualise / criticise their message or distinguish between advert and editorial content.

4.4.4. Interactive technologies

Eye contact, voice recognition, webcam and similar technologies are embedded in connected TV devices. Although they are designed for a specific purpose (user interface features such as facial and gestural recognition), they may be hacked or used to breach privacy (in-built cameras which activate interface). Viewers will require sufficient safeguards against the possibility of hacking or abuse of features such as user recognition cameras.

4.5. Overview of legal issues

Table 2 below provides an analytical overview of the main EU regulatory areas which intersect with connected TV issues. Whilst the AVMS directive - which was drafted in a time where connected TV was not a presenting issue - is today the most closely relevant legal norm in the context of Connected TV's developments, various aspects of the EU directives under the 2009 EU regulatory framework for electronic communications (Telecom Package) also have strong relevance.

Table 2: Directives potentially relevant to Connected TV issues

Directives	CTV related issues
AVMS (2010/13/EU)	Advertising, protection of minors, cultural diversity, Hybrid TV, accessibility, exclusive rights, media literacy, right of reply
Universal service directive (2002/22/EC)	'Must carry',' must offer', must-be-found
E commerce and Distance selling Directive (97/7/EC)	Consumer protection, right of cancellation
Citizen's rights and electronic communications (2002/58/EC)	Right of reply, right of correction Defamation, slander, libel Invasion of privacy, Personal data, privacy, Right to be forgotten
Access (2002/19/EC)	Interoperability/standards/ Must carry/must offer/must be found

5. CONCLUSIONS

The convergence marketplace is more open and competitive than traditional media markets from the analogue era. Legacy gatekeepers are no longer in a position to command access to the consumer by the various stakeholders.

There is a growing diversity of market players packaging services and content to the consumer through the interactive template of the connected TV. Proprietary applications (App store style) so far are not the dominant model; they represent only one of the strands of the connected TV experience. Linear broadcasting retains a powerful hold on the consumption pattern of the average European user.

OTT operators and ISPs entering the content aggregation business, have taken a significant market share (see table 1, p.19) in television viewing. Many face competitive battles ahead for the strategic control of relevant multi-territory rights on premium, flagship content which they can use to brand themselves and drive consumers to their platforms.

Although consumers are increasingly switching to connected TVs, the majority are mostly consuming television as before, making scant use of its connected functions in order to experience with new forms of access. The resounding exception is catch-up services from linear broadcasters, a phenomenon attributable in part to the powerful brand advantage built by legacy EU national broadcasters over decades.

While standards' wars are no longer hindering the development of the market for smartphones and tablets, they are slowing down the evolution towards interoperability of services and content in television, to the extent that proprietary systems are still the basis of many ecosystems. In this context, the deployment of HTML5 bodes well, since its integration into future hardware will introduce the flexibility that is currently missing from this market.

Connected TV stakeholders are developing ecosystem-building strategies based on partnerships and/or mergers and acquisitions which may create new growth opportunities for European SMEs also. These consolidation strategies enable stakeholders to package cost effectively the entire range of applications meant to convert the consumer to the connected TV experience (e.g. services and apps / user friendly technologies / access / content / e-commerce).

The resilience of traditional linear television channels within the connected TV ecosystems has preserved the capacity of these legacy businesses to remain the principal engines of financing and production of new original content in the EU. Broadcasters remain strongly positioned to supply the EU consumer with popular, quality content in sports (e.g. tour de France, English Premier League, and live shows (BBC's Proms) and other premium content such as drama series. The latter are predominantly financed in the domestic markets of Member States, based on exclusive rights for the local territory.

The rise of connected TV as a product emblematic of the convergent world raises challenging questions for regulators and legislators in the EU. On the one hand, heightened competition is in evidence at this pioneering stage in the development of the market. On the other hand, new forms of bottlenecks may form as a result of the current re-structuring of the market around what the new technology allows, and issues around discoverability of

certain content inside an ever growing array of packaged services and platforms, present a complex challenge. Additionally, the connected TV intensifies the complexity involved in devising appropriate safeguards in areas such as consumer protection, including and especially, the protection of minors. Europe's established policy of stimulating original content production and promotion on the new platforms may also require adaptation if it is to ensure there is a regulatory level playing field between aggregators, services and platforms in this area.

The flexibility of the Internet and the quality of broadband content presents a unique opportunity to provide a solution to issues that limit the circulation of European works, such as dubbing and subtitling, the educational dimension of television, the interactive enrichment of content, the intra - and inter - language versions for the dissemination of multilingualism and educational support, etc.

Finally, connected TV presents new and unprecedented possibilities to enhance access to culture, education and information for all European citizens suffering from physical or cognitive disabilities and thus contribute not only to Europe's economic growth but also to its social cohesion and general well-being.

6. RECOMMENDATIONS

In an increasingly fluid and fast changing media convergence market, a number of European companies in the digital economy sector are developing long term strategies which should deliver good growth prospects for EU stakeholders. However, this is a vulnerable, pioneering sector and care should be taken not to add unnecessarily to the regulatory burden at a time when this EU sector requires flexibility in order to stay competitive and deploy in new markets. Prescriptive regulation has its place. However, alternatives, including co-regulation, or self-regulation may deliver more appropriate results more flexibly and for a relatively low compliance cost.

The market for connected TV is not yet mature, and market/financial data are still difficult to come by. Europe's regulatory and incentive bodies need access to reliable market data in order to nourish their thinking on these complex issues and inform future decisions on regulatory intervention, or lack thereof.

Regulation and legislation very often lag behind fast paced developments in markets, especially those driven by technologies. The time is for neither a 'big bang' style de-regulatory push nor complete standstill. Instead, targeted regulatory adjustments may be appropriate in areas where such intervention may help drive innovation, ensure competition on fair terms and protect the consumer.
As by far, AVMS directive is the most important legal basis for audiovisual sector and others directives are concerned it could be relevant to have another detailed briefing note focused the legal issues and dispositions within specific directives which may be suitable for review.

In the technology arena, the imposition of a single, specific common standard is not a sustainable option. However, increasing interoperability is of utmost importance. Europe's institutions may play a useful part in facilitating the voluntary adoption of common standards shared by the market and stakeholders, such as HTML 5, through encouraging all stakeholders to reach voluntary agreements.

In the content development and production sectors, which are key to the EU's ability to sustain its competitiveness in connected TV, European operators, broadcasters and independent producers and distributors may require ongoing, long term incentive policies to remedy persistent market failure and the uneven playing field with content offers from third countries.

Such incentives should be accompanied by rules of engagement which will ensure that content supplied by primary broadcasters and other right holders (e.g. distributors and independent producers) will be easily discoverable identifiable. For EU content to compete effectively with attractive content from third countries, it is a prerequisite that it should be highly visible within the search and recommendation engines that will drive users to content in the converged world.

The original format of TV programmes should be respected, with no third party able to embed and monetise add-ons around such content without prior consent from its suppliers or aggregators.

The European Parliament has a positive role to play in fostering consultations between stakeholders, to ensure that equal access for all European citizens remains at the heart of the development of connected TV.

ANNEX I - DEFINITIONS/GLOSSARY[44]

3DTV Three-dimensional television. A television viewing system whereby a 3D effect is created for the viewer. The 3D image is generated using red and blue colour tints on two overlaid images intended for left and right eye. Some forms of 3D TV can involve the viewer wearing glasses (stereoscopic) but more advanced systems do not require glasses (auto- stereoscopic).

3G Third generation of mobile systems. Provides high-speed data transmission and supports multimedia applications such as full-motion video, video-conferencing and internet access, alongside conventional voice services.

4k video An ultra high definition video display standard (4 times the definition of present HDTV) already used in movie theaters.

Access network An electronic communications network which connects end-users to a service provider; runs from the end-user's premises to a local access node and supports the provision of access-based services. It is sometimes referred to as the 'local loop' or 'last mile'.

Active internet user An internet user is deemed active if they are online at least once in a given period of time e.g. a month.

Active reach The number of unique visitors to a website as a proportion of all active internet users, for a given time period and geography.

ADSL Asymmetric digital subscriber line. A digital technology that allows the use of a standard telephone line to provide high-speed data communications. Allows higher speeds in one direction (towards the customer) than the other.

ADSL2+ A technology which extends the maximum theoretical downstream data speed of ADSL from 8Mbit/s to 24Mbit/s/.

API Application Program Interface, the technical specification that allows a program delivered by Internet or over a broadcast signal to interact with a connected device. More generally a specification that allows two different computer programs to interact.

ARPU Average revenue per user. A measurement used by pay-television or mobile companies to indicate the average monthly revenue earned from a subscriber.

Blog Short for weblog. A weblog is a journal (or newsletter) that is frequently updated and intended for general public consumption. Blogs generally represent the personality of the author or the website.

Broadband A service or connection generally defined as being 'always on' and providing a bandwidth greater than narrowband.

Catch-up TV Usually refers to a services that allow consumers to watch or listen to content on a non-linear basis after the initial broadcast.

Connected device A device which can access the internet in some form or other. Accessible content varies by device. Also known as an internet-enabled device.

[44] Based on the Ofcom Glossary.

Connected TV A television that is broadband-enabled to allow viewers to access internet content.

Dongle A physical device, attached to a PC's USB port, which adds hardware capabilities and is often used to enable a laptop to connect to mobile broadband services.

DSL Digital subscriber line. A family of technologies generally referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as 'twisted copper pairs') into highspeed digital lines, capable of supporting advanced services such as fast internet access and video on demand. ADSL, SDSL (symmetric digital subscriber line) and VDSL (very high data rate digital subscriber line) are all variants of xDSL. VDSL is usually used to connect premises in fibre-to-the-cabinet networks.

DTT Digital terrestrial television.

DVB Digital Video Broadcasting is the consortium that wrote the specifications for satellite, cable and terrestrial digital broadcast TV, as standardised by ETSI. DVB is also active in the development of specifications in other domains, such as APIs and IPTV

DVR Digital video recorder (also known as 'personal video recorder' and 'digital television recorder). A digital TV set-top box including a hard disk drive which allows the user to record, pause and rewind live TV.

E-reader An electronic, portable device capable of downloading and displaying text such as digital books or newspapers.

Ecosystem "A company is not viewed as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies coevolve capabilities around a new innovation: they work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations." (quoted from James F. Moore ; Predators and preys; an new ecology of competition Harvard Business Review May-June 1993)

EPG Electronic programme guide. A programme schedule, typically broadcast alongside digital television or radio services, to provide information on the content and scheduling of current and future programmes.

ETSI European Telecommunications Standards Institute, a recognised European standardization entity

Feature phone A low-end mobile phone that has less computing ability than a smartphone, but more capability than the most basic handsets.

Free-to-air Broadcast content that people can watch or listen to without having to pay a subscription.

Game Console A specialised device to play video games. Many game consoles can be connected to the Internet and serve as a home entertainment gateway

HbbTV Hybrid broadband television. A standardised API specification for connected TV sets and set top boxes able to access both DVB networks and Internet based TV.

HDTV High-definition television. A technology that provides viewers with better quality, high- resolution pictures.

Headline connection speed The theoretical maximum data speed that can be achieved by a given broadband. A number of factors, such as the quality and length of the physical line from the exchange to the customer, mean that a given customer may not experience this headline speed in practice.

Hybrid TV A television device that can receive television and other AV programs both through a DVB network and through an IP network

Internet A global network of networks, using a common set of standards (e.g. internet protocol), accessed by users with a computer via a service provider.

Internet Media Player or Digital Media Receiver A networked device or appliance designed to play digital content received via the Internet. This content can be downloaded or streamed

Internet TV Television service delivered over the "open" Internet, as opposed to IPTV delivered over closed networks

Internet-enabled device See 'connected device'.

IP (internet protocol) The packet data protocol used for routing and carrying messages across the internet and similar networks.

IPTV Internet protocol television. The term used for television and/or video signals that are delivered to subscribers or viewers using internet protocol (IP), the technology that is also used to access the internet. Typically used in the context of streamed linear and on-demand content, but also sometimes for downloaded video clips.

ISP Internet service provider. A company that provides access to the internet.

LTE Long-term evolution. Part of the development of 4G mobile systems that started with 2G and 3G networks.

Mbit/s Megabits per second. The speed of transmission of data across a network. Other prefixes may also be used before bit/s. Equivalent to the notation Mbps.

Mobile broadband Access to the internet via a cellular network connecting through the use of, for example, a dongle, wireless modem or a SIM embedded in a mobile device. Does not include access to the internet via a mobile handset.

Mobile internet advertising Internet advertising viewed on mobile platforms, in particular through mobile browsers and applications on smartphones.

Mobile social networking Visiting social networking sites on a mobile device, often a smartphone, through the device's browser or a dedicated app.

MP3 (MPEG-1 audio layer-3) A standard technology and format for compressing a sound sequence into a very small file (about one-twelfth the size of the original file) while preserving the original level of sound quality when it is played.

MP3 player A device that is able to store and play back MP3 files.

Multichannel Refers to the provision or receipt of television services other than the main historical analogue channels, plus local analogue services. 'Multichannel homes' comprise all those with digital terrestrial TV, satellite TV, digital cable or analogue cable, or TV over broadband. Also used as a noun to refer to a channel only available on digital platforms (or analogue cable).

Multiplex A device that sends multiple signals or streams of information on a carrier at the same time in the form of a single, complex signal. The separate signals are then recovered at the receiving end.

Net neutrality The principle that all traffic on the internet should be treated equally, regardless of content, site or platform.

Netbook A small, lightweight, and often inexpensive laptop that lacks certain features of a conventional laptop, such as a DVD drive.

Next generation access networks (NGA) New or upgraded access networks that will allow substantial improvements in broadband speeds and quality of service compared to today's services. This can be based on a number of technologies including cable, fixed wireless and mobile. Most often used to refer to access networks using fibre-optic technology.

Next generation core networks (NGN) Internet protocol-based core networks which can support a variety of existing and new services, typically replacing multiple, single-service legacy networks

Non-linear Content that is delivered 'on demand' as opposed to linear, broadcast content.

OIPTV Open Internet Protocol Television forum, a consortium that develops specifications for IPTV STBs. It is also the consortium that adopts, for standardization by ETSI, the HbbTV technical specification.

OTT/Over-the-top video Refers to audio-visual content delivered on the 'open' internet rather than over a managed IPTV architecture.

Pay-per-view A service offering single viewings of a specific film, programme or event, provided to consumers for a one-off fee.

Peer-to-peer (P2P) distribution The process of directly transferring information, services or products between users or devices that operate on the same hierarchical level.

Pure play OTT A service operator that delivers its services online via the open Internet, and which is not linked to a network operator or an existing broadcaster.

PVR See DVR

RWD Responsive web design. A web design approach which aims to automatically provide an optimal viewing experience across a wide range of devices (from desktop computer monitors to mobile phones)

Search term The word(s) or phrase an internet user enters into a search engine.

Service bundling (or multi-play) A marketing term describing the packaging together of different communications services by organisations which traditionally offered only one or two of those services.

Service provider A provider of electronic communications services to third parties, whether over its own network or otherwise.

Smart TV A standalone television set with inbuilt internet functionality.

Smartphone A mobile phone that offers more advanced computing ability and connectivity than a contemporary basic 'feature phone'.

STB Set Top Box

Streaming Media Device a streaming only Internet Media Player

Superfast broadband Sometimes known as next-generation broadband, superfast broadband delivers headline download speeds of at least 30Mbit/s

Tablet computer A mobile computer which is included within a single panel with a touchscreen

Telecommunications, or 'telecoms' Conveyance over distance of speech, music and other sounds, visual images or signals by electric, magnetic or electro-magnetic means

VoD Video-on-demand A service or technology that enables TV viewers to watch programmes or films whenever they choose, not restricted by a linear schedule

Web TV Web television (abbreviated web TV) is original television content produced for broadcast via the World Wide Web

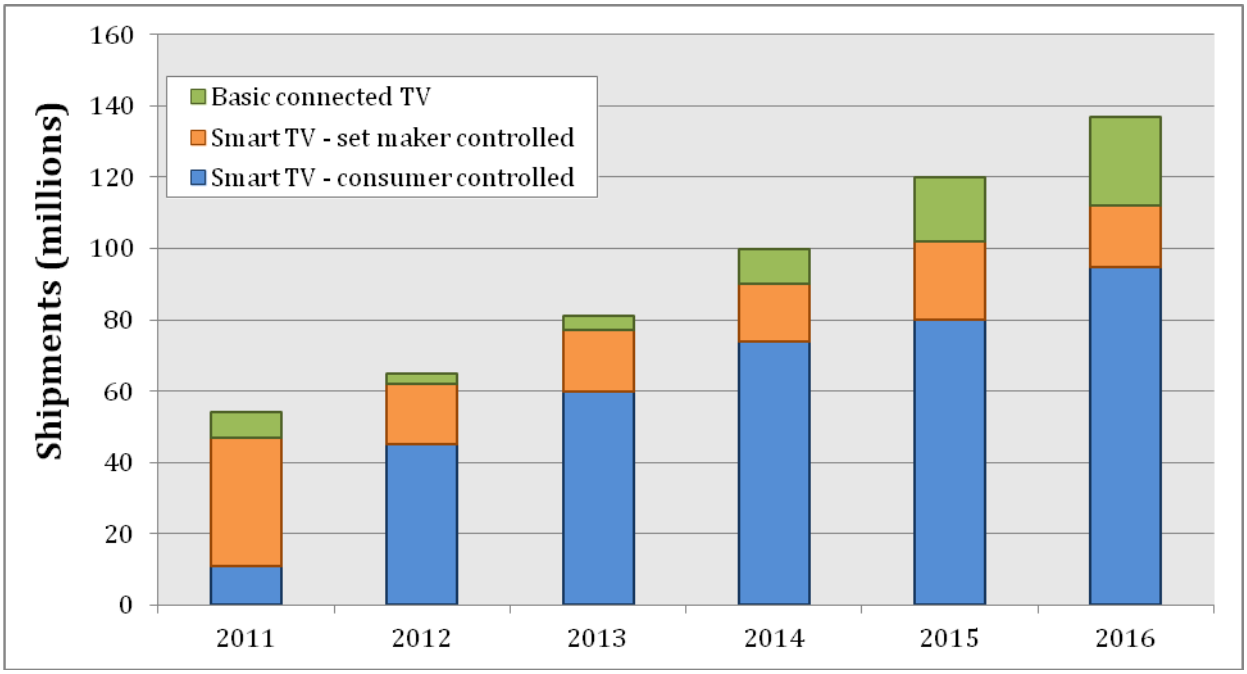
"WebTV" (launched in 1997) is the original name of the MSN TV service, which was recently shut down

WiFi hotspot A public location which provides access to the internet using WiFi technology

Wired internet advertising Internet advertising that traditionally delivered to laptop and desktop computers, but which now may be viewed on other connected devices. Contrasted with 'mobile internet advertising'.

ANNEX II – MARKET DATA

Table 1: Connected TV set sales projections[45]



By the end of 2012, the global installed base of smart TVs had reached 104 million. In leading markets like the US household penetration now exceeds 20 percent.

Basic connected TV: connected TV with links to Hbbtv (and Ginga in Brazil) and sold at the lowest prices

Smart TV – set maker controlled: internet access offered with proprietary access

Smart TV – consumer controlled: with open internet access

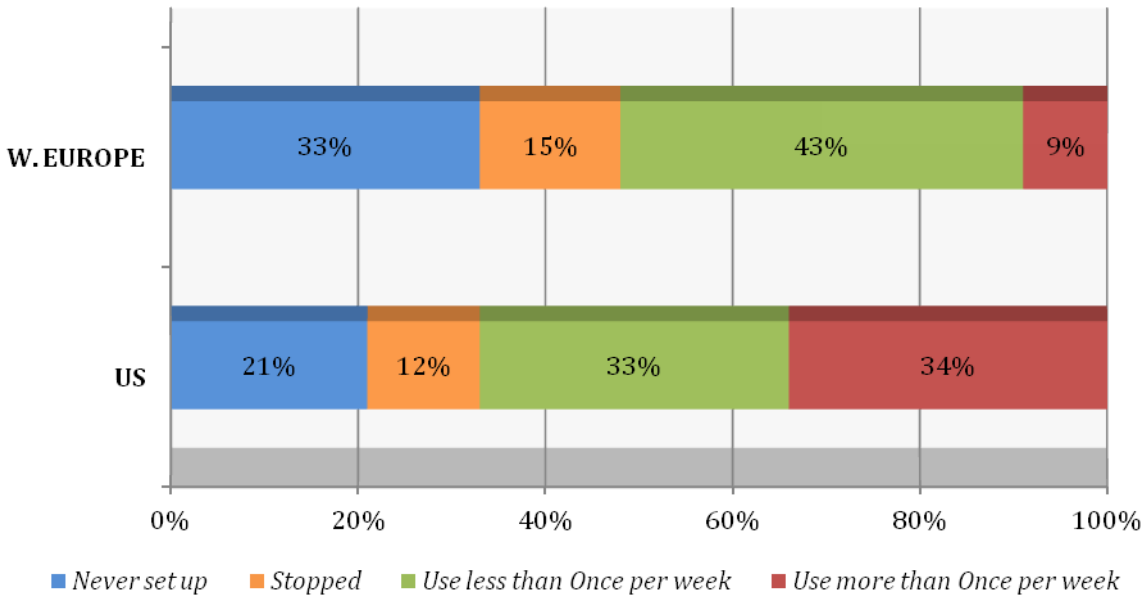
[45] NPD DisplaySearch, Quarterly Smart TV Shipment and Forecast Report, Santa Clara, California, October 17th, 2012.

Table 2: Smart TV Installed Base Forecast: Selected Countries in 2012[46]

Smart TV Installed Base by Country (Millions of Units)	2012
Japan	21,1
United States	15,8
China	13,8
Germany	7,1
UK	6,8
France	4,2
South Korea	3,5
Russia	3,1
Italy	2,9
Spain	2,7
Total	81,0

Table 3: Use of connected functionality

Q: How often do you use the connected functionality on your TV?



Source: Strategy Analytics' Digital Home Observatory service, May 2012
Base: 760 owners of smart or connected TVs in the US, France, Germany, Italy and UK.

[46] Strategy Analytics, *Global Smart TV Sales Forecast for 88 Countries: 2007 to 2017*, Boston MA, January 3rd, 2013.

Table 4: Requests for TV programmes across BBC iPlayer by device type[47]

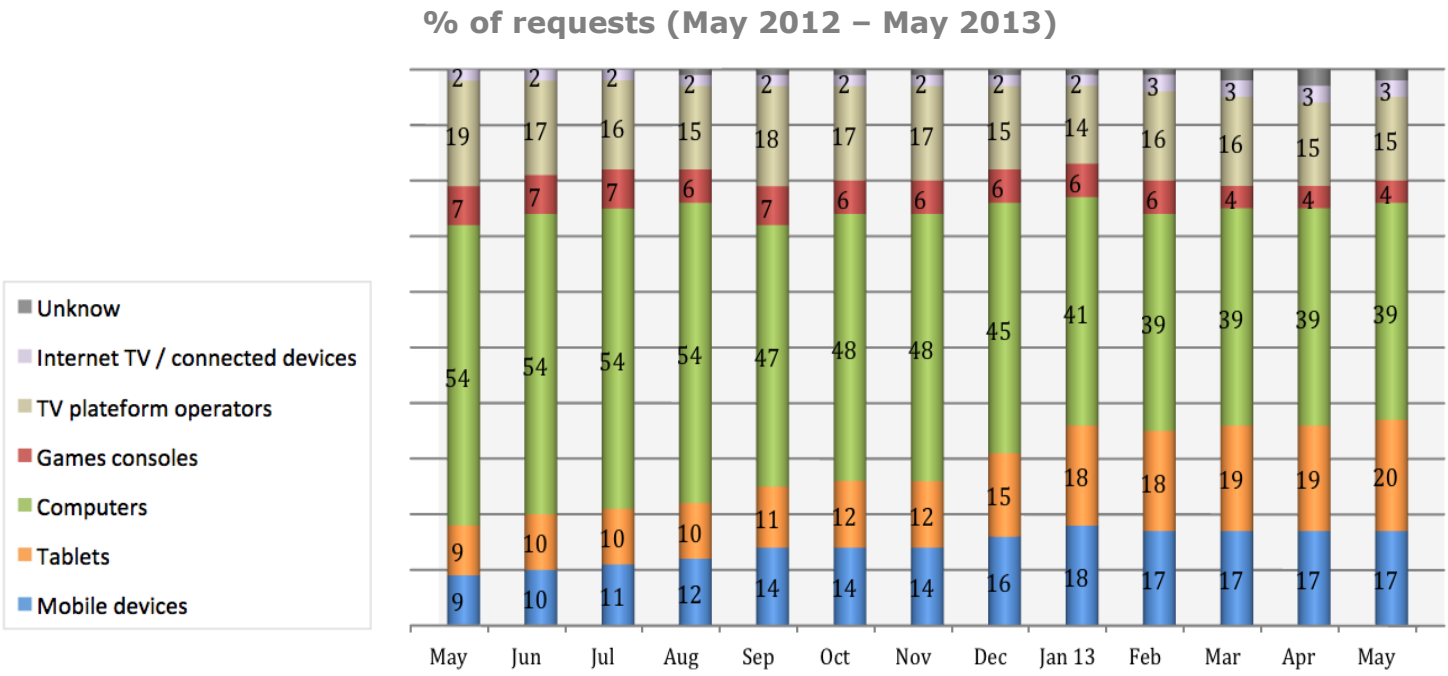


Table 5: Completion rate per device

Digital Video Completion Rates Wordwide, by Device, Q1 2013

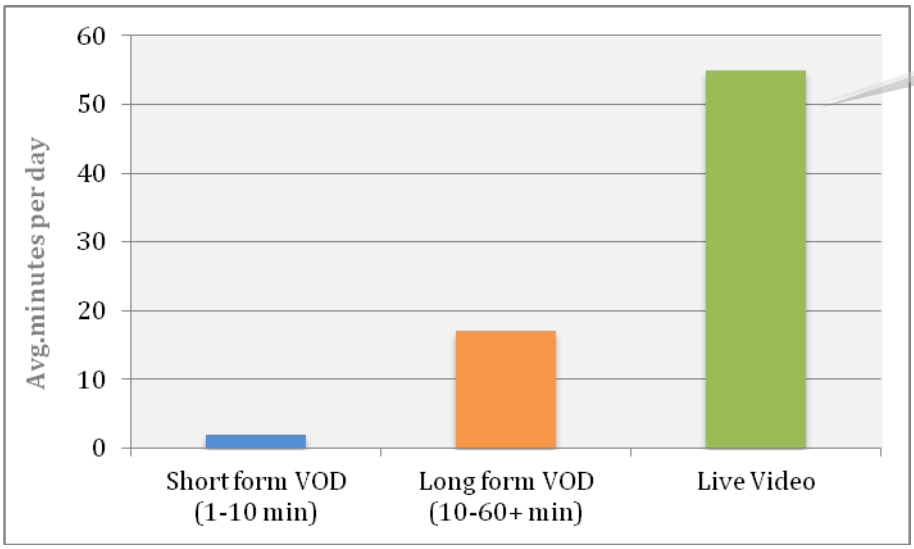
	Tablet	CTV & GC	Desktop	Mobile
25% completion	72,90%	68,80%	63,10%	60,50%
50% completion	64,30%	62,70%	54,50%	52,90%
75% completion	56,20%	57,70%	48,50%	46,90%
100% completion	41,50%	47,20%	38,30%	33,40%

Note: over Ooyala's customer & partner database
Source: Ooyala, *Global Video Index Q1 2013, * June 19, 2013

[47] BBC iPlayer, monthly performance pack, May 2013. Note: Internet TV / connected devices include Freeview and Freesat smart TVs, set-top-boxes and devices like Roku and blu-ray DVD players. TV platform operators include VirginMedia and BTVision. Games consoles comprise SonyPS3, Nintendo Wii and Microsoft Xbox 360. Some stats from PS3 devices were missing between 18 Feb – 21 May 2013.

Table 6 : Uses of CTV

Time per day : VOD vs. Live



Connected viewers watch live broadcast video **2,5x** longer than VOD

People tune in to live sports, breaking news, and special events for far longer than on-demand content online.

Source: Ooyala, Global Video Index: Broadcaster Edition, data from March 2013 representing an anonymized cross section of Ooyala's global footprint of broadcasters and entertainment networks.

ANNEX III - STAKEHOLDERS'S MAJOR STRENGTHS AND WEAKNESSES IN THE NEW ECOSYSTEMS

Stakeholders	Brands/Players	Core business	Opportunities	Threats
TV set manufacturers	Samsung, Panasonic, Sony, LG, and many others	Consumer electronics	Selling connected TV to households in a difficult TV market. Fight price erosion of TV sets. Create a continuous revenue stream based on content services (manufacturers portal) Access to user data	Multiplication of standards leading to low take up. Inexperience in the content market. Limited user engagement
Internet Access Providers (IAP)/ Internet Service Providers (ISP)	Telecom operators, cable operators	Provide access to the Internet for the end consumer	Ability to sell multiple services (internet/voice messaging and TV). Access to subscriber usage data Own platform service provision. Charging for content delivery to end user Triple/Quadruple play	Commoditization of the access service Competition with OTT. Heavy handed net neutrality Inexperience in the content market (except for some cable operators)
PC manufacturers	Apple, HP, Lenovo, Sony, etc.	Open platform,	Minimal possibility of control	The tablets are overtaking the PC as a consumer device.
Tablets and smartphone manufacturers	A convergence zone between PC manufacturers and consumer electronics	Pcs	Creation of a controlled ecosystem	CTV is mostly for TV screens users. Cell phone is still used for voice and texts messages.
STB manufacturers	ADB, Pace	B2B provision of STB	Distrist in the stability of the Connected TV solution	Replacement of operator provided STBs with consumers' own devices

Game consoles	Sony, Microsoft, Nintendo	Consoles and content (games)	Developped on line connectivity. Service to content distributors	Tablets, smartphones incroaching on the game market
Media player manufacturers	Apple TV, Roku, and many small brands	Interface design	Offer a better experience than connected TVs. "Upgrade" of un-connected TV sets	TV manufacturers solving the interoperability issue and offering a better user experience
Mainstream free to air broadcasters	Public and Commercial channels, BBC, TF1, Mediaset	Right holders and content producers. Structured offerings	Possibility to extend their brands in the new arena of on demand TV Acquisition of data on actual use of provided content Targetted content offerings	Monopoly on licence fee for PSB is challenged by newcomers and commercial TV. New OTT entrants moving very quickly Limited Internet culture Limited direct relationship with end user
Pay TV channels	Sky, Canal +	Ability to build offers and to sell content to subscribers Very large content offers (news/sport/cinema)	Number of subscribers, Know how in subscriber management	Competition with new entry pure online players
OTT, Hybrid Boxes players & VOD services	Netflix, Hulu, Lovefilm, UniversCine, Youtube Roku, Flectech, Vudu, Netgem etc.	Subscribers base/content providers, proprietary systems	Access to fullscreen. Change in consumer's habits	Access to premium content.
Content Producers	Studios, producers, (HBO…)	Production of content Deep content libraries	Direct to consumer, Discoverability Acquisition of data on consumer usage	Multy territory licence, end of media chronology. Competition with international giants coming from the

				manufacturing or advertising industry (Apple, Google) and established OTT players (Netflix)
Social and community networks	Youtube, Facebook, Dailymotion	Interactive services, and building communities	Linking people, buiding additional audiences Delivering professionnaly produced content	Inexperience in sutomer management. Inexperience in content aquisition
Software developers	Apple, Boxee,	User interface and application development -	Revenue sharing with content owners Licensing to the other players	Costs of development and market access
Pirate streaming sites, P2P networks	Mega, the Pirate Bay, etc.	Low cost service to end user, based on free content through disregard for copyright	Enter the legal business of content provision In some cases better user interface than established legal providers	Poor reputation with content providers Competition from other players

Source: Media Consulting Group

ANNEX IV - LEGAL ISSUES RELATED TO CONNECTED TV

Topic	Nature of the difficulty
Protection of children and minors	It is a generic problem for Internet based services
Right of reply, right of correction	The worldwide nature of Internet can make it difficult to identify the regulatory regime and the regulatory authority, that might be able to guarantee such rights.
Defamation, slander, libel	Identification of the relevant jurisdiction, limitation of the number of jurisdictions involved (to avoid the "chilling effects") are some of the core issues to guarantee pluralism of information.
Invasion of privacy	The worldwide nature of Internet makes it difficult to identify the even the regulatory authority, that might be able to guarantee a persons privacy and/or limit the harm caused by an invasion.
Personal data, privacy	As the acquisition of private data, in this case about the usage of AV media as linked to other personal data, is one of the more important drivers towards connected TV, the protection against abuse of this data need to be considered. Can the data controller be identified precisely in each case?
Right to be forgotten	It is a generic problem for Internet based services, not yet solved, but which might be amplified in the case of connected TV, as TV represents such a large share of daily activities
Editorial responsibility and control	There is a need to be able to identify the entity responsible (immediately and ultimately) for the content offered, not only to be able to have legal recourse, but also to understand wherefrom information comes and from whom: a media transparency issue.
Access to all (legitimate) content	User need to be able to access all (legitimate) content, i.e. any of the technical gatekeeper should not be able to limit access, or at least, any limitations should be clearly advertised (e.g. for service dedicated Internet media players)
Share of mind	To fulfill the promise of pluralism and diversity, the citizen consumer must have the possibility to know of the services, including of the "non major" ones. Conditions of access a manufacturer's portal (the connected TV's "home screen"), placement "apps" on the screens, are the issues to be considered to here. The more limited visual "real estate" of a TV screen makes the issue different from the different app stores for computers and tablets.

Content discovery	Listing of content and place of listing in the different discovery engine. The risk is that only majority used services become easily "discoverable" – i.e. that alternative offerings remain in the shadow. Share of mind and content discovery are issues similar to that of the Electronic Program Guides (EPGs).
Must Carry	Linked to the issues above, how should/could "must carry" rules be translated into this new television paradigm
Must offer/non discrimination	Should service providers that benefit from must carry, also have an obligation of must offer, non to discriminate between different manufacturers, aggregators or other service providers?
Competition issues	Vertical integration issues (production, TV service provision, technical platform, device, customer management): is there is need to, and how to, apply the spirit of the Multimedia Betriebsgesellschaft (MMBG) decision that structured the launch of digital linear television?
Technical standards, interoperability,	The fragmentation of the world of devices created a barrier of entry for smaller players, which will not have the means to maintain compatibility with all the devices used by their potential customers. Standardization and unicity of the API might help solve this, but at the cost of technological development and progress. The movement of the market seems to be going in that directly, at least for a base common ground (HTML 5). Is there a way to promote this movement, without pre-empting the technical choices that need to be done by the market.
Access to technology (DRM and other)	In a technically fragmented, on issue for pluralism is the technical possibility to access the devices owned by the end consumer. In the linear digital TV world, Conditional Access and API were considered. How should this be transposed in a multiscreen TV world?
Promotion of cultural diversity and pluralism	The specific issues listed above also affect the regulatory framework for the promotion of cultural diversity and pluralism
Role of Public Service Broadcasting	PSBs are key actors in delivering a culturally diverse range of content. They are also struggling to capture additional sources of revenues as public sector grants or license fees are being capped or are no longer sufficient to provide all the services their remit compels them to deliver.
Financing of European production	Stimulating investment in European content is one of the tenets of the AVMS directive and others European policy strands, such as Europe Culture, which will start in 2014 with a Budget line of 900 M € for audiovisual. Quality drama and feature films drive consumer applications.

Promotion of European works	Relevant articles in AVMS articles are designed to promote European works on European TV screens. The fitness for purpose of these existing dispositions in the convergent world of connected TV may be raised.
Support of independent production	The Media 2007 programme of EU incentives managed by the Commission has been focused primarily on feature films. Is there a need to adapt the aims of the new Media programme, adopted last year, to support the new challenges raised by connected TV?
Tax issues	The known phenomena of delocalization to low tax havens, including to advantageous transfer pricing of content rights.

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