



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n: 761999



EasyTV: Easing the access of Europeans with disabilities to converging media and content.

D7.6 Consolidated market analysis and final business model

EasyTV Project

H2020. ICT-19-2017 Media and content convergence. – IA Innovation action.

Grant Agreement n°: 761999

Start date of project: 1 Oct. 2017

Duration: 33 months

Document. ref.: D7.6

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PROGRAMME NAME:	H2020. ICT-19-2017 Media and content convergence - IA Innovation action
PROJECT NUMBER:	761999
PROJECT TITLE:	EASYTV
RESPONSIBLE UNIT:	ENG
INVOLVED UNITS:	ENG, MV, UICI, FCNSE
DOCUMENT NUMBER:	D7.6
DOCUMENT TITLE:	Consolidated market analysis and final business model
WORK-PACKAGE:	WP7
DELIVERABLE TYPE:	Report
CONTRACTUAL DATE OF DELIVERY:	30-06-2020
LAST UPDATE:	30-06-2020
DISTRIBUTION LEVEL:	PU

Distribution level:

PU = *Public,*

RE = *Restricted to a group of the specified Consortium,*

PP = *Restricted to other program participants (including Commission Services),*

CO = *Confidential, only for members of the LASIE Consortium (including the Commission Services)*

Document History

VERSION	DATE	STATUS	AUTHORS, REVIEWER	DESCRIPTION
1.0	1/06/2020	Draft release	ENG	Draft release
1.1	15/06/2020	First release	ENG	First release
1.2	25/06/2020	Candidate release	ENG	Version shared for the internal review (UPM and CERTH)
1.3	29/06/2020	Candidate release	ENG, UPM, CERTH	Version that incorporates the reviewers' notes
1.4	30/06/2020	Final candidate release	ENG	Added the references to open source exploitable assets

Definitions, Acronyms and Abbreviations

ACRONYMS / ABBREVIATIONS	DESCRIPTION
AI	Artificial Intelligence
AVMSD	Audiovisual Media Services Directive
BMC	Business Model Canvas
E&M	Entertainment and Media
EBU	European Broadcasting Union
EU	European Union
HBBTV	Hybrid Broadcast Broadband TV
IoT	Internet of Things
OCR	Optical Character Recognition
SaaS	Software as a Service
SL	Sign Language
STB	Set-Top Box
TVWF	Television without Frontiers
UX	User Experience
VOD	Video on Demand
VPC	Value Proposition Canvas
WHO	World Health Organization
WP	Work Package

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1. EXECUTIVE SUMMARY

The aim of the document is to illustrate a market analysis allowing, together with other considered dimensions, to define the final business model for EasyTV that lead to an exploitation plan for each partner involved in the project. The deliverable is divided into different sections:

- *Market Analysis, European broadcaster scenario* and *Assistive technologies scenario* present a wide analysis of the main aspects that characterize the Digital Media landscape from a technological and socio-economic perspective.
- *Business model* and *Individual exploitation plan* focus on the adopted strategies to maximizing the project long-term impacts in technology, society, and industry.

The **Market analysis** represents a picture of the current situation on all aspects that EasyTV is facing. An overview on the main trends in the Digital Media scenario has been conducted, focusing especially on the audio-visual contents and television ecosystem, having implications for the development of Easy TV services evaluation, the business model definition and the process of exploitation of the solutions generated within the project.

From the Market analysis has emerged that the “television experience”, although has changed in the last years, it is still a central activity in people’s lives. Increasingly, “content and media” sector plays a key role that is economic, social, and cultural. Consequently, globally, audiovisual media content, and their providers, are subject to certain rules, and recent developments have posed several legal, economic, and technical issues. In Europe, the European Commission has assumed the role to put in place the ideal conditions and regulations to create a single market for audio-visual media services. The **European broadcaster scenario** section, starting from the European directives, describes the current situation regarding the effect of rules introduced for accessibility of audiovisual media services for people with disabilities.

Focusing on the two main target users of EasyTV, as *Blind/Visually Impaired* and *Deaf/Hard of Hearing* people, a deeper analysis on the **Assistive technology scenario** has been led. The overview on systems and services related to the delivery of assistive products allows to better understand the solutions more widely adopted by people with visual or hearing impairments.

Subsequently, starting from the considerations emerged from previous market and scenarios analysis, a **Business Model** has been proposed, to describe the logic with which Easy TV will create, capture and distribute value. The business model has been defined using two principal tools: *Value Proposition Canvas* and *Business Model Canvas*. This section also illustrates an economic feasibility study for the establishment of a NewCo based on the services and technological solutions developed within the project and a business case of a CCMA project partner.

Finally, to combine the most promising exploitable knowledge items of EasyTV results to the partner’s industrial plan and strategy, an **Individual exploitation plan** has been proposed, specifying the exploitation plans of the project results for each consortium partner.

In this version of the document the value proposition of the project is now focused on the main potential customer of the solution (Broadcaster and OTT - Over The Top - players). EasyTV delivers services to broadcaster and OTT providers adopting a Software as a Service (SaaS) model, to solve the potential barrier due to up-front cost in purchasing the solution and adopting standard interfaces to limit the cost of integration. The previous version of the document has been integrated with:

1. An updated version of the business model canvas (section 6.4).
2. “EasyTV platform newco feasibility study”: illustrates an economic feasibility study for the establishment of a NewCo based on the services and technological solutions developed within the project (section 6.5).
3. A new and updated version of “individual exploitation and Exploitable assets” and related TRL, to put in evidence the technologies and knowledge gained within the project (section 7).

2. INTRODUCTION

The Entertainment and Media (E&M) Industry, in the last few years, has been at the centre of the *digital revolution* that has redefined not only customers habits and consumption choices, but also the business strategies made by technology, media, and telecommunication companies.

The *digital convergence* has enabled people to view the same multimedia content from several types of devices. This process has been allowed mainly by the digitization of content (movies, pictures, music, voice, text) and the development of connections methods. On one side, customers have many connected devices available at the same time, on the other, networks, technologies and content converge on a single device. These various aspects have a substantial impact on the process of creation, fruition, distribution, interaction, and personalization of digital media content, especially television contents.

Considering that prime motivation of EasyTV is the necessity of *equal access* to television and audio-visual services, a wide analysis of the main aspects that characterize the current Digital Media scenario is an indispensable step to achieve this goal. In fact, identifying *why, how, when* and *where* customers today enjoy TV content, and furthermore *how much* they want to pay for it, it is possible define the whole actual “TV experience” which EasyTV services have the purpose to extending to a wider range of people.

One of the main challenges of the project is to reduce access/adoption barriers, and, moreover, design services that fit the needs of the two main target users of EasyTV, as *Blind/Visually Impaired* and *Deaf/Hard of Hearing* people. For this reason, it is strategic understand what kind of services and product are currently available for them, to be aware of technologies they use daily.

Moreover, beside the technologies, it is important to also explore the context of policy maker, broadcaster and content providers, and their role in contributing to make available accessible multimedia content.

EasyTV aims to ease the access to multimedia services by offering an improved user experience related to the accessibility functionalities, but this value proposition of the platform must reach the different target groups.

From this point of view, the business model prepared in the previous versions of the document (D7.7) has been updated, with the aim of defining a general business plan and understanding the structure of costs and revenues that can be the basis of the economic sustainability of a NewCo that bring to the market the solutions developed within the project. In this regard, the following types of revenues and costs were formulated:

- revenues: sale of perpetual licenses, consultancy & technological services, access fees for the service in SaaS mode.
- costs: licenses, research, development, infrastructure, customer support, communication, marketing & business development, general/structure.

To support this business plan, based on the currently available data, has been identified the reference market of the Broadcasters of the countries to which the project partners belong, however it is highlighted how extending the market to OTTs and third-party service providers is a mandatory step to increase the economic resilience of the NewCo that relies on these services.

2.1. Purpose and scope

The document, D7.6, is part of Work Package (WP 7) aimed to plan and execute communication, dissemination and exploitation actions to maximizing the project long-term impacts in technology, society and industry. One of the main objectives of WP 7 is to develop business model and exploitation plans for the most promising exploitable knowledge items.

The present deliverable is part of *Task 7.3 Market analysis and business plan definition* that includes all activities foreseen by EasyTV partners for exploiting the knowledge generated within the project's lifetime, with the aim of maximizing the business plan of the innovative solutions. It is composed by a two-level strategy:

- Innovation opportunity identification;
- Business analysis and modelling;

Providing a business model for EasyTV is strategic: it allows both to make the project sustainable and exploit its innovation impact.

2.2. Relation to other tasks

As shown below (Table 1), this document should be considered in directly conjunction with other deliverables.

Table 1. D7.6 dependencies and linkages

ID	Title	Remarks
D1.1	User scenario and requirements definition	The end user requirements gathering process of D1.1 has allowed to define more consistently the user needs.
D1.2	EasyTV system requirements specification	The design choices carried out in the context of the requirements design of D1.2 has led to the identification of the main technologies, functionalities, devices and interaction patterns foreseen for the EasyTV platform.
D1.3	EasyTV system architecture	The core set of components identified in D1.3 has been considered as a guideline for the definition of product and services offered by the EasyTV platform.
D7.1	Early-stage market analysis and initial business model	The report, delivered at M9, was a preliminary plan for exploiting the knowledge generated within the project's lifetime, with the aim of maximizing the business plan of the innovative solutions.
D7.7	Mid-term report on market analysis and business model	This document was delivered at M22 and it represents an update on market analysis, impact creation activities and, furthermore, on the business plans and exploitation plans yet presented in D7.1.

2.3. Approach and methodology

This latest version of the document is based on what has already been prepared in previous versions, updates and expands it, above all by identifying the economic potential of the technologies developed within the project. Aware that the technologies developed during the project are not ready for immediate marketing, a period of one year has been assumed for the industrialization of the developed solutions, so that the commercial conditions for an economic feasibility of a NewCo can be created, to market what has been achieved. In this regard, the individual exploitation of each partner can be understood as a tool to support the industrial strengthening of what has been achieved both in terms of assets developed and of knowledge gained. To make each partner's commitment clearer and more comprehensible, the "individual exploitation" and "Exploitable assets" previous sections (in D7.7) have been unified, and for each asset the following have been indicated: the license, the TRL and, if it was a technology released with Open Source license, the repository that allows access to what has been developed. To facilitate readability, an icon was also associated with each asset, with the aim of also inserting a visual reference when reading the document.

3. Market Analysis

To identify the overall value of the project EasyTV, and foresee its socio-economic impact in a broader way, it means firstly define project target groups and consequentially analyse more in detail its potential target markets (focusing specially on EU-28 countries).

Secondly, to design solutions able to fit the different customer segment's needs, it is crucial to understand the emerging overall changes of consumer's habits and attitudes in the current digital media landscape, and the contextual impact on the Entertainment & Media sector.

Secondly, for the actual achievement of the project's objectives, it is strategic to introduce and develop services consistent with the current technological and economic trends in the digital media market that represent the reference scenario for EasyTV.

For the mentioned key issues, an overview on the main trends in the digital media landscape has been conducted, focusing especially on the audio-visual contents and television ecosystem. The latter, in fact, presents the leading challenges and implications for the development of Easy TV impact evaluation, the business model definition and the process of exploitation of the solutions generated within the project.

3.1. Potential target markets

The potential EasyTV direct customers can be divided into two main groups:

- **Enduser:** people that can use EasyTV platform and services to easily access the TV contents, having a better user experience according to their abilities:
 - *People with some physical impairments* (specifically who has hearing or visual impairments);
 - *Elderly people*, experiencing disability due to their age;
 - *Immigrant*, people migrated to a European state different from the original country that usually present difficulties, or a lack of literacy skills, about the language of the host country. EasyTV services offer them the opportunity to improve their skills and reduce the cultural and communicative gap that could be present;
- **Business user:** that are broadcasters and content providers for television, but also big media players and telecommunication operators. EasyTV project solutions can develop business purposes of these economic actors.

Following, these target markets are briefly described together with their characteristics and market potential.

3.1.1. End user: people with disabilities or difficulties

People visually and hearing impaired

The World Health Organization (WHO) estimates approximately that globally 1.3 billion people live with some form of vision impairment.

According to the European Blind Union (EBU) statistics¹, there are estimated to be over 30 million blind and partially sighted persons in geographical Europe. This means that an average of 1 in 30 Europeans experience sight loss. There are four times as many partially sighted persons as blind persons and women are more at risk of becoming blind or partially sighted than men.

Regarding hearing impairment, 466 million persons in the world live with disabling hearing loss, 6.1% of the world's population. Worldwide the number of disabling hearing loss people will grow over the years, up to 630 million by 2030 and over 900 million in 2050 [1].

¹ <http://www.euroblind.org/about-blindness-and-partial-sight/facts-and-figures#details>

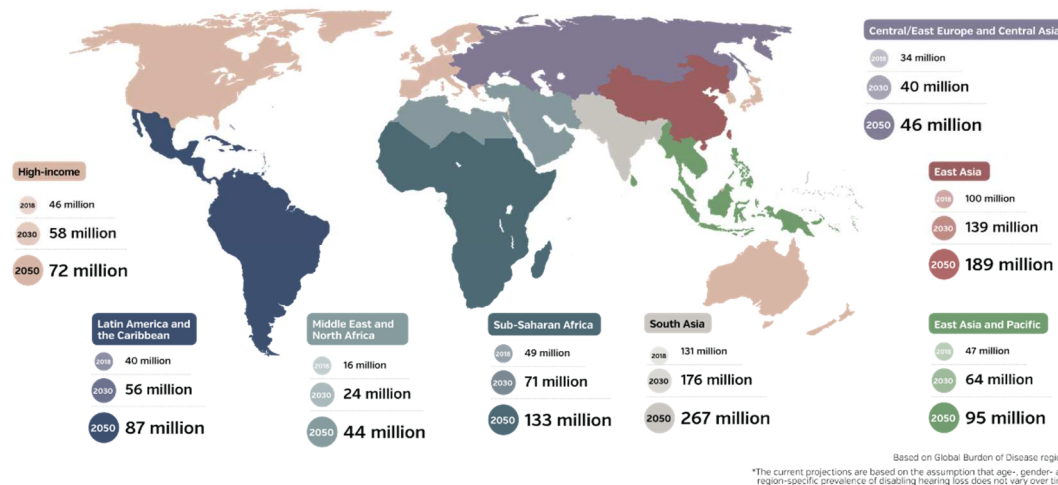


Fig. 1 Projected number of people with hearing loss in different world regions until 2050 (WHO)

However, the European Federation of Hard of Hearing People (EFHOH) estimates that in the EU people who experience hearing loss are about 51 million people, around 9% of the population or approximately 1 in 10 [2].

Elderly people

According to the WHO, worldwide people are living longer. By 2050, the world's population aged 60 years and older is expected to total 2 billion, up from 900 million in 2015. Today, 125 million people are aged 80 years or older².

Currently, in the EU, the elderly share (65 or over) among the total population (EU-28) is 19,2%³. Statistics confirm that Europe's population is getting older, indeed the total population is projected to increase from 511 million in 2016 to 520 million in 2070, but the working-age population (15-64) will decrease significantly from 333 million in 2016 to 292 million in 2070 due to fertility, life expectancy and migration flow dynamics [3].

Several common health conditions are associated to ageing hearing loss, cataracts and refractive errors, back and neck pain and osteoarthritis, chronic obstructive pulmonary disease, diabetes, depression and dementia. Furthermore, as people age, they are more likely to experience several conditions at the same time.

As the EU population is getting older, the number of Europeans with disabilities is significantly rising. It is expected that, by 2020, approximately 120 million Europeans will have a disability.

The most common causes of sight loss in Europe are age-related eye conditions. Eyesight in seniors may be affected by conditions such as macular degeneration or cataracts: one in three senior citizens over 65 faces sight loss. 90% of visually impaired persons is over the age of 65⁴.

WHO estimates that globally approximately one-third of persons over 65 years are affected by disabling hearing loss⁵.

Immigrants

In 2016 4.3 million people are immigrated to one of the EU-28 Member States, while at least 3.0 million emigrants were reported to have left an EU Member State. These total figures do not however

² <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>

³ <https://ec.europa.eu/eurostat/cache/infographs/elderly/index.html>

⁴ <http://www.euroblind.org/about-blindness-and-partial-sight/facts-and-figures#details>

⁵ <https://www.who.int/pbd/deafness/estimates/en/>

represent the migration flows to/from the EU, since they also include flows between different EU Member States⁶.

Among these 4.3 million immigrants in 2016, there were an estimated 2.0 million citizens of non-EU countries, 1.3 million people with citizenship of a different EU Member State from the one to which they immigrated, around 929 thousand people who migrated to an EU Member State of which they had the citizenship (for example, returning nationals or nationals born abroad), and some 16 thousand stateless people.

Immigrants into EU Member States in 2016 were, on average, much younger than the total population already resident in their country of destination. On 1st January 2017, the median age of the total population of the EU-28 stood at 42.9 years, while it was 27.9 years for immigrants to EU-28 in 2016.

The number of people resident in an EU Member State with citizenship of a non-member country on 1st January 2017 was 21.6 million, representing 4.2 % of the EU-28 population. In addition, there were 16.9 million of persons living in one of the EU Member States on 1st January 2017 with the citizenship of another EU Member State.

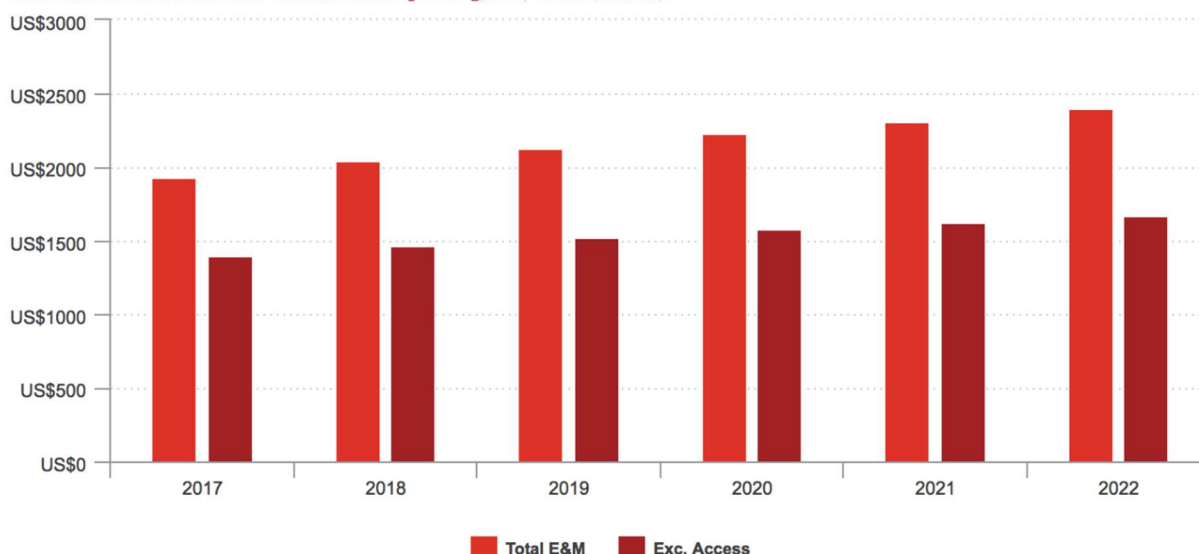
3.1.2. BUSINESS USER: Broadcasting

Digital transformation has expanded the Entertainment & Media industry, opening the market to new players.

The global Entertainment & Media industry is growing. PwC's *Global Entertainment & Media Outlook 2018-2022 report* predicts total spending in the global entertainment and media industry to grow by 4.4% year over the next five years, reaching US\$2.4 trillion in 2022, from US\$1.9 trillion in 2017.

Growth forecasts tick up, but Internet access revenue skews the trends

Total E&M revenue with and without access spending, 2017-2022 (US\$bn)



Source: PwC Global Entertainment & Media Outlook: 2018–2022. PwC, Ovum

Fig. 2 Growth forecasts of entertainment and media industry (2017-2022)

The historic boundaries between Technology, Telecommunications and Entertainment & Media are dissolving and two main players are emerged in the market: on one side the broadcasters, which focus on their core business, the contents, and on the other side the telecommunication operators who exploit their more developed distribution capacity.

E&M revenues are constantly shifting from editorial activities to video and internet-related activities,

⁶https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Migration_and_migrant_population_statistics#Migration_flows:_2_million_non-EU_immigrants

to OTT services and consumer data management. This development generates opportunities both for new operators and for traditional players wishing to open to new segments such as OTT videos and e-commerce offer.

Consequently, the EasyTV solutions could be offered to the several actors of the current scenario:

- broadcasters;
- local network television stations affiliates;
- cable television providers;
- terrestrial and satellite TV providers;
- Internet TV providers;
- IPTV providers;
- Media content providers;
- Telecommunication operators.

3.2. Digital media market scenario

The rapid digital shift, which involved in the last few years the entire Entertainment and Media (E&M) Industry, has redefined not only habits and consumption choices, but also the business strategies of technology, media, and telecommunication companies, with a substantial impact on the whole E&M segments: Books, Business-to-business, Cinema, Data consumption, E-sports, Internet access, Internet advertising, Internet video, Magazines, Music, Newspaper, Out-of-home advertising, Radio, Traditional TV and home video, TV advertising, Video games, Virtual reality.

According to various digital media industry studies [4] [5], the key global drivers of this notable change have been:

- the expansion of mobile devices that are becoming the principal digital platform;
- the increasing of wireless connectivity and broadband penetration;
- the growing of alternative digital media platforms;
- the inclination to access to content without owning it;

In the Deloitte's 12th edition *Digital media trends survey*⁷, key insights are illustrated to better understand the shifting regarding consumer's attitudes and behaviours due to the digital transformation. These two main trends involve the whole digital media environment (entertainment devices, advertising, media consumption, social media, and the Internet) and, more specifically, the television and audio-visual services: the centrality of *video streaming* and the expanding of the "value gap" of Pay TV.

Regarding the video streaming on demand practice, the adoption of streaming video subscriptions is growing, alongside the request by customers for original content and the new flexibility attitude to consume media wherever and whenever, on any device they want.

The rise of video streaming on demand practice has an impact both on the linear TV consumption (especially for the younger generation) and the broadcasters' strategies of contents creation and distribution.

Streaming services have given to consumers an alternative for their entertainment. They are starting to "cut the cord": reviewing or cancelling their subscriptions to pay television or reducing the number of hours of subscription TV viewed, in response to competition from media available over the Internet.

A sort of "value gap" of pay TV and traditional broadcaster's offer is driving E&M companies to rethink business models in a marketplace that is increasingly competitive. The key activity for them it will be to increasingly engage the customers, focusing, more intensely, on an innovative user experience

⁷<https://www2.deloitte.com/insights/us/en/industry/technology/digital-media-trends-consumption-habits-survey.html#endnote-1>

that meets their needs (Perspectives from the Global Entertainment and Media Outlook 2017–2021, 2017).

These initial considerations on the current digital media landscape, as new technological/consumption trends and socio-economic changes, lead the present market analysis towards a focus on the most interesting aspects for the Easy TV project. Therefore, considering the pillars of the project, the following main dimensions related to the audio-visual and television market scenario have been examined:

1. Fruition
2. Creation
3. Distribution
4. Interaction
5. Personalization

3.2.1. Fruition

As mentioned, in the last few years new forms of video and TV consumption have arisen, so that, understand the transformation of audio-visual and TV content fruition habits, have become strategic to realize and distribute products successfully.

Eurodata's *One Television Year in the World* report⁸ found that global individual viewing time for television stood at 2 hours and 56 minutes a day, even though there are disparities between the continents for example between North America (which ranked highest with 4 hours and 3 minutes) and Europe (followed closely behind with 3 hours and 49 minutes per person daily) and developing countries. According to the study, in the last 25 years global TV viewing time has remained steady and seems that "TV has kept its appeal" and is taking advantage of new usages.

In general, the TV is still a central experience in people's days and life, but something has changed substantially especially in fruition modalities.

Video content, particularly linear television, remains the dominant form of entertainment, despite of the classic linear broadcast network loses audience share, replaced by new forms of consumption.

As the Ericsson's report [6] displays, except from the youth (age 16-24), that are the main driver of Video on Demand usage (VOD), more than 55% of weekly time is spent to watch live/linear TV, this percentage increases with the increasing of the age group.

Not only consumers are changing the ways in which they watch video and TV content *every time* they want (see Fig. 3) about on-demand Vs linear viewing), but they also access the contents *everywhere*, using different device.

⁸ <http://www.mediametrie.com/eurodatatv/communiques/one-television-year-in-the-world-between-safe-bets-and-innovative-content-trends-tv-has-kept-its-appeal-and-is-taking-advantage-of-new-usages.php?id=1854>

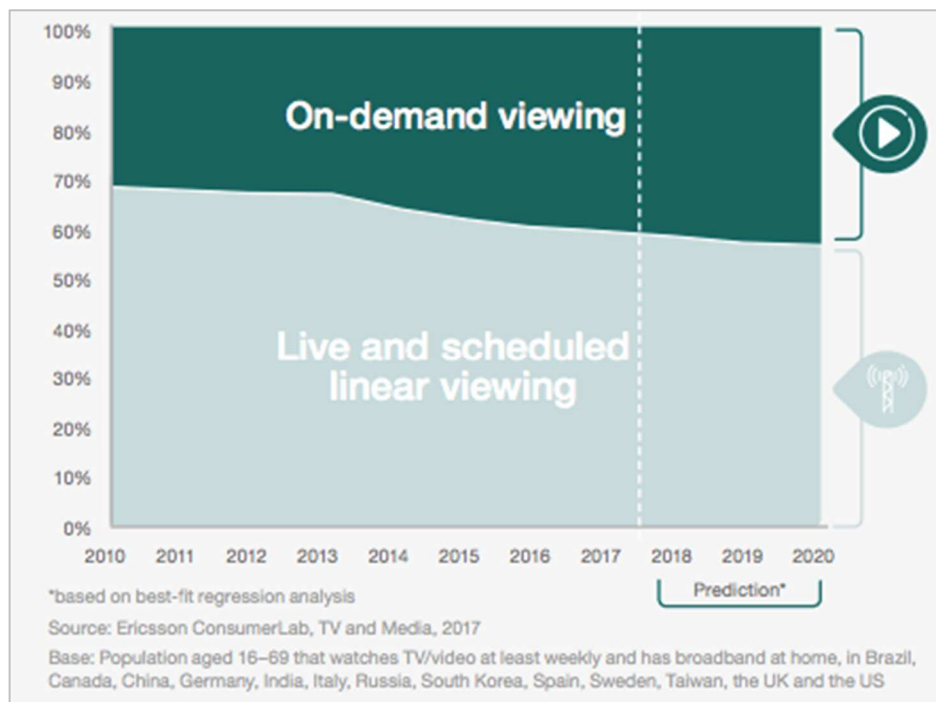


Fig. 3 On-demand vs Live and scheduled linear viewing

As smartphones, tablets, and wearable technologies rise in popularity, consumers increasingly use their mobile devices to watch TV and video (Fig. 4).

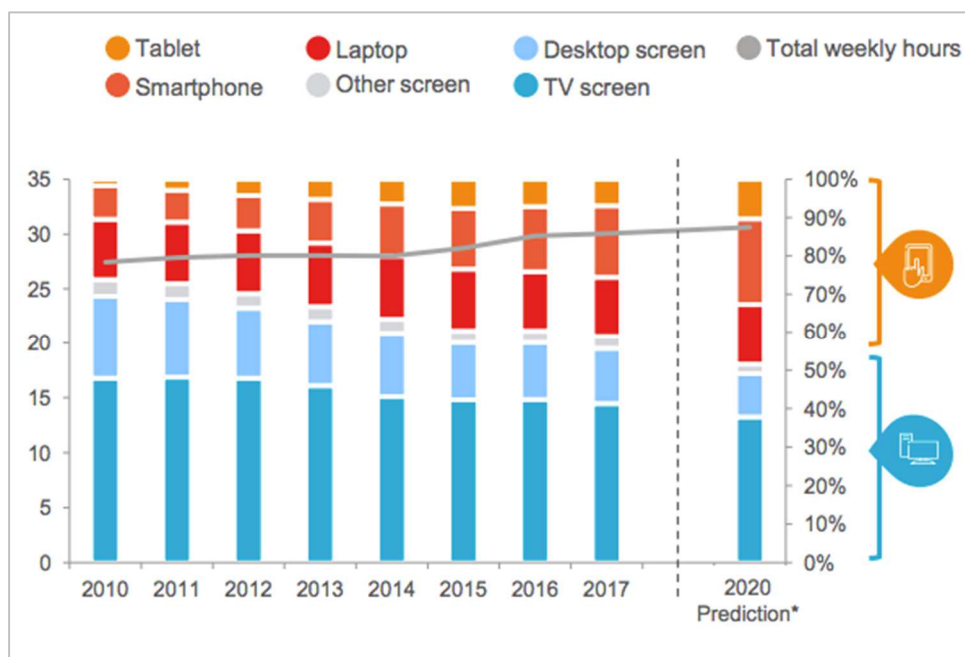


Fig. 4 Share of total TV/video-time done on respective device screen on right axis, and average tot nr of hours per week watching TV/video on left axis [self-reported] *source Ericsson

Moreover, Ericsson's study presents six different profile of user group that try to correspond to the actual TV and video habits.

Regarding the profiling of customer behaviour, the main variables to consider are age and types of devices used to access the audio-visual content. The TV-user group segmentation (see Fig. 5) gives an overview on different watching patterns adopted by users: from traditional way to watch the TV

and video content (“TV Couch Traditionalist”: broadcaster TV via traditional TV screen) to new practices that are growing (as “Screen shifter” and “Mobility centric”).

Certainly, there are some differences in the demographics between the groups, for example, 35% of “TV Couch Traditionalists” are aged 50–69, compared to 15 percent in the overall sample and in contrast, “Mobility Centric” have a 14 percentage-point over-representation of people aged 16–24.

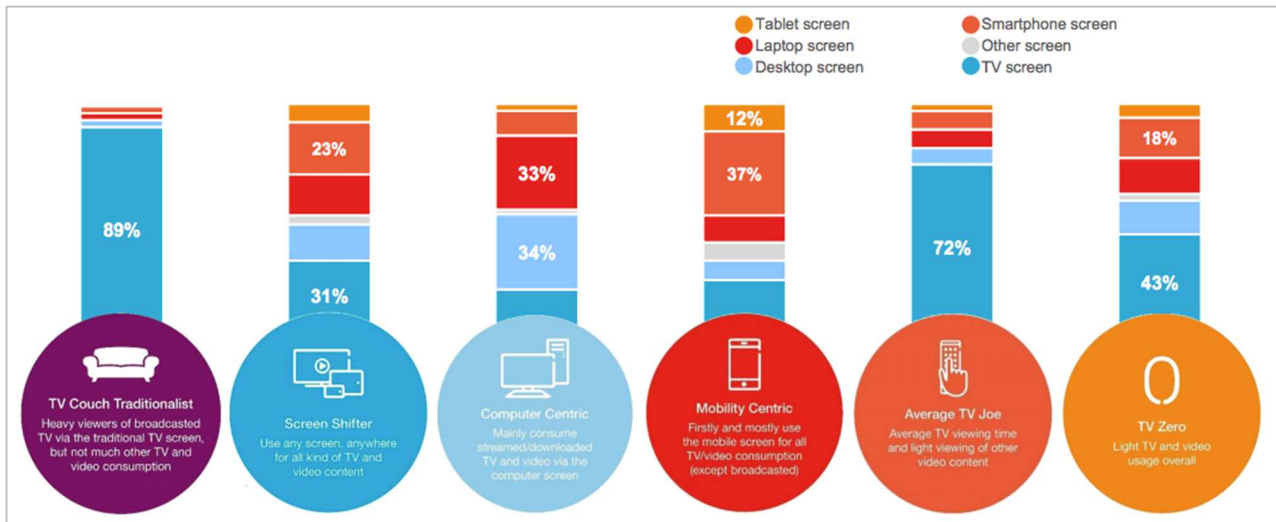


Fig. 5 Definition of TV-user groups based on total weekly TV and video active viewing time spent on each device/screen [self-reported] *source Ericsson

The new global widespread habits and needs of consumers, regarding video and TV content consumption, lead to a first consideration: the video experience is no longer constrained by schedules, location, devices or a narrow choice of content.

3.2.2. Creation

The first preliminary consideration is that *content is (still) the king*. In the mentioned Ericsson’s study over 70% of consumers agree that content and price remain at the top of their priority list when evaluating new TV services.

Content providers are increasing their investment in original video. For example, Netflix announced an increase in its content budget for 2018 to between \$7.5 billion and \$8 billion, up from \$6 billion in 2016. It is evident that original contents, and their quality, are strategic and their availability will make the difference for consumers when they decide to subscribe a service.

It is important to consider that the digital shift has changed how people watch TV or video content and, consequently, it has changed the process of content creation itself.

Today, content’s creation process must take into account the new practices of consumption since user behaviour and consumption (especially among younger users) trend more toward social media, mobile devices and streaming. Contents delivered should be more “spreadable” [7] among the different media and available devices. Multi-screening practice (during the view there is a compresence of multiple screen and devices), alongside the social networking activities related (or not) to the TV content (sharing the viewing experience and TV contents - the so-called Social TV), have completely transformed the way of content creation.

It is what Henry Jenkins have defined *Transmedia storytelling*: “Transmedia storytelling represents a process where integral elements of a fiction get dispersed systematically across multiple delivery

channels for creating a unified and coordinated entertainment experience. Ideally, each medium makes its own unique contribution to the unfolding of the story⁹.

It's important to highlight that television, and its content, are still the key driver of social conversation and interaction [8]. At this point it is strategic, for broadcaster, to carry out social media strategies for TV content, able to engage audiences on the different social media platforms.

A consequence of this new process of content creation and media convergence, able to create a high level of audience engagement, is the arise of form of content co-creation: "Viewers increasingly want to be a part of the experience. Content producers will need to convince the creative community of the merits of choice-based stories, and the IT community of making it technically scalable and cost effective¹⁰". It is the fulfilment of the transitions, for viewers, from "consumer" to "producer", realizing a new hybrid form of empowered category of users, the *prosumers*.

3.2.3. Distribution

The various TV consumption practices emerged in the last years have had an inevitable impact also on the distribution mechanism and have affected how TV is made.

To better understand how TV content distribution is changing, it's necessary to give an overview of the actual consumer's home configuration. The current setting of "connected living room", in fact, allows to analyse how and in which way consumer needs, different digital devices, linear television on one side, and new forms of content and new channels of distribution on the other, have met.

The modern living room is the most popular location for several, diversified and connected media devices, from mobile to ones that allows consumers to deliver content from the Internet.

An interesting study [9] (involving the U.S. market¹¹) illustrates that today multiple screens on which to stream video content at the same time and in the same place are available for consumers: computer, smartphone and tablet and devices which allow on demand television content delivered via streaming over the internet (OTT) such as: smart TV, streaming players (such as Apple TV, Roku, Chromecast, Amazon, Fire TV), or gaming console.

Streaming box and stick devices like Roku (the largest player highlighted in the U.S. market), Amazon Fire, Chromecast, are propelling the OTT category forward, allowing new choice to consumer and new distribution for program and channel owners.

Fruition of Internet-based video content on TV is increasingly a daily habit, and connected TV are becoming widespread. Smart TVs allow streaming of digital video and enable new forms of interaction and convergence of contents and technologies. It is important to highlight that Internet-based TV contents are available also through gaming console, enough mainstream in the household environment.

According to *The state of video* report, connected TV and OTT represent an expanding part of how viewers consume television contents. As the study affirms, it is possible OTT will become the dominant form of distribution by the middle of the next decade.

⁹ http://henryjenkins.org/blog/2007/03/transmedia_storytelling_101.html

¹⁰ <https://www.wired.com/insights/2013/12/six-trends-directing-future-television/>

¹¹ American market data are used as an example of market that forecast global technology trends

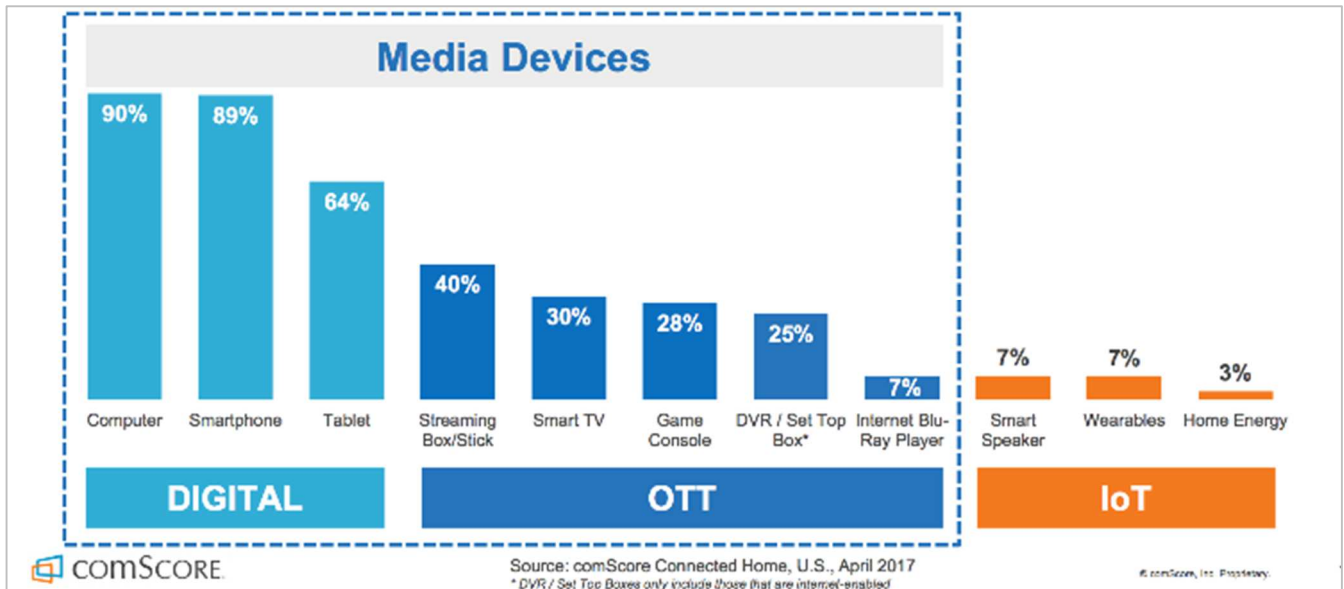


Fig. 6 Connected Home device penetration among U.S. Wi-Fi households *source ComScore

Furthermore, in the era of “ubiquitous computing” paradigm [10], consumer’s home is increasingly becoming “Smart home”, through the opportunity to easily create a network of physical devices, home appliances and other items, embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data (Internet of Things).

Connected home, made up by the Internet of Things (IoT) ecosystem, allow users to interact across devices in household environment. It follows that the living room (see Fig. 6) is the location of other kind of devices, such as smart speakers (Amazon Echo, Google Home, Apple HomePod, etc.).

These Smart home devices enable other forms of interaction with TV and video content, for example assisting users in watching, or finding contents through intuitive and natural speech [11].

Direct consequences of the growth of connected devices inside the modern living room is the increase in:

- multi-screening practices;
- TV contents delivered over the internet;
- devices enabling users to interact with TV.

This new “home setting”, together with the emerging needs for broadcasters, operators, STBs and TVs Multisource providers to find a shared standard for distribution of contents and services, have allowed the rising of international standard for interactive TV as HbbTV. Hybrid broadcast broadband TV (HbbTV) is a global initiative aimed at harmonizing the broadcast and broadband delivery of entertainment services to consumers through connected TVs, set-top boxes and multiscreen devices. The HbbTV specification is developed by industry leaders to improve the video user experience for consumers by enabling innovative, interactive services over broadcast and broadband networks. The specification uses elements of existing specifications from other standards including OIPF, CEA, DVB, MPEG-DASH and W3C. HbbTV brings a range of new possibilities to consumers through broadcast-related application¹².

3.2.4. Interaction

Availability of digital mobile devices and broadband connection are changing how audiences interact with and consume video content. It is important to point out that the interaction experience between

¹² <https://www.hbbtv.org/overview/>

users and the TV content must consider the technological platforms involved in the fruition process, and the quality of user experience. Watching TV today means, indeed, moving across different digital devices in different ways, so that the consistency of experience has to be guaranteed. Besides this, it is important to consider the sequential usage of fruition devices, because users move from one device to another at different times.

Furthermore, *multi-screening* practice is now consolidated: consumers use more than one device at the same time for activities either related or unrelated to audio-visual content viewing.

In the next years a more immersive experience of interaction with audio-visual contents will be designed both by content and technology provider.

Following are specified the leading trends regarding the future interaction experience to consider.

3.2.4.1 Virtual reality

The expected presence of VR experience in the TV's future is foreseen by analysed digital trend research. The Edelman' report [12] observes how "out of home experience" of virtual reality (as airports, shopping centres, landmarks, gaming) will educate consumers on how impactful immersive content can be. Consumers are becoming more educated on virtual reality.

As also affirmed in The Economist special report *Winner takes all*¹³ (2017) "the best time to gain (or lose) audience - and to challenge the dominance of an established platform - is when technology makes a leap. That is why media, gaming and tech companies are investing billions in virtual reality and augmented reality. Such technologies can change the way that people experience storytelling and persuade them to suspend disbelief".

The already mentioned Ericsson's report (TV and Media 2017, 2017) advises that VR is starting to arrive in people's living rooms. Most VR headsets available today were released within the last 2 years, yet 10 percent of consumers are already using a VR device, and over 25 percent are planning to get one. Even though VR headsets are mostly tied to gaming today, 30 percent of consumers say that they will use VR for TV and video viewing in 5 years' time.

3.2.4.2 Image recognition

Another important trend registered in the interaction practices is the growing use of image recognition for quicker and easier interactions.

The image is the centre of a culture based on the "visual": smartphone use, cheaper cameras, social networks (Facebook, Instagram, Pinterest, Snapchat etc.), exposed people to an increasingly number of photo and video daily. Supported by the development of deep learning techniques, computers can "read the word" [13] interpreting images, video or code.

Image recognition enables a new form of input information for computers. In the context of machine vision, it is defined as the ability of software to identify objects, places, people, writing and actions in images. To achieve image recognition, machine vision technologies are used in combination with a camera and artificial intelligence software.

The drivers of digital media market (Google, Facebook, Microsoft, Apple and Pinterest) are among the many companies that are investing significant resources and research into image recognition and related applications.

According to the analysis of market trends, images will be increasingly used for a variety of purposes, the most important are contributing to realize interactive media and enhanced access capabilities (i.e. to find, record, unlock, activate, identify, match, buy etc.), especially for the visually impaired people.

The key primary areas of development are:

- **Visual Search:** using images to search instead of using text as the input to search;

¹³ <https://www.economist.com/special-report/2017/02/11/mass-entertainment-in-the-digital-age-is-still-about-blockbusters-not-endless-choice>

- **Facial Recognition:** identify people faces through more powerful cameras added to smartphones;
- **Scanning Codes:** providing fast links for identification, payments, personalized offers or easy access to entertainment and media content.

3.2.4.3 Speech interaction

As seen so far, today consumers have many devices at their disposal, often these technological objects are present in the same place (the living room) and are connected.

According to *MINDSHARE trends 2018*, in the future it is expected that the access to different devices will increasingly be done by voice through the help of Intelligent Personal Assistant. Consumers will be moving from clicks to conversations, from individual apps to synchronous experiences, from latent actions to predictive intelligence.

Currently consumers are aware of voice search functionality, they are accessing it daily in different environments and situations. Regarding the interaction with TV contents, voice search functionality expands across multiple devices in the living room, including TV remotes, iPad/tablets, smartphones and smart home devices.

Smart speakers are a kind of smart home device coming into the market with some success: Google Home and Amazon Echo grow in popularity and will increasingly be common devices in the consumers' home. Intelligent Personal Assistants (IPAs) like Google's Assistant, Amazon's Alexa, Apple's Siri, Microsoft's Cortana, Alibaba's Duer, are currently integrated into Smart speakers and also into different devices as smartphones and tablets and actually voice search is becoming a routine for users.

In the *TIVO video trends report's* findings, given to users the opportunity to use voice commands to perform tasks (i.e. find something to watch on TV) and to have a sort of "conversations" with the set-top-boxes, is a must-have feature for TV device and content providers.

3.2.5. Personalization

One of the main pillars of the EasyTV project is the centrality of user's preferences through the personalization of the content experiencing (EasyTV proposal p. 4).

In the current digital media scenario personalization is a key topic. Actual actors of personalization activities and processes are both consumers, through their direct choices of consumption, and broadcaster/content provider, through the analysis of data provided by users. In the E&M industry, indeed, "data is evolving into a form of currency" (Perspectives from the Global Entertainment and Media Outlook 2017–2021, 2017) and his principal value is allowing companies and broadcasters activities of personalization, customization and segmentation addressed to consumers.

Therefore, there are two prospective from which observe the personalization of the audio-visual viewing experience, but it emerges that currently the key issues to overcome for users and broadcasters are the same: *fragmentation* and *content discovery*.

3.2.5.1 Within the fragmentation

With the advent of more affordable technology now than ever, new broadcast platforms are launched by telecommunication company, small media company and some non-traditional media players.

This means the availability of abundant content resources for consumers.

Free from the time and space constraints of the traditional and linear TV, consumers today, beside the making of a personal daily TV program schedule, create their own "channel" made by different kind of content coming from several distribution channels (linear TV, on demand, OTT etc.).

When possible, users create their own profile setting their preferences or they are automatically profiled by systems on the different platforms.

However, fragmentation of platforms (each with its own interface and pattern of interaction), leads to a more fragmented user experience. For this reason, it is foreseen that a growing need by users will concern the integration of platforms to search and move among all contents in a fully integrated solution that gives viewers the ability to find and access multiple video services (Online Video and Pay-TV Trends Report, 2017).

3.2.5.2 The content discovery crisis

The access to more content than ever, represents an opportunity for consumers, but, at the same time, the platforms and offer fragmentation, corresponds to a threat for them: they are struggling to find something to watch. Content discovery is becoming a challenge: “So much content, so little time”. According to Ericsson study (TV and Media 2017, 2017) consumers spend every day nearly an hour searching for content on scheduled linear TV and on video on-demand services.

Content discovery is a challenge also for broadcasters called to improve content discovery functionality to help viewers find something to watch on TV. Collecting data of user behaviour enables companies to further refine, target, and engage their core audiences in ways that delight (Perspectives from the Global Entertainment and Media Outlook 2017–2021, 2017).

In this regard, the use of data, Artificial Intelligence (AI) and machine learning is a point of attention for the next coming years with the purpose of analysing and predicting human behaviour. Through algorithms, broadcaster platforms will increasingly shape and guide the decisions of consumers with more adequate and personalized recommendations, and they will improve search functionality, affecting viewer engagement and satisfaction.

3.3. New business strategies

As emerged, audience (or better “the audiences”, as resulted by fragmentation) now has empowered by the ability to enjoy TV content how, when and where they want. Moreover, they can decide how much they want to pay for it among a variety of offers.

Companies and broadcasters are moving in a marketplace that is increasingly competitive, slower-growing and dependent on personal recommendations. They must develop strategies that engage, grow, and monetize their most valuable customers (Perspectives from the Global Entertainment and Media Outlook 2017–2021, 2017). Big and small players, old and new media companies, will fight for market share and subscribers, and it will become increasingly a challenge to develop successfully business, strategy and product.

Some principal aspects, illustrated below, must be considered for the design of affective business strategies.

Firstly, the *Long tail* phenomenon must be considered. In the book “The Long Tail”, published in 2006, Chris Anderson observed that the internet has opened to potential markets for any niche product. Starting from this consideration, market’s niches are a model to be considered also for the digital media market since there is evidence that fragmentation arises, not only in terms of platforms multiplication, but also appearing regarding consumer segments. Consequently, to this target segmentation it will correspond an increase in “niche broadcast services”.

There will be more launches of services that target only a certain segment of the market. Evaluating the current trend, it seems that “diversity” is conceived as an opportunity¹⁴, so that probably these niches can be along demographic lines, ethnicity, interests, behaviour, etc. Content produced for different niche communities, or related to specific thematic areas, will find more easily audience acceptance and, hence, will communicate to customers an added value of the product.

In fact, a central issue and challenge in a long-tail economy model is not only to actual meet the needs of target segment but also to reach the final audience among a wide offer.

One of the argumentation of *Economist’s report* is referred to this theme “there is almost no limit to the supply of entertainment choices in every category, but people’s awareness of these products and their ability to find them is constrained by the time and attention they can spare. Overwhelmed by the abundance of choice, they will generally buy what they are most aware of”¹⁵.

As well as the consumer’s self-schedule phenomenon, the long-tail segmentation of multimedia market represents a threat to consider for companies and broadcasters (Mike Rich, 2017) to turn it into an opportunity of business.

As suggested in the PWC report (Perspectives from the Global Entertainment and Media Outlook 2017–2021, 2017), two further aspects must be considered for new business strategies: *Fan-centric businesses* and *Improve user experience through emerging technologies*.

In the article “How to Make Entertainment and Media Businesses “Fan-tastic”, by Christopher Vollmer, he affirmed: “In today’s hypercompetitive landscape, entertainment and media businesses designed around and for fans command multiple strategic advantages. They know more about who their users are, what they want, and how and where to deliver it. Fans spend more per capita and are less likely to churn. Today’s fans recruit tomorrow’s ”¹⁶.

Making businesses that are fan-centric means capturing the strategic advantages from audiences that are more engaged, are more committed, and spend more per capita. To achieve this goal some points are strategic:

- *Know who the fans are*: be able to distinguish fans from casual users and analyse the relative

¹⁴ <http://www.globalmediaconsult.com/television-dark-times-industry-trends-2017/>

¹⁵ <https://www.economist.com/special-report/2017/02/11/mass-entertainment-in-the-digital-age-is-still-about-blockbusters-not-endless-choice>

¹⁶ <https://www.strategy-business.com/article/How-to-Make-Entertainment-and-Media-Businesses-Fan-tastic?gko=3a2bc>

value of different audience or user segments;

- *Increase business agility and flexibility*: respond faster to new user preferences, new business models, and recent technologies;
- *Monetize the total fan relationship*: identify new revenue opportunities;
- *Adopt a user-/fan-centric focus*: adopt a direct-to-consumer strategy delivering end-to-end experiences directly to users, consumers, and fans.

The last main aspect to consider, because of his impact on business strategies, is improving user experience through emerging technologies. A great User Experience (UX) is a key factor to engage and delight consumers in new ways. Furthermore, increasing engagement and attention lead companies and broadcasters to get more data and, consequently, more understanding about what customers want. As part of a virtuous circle, from these users' insight the experience can be further improved.

4. EUROPEAN BROADCASTER SCENARIO

The previous digital media market analysis has allowed to identify the main trends regarding the creation, fruition, distribution, interaction, and personalization of digital media content, especially television contents.

In general, it emerges that the “television experience” has changed in the last years, but it is still, and increasingly, a central activity in people’s lives. This consideration corroborates the importance of the prime motivation of the EasyTV project: “the necessity of equal access to television and audio-visual services so to ensure that all users, especially persons with various degree of disabilities including sight and hearing, the growing ageing population of Europe, and users with special needs, could derive maximum benefit in terms of choice and quality of media content and services” (EasyTV proposal, p. 3).

For this reason, it is important to examine what the Media industry, and broadcasters, offer in terms of availability of audio-visual services targeting users with disabilities.

To conduct an analysis able to be useful for the development of the EasyTV project, and, secondly, to provide a wider and deeper overview on EasyTV target’s needs and challenges, the present analysis will focus on the European scenario.

Particularly, the European policies and broadcasters’ actions regarding the accessibility improvement of audio-visual media products and services will be identified.

4.1. EU policies for accessibility of Audiovisual media services

The content and media sector play a key role that is economic, social and cultural. For this reason, globally, audio-visual media content, and their providers, are subject to certain rules. Furthermore, recent developments into the audio-visual landscape have posed several legal, economic and technical issues.

Since content industries are both crucial to cultural diversity and economic development, in Europe the European Commission has assumed the role to put in place the ideal conditions and regulations to create a single market for audio-visual media services.

International agreements and constraints in the Audio-visual sector play a key role on how the European Union and the member states develop this policy and frame as well the options to cooperate with third countries¹⁷.

The first framework of minimum common rules for EU-wide television broadcast regulation was provided by the Television without Frontiers (TVWF) Directive in 1989. In 2010, the TVWF directive and its subsequent 1997 and 2007 amendments were incorporated into a single text, the *Audio-visual Media Services Directive (AVMSD)*, which is at present the cornerstone of media regulation in the EU¹⁸.

To follow the evolution of the audio-visual market, on 25th April 2017, the European Parliament’s Committee on Culture and Education voted to amend the proposal for an updated EU Audio-visual Media Services Directive, presented by the Commission in May 2016.

The European Union’s audio-visual and media policy, and more particularly the *Audio-visual media services directive*, aim to ensure they can circulate freely and fairly in the single European market, regardless of how they are delivered (traditional TV, video-on-demand, internet, etc.)¹⁹.

¹⁷ <https://ec.europa.eu/digital-single-market/en/international-dimension-audiovisual-policy>

¹⁸ http://www.europarl.europa.eu/RegData/etudes/BRIE/2016/583859/EPRS_BRI%282016%29583859_EN.pdf

¹⁹ https://europa.eu/european-union/topics/audiovisual-media_en

Among the objectives of the *Audio-visual media services directive*, each European Union country is encouraged to follow minimum standards for accessibility: media companies should make their audio-visual content accessible to people with visual or hearing impairments.

Sight- and hearing-impaired persons as well as elderly people should be able to participate in the social and cultural life of the European Union. Therefore, they shall have access to audio-visual media services. Governments must encourage media companies under their jurisdiction to do this by *sign language, subtitling, audio-description or easily understandable menu navigation*²⁰.

Member States were required to transpose the AVMSD in national legislation by 2009. While all European Union countries have notified transposition measures, issues of implementation are still ongoing in some countries.

The changes in the new proposal of AVMSD provide that the provisions on accessibility are deleted with reference to the proposed *European Accessibility Act* which sets accessibility requirements for a wide range of products and services including AVMS.

The proposed Accessibility Act is intended to set common accessibility requirements for certain key products and services that will help people with disabilities at European Union level to participate fully in society [14]. It aims to improve the functioning of the internal market for accessible products and services by removing barriers created by divergent legislation. This will facilitate the work of companies and will bring benefits for disabled and older people in the EU²¹.

Among the products and services covered by the Accessibility Act there are specifically:

- TV equipment related to digital television services
- Audio-visual media services such as television broadcast and related consumer equipment

The Directive will tell “What” needs to be accessible in terms of functional requirements but will not impose detailed technical solutions telling “How” to make it accessible, allowing for innovation.

Furthermore, according to the purposes of the European Commission, the initiative will generate growth of market opportunities for businesses, developing accessible products and services.

Moreover, in the last years the European Commission has proposed other important initiatives regarding accessibility of Audio-visual media services. For example, it introduced the necessity for a more efficient funding for, and use of, subtitling and dubbing by public funds. In 2015 and, later, in 2017, the Commission launches a €1 million call for proposals to find innovative solutions for film translation and for tracking language versions of films.

The aim is to increase the availability and circulation of European films by reducing the costs of subtitling and making better use of public funding for film translation²², more specifically:

- a) Find innovative solutions for high-quality film translation (e.g. crowdsourcing, machine translation etc.). These innovative solutions/processes/models should be applied to a curated catalogue of European works which should be then made available to VOD services;
- b) Enable tracking of language versions of films online and enable service providers (e.g. VOD services, catch-up TV services or cinemas) to easily find the language version of their choice.

4.2. EU Public Service Broadcasters

Starting from the European directives, almost all EU countries have introduced rules effecting on accessibility of audiovisual media services for people with disabilities.

The implementation of rules, however, follows different paths. While some Member States have detailed self-regulatory rules, others have only very general provisions, or limit the accessibility

²⁰ <https://ec.europa.eu/digital-single-market/en/content-distribution-rules-avmsd#accessibility>

²¹ <http://ec.europa.eu/social/main.jsp?catId=1202>

²² <https://ec.europa.eu/digital-single-market/en/news/preparatory-action-crowdsourcing-subtitling-increase-circulation-european-works>

obligation to the services of Public Service Broadcasters. For this reason, focusing on Public Service Broadcasters means identify the subjects of media industry more involved by European regulation regarding accessibility interventions.

The report *Access Services Pan European Survey 2016*, conducted by EBU (European Broadcasting Union) gives an overview of the situation in Europe with regard to public service broadcasters providing accessibility services to people belonging to minorities or with disabilities.

As the document explains, in recent years the demand for access services is growing, thanks also to new national and international standards. The provision of these services does not depend only on the broadcasters. In fact, broadcasters, who try to provide this type of services, must face daily issues of costs and technological solutions that the market offers.

The research was carried out between May and September 2016, covering 4 key areas, namely:

1. *Subtitling*
2. *Audio subtitling*
3. *Audio description*
4. *Signed programs*

Data were collected on 36 broadcasters distributed in 24 markets (Fig. 7).

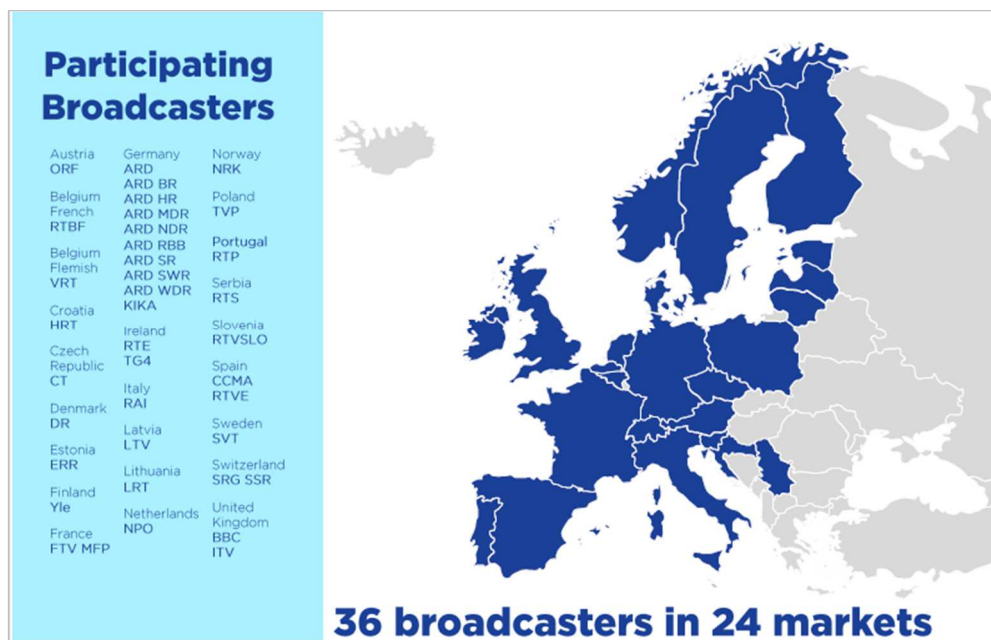


Fig. 7 Broadcasters participating in Access Services Pan European Survey 2016

The document can help to answer many questions about access services produced by European public broadcasters and to make an analysis of the actual European situation.

It is possible to understand, for example, how these services are outsourced, how they are distributed, how much budget is allocated to these activities and how broadcasters offer part of their programs.

In general:

- 72% of the broadcasters outsource their access services and most of these are subtitling services, immediately followed by audio description, signing and live subtitling services;
- only the remaining 28% produce in-house contents;
- on average, only 0.44% of the budgets of the PSM Organizations are destined to the production of accessibility services;
- 89% of broadcasters offer part of their programs as VOD (Video On Demand) and 67% of

these have a HbbTV app (or connected TV) and offer part of the programs on demand.

Analysing the areas taken into consideration, it certainly emerges that the subtitling is the most offered access service by European broadcasters and that they prefer to spread the content on their own websites instead of on external platforms.

The request from the associations of the hearing and associations of the blind, however, is to spread the access services on all the devices.

Many countries are certainly more advantaged than others, but the **limits of resources** are a huge obstacle. The intent of broadcasters is certainly to predict in the coming years the exponential increase in access services.

1. Subtitling

The addition of subtitles to a program is the service most offered today in Europe. In fact, 100% of the interviewed broadcasters of this survey deliver subtitled programs on own website.

On average, public broadcasters deliver subtitles on over 66% of programs, half of broadcasters on 80%. Some are committed to subtitling 100% of all content while other broadcasters have more limited resources, and this is one of the most important obstacles to the growth of this kind of services despite the request is very high.

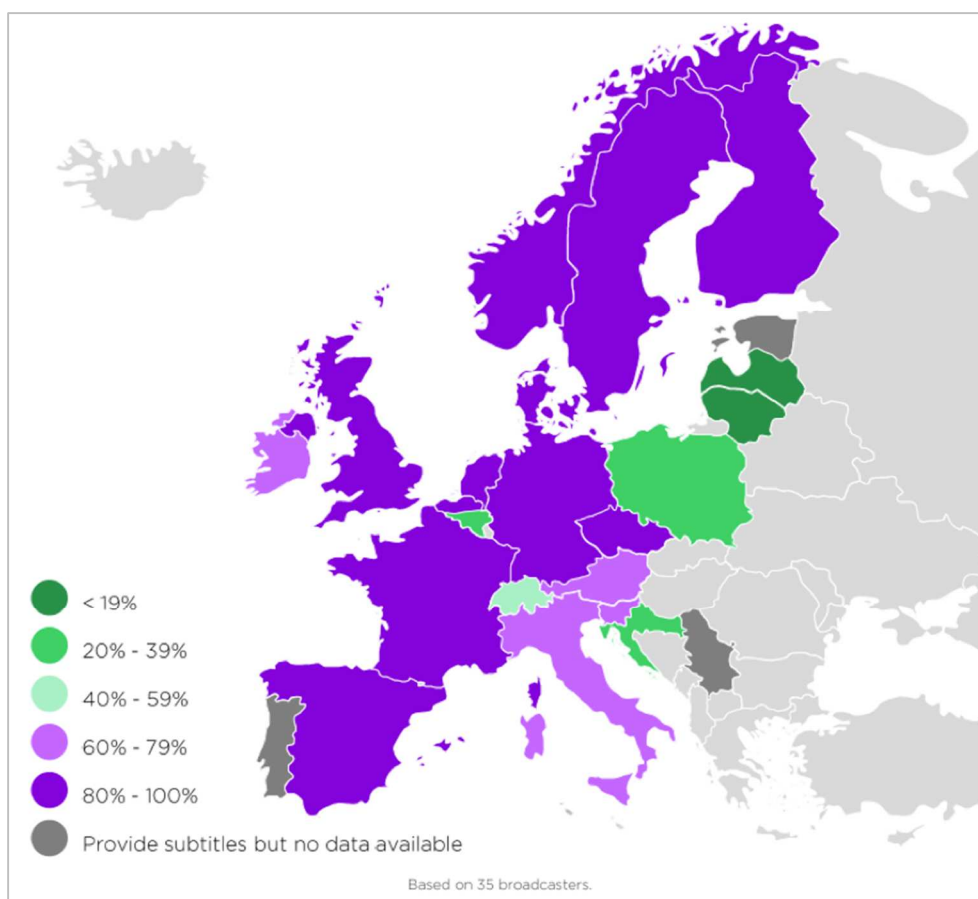


Fig. 8 Percentage of total programmes with subtitles

The most relevant data in this area are:

- the concentration of issuers that subtitle content is in the north-west of Europe;
- all PSM Organizations make subtitles available on their websites. Not the same for external platforms on which instead there is a decline (HbbTV, VOD and mobile devices);
- only 1/3 makes them available on social networks;
- in 87% of countries surveyed associations of the hearing impaired have requested or demanded subtitles on all devices.

2. Audio subtitling

The audio subtitling is the service less offered in Europe. In fact, only 8 of the 36 broadcasters interviewed offer it.

There are many differences between the interviewed broadcasters. For example, Nordic and Belgium Flemish broadcasters offer almost all programs with audio subtitling, in contrast to Spanish broadcasters that offer less than 19% of programmes.

Another data to underline is the availability of content on the platforms. In fact, only 2 out of the 36 broadcasters have made audio subtitles available on online platforms (own website, mobile devices, HbbTV). About 3 broadcasters intend to provide it in 2016.

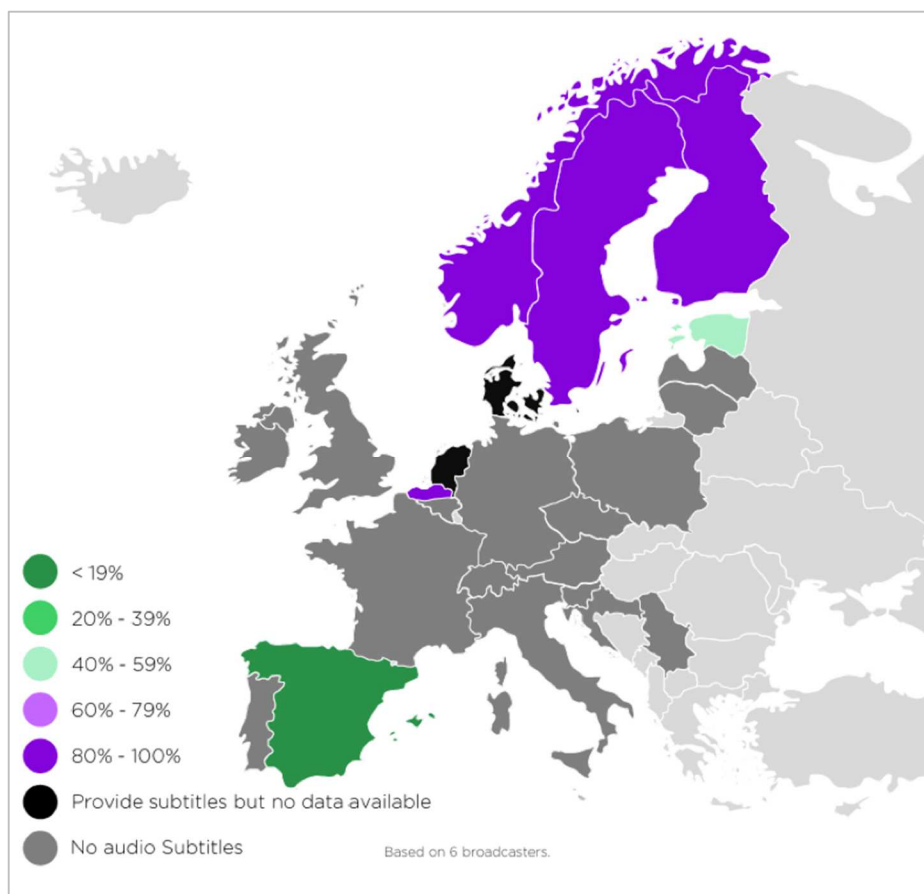


Fig. 9 Percentage of total programmes with audio subtitles

3. Audio Description

Audio description is widely provided from broadcasters. In fact, 30 out of interviewed broadcasters offer this service. Broadcasters that do not offer this service are mainly located in northeaster Europe. In Ireland RTE offers audio description, TG4 does not.

In general:

- audio description is deliverable only on 13% of their total numbers of programs. England, Spain, Germany and the Czech Republic are the countries that mostly do this;
- own website and mobile devices are the most used platforms for audio description;
- 25% of interviewed broadcasters have not audio description available online. 4 broadcasters intend to provide it in 2016;
- in 50% of the interviewed countries, the associations of the blind have requested or demanded audio description on all devices;

- 72% of selected countries think that it's very important to deliver audio description on HbbTV and other connected TV services;
- pre-mixed is the most common method used to deliver audio description, followed by receiver-mix, but in a much lower percentage.

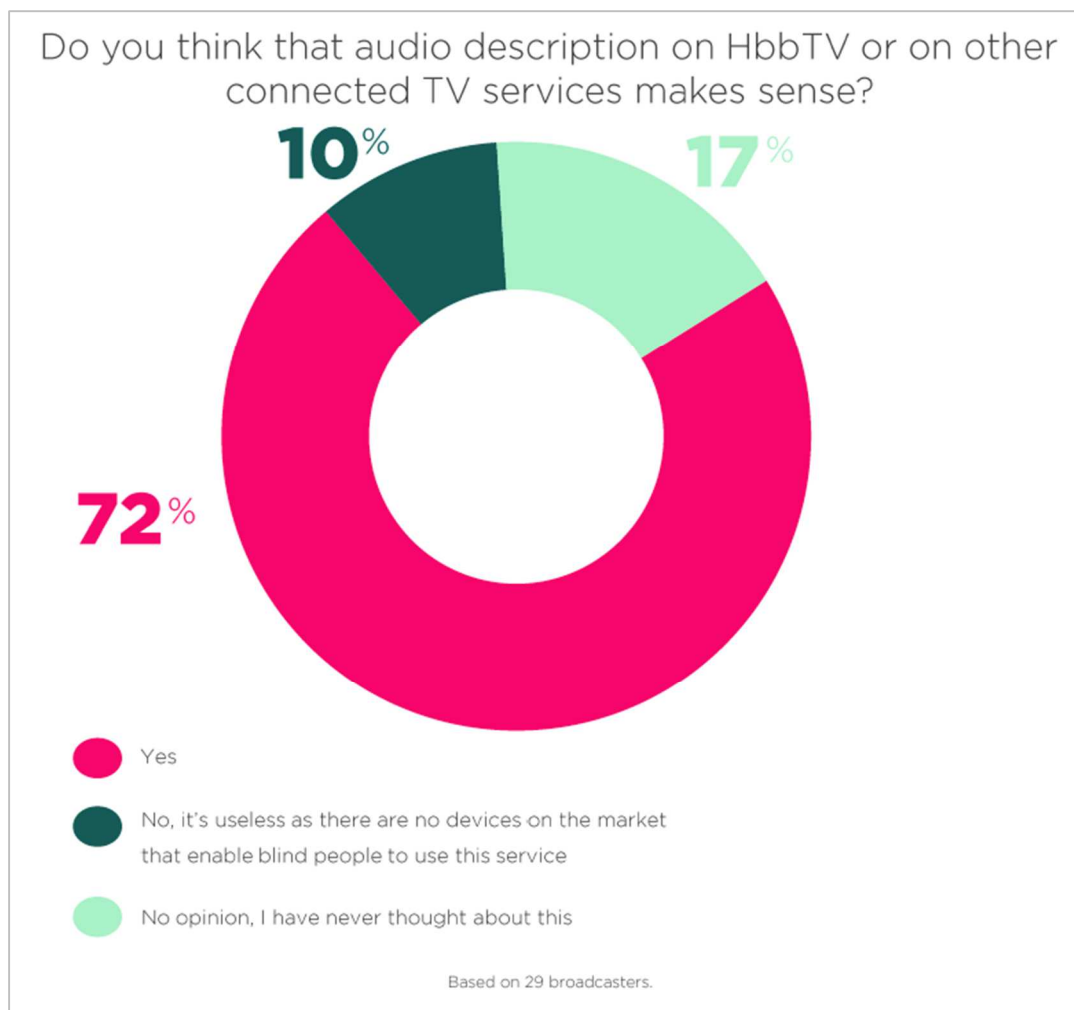


Fig. 10 Audio description on HbbTV or on other connected TV service

But, the most interesting data concerns the availability of such content: nobody is using it on social networks.

4. Signed Programs

Signed programs are provided from 32 out of interviewed broadcasters.

In particular:

- in Ireland RTE offers audio description, TG4 does not;
- in Germany ARD offer signed programs but not from all regional broadcasters;
- France offer signed programs, but data are not available;
- in Denmark, however, around 18% of programs are signed.

On average, public broadcasters deliver sign language on 4% of programs and in over half broadcasters less than 4% of programs are signed.

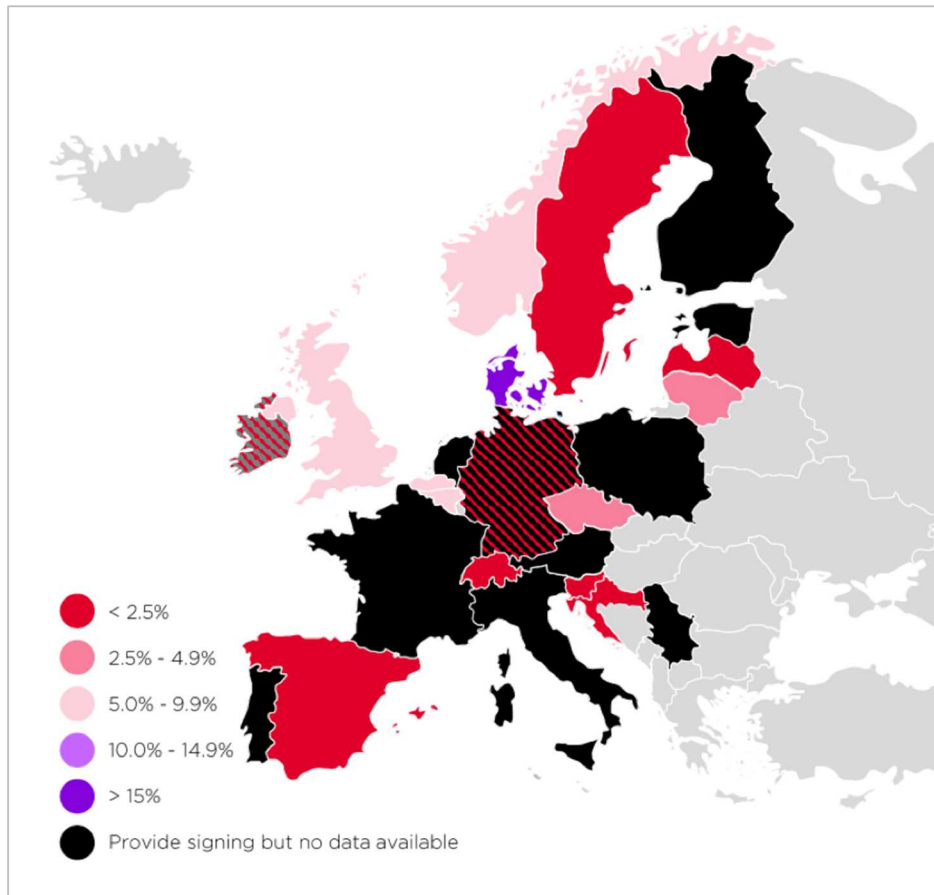


Fig. 11 Percentage of total programmes with signing

In conclusion:

- in all countries, the main public broadcasters make a signed daily news program available;
- in addition, other types of sign language programs are offered, such as special programs, children's programs, entertainment programs, sports and documentaries;
- 90% of broadcasters make sign language programs available on their websites, mobile devices and HbbTV.

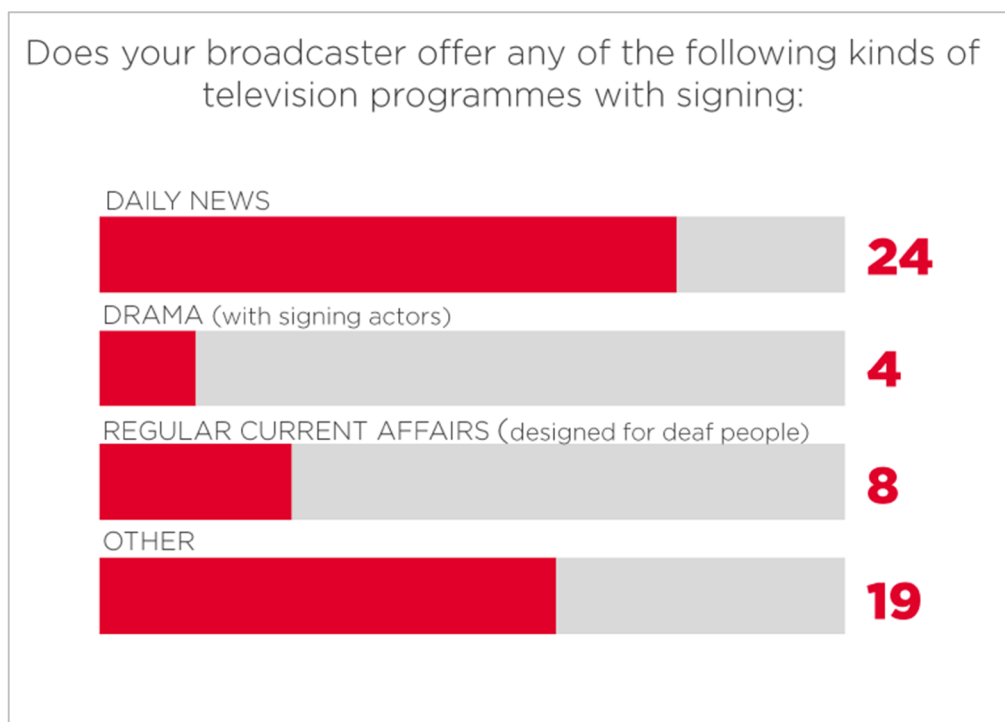


Fig. 12 Kinds of television programmes with signing

In conclusion, for the European Broadcaster the most important **challenges** to win are:

- Costs
- Engagement of the on-line services providers with the accessibility
- Access service online
- Switch over to digital

Difficulties for delivering access services in the next years are foreseen to come from financial cuts of 17 broadcasters (55%).

Other aims of the member's organizations are:

- *Enhance awareness in their organizations*
- *Improve quality of access services*
- *Anticipate the impact of an ageing population*
- *Beware the constant change of technology*
- *Increasing quotas and regulations*

Other foreseen developments are:

- *Read me button on websites*
- *Easy-to-read content*
- *Font size options*
- *Slowly spoken language*
- *App with inclusive access*
- *Accentuate an easy accessibility*
- *Personalized subtitles on HbbTV*

As displayed by the mentioned study, the demand for accessibility services is growing significantly in recent years.

However, there are many difficulties encountered by public broadcasters, such as high costs and technological supports that do not live up to the situation. Certainly, there are more advantaged markets but not enough.

The main services chosen for the survey (*Subtitling, Audio subtitling, Audio description and Signed programs*) are unfortunately not guaranteed by all public broadcasters.

However, many are the objectives that the members of the organizations have set themselves, such as enhancing the awareness, increasing the portion of accessible content, and improving regulations.

5. ASSISTIVE TECHNOLOGIES SCENARIO

The World Health Organization (WHO) defines **Assistive technology** as an umbrella term covering the systems and services related to the delivery of assistive products and services. It refers to any product that has the purpose to maintain or improve an individual's functioning and independence to facilitate participation²³. Furthermore, assistive technologies can enhance the health and well-being of a person and their family, as well as broader socioeconomic benefits.

According to WHO, globally, more than 1 billion people need one or more assistive products. With an ageing global population and a rise in non-communicable diseases, more than 2 billion people will need at least one assistive product by 2030, with many older people needing two or more.

The increasing aging population, together with the support of government initiatives and independent agencies, are impacting on the growth of elderly and disabled assistive devices market.

The global elderly and disabled assistive devices market was valued at \$14 billion in 2015 and is expected to surpass \$26 billion by 2024²⁴.

To better understand the assistive technologies scenario for the two main target users of EasyTV, as *Blind* and *Deaf* people, a deeper analysis on these two segments has been led, focusing on:

1. *Solutions*
2. *Competitors*
3. *Market drivers*
4. *Customers habits and relative needs*

5.1. Blind

5.1.1. Solutions

The low-vision products are classified into several types. Below there is a list of product categories²⁵. Some products fall into more than one category, such as an electronic notetaker with speech and braille output that can also work as a braille display connected to own computer. Some products require another product to work; for example, a speech synthesizer needs a screen reader to tell it what to say.

- Accessible Mobile Apps
- Accessible Software
- Audible and Tactile Signs and Warning Surfaces
- Braille Printers
- Braille Translators
- CCTVs/Video Magnifiers
- Deaf-Blind/Multiple Disabilities
- Digital Talking Book Players (Hardware)
- Digital Talking Book Players (Software)
- Educational Technology
- Electronic Notetakers (Braille)

²³ <http://www.who.int/disabilities/technology/en/>

²⁴ <https://www.forbes.com/sites/tjmccue/2017/03/21/elderly-and-disabled-assistive-technology-market-to-surpass-26-billion-by-2024/2/#2ed5fced2d0b>

²⁵ Source *American Foundation for the Blind*

- Electronic Notetakers (Speech)
- Games and Activities
- GPS (Hardware)
- GPS (Software)
- Household, Personal and Other Independent Living Products
- Lighting
- Low Vision Optical Devices
- Miscellaneous Speech Products
- Optical Character Recognition Systems
- Refreshable Braille Displays
- Screen Magnification Systems
- Screen Readers
- Speech Synthesizers
- Windows-Based Tutorials

The EASYTV project straddles some of these categories.

5.1.2. Customers habits and relative needs

Following a recent research (*"Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis"*, Bourne et al. Lancet Glob Health, 2017, globally, of the 7,33 billion people alive in 2015, an estimated 36,0 million were blind, 216,6 million people had moderate to severe visual impairment, and 188,5 million had mild visual impairment. The estimated number of blind people increased by 17,6%, from 30,6 million in 1990 to 36,0 million in 2015. This change was attributable to three factors, namely an increase because of population growth (38,4%), population ageing after accounting for population growth (34,6%), and reduction in age-specific prevalence (-36,7%). The number of people with moderate and severe visual impairment also increased, from 159,9 million in 1990 to 216,6 million in 2015.

Visually impaired users use the TV systems and contents, both alone or with family. They access usually by TV-sets, but also by mobile, tablet and PC, with a lot of difficulties/needs such as:

1. it's not easy to access the TV;
2. it's very difficult to use the remote control without audio feedbacks;
3. there is not enough audio description available, only few programs are described;
4. it's very difficult to change and tune to the specific audio channel;
5. it would be useful to have a standard button on the remote to activate/deactivate audio descriptions;
6. teletext is not accessible. It cannot be read. Would be useful to read teletext;
7. overlay text during live programs/adv/movie are not readable. It's very interesting to read aloud this information;
8. it would be especially useful to manage audio and video playback. Manage volume differently on every audio track; for example, it lowers the audio of the movie and increases the audio level of the description (text to speech) and so on;
9. it would be particularly useful to have the possibility to save the screen image or to stop the image on the screen to read well what the user is looking at.

5.1.3. Market drivers

Some of the main market drivers for the EASYTV business may be the following:

1. the accessibility gap still existing nowadays in the TV market and the strong added value of the EASYTV Platform to fill this gap;
2. the growing numbers of potential users, due to the increased longevity;
3. the growing needs to improve the accessibility to meet regulatory targets;

5.2. Deaf

5.2.1. Solutions

The CNSE Foundation identifies the following services of interest to deaf and hard of hearing people:

- *Image magnification*: face zooming, by which the system, based on an automated face detection algorithm, can enlarge the area where a face is detected. This is useful for hard of hearing people which need to read lips. Also, it is useful for deaf people who want to zoom the sign language interpreter window.
- *Image adaptation*: changing the subtitle parameters such as colour, font and size to increase their personal preferences.
- *Clean audio*: increasing the opportunities to hard of hearing for better speech understanding.
- *Sign language 3D realistic avatar*: using it to translate speech to sign language.
- *Crowdsourcing platform for sign language interpretation*: increasing the signs database available to use with the sign language avatar.

These services must be retrieved from different devices and platforms:

- Digital TV
- Live video streaming
- Mobile devices
- Web

5.2.2. Customer habits and relative needs

All evidence shows that deaf and hard of hearing people use the same technologies and with the same frequency as hearing people, perhaps even more because their need for access to information.

In Spain, a 'Survey on Disabilities, Personal Autonomy and Dependency Situations' reveals that watching television or DVD was the main activity they dedicated their free time, followed by sports and reading [22].

In USA, a survey about technology use among deaf and hard of hearing adults suggest that "individuals who are DHH make frequent use of smartphones such as iPhones, Androids, and Blackberrys (71.6%), as well as personal computers (PC) (70.9%)" [23].

Lastly, CNSE Foundation perceives that in recent years there has been an increase of video streaming (such as Netflix, HBO or Movistar+) and social media (Facebook primarily) use by deaf and hard of hearing people, but it wasn't proved.

5.2.3. Market drivers

The last CESyA²⁶'s report shows the increment of the subtitles in the bigger broadcasters' groups in Spain (CRTVE, Atresmedia, Mediaset, Vocento, Unidad Editorial). That denotes the interest about the accessibility in the broadcasters' companies so it is supposed that they will have interest in incorporating EasyTv technology²⁷.

Table 2. broadcaster and related services

Company	Services
36caracteres	Subtitle for cinema, television, theatre and opera
Agils Accesibilitat	Magnetic loop, braille, sign language translation, live transcription, audio description
APTENT	Subtitle, audio description, sign language translation, magnetic loop y cognitive accessibility
Aristia Producciones y Espectáculos	Audio description in films and theatre, subtitle
BANDAPARTE	Subtitles
Best Digital Group	Subtitles
CNSE Foundation	Sign language translation, sign guide and streaming
Edsol Producciones	Sign language translation, subtitles and streaming
Ilunion	Audio description and subtitles
IMAGINABLES, INC.	Subtitles in several languages for television, video and DVD
LASERFILM	Subtitles
M.Q.D.	Live subtitles, Stenotype and sign guides
Multisignes	Subtitles, audio description and sign language
Savinen	Subtitles for live events, video-digital and DVD
SDI Media	Subtitles and audio description
Sonygraf	Subtitles for video and films. Record sound, editing and postproduction
STENOTYPE ESPAÑA	Live subtitles
Subbabel	Audio description, subtitles, sign language translation, audio guide and sign guide
Trágora	Subtitles and audio description

5.2.4. Competitors

5.2.4.1 Image magnification

No projects or solutions are known for this service.

²⁶ CESyA is the acronym of Spanish Center for Subtitling and Audiodescription. More info: <http://www.cesya.es/>

²⁷ A full list of companies who works with subtitling and audiodescription can be seen here: <http://www.cesya.es/recursos/empresas>

5.2.4.2 Image adaptation

Between 2007 and 2008 INDRA and the Universidad Politécnica de Madrid (UPM) developed a project called 'ACANTO [29] full accessibility to digital TV' with the collaboration of the Universidad Carlos III, Drake Europe, CNSE Foundation and the ONCE²⁸ [15]. One of the goals in this project was the improvement of subtitling presentation for deaf and hard of hearing people as follow:

- Transparency level of the box on which the subtitles are displayed
- Screen position of subtitles
- Font size
- Font type

No efforts are known of the technology developed in this project after its ending.

On the other hand, between 2013 and 2016, a consortium of twelve European partners carried a project coordinated by Universitat Autònoma de Barcelona (UAB), called 'Hybrid Broadcast Broadband for All' (HBB4All), who evaluated the impact for the user to make selections of aspects of the subtitle presentation such as the font, the colours used, the location of the subtitles, the duration of subtitles and the temporal presentation style [16].

5.2.4.3 Clean audio

Between 2010 and 2013, a consortium of eleven partners from Europe carried a project called 'FascinatE' [17], in which one of his goals was to develop an "object-based approach that can be implemented within MPEG-H that can give users control of their audio mix and hence facilitate enhancements to be made for hearing impaired viewers".

The above-mentioned project HBB4All also offered users the possibility to adjust the dialogue intelligibility to personal preference and transmit clean audio enhanced streams by exploiting HbbTV 2.0 features [18].

5.2.4.4 Sign language realistic 3D avatar

In Spain, the most realistic 3D avatar ever known was developed in the framework of the project "Consignos, automatic sign language converter and player" lead by Indra in a consortium formed by Institute for the Spanish Turistic Quality (ICTE), the Universidad Politécnica de Madrid (UPM), the Universidad de Castilla-La Mancha (UCLM), Ambiser company and the CNSE Foundation [19] [20].

There are a lot of sign language avatars developed around the world, but all of them has the following issues:

- The lack of enough in-depth knowledge about the logical and internal functioning of sign languages. More linguistic researches are needed.
- The challenge of giving a hyper-realistic facial expression and body movements to the avatar, both of them crucial linguistic components.

A review of different sign language avatars can be seen in Wolfe et al. [21].

5.2.4.5 Crowdsourcing platform for sign language interpretation

No projects or solutions are known for this service.

²⁸ Spanish National Organization of the Blind. More info here: <https://www.once.es/otras-webs/english>

6. Business Model

Providing a business model for EasyTV is strategic: it allows both to make the project sustainable and exploit its innovation impact. Therefore, creating a business model for Easy TV means to achieve two main goals:

1. define a strategy to capture and generate value from the innovative solutions;
2. maximizing the project long-term impacts in technology, society and industry.

To describe the logic with which Easy TV will create, distribute and capture value, in the present document a second iteration on business model is proposed. It represents, in fact, a second proposal concerning the stage of the EasyTV project development. A business analysis has been developed based on the outcomes of the previous analysis related to:

1. European Broadcaster scenario;
2. the rising relevance of the Over-The-Top (OTT) players in the Digital Market Scenario;
3. assistive technologies scenarios;
4. the findings of precedent deliverables of the project (see D1.1 and D1.2).

Starting from this analysis, a business model has been defined to identify the more appropriate way for offering the EasyTV solutions and with the objective of increasing the active participation by a large constituency of stakeholders as well as at lowering the barrier of adoption.

EasyTV will be a newco that will deliver services to Broadcaster & OTT and Third-party service providers, primary in SaaS model. The big picture of the business model is depicted in the following diagram.

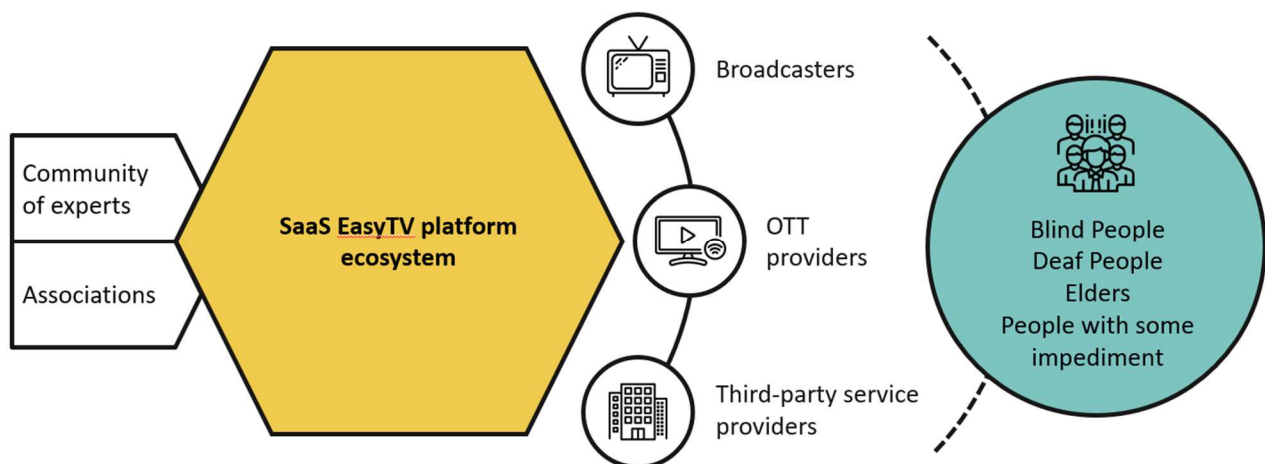


Fig. 13 Big pictures of the model

The diagram is divided into 4 sections, starting from the right:

1. **Contributors to the EasyTV system.** Experts and voluntary associations can contribute to the system through the crowdsourcing platform, which allows them to upload content accessible to end users;
2. **EasyTV platform.** The platform collects user contributions and make them available to Broadcasters & OTT and Third-party service providers to offer them to their own audience;
3. **Customers.** Broadcaster (small and medium) & OTT and Third-party service providers will provide services to their users buying the EasyTV services, in a B2B2C model. The main goals for the customers adopting EasyTV services are the improve quality of the accessible contents and saving cost to produce that accessible;
4. **End users:** Users will benefit from accessible content provided by their own providers, thanks to the support of the EasyTV platform.

Before delving into the general business model, the following chapter explores the approaches and mechanisms adopted by the platform to motivate experts and associations to collect their contributions in the crowdsourcing system.

6.1. Crowdsourcing engagement mechanism and approach

The crowdsourcing (CS) platform is one of the main assets of the EasyTV project, for this reason a deeper focus on the platform participants and the related incentive mechanisms for user participation, is needed.

Since the success of crowdsourcing systems is influenced by users' levels of participation and interactions on the platform, following is presented a hypothesis about an engagement strategy for "crowd-workers". An overview on user motives and incentive mechanisms in crowdsourcing systems has allowed to subsequently define the proper engagement methods for the EasyTV crowdsourcing platform.

6.1.1. Taxonomy of engagement methods in crowdsourcing

A CS platform, by definition, requires the participation of the crowd for the accomplishment of specific tasks. The EasyTV crowdsourcing system expected to involve expert and end-user associations as volunteers-workers, allowing them to contribute, with their knowledge-based skills, at the creation of multilingual sign language and subtitle repositories. It follows that the quality and quantity of contributions made by platform's users is crucial for its success.

Considering these goals to achieve, engagement methods have been investigated: starting from users' motivations, they support to identify the appropriate mechanisms of participation and involvement of crowd-workers in the crowdsourcing environment.

Reasons for participating in CS systems result from a wide spectrum of motives. Following is presented an overview on the more relevant motives in CS environments and examples of relative incentives:

Table 3. Relevant motives of participation in CS system and relative incentives (elaboration from Katmada et al. 2016)

Tipe	Motivation	Incentive
Intrinsic motivation	Learning/personal achievement	Access to the knowledge and feedback of experts or peers
	Altruism	- Contribute for a good cause - Receiving feedback concerning the impact of personal contributions
	Enjoyment/intellectual curiosity	Share enjoyment and satisfaction
	Social motives	- Attain social status and respect by organizers and peers - Present a good social image
Extrinsic motivation	Self-marketing	Career options
	Direct compensation	- Small monetary prize or token - Higher payment

Understanding user motives could enable the design of appropriate incentives to sustain user engagement in CS platforms. Four main categories of incentive mechanisms have been categorized²⁹:

1. **Reputation systems:** “platform’s users rate other users based on their behavior, and the reputation system combines these ratings to form cumulative assessments of their reputation”. According to the CS platforms’ goals, different reputation metrics can be used: for example, in case “the content is mainly user-generated, users accumulate reputation points, based on the ratings of their submissions and their voting activity on other users’ submissions”. Furthermore “reputation systems include some kind of reward for users with high reputation and/or penalties for users with very low reputation. Penalties could consist of blocking users with low reputation from accessing future task”.
2. **Gamification:** use of game design elements in non-game contexts allow to improve user experience and engagement: “such game design elements, also known as «game mechanics», include self-elements, such as points, achievement badges, levels, and time restrictions; social-elements, such as storylines, leaderboards, and interactive cooperation; and can also include the virtual space and goods, as well as virtual gifts”.
3. **Social incentive mechanisms:** “act as enablers of social interactions, giving users the chance to showcase their skills and gain social status in the community. Having a good social image is very important for participants in online communities, who want to be perceived as intelligent, fair, wealthy, and «good», in general”.
4. **Financial rewards and career opportunities:** “apart from payment, financial rewards can also comprise small tokens, various prizes, and free access to services and products. Monetary rewards are often be used in combination with other kind of incentives, especially «reputation systems»”.

6.1.2. Design an incentives system for EasyTV crowdsourcing platform

The CS system, in the EasyTV project, aims to enable users to fulfil *tasks* in order to create a subtitle repository and, moreover, manage the creation of sign language contents. Therefore, crowd-workers could contribute to the platform mainly as *content editor* (creating subtitles and sign language translations). Furthermore, could be considered the role of the *reviewer* (evaluating contributions uploaded).

The fundamental role of a *crowd-workers engagement strategy* has conducted to a proposal of a holistic incentive system for the EasyTV crowdsourcing platform, including the above-mentioned categories of incentive mechanisms.

Firstly, to design incentive strategies, a “score system” has been supposed. Considering the tipe of tasks to perform and contents to produce, a first criterion to assign a score to a platform’s collaborator could be based on a *system metric*, obtained through an algorithm that evaluate:

- **Promptness** or time needed to deliver the task;
- **Quality** of contents produced;
- **Quantity** of contents produced;
- **Frequency** of contents production.

A second criterion to acquire score could be based a *social metric*, grounded on platform’s users rating. Combining the different results of the “double” score system, it is possible to propose an overall engagement strategy founded on the abovementioned four categories of incentive mechanisms:

1. **Reputation systems:**
 - a. Users accumulate reputation points based both on the *system and social metrics*;
 - b. Users can access to stats and have visibility of the work done with the platform;
2. **Gamification:**

²⁹ Katmada et all. 2016

- a. Contributors can rate other users and comment on other contributions. These kinds of activities allow them to achieve badges and levels;
 - b. The ranking based on the *social metric* (rating by platform's users) produce a leaderboard. To be placed on the top-ranking positions enable to access to "bonus" such as, for example, free access to some content of the EasyTV platform;
3. **Social incentive mechanisms:**
- a. Promote social interactions such as comment and voting;
 - b. Public mention: i.e. recognize the contributor on the final output (before the first subtitle, or SL video);
4. **Financial rewards and career opportunities**
- a. Users with high reputation, based on *system metric* points, can pass through a scaling process, by means of it a user can move from "beginner" to "expert" status up to become a "reviewer";
 - b. Expert users with best score (first 20% of users) and reviewers (first 10% of reviewer ranking) can be paid for their services.

6.2. Methodological approach

For its success, a business model, firstly, must reach the potential customers and meet their needs. Consequentially, a *customer-oriented* approach has been used in continuity with the general *user-centred* approach adopted for the whole project.

Two different tools, widespread and widely used in business development, have been utilized for the business development of the EasyTV project:

1. the **Value Proposition Canvas (VPC)**
2. the **Business Model Canvas (BMC)**

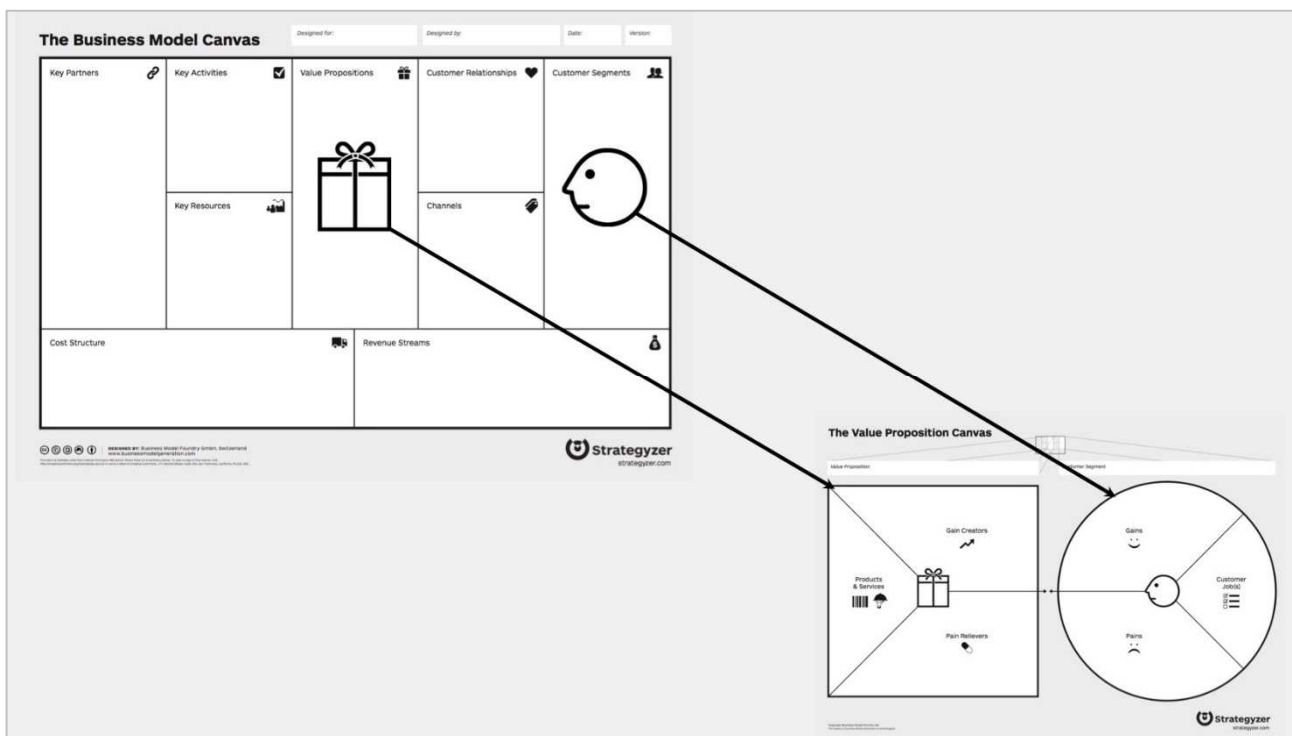


Fig. 14 Connection between BMC and VPC

As better explained below, the Value Proposition Canvas and the Business Model Canvas are connected. These strategic management tools allow creating a Business model for EasyTV in a structured way and supporting its description using visual charts. Both canvases capture the core issues around understanding and finding customer problems and designing and validating potential solutions. Furthermore, a visual representation enables an immediate focus on the more significant items of EasyTV project.

The Osterwalder's BMC³⁰ is made by nine blocks and every block contains different elements. The most important part of the business model is the relationship between the **Value Proposition** and the **Customer Segment**. To achieve a consistent and effective proposition of value for the different customer segment, the VPC has been used. It zooms into the value proposition and customer segment to describe the interactions between customers and product more explicitly and in more detail.

The process that has led to the business model for the EasyTV project consisted of two steps: first, define the Value Proposition Canvas, and then complete the Business Model Canvas.

6.3. Value Proposition Canvas

The Value Proposition is a strategic dimension to create an effective Business model and it refers to the bundles of products and services that represent a value for a specific customer segment.

Products and services create value for the different customer segments when, through them, they can satisfy their needs, solve problems or realize aspirations and desires.

Therefore, to create an attractive Value proposition, a customer-oriented design is the most useful approach to consider. Users/customers, with their differences and similarities, needs and difficulties, are at the centre of the design process, as emerged in other phases of the EasyTV project.

The Value Proposition Canvas, consistently with this leading approach, has been used as a business tool to create, design and implement value propositions for different customer segments. It works in conjunction with the Business Model Canvas and it is a key component. In fact, it is a plug-in tool³¹ that allows understanding customers' needs focusing on their requirements, to design products and services they want. The VPC is based on two elements of the business model, the "Customer segment" and the "value proposition". Therefore, it allows mapping out both in more granularity and shows the fit between what is offered and what customers want.

This is the first aspect for two main motivations:

1. new products and services introduced into the market can fail to deliver on expectations and not be successful in the market segment;
2. in the specific context of the EasyTV, realize a valid value propositions for the project's main customer segment means, not only create a successful business model, but also create products and services that fit the actual end user needs to achieve the main goals of the project.

The Value Proposition Canvas helps to systematically understand what customers want, why they need a supplier, what they can perceive as an extra value and what they find profitable or disadvantageous.

It is moreover possible to identify customer needs in a visual and structured way.

³¹ <https://strategyzer.com/platform/training/crash-courses/business-model-basics#video-learn-the-value-proposition-canvas>

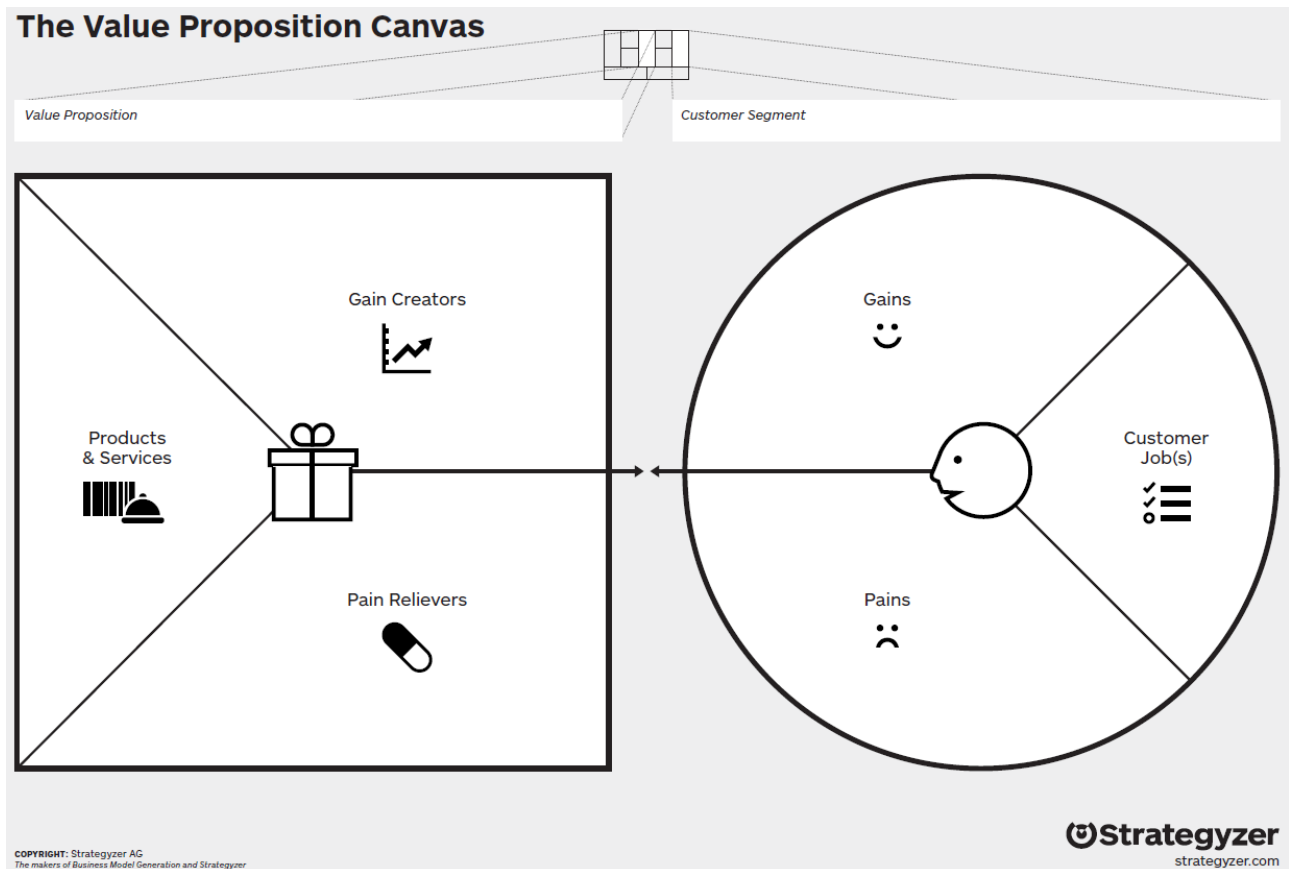


Fig. 15 Value Proposition Canvas

The Value Proposition canvas has two sides that focus on the two key building blocks of the business model canvas:

1. The Customer Segment is broken down into three boxes:
 - a. Customer Jobs
 - b. Customer Pains
 - c. Customer Gains
2. The Value Proposition is broken down into three boxes:
 - a. Products and Services
 - b. Pain Relievers
 - c. Gain Creators

The Value proposition canvas enables to create products and services that perfectly match user's needs allowing collecting, simply and easily, customer's information.

The canvas traces a parallel line between products and services offered and the needs of customers. Moreover, there are correspondence and dependence among the other panels of the canvas regarding "Pains" and "Gains": the problems that users experience and how these can be solved; what expectations they have and how they can be met by products and services.

With the customer profile block is possible to clarify the customer understanding achieved, otherwise, the value proposition map allows to describe how is intended to create value for that customer. The fit between the two is achieved when one meets the other.

The right side of the canvas is the first to be completed, starting from Customer Job(s) box, and then continue with Customer pains and gains.

- **Customer Jobs** describe the things that they are trying to get done in their work or in their

lives. A job can be a task they are trying to perform, the problem they are trying to solve or a need they are trying to satisfy. Customer jobs involve functional, social, personal and supporting factors.

- **Customer pains** revolve around undesired outcomes, obstacles, risks and emotional pains that user can faced. The box describes all the negative emotions and undesired situations which the customer could experience before, during and after getting the job is done.
- **Customer gains** can be classified into required gains, expected gains, desired gains and unexpected gains. It is about what the customer expects and what would surprise him.

A clear image of the client emerges, writing and classifying the problems and the elements of the Customer segment boxes. Subsequently, it is important to manage the customer's biggest pain and gain: these elements will then form the basis of the product or service. In fact, once the right side of the canvas is completed, it is possible to move over to the left side, on the box "Products and Services" and then continue with "Pain relievers" and "Gain creators".

- **Products and Services** is a list of all the products and services which the value proposition is built around. They can be tangible, intangible, digital, financial etc.
- **Pain Relievers** describe how services and products address the challenges needs and the pains of the customer, how they eliminate negative emotions and undesired or avoidable situations.
- **Gain Creators** describe how customers can benefit from products and services offered.

In conclusion, starting from what customer wants, it is possible to understand whether products and/or services are in line with the customer needs.

After understanding the Value proposition canvas structure and the objectives of each section and box, the next phase is fill and complete the canvas with the item individuated.

To substantiate and corroborate the choices made, the process of creation and collocation of the item has followed a first phase of recognition of different issues, topic and solutions collected into the previous documentation (D1.1 and D1.2) or emerged from the analysis present in the different sections of the present document.

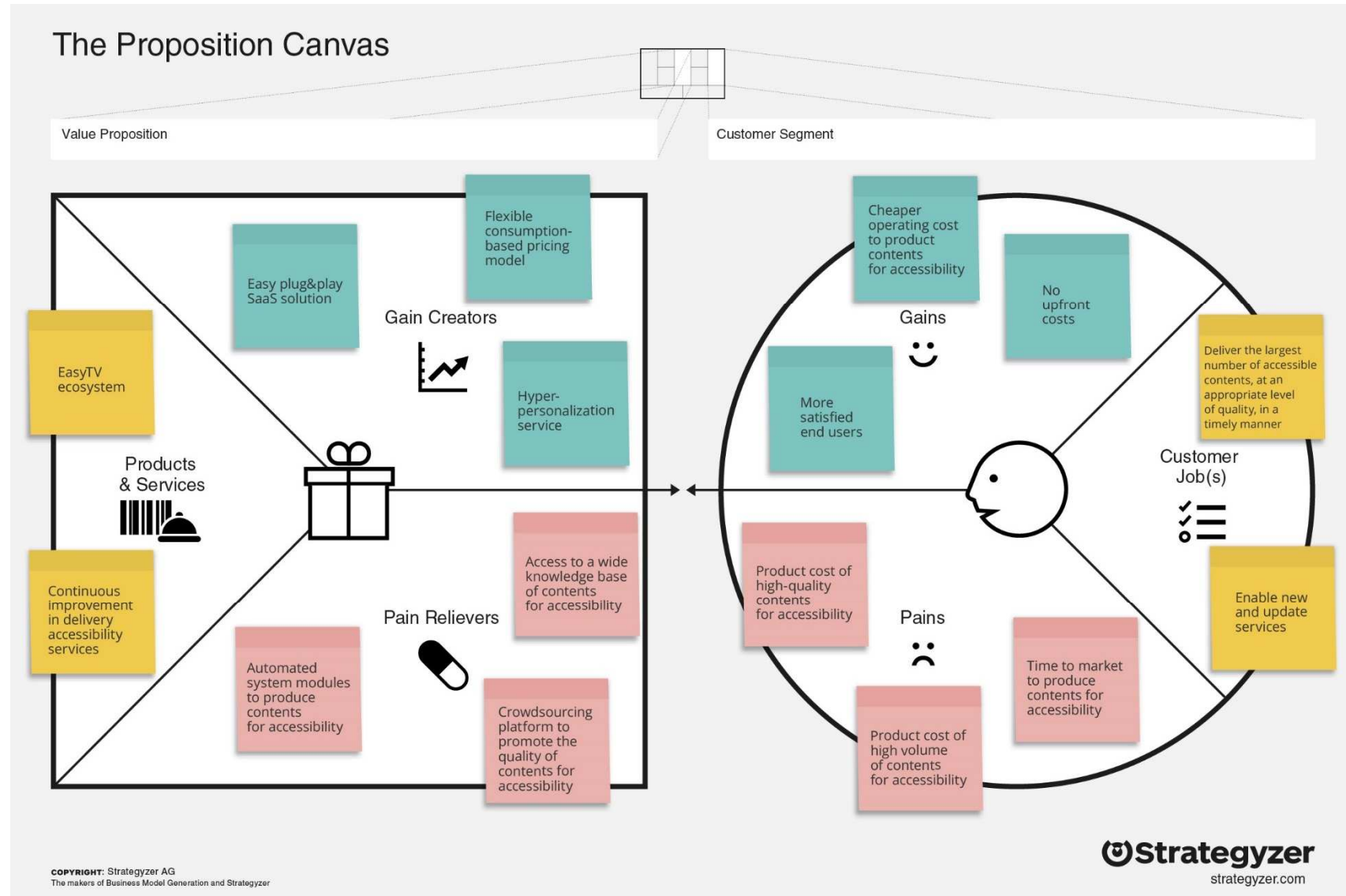


Fig. 16 EasyTV Value Proposition Canvas

6.3.1. Customer Job

Table 4. Value Proposition Canvas: Customer Job

Definition	Description
Deliver the largest number of accessible contents, at an appropriate level of quality, in a timely manner	One of the main jobs for Broadcaster & OTT and Third-party service providers is to make their content available for any type of customer, in order both to reach a wider audience and fulfil policies and regulations regarding media services.
Enable new and update services	One of the goals of Broadcaster & OTT and Third-party service providers is to continuously improve their own services. The improvement of the services dedicated to inclusion is not only intended for disabled users but also for a wide range of users, for example: the elderly, migrants, people with temporary perceptive difficulties. Improving the accessibility of services therefore has a very extensive impact on the potential users of the services provided.

6.3.2. Pains

Table 5. Value Proposition Canvas: Pains

Definition	Description
Product cost of high-quality contents for accessibility	The production of high-quality accessible content represents a significant burden for Broadcaster & OTT and Third-party service providers. Quality is one of the most important drivers to ensure a rewarding user experience.
Product cost of high volume of contents for accessibility	The production of a significant number of accessible contents represents an important commitment for Broadcaster & OTT and Third-party service providers to ensure the dissemination of their contents to a wider audience and compliance with the relevant European legislation.
Time to market to produce contents for accessibility	Timeliness in the preparation of content is an important organizational constraint for Broadcaster & OTT and Third-party service providers committed to ensuring the full usability of their content.

6.3.3. Gains

Table 6. Value Proposition Canvas: Gains

Definition	Description
No upfront costs	The SaaS model allows the Broadcaster & OTT and Third-party service providers not to have initial investments to equip itself with the infrastructure for the creation of content for accessibility.
Cheaper operating cost to product contents for accessibility	The EasyTV solution is also efficient compared to the fixed costs generally incurred by Broadcaster & OTT and Third-party service providers to produce content for accessibility.
More satisfied end users	The adoption of a SaaS service allows greater satisfaction in the users' user experience determined by the specialization of the services provided.

6.3.4. Product & Services

Table 7. Value Proposition Canvas: Product & Services

Definition	Description
EasyTV ecosystem	The EasyTV solution is an ecosystem of modular, scalable and flexible services with functional terms and a pricing model. The different modules that make up the solution allow an evolution of the service provided based on the ever-changing needs that characterize the television market and the ever-new expectations of users.
Continuous improvement in delivery accessibility services	The centralized management of the service allows a specialization of the solution and a continuous evolution of the accessibility services provided, also based on third part services based on the EasyTV platform ecosystem.

6.3.5. Pain Relievers

Table 8. Value Proposition Canvas: Pain Relievers

Definition	Description
Crowdsourcing platform to promote the quality of contents for accessibility	Crowdsourcing platform will be used by expert and end-user associations to openly contribute with subtitles and sign subtitles that, furthermore, will simultaneously translate to multiple languages.
Automated system modules to produce contents for accessibility	Automation component to produce contents for accessibility: <ul style="list-style-type: none"> • Image Enhancement (face & text detection) • Audio enhancement • Automatic Voice Synthesis of Subtitles • Subtitle production • Sign Language Production
Access to a wide knowledge base of contents for accessibility	The platform makes it possible to enhance the contents for accessibility stored over time, thanks to the creation of a shared repository accessible to the solution's Broadcaster & OTT and Third-party service provider's customers.

6.3.6. Gain Creators

Table 9. Value Proposition Canvas: Gain Creators

Definition	Description
Easy plug&play SaaS solution	The solution allows Broadcaster & OTT and Third-party service providers API-interoperability, between their own and the EasyTV infrastructure, to provide its users with the accessibility services provided by EasyTV.
Flexible consumption-based pricing model	A consumption-based pricing model let customers pay according to the amounts of services that they use or consume. Appropriate criteria will be formulated for the quantification of operating costs, based on the services provided.
Hyper-personalization service	Possibility to have an automatic customization of accessibility services based on user's profile, the usage and, furthermore, the technical characteristics of devices and type of connectivity.

6.4. Business Model Canvas

The Business Model Canvas consists of nine blocks. Each block represents a constituent element of the EasyTV project, and it's connected to all the others creating an ecosystem where all elements are interconnected.

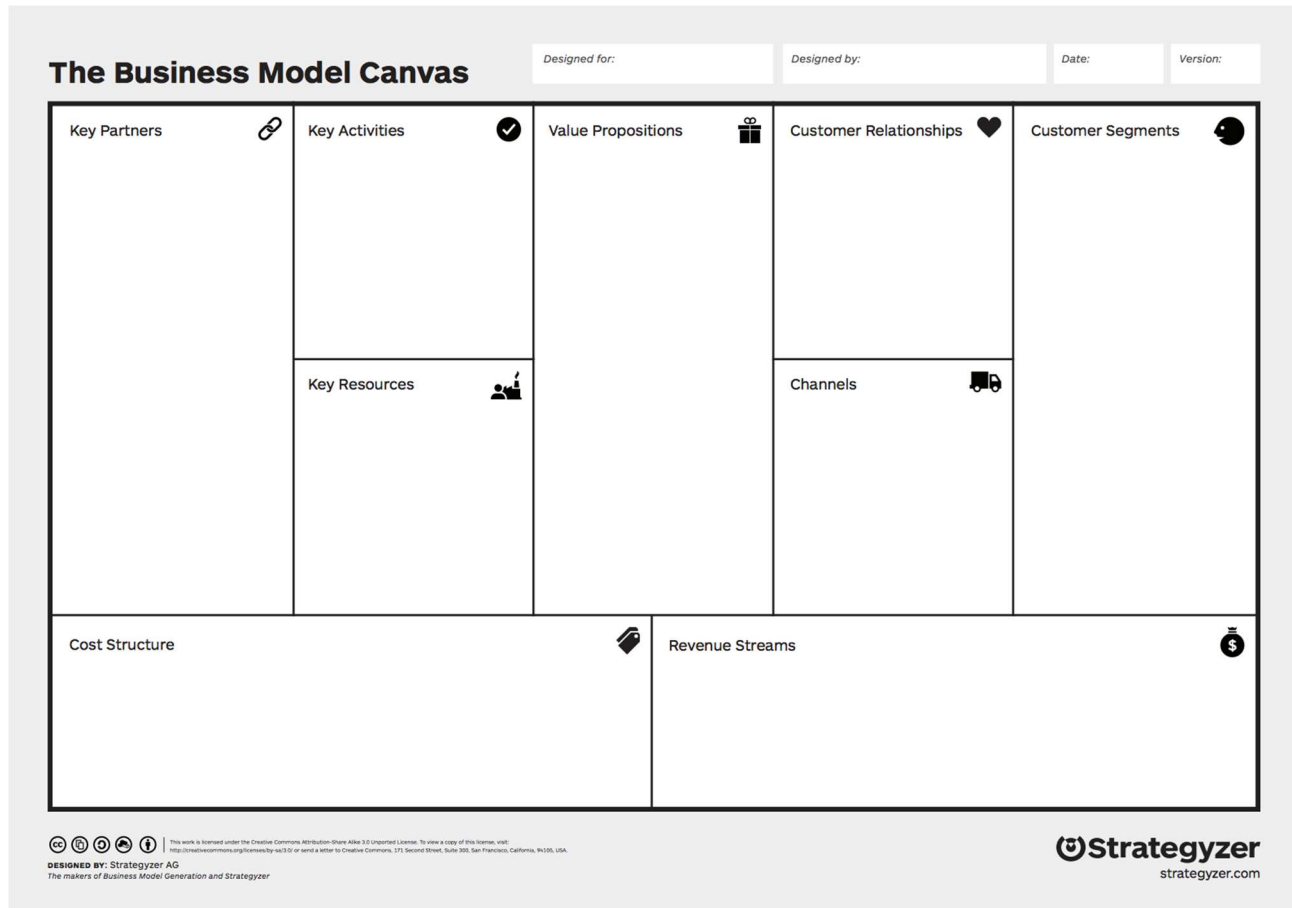


Fig. 17 Business Model Canvas

For the Easy TV business model, the nine blocks are defined as follow:

1. **Customer segments:** the different groups of companies that EasyTV is targeting. This block of the Business Model Canvas is fundamental: it allows building the bundle of products and services around the needs of each specific cluster of customers.
2. **Value Propositions:** the bundle of products and services that represents a value for a specific customer segment.
3. **Channels:** all the channels through which EasyTV reaches a certain customer segment to present, and provide, its value proposition. Channels represent a *touch point* with the customers.
4. **Customer Relationships:** the type of relationship that EasyTV establishes with the various customer segments.
5. **Revenue Streams:** the revenue streams that EasyTV obtains from the sale of products/services to a specific customer segment.
6. **Key Resources:** the strategic assets that EasyTV must have to support its business model. Identify what enables the business model to work.

7. **Key Activities:** the strategic activities that must be performed to create and sustain value propositions, reach customers, maintain relationships with them and generate revenues.
8. **Key Partnerships:** acting in a larger ecosystem, the network of suppliers and partners is necessary for success of the EasyTV business model.
9. **Cost Structure:** costs implied by EasyTV Business Model. They derive directly from the structure of the blocks related to Key Activities, Key Partners and Key Resources.

The Business Model Canvas is usually divided in two sides. Left side is mainly focused on processes related to products (Resources, Partners, Cost, Activities), instead, the right side focuses on customers and market (Segments, Customer relationship, Revenue). The Value proposition is in the middle to mean that it contains and combines instances both from the market and the development of products.

In the Business Model proposed for EasyTV in each block of the canvas it is possible to find items of distinct colours (Fig. 32). Colours are present, (blue, red and grey) are used to discern between the three main target segments of the project:

- Broadcaster & OTT players (blue cards)
- Third-party service providers (red cards)
- Platform collaborators (green cards)

Below, is illustrated in more detail each block of the proposed business model canvas, and each item present is explained. All the grey cards activities are related to meet the needs of multiple types of customer segments.

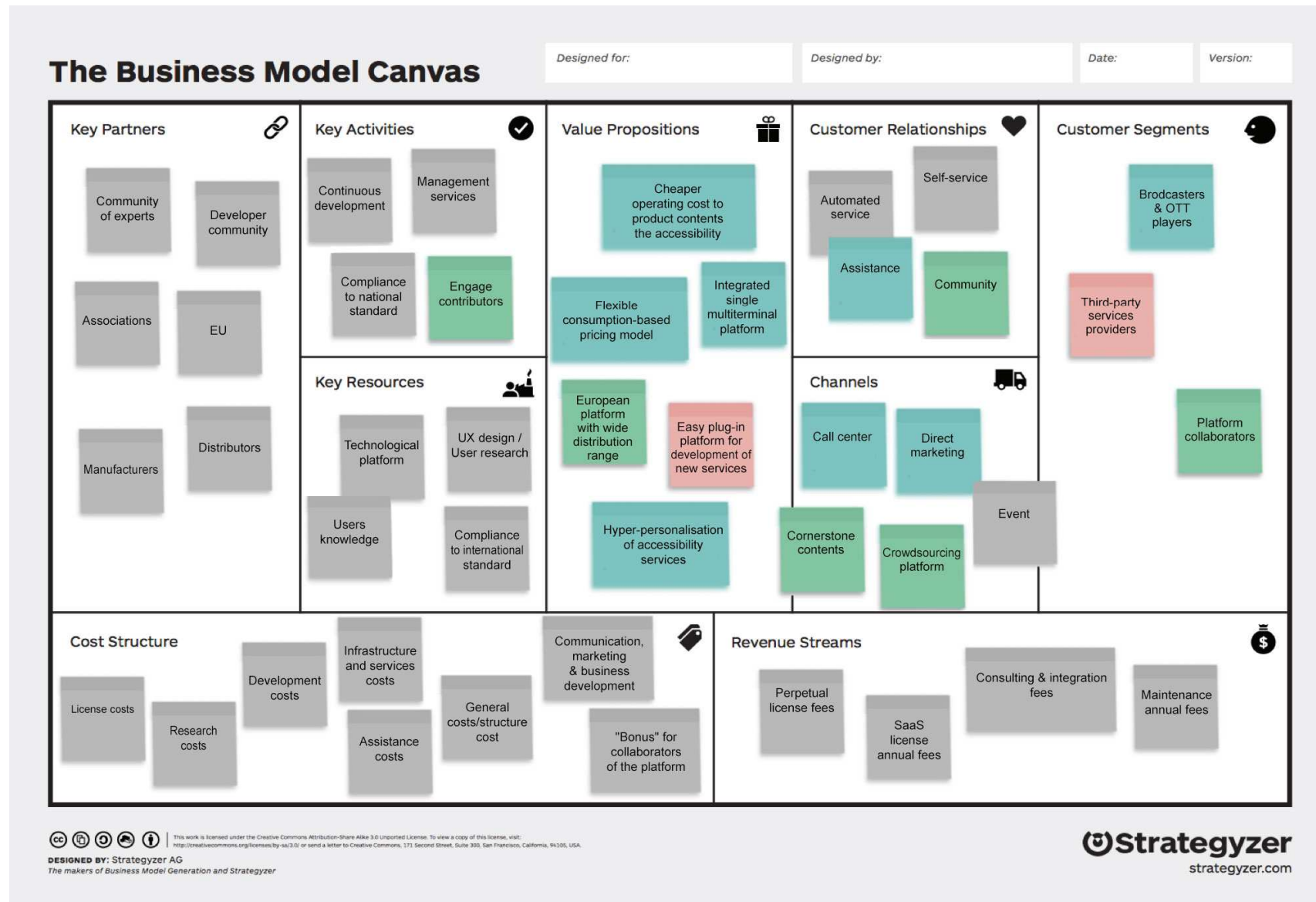


Fig. 18 EasyTV Business Model Canvas

6.4.1. Customer segment

Table. 10 Business Model Canvas: Customer segment

Definition	Description
Broadcaster & OTT	Represented by broadcasters, local network television stations affiliates, cable television providers, terrestrial and satellite TV providers, Internet TV's, IPTV's, OTT providers.
Third-party service providers	Third-party wishing to purchase specific services or components made available by the EasyTV infrastructure to provide their value-added services.
Platform collaborators	<p>Developers that might be interested to develop, test and deliver their own services in the EasyTV multi-terminal technical platform without profit finality.</p> <p>People with high level of expertise in Sign Language and proficient in translation activities.</p>

6.4.2. Value Propositions

Table 11. Business Model Canvas: Value Propositions

Definition	Category	Description
Cheaper operating cost to product contents for accessibility	<i>Broadcaster & OTT</i>	Improving the production process of accessible contents, optimizing times and costs and guaranteeing high quality.
Flexible consumption-based pricing model	<i>Broadcaster & OTT</i>	Consumption-based pricing model let Broadcaster pay according to the amounts of services that they use or consume.
Hyper-personalisation of accessibility services	<i>Broadcaster & OTT</i>	Possibility to have an automatic customization of accessibility services based on user's profile, the usage and, furthermore, the technical characteristics of devices and type of connectivity. Provide suggestions of accessibility services available that may be useful to customers.
Integrated single multiterminal platform	<i>Broadcaster & OTT</i>	Opportunity to have an integrated platform that offers an up-to date range of accessibility services by distributing them on different devices in a consistent way.
European platform with wide distribution range	<i>Platform collaborators</i>	Availability of a platform that distributes content on a wide audience.
Easy plug-in platform for development of new services	<i>Broadcaster & OTT</i> <i>Third-party service providers</i>	Availability of a platform that allow easier to create innovative and efficient solutions.

6.4.3. Channels

Table 12. Business Model Canvas: Channels

Definition	Category	Description
Call center	<i>Broadcaster & OTT Third-party service providers</i>	A call center as a dedicated service to support all the Broadcaster to receive assistance and information.
Direct marketing	<i>Broadcaster & OTT Third-party service providers</i>	Reach the main stakeholders through direct marketing actions (by email) to communicate information about the product and services to increase sales and awareness of EasyTV platform.
Event	<i>General</i>	Participation in major media industry events to get directly in touch with the customers.
Cornerstone contents	<i>Platform collaborators</i>	Content marketing based on cornerstone contents dedicated to topics of interest of EasyTV project.
Crowdsourcing Platform	<i>Platform collaborators</i>	Crowdsourcing platform used by experts and end-user associations to openly contribute to the development of accessible content.

6.4.4. Customer Relationship

Table 13. Business Model Canvas: Customer Relationship

Definition	Category	Description
Assistance	<i>Broadcaster & OTT Third-party service providers</i>	Customers can communicate with a customer relationship manager to receive assistance during the sales process or after the sale has been completed. It will be possible through a call center
Automated service	<i>General</i>	Services that automatically recognize specific user targets and their characteristics and offer them information related to their profile.
Self service	<i>General</i>	Enabling customers to gather information about services offered by EasyTV by themselves in an easy way (for example by user manuals).
Community	<i>Platform collaborators</i>	The presence of an online community to involve and support collaborators, reach potential ones and facilitate the connection between members. A Community promotes the exchange of knowledge and the mutual solution of problems. It is a strategic channel to establish and maintain an optimal relationship with collaborators of the platform.

6.4.5. Revenue Streams

Table 14. Business Model Canvas: Revenue Streams

Definition	Category	Description
Perpetual license fees	<i>Broadcaster & OTT Third-party service providers</i>	Revenues coming from the sale of the perpetual license of the technologies developed in the project.
Consulting & integration fees	<i>Broadcaster & OTT Third-party service providers</i>	Revenues coming from the sale of consultancy and technological integration services mainly deriving from the sale of perpetual licenses.
Maintenance annual fees	<i>Broadcaster & OTT Third-party service providers</i>	Maintenance and updating fees for solutions sold as perpetual licenses
SaaS license annual fees	<i>Broadcaster & OTT Third-party service providers</i>	Fee for the use of the services provided.

6.4.6. Key Resources

Table 15. Business Model Canvas: Key Resources

Definition	Category	Description
Technological platform	<i>General</i>	The overall integration of software and hardware components of the EasyTV system.
UX design/User research	<i>General</i>	The research activities allowing to design a user experience that fits the efficiency and satisfaction requirements for the user.
Users knowledge	<i>General</i>	Access to aspects related to the needs, attitudes, behaviours and aspirations of users.
Compliance to international standard	<i>General</i>	Following national/international standard to have a reference model and, if possible, improve it or introduce new ones.

6.4.7. Key Activities

Table 16. Business Model Canvas: Key Activities

Definition	Category	Description
Continuous Development	<i>General</i>	Maintenance of the system and continuous development to guarantee updating of the components and the infrastructure.
Management services	<i>General</i>	Services related to management and problem-solving activities.
Compliance to national standard	<i>General</i>	Following national/international standard to have a reference model and, if possible, improve it or introduce new ones.
Engage contributors	<i>Platform collaborators</i>	Activate actions to engage contributors and find new contributors.

6.4.8. Key Partnership

Table 17. Business Model Canvas: Key Partnership

Definition	Category	Description
Community of experts	<i>General</i>	The community of linguistic and sign language expert.
Developer community	<i>General</i>	The community of developers of new services.
Associations	<i>General</i>	Associations and organisations dedicated to disability and accessibility issues.
EU	<i>General</i>	Policy makers at national and European levels who could take advantage of EasyTV outputs. Furthermore, any EU research organisation potentially interested in EasyTV (who could join the community, use facilities contribute to their developments, etc.).
Manufacturers	<i>General</i>	The manufacturers of devices which are component of the platform.
Distributors	<i>General</i>	Actors involved in the distribution process of the devices which are part of the platform.

6.4.9. Cost Structure

Table 18. Business Model Canvas: Cost Structure

Definition	Category	Description
License costs	<i>General</i>	Include all costs for the proper development and industrialization of the services
Research costs	<i>General</i>	Costs related to activities of Research to guarantee innovative solutions and services.
Development costs	<i>General</i>	Costs related to activities of maintenance of the system and continuous development to guarantee updating of the components in a consolidated solutions and services.
Infrastructure and services costs	<i>General</i>	Costs related to activities of building, management and maintenance of the platform infrastructure.
Assistance costs	<i>General</i>	Costs related to activities of support and assistance of Customers intended as a “premium” service for this category of customers.
General/structure costs	<i>General</i>	Costs for the management and maintenance of a physical office.
Communication, marketing & business development	<i>General</i>	Costs related to Communication and marketing activities, strategic for the sale of the products and services offered and for their awareness.
"Bonus" for collaborators of the platform	<i>Platform collaborators</i>	Costs related to “Bonus” given to each collaborator to ensure a deeper engagement and a wider number of collaborators.

6.5. EasyTV platform newco feasibility study

This chapter describes the economic feasibility for the establishment of a NewCo based on the services developed within the project. The aim of the study is to identify the variables that most affect the economic sustainability of the initiative. In this regard, it was assumed that the cost and revenue model differ based on the time frame reference.

It has been hypothesized that the first year after the conclusion of the project is dedicated to the industrialization of the project assets and communication activities to make sure that the market can understand the services offered and, at the same time, allow NewCo to align on the emerging needs of future potential customers.

In this regard, a cost analysis has been formulated with a duration of four years, while that of revenues 3.

The services offered to customers have the aim of improving the accessibility of content, better described in D6.5. To make the overall service completer and more attractive to potential customers, it was decided to bring a complete offer on the market with a flat licensing method. The purchase of the license allows access to all the services made available by the project.

6.5.1. Target

Based on the information reported by Eurostat, the European reference market to which the commercial offer of the initiative is addressed has been identified³². The study is not updated, however more recent reliable sources could not be identified. Only players for each country participating in the project were considered. The revenues approach also does not include the possibility of selling services or licenses to third party operators with the aim of integrating them into their business model, in the absence of exhaustive data that can help do define this potential market sector.

Table 19. Number of Programming & broadcasting companies per Project countries

Project countries	Number of Programming & broadcasting companies
Greece	1.200
Spain	2.000
Italy	1.500
TOTAL	4.700

Although no equivalent sector studies are known referring to OTT operators, the criteria and methodology for identifying the volume of revenues and costs can also be replicated by addressing their services to the contiguous sector, such as that of the OTT, favouring in this thus creating greater economies of scale and providing NewCo with greater resilience in the event of changes in its business sector.

6.5.2. Offer and pricing

In this regard, it has been assumed that there are two main methods of selling the services:

1. SaaS: as illustrated below, the SaaS model is less profitable, but it places fewer constraints and constraints to the operators who choose it. To facilitate the first adoption of the service, a SaaS license value of just over half of the cost of the perpetual license was chosen: 17,500 euros (based on the size of the customer and the services used).
2. Perpetual license: the average estimated cost for each perpetual license (one-off) is 30,000

³² https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Programming_and_broadcasting_statistics_-_NACE_Rev._2&oldid=184675

euros (based on the size of the customer). Although it is a more remunerative type of service, it is assumed that fewer operators choose it because it is more expensive and has impacts on their IT structures. The sale of perpetual licenses also allows you to expand your services also in terms of;

1. consultancy & integration, necessary to enhance the use of services by customers, estimated at 45% of the value of the licenses sold during the year;
2. an estimated cost of maintenance of 10% of the total value of the licenses sold the previous year.

6.5.3. Hypothesis of revenues in the first 3 years

To formulate a prudential approach to analysis, an extremely low percentage of market penetration was considered and with a slow progression in the three years considered in the revenue model.

Table 20. Estimated Revenue trend for the "perpetual license" model

Perpetual licenses		Year 1			Year 2			Year 3		
Countries	Number of Programming & broadcasting companies	% of customers	# of customers	Revenues	% of customers	# of customers	Revenues	% of customers	# of customers	Revenues
Greece	1.200	0,2%	2	60.000,00	0,4%	5	150.000,00	0,6%	7	210.000,00
Spain	2.000	0,2%	4	120.000,00	0,4%	8	240.000,00	0,6%	12	360.000,00
Italy	1.500	0,2%	3	90.000,00	0,4%	6	180.000,00	0,6%	9	270.000,00
Perpetual License fees			9	270.000,00		19	570.000,00		28	840.000,00
Consulting & integration fees				121.500,00			256.500,00			378.000,00
Maintenance annual fees							54.000,00			114.000,00
TOTAL				391.500,00			880.500,00			1.332.000,00

Explanatory notes to the calculation of the values shown in the table:

1. Average cost per license (based on the size of the customer): 30,000 euros.
2. Value of consulting and technological integration projects = 45% of the value of licenses sold during the year.
3. Maintenance value: 10% of the total value of the licenses sold the previous year.
4. The number of customers reached by the service has been rounded and corresponds to the indicated percentage values.

Table 21. Estimated Revenue trend for the "SaaS" model

SaaS Service		Year 1			Year 2			Year 3		
Countries	Number of Programming & broadcasting companies	% of customers	# of customers	Revenues	% of customers	# of customers	Revenues	% of customers	# of customers	Revenues
Greece	1.200	0,3%	4	70.000,00	0,6%	7	122.500,00	1,0%	12	210.000,00
Spain	2.000	0,3%	4	70.000,00	0,6%	12	210.000,00	1,0%	20	350.000,00
Italy	1.500	0,3%	3	52.500,00	0,6%	9	157.500,00	1,0%	15	262.500,00
SaaS license annual fees			11	192.500,00		28	490.000,00		47	822.500,00

Explanatory notes to the calculation of the values shown in the table:

- a) average fee (based on the size of the customer and the services used): 17.500 euros.
- b) the number of customers reached by the service has been rounded startin from the indicated percentage values.

Table 22. Total Estimated revenue over the three years

SaaS Service	Year 1	Year 2	Year 3
Countries	Revenues	Revenues	Revenues
Perpetual license fees	270.000,00	570.000,00	840.000,00
Consulting & integration fees	121.500,00	256.500,00	378.000,00
Maintenance annual fees		54.000,00	114.000,00
SaaS license annual fees	192.500,00	490.000,00	822.500,00
Total	584.000,00	1.370.500,00	2.154.500,00

6.5.4. Cost assumptions in the first 4 years

As previously indicated, following the conclusion of the project, a year has been scheduled to allow the industrialization of the services to be subsequently brought to the market. The cost structure formulated for all the years is as follows:

1. License costs:
 - a) include all costs for the proper conduct of the services;
 - b) in the first year only the costs necessary for development are considered;
 - c) it is assumed that the cost trend is increasing and foresees a progressive annual increase based on the growth of customers to be served.
2. Research costs:
 - a) include all the costs so that the services offered are always updated in terms of technological, compliance to national and market standards;
 - b) the research activities in the first year aim to finalize, where necessary the services already carried out within the project;
 - c) costs are assumed to be stable;
 - d) the estimate is based on the cost of human resources and grows based on the number of resources dedicated to the activity (average cost for 1 Full Time Equivalent: 50.000 euros).
3. Development costs:
 - a) the development activities will be strengthened with the aim of bringing mature products to the market, to provide services in production environments, subsequently they will be calibrated based on the volumes of revenues / customers who will use the service. This cost item includes consultancy and interaction activities provided by the release of perpetual licenses.
 - b) is assumed that the cost trend is increasing and provides for a progressive annual increase based on the growth of customers to be served;
 - c) the estimate is based on the cost of human resources (FTE) and grows based on the number of resources dedicated to the activity.
4. Infrastructure and services costs:
 - a) refer to the infrastructure costs and hardware services necessary to deliver the service;
 - b) in the first year, they have the objective of preparing the basic and testing infrastructure in the development environment, testing and the preparation of the production environment for the provision of services;
 - c) it is assumed that the cost trend is increasing and provides for a progressive annual increase based on the growth of customers to be served.
5. Assistance cost:
 - a) refer to the costs of assistance to end customers;
 - b) in the first year there are no assistance costs;
 - c) it is assumed that the cost trend is increasing and provides for a progressive annual increase based on the growth of customers to be served;
 - d) the estimate is based on the cost of human resources (FTE) and grows based on the number of resources dedicated to the activity.
6. Communication, marketing & business development:
 - a) these activities aimed to make new services visible and above all to monitor the reference market, to direct research and development activities so that they are in line with the expectations of future customers. In these costs are also included: bonuses and incentives for the external collaborators, participation to sector events, the production of cornerstone contents dedicated to the collaborators of the community;
 - b) the first year, these activities will aim to communicate the characteristics of the services offered to the outside world and, at the same time, allow NewCo to align itself on the emerging needs of future potential customers
 - c) it is assumed that the cost trend is increasing and provides for a progressive annual

- increase based on the growth of customers to be served;
- d) the estimate is based on the cost of human resources (FTE) and grows based on the number of resources dedicated to the activity.
7. General/structure cost:
- a) they refer to the costs for a single European office, considering that the newco will operate in virtual mode in the three reference countries: Greece, Spain, Italy.
- b) no offices will be set up in the first year;
- c) average annual location cost: 40.000 euros.
- d) costs are assumed to be stable.

The following table shows the trend of costs in the 4 years following the conclusion of the project.

Table 23. Total estimated costs over the four years

Cost tipe	Cost type	Year 0 (industrialization)	Year 1	Year 2	Year 3
License costs	variables	20.000,00	30.000,00	40.000,00	50.000,00
Research costs	variables	150.000,00	100.000,00	100.000,00	100.000,00
Development costs	variables	300.000,00	200.000,00	300.000,00	400.000,00
Infrastructure and services costs	variables	60.000,00	80.000,00	120.000,00	150.000,00
Assistance costs	variables	-	100.000,00	200.000,00	300.000,00
Communication, marketing & business development	variables	120.000,00	170.000,00	320.000,00	470.000,00
General/structure cost	fixed	-	40.000,00	40.000,00	40.000,00
Total		650.000,00	720.000,00	1.120.000,00	1.510.000,00

6.5.5. Final considerations

Based on the analysis conducted, the following table shows a budget hypothesis for the first four years of the NewCo.

Table 24. Total revenues in the four years

Year	Revenues	Costs	Balance
0	-	650.000,00	- 650.000,00
1	584.000,00	720.000,00	- 136.000,00
2	1.370.500,00	1.120.000,00	250.500,00
3	2.154.500,00	1.510.000,00	644.500,00
Total	4.109.000,00	4.000.000,00	109.000,00

Some considerations that can be drawn from the analysis conducted:

- a) the sale of perpetual licenses seems to be more profitable, above all because determines the sale of related services, however they are more difficult to offer on the market especially for a NewCo. In this regard, it can be assumed that SaaS services can be adopted as the first access channel to customers, with the aim of then selling perpetual licenses and related services.
- b) The economic balance achieved is strongly determined by the number of customers and the proposed fees. A reduction in prices or in the number of customers could immediately put in

crisis the economic feasibility of the initiative.

- c) the company should extend its services to a larger, accessible user base:
- diversifying its services towards adjacent markets, such as the OTT market.
 - or extending its target to other European countries, or to countries in Latin America. In both cases, it will be necessary to understand the potential costs and revenues that such interventions can foresee.

6.6. CCMA business case

6.7. Actual operational workflow

Public service broadcasters have a duty to provide services to the whole community. People from minorities and those with sensory disabilities are an important part of the audience. CCMA maintains a firm commitment to make its content accessible to everyone, works to make them available to the citizens through different solutions and also to adapt them to the needs of the audience, covering four key areas: Subtitling, Audio Subtitling, Audio Description and Signed Language.

Its audio-visual offer includes six TV channels to cover a territory of 7.5 million of people, plus 0.3 living abroad. Although, if we compare by population, the CCMA is not big a broadcaster in terms of potential audience of a national broadcaster in Europe, however according to the average the level of accessibility services offered is quite remarkable.

Table 25. Channel descriptions

Channel	Description
TV3	Principal channel
CS3/33	Kids/Culture (shared)
E3	Sports
324	News 24h / 30 min bulletin
Tv3.cat	Tv3 contents for international distribution with rights protection

The starting point of the operational workflow is the future broadcast programming (schedule). The accessibility team composed of two persons is in charge to revise the daily, weekly, monthly or quarterly schedule. They must select the candidate programs according defined criteria and determine the type of accessibility solution to be generated. Then, the new tasks are notified to external service providers.

Finally, all accessibility assets produced are uploaded to the Accessibility Content Manager, a piece well connected to the publication chain. Moreover, it has specific interfaces to gather and store all the generated assets, and it can generate different output formats such as subtitles case. Later all become available for publication.

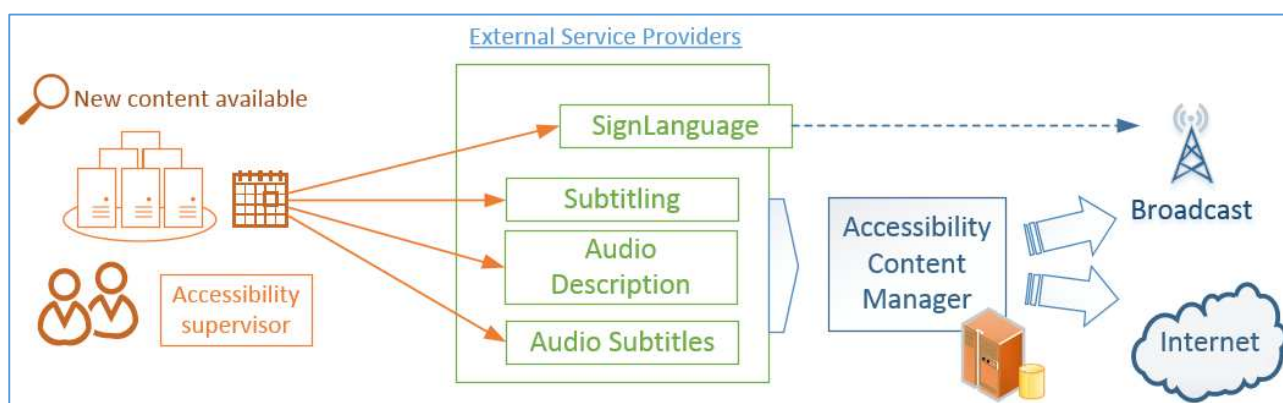


Fig. 19 CCMA general operational workflow

6.7.1. Subtitling

Subtitling is a matter of time and budget, sometimes the content is delivered too late and produce subtitles on time is not possible.



Fig. 20 subtitling sample

During 2018, 19.350 hours of subtitling were broadcasted through CCMA digital terrestrial channels.

Table 26. 2018 Subtitling Summary

Channel	Annual Hours	% subtitled hours. Deaf coverage
TV3	6.137	76,95%
CS3/33	7.624	92,5%
E3	1.765	21,2%
324	3.824	43,65%

In reference to TV3.cat, reprogrammed for international audiences, 7.811 hours have also been subtitled for deaf people (97.5% of their programming). There are two different types: live and on-demand. Moreover, each one has different workflows and particularities.

6.7.1.1 Pure Live

This section refers to the material that is produced and broadcasted in real time. Depending on the type of program, the most appropriate system is assigned.

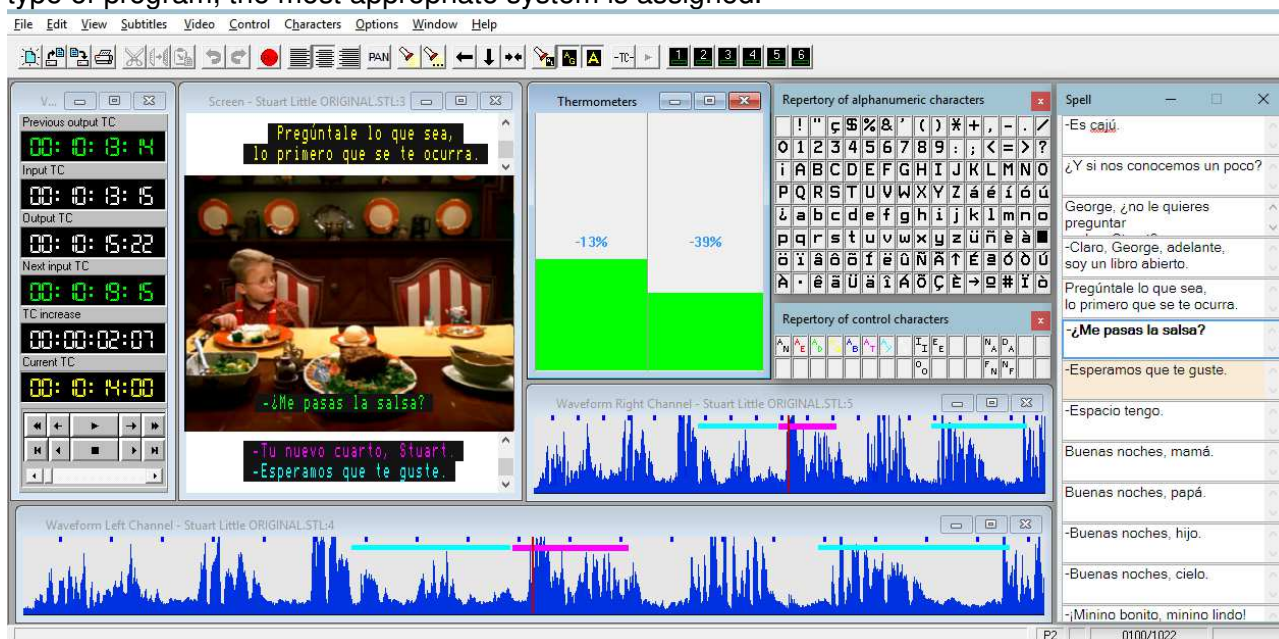


Fig. 21 Subtitling editing tool

There are four different workflows:

- **Live:** We use this live subtitling system for programs where the most important is what is said. While the program is being broadcast, five persons work in shifts, writing literal subtitles on the fly.
- **Live - summary:** When apart from what is said, visual information it is also very important. If a literal subtitling were placed would often mask relevant information. For example, during elections results or weather forecast. The people in charge generate on the fly summarized subtitles.
- **Live previously prepared:** We often have used this subtitling system when programs do not arrive early enough before being broadcasted. The clearest example of this group is the news. The scripts are available before emission and then a software solution can generate subtitle pieces as a basis. During the live emission, the people covering the service selects the proper subtitle from the pre-generated pieces and sometimes is necessary to complete, update or transcribe what is missing, and summarizing when necessary.
- **Speaking:** The way to proceed is as follows: During a debate, a person could be listening a program like in a simultaneous translation. Their task consists on summarizing and translating with her voice the relevant information, and later a voice-to-text system converts voice into subtitles.
- **Previously recorded:** These programs have always subtitled when the material is available with the time enough to produce it. Here the editing team works:
 - With script: first is it necessary to arrange the script and then subtitle it with the support of the video source
 - Without script: Directly generated from the video source.
 - Automatically: A first version is generated automatically and reviewed by an editor.

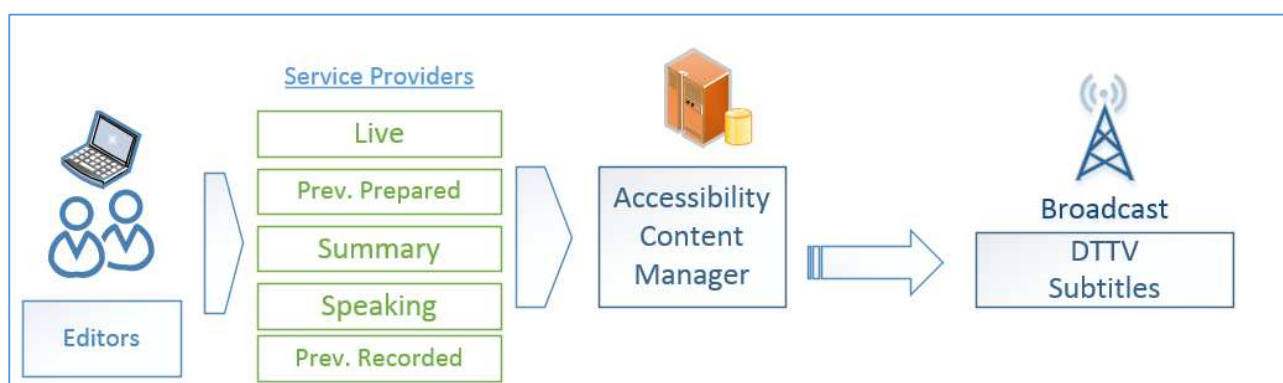


Fig. 22 CCMA live subtitling workflow

6.7.1.2 On demand

All the broadcasted content, with the proper rights, becomes available to be consumed on-demand, and the subtitles are available too. If due to any reason, the subtitles have not been generated for live broadcast, can be generated for on-demand distribution and ready for being aired in the future.

Similar to previously recorded example, in that case the editors use an editor tool, to check video source and generate the subtitles.

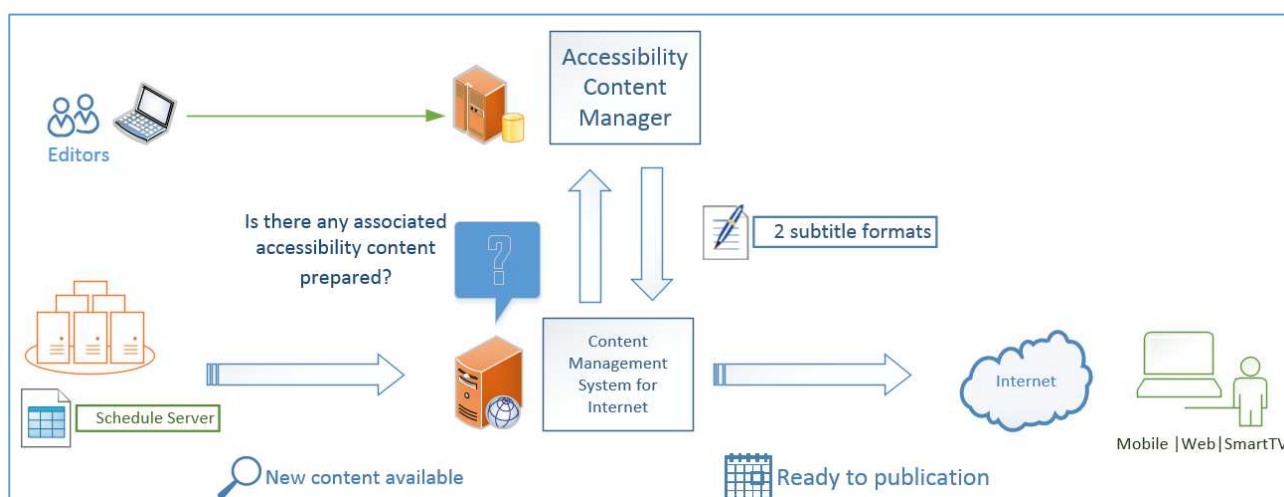


Fig. 23 CCMA on-demand subtitling workflow

6.7.2. Audio Description

This service is offered over previously recorded content, not live content. The task to do here is done by a person, who does the script and note the timecodes and later generates the voice. The voice asset, consisting on an audio playlist, is uploaded to the Accessibility Content Manager. On airing phase, the system reproduces the precise piece of audio each moment.

Table 27. 2018 Audio Description summary

Channel	Annual Hours
TV3	435
CS3/33	434
E3	-
324	-

For live content, since February 20, 2019, TV3 HD channel allows due to last technological developments to broadcast the stereo audio channel and the audio description. The newest TV receiver terminals allow mixing both. However, older models where that option is not available, the users could look for an SD channel where is broadcasted through the designed audio channel. Changing the audio you can choose between Catalan, original version or audio description, and is available for on demand content.

6.7.3. Audio Subtitles

We produce two types of AudioSubtitles manual and automatic. The manual type, the service in charge receive a subtitle file containing timecodes, and their work consist into read and record the voice that matches the content. The process is like audio description, the voice asset is uploaded to the Accessibility Content Manager. On airing phase, the piece of audio is synchronously reproduced. The automatic type refers to a Text-to-voice solution applied during news. When a personality speaks, normally is left on the original language and the translation subtitled on screen. The audio subtitles offer the translated audio.

6.7.4. Sign Language

Currently, the sign language coverage is present in midday and night news from Monday to Friday. TV3 and 324 broadcast these bulletins on simulcast. Since 324 is not the principal channel and have less audience, we take advantage to scale the main video on the news channel and add the SL window helping deaf people to follow news.



Fig. 24 Sign Language sample

A team of three people works on the next news bulletin, to offer a simultaneous translation during news emission.

Table 28. 2018 Sign Language summary

Channel	Annual Hours
TV3	-
CS3/33	-
E3	-
324	520

6.7.5. Workforce

Apart from the two persons that coordinate the service the rest of the production is offered by external service providers, assigned after competitive tender.

Table 29. 2018 external service providers summary

Concept	Persons
Internal	2
Live Subtitling	25
Audio Description	4
Previously recorded Subtitling	7
Sign Language	3

6.8. Actual economic information related the production of content for accessibility

From economical point of view, following CCMA example, we must consider many factors. First, accessibility on public service media do not generate revenues. Second, the equipment cost is difficult to estimate from scratch and is not easy get a market reference. Furthermore, existing solutions we have in production have been co-developed, particularized and integrated over the existing infrastructure.

Hence, the on the next table are summarized 2018 exercise costs, composed by internal cost, sign language, audio description and subtitling. The sum rounds 1.2 M of euros. Inside the internal concept are grouped manpower and other cost related.

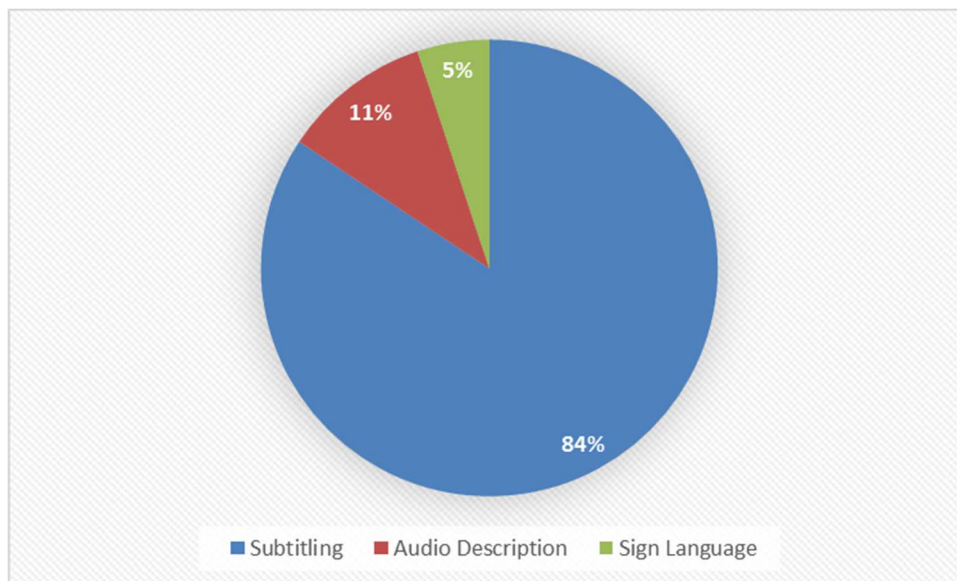


Fig. 25 Cost distribution by accessibility format

Table 30. 2018 accessibility cost

Concept	Cost
Internal	120.000 €
Live Subtitling	649.000 €
Previously recorded Subtitling	310.000 €
Audio Description	120.000 €
Sign Language	58.000 €
Total	1.257.000€

The cost of the live subtitling is separated to emphasize their relevance. As can be seen the aggregation shows that 84% of the costs are invested on subtitling. For CCMA's TV station, accessibility supposes a direct cost in a range of 0,4 - 0,6% of the annual budget.

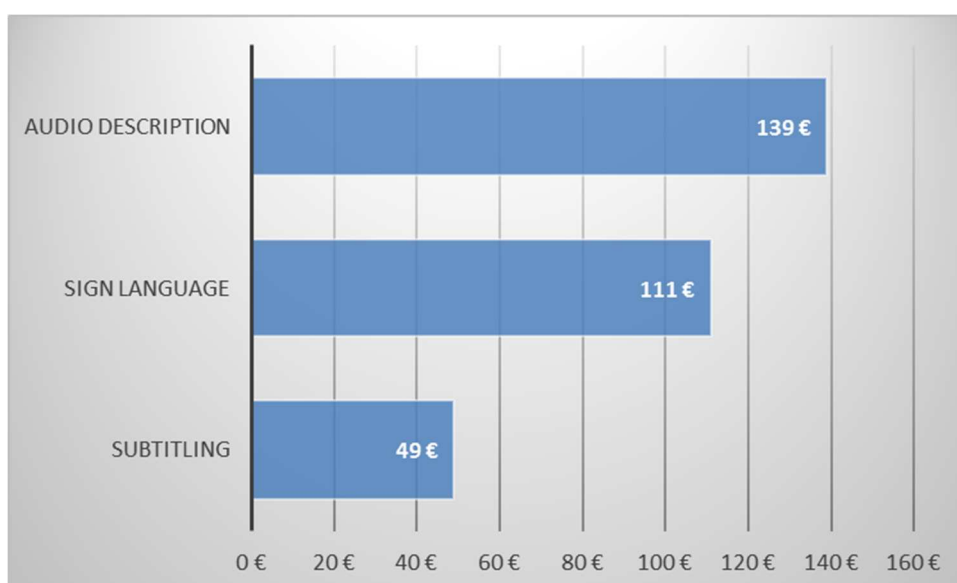


Fig. 26 Cost per hour estimation

6.9. Economic feasibility

The following tables presents the economics information related to CCMA splitted in Live/not live services.

Table 31. CCMA costs splitted by services

Category	Sub-category	Persons	Cost_P	Live	Recorded
Sign Language	Sign Language	3	58.000,00	58.000,00	
Subtitling	Pure live	25	649.000,00	649.000,00	
	On demand	0	-		
	Previously recorded Subtitling	7	310.000,00		310.000,00
Audio Description	Audio Description	4	120.000,00		120.000,00
Audio Subtitles		0	-		
Internal	Internal	2	120.000,00	120.000,00	
Total		41	1.257.000,00	827.000,00	430.000,00

The following list illustrates the exploitable assets developed in the EasyTV project:

1. Service Manager
2. Multilingual Subtitle production
3. Sign Language Production
4. Hyper personalization
5. Crowdsourcing Platform
6. Gesture/Gaze Remote Control
7. TTS Service for Screen Reader and Automatic voice synthesis of subtitles
8. Speech Platform SDK
9. Automatic Web Page Voice Interaction
10. Image Enhancement (face & text detection)
11. Audio enhancement

Comparing the exploitable assets with those currently used by CCMA we find the following correlation. The asset in the left column can match those in the left one.

Table 32. CCMA services VC EasyTV Exploitable assets

CCMA services	EasyTV Exploitable assets
Sign Language	Sign Language Production
Subtitling	Multilingual Subtitle production
Audio Description	Audio enhancement
Audio Subtitles	TTS Service for Screen Reader and Automatic voice synthesis of subtitles

















Within the project we can also identify a further exploitable asset, currently not adopted in CCMA workflow, but able to provide a significant added value: the Image Enhancement module (face & text detection). Then there are further exploitable assets that enable by the EasyTV infrastructure: Service Manager, Hyper personalization, Crowdsourcing Platform. Multi Terminal Application.

This analysis allows us to have a first order of magnitude of the components enabled by the EasyTV project, able to be adopted by a broadcaster to replace those currently used. The economic value relating to these components stands at € 400,000, a value that can constitute a benchmark for understanding the substitutability threshold of the solutions currently adopted, with those provided by EasyTV for a medium-sized broadcaster.

7. INDIVIDUAL EXPLOITATION AND EXPLOITABLE ASSETS

Following EasyTV services/assets have been described to better identify the main opportunities enabled by each project's asset, both from a market perspective (competitor analysis) and from the value creation for the end users (value proposition). Here below the list of partners and related responsibilities.

Table 33. Exploitable Assets

Owner	Exploitable assets	Exploitable assets Icon
	1. Service Manager	
	2. Multilingual Subtitle production	
	3. Sign Language Production	
	4. Hyper personalization	
	5. Crowdsourcing Platform	
	6. Gesture/Gaze Remote Control	
	7. TTS Service for Screen Reader and Automatic voice synthesis of subtitles	
	8. Speech Platform SDK	
	9. Automatic Web Page Voice Interaction	
	10. Image Enhancement (face & text detection)	
	11. Audio enhancement	

7.1. ARX.NET

7.1.1. Company overview

ARX.NET will exploit the opportunity to explore and develop new technologies and user interfaces in the area of TV/Video application development with special focus on accessibility, personalised content and service delivery and multi-device delivery. The participation in the project has increased the company's capabilities and knowledge in the delivery of next generation applications for TV/Video services that can adapt and target any user, no matter their age or potential disability. The knowledge and expertise that the company has developed can be utilized in the delivery of commercial TV/video applications with any of the paid TV service providers ARX.NET already cooperates with.

7.1.2. Outcome/results from the project

ARX.NET is researching and plans to exploit in the following areas:

- Universal and accessible remote control powered by speech recognition technologies to manage TV set and TV applications for blind and visually impaired people.

- Gesture/gaze recognition technologies that will be integrated in the universal remote control.
- Device interoperability within the user environment making possible to interoperate across different devices.
- HbbTV companion screen application with video synchronization capabilities.
- Service Development Kit that will allow the integration of the accessibility services of the EasyTV project in other platforms. It will include a set of well-integrated open sources libraries and tools that will assist developers to create better applications for people with disabilities.
- Service Manager that can facilitate and enable projects which require complex workflow management processing system.

7.1.3. Individual exploitation plan

By participating in this project ARX.NET will utilize the know-how to provide better solutions for people with various degrees of disabilities.

ARX.NET will develop a HbbTV platform that will integrate and exploit all the knowledge gained from the EasyTV project. It will include accessibility services such as speech recognition to manage HbbTV applications, text-to-speech technologies to relay useful information to blind and visually impaired people and a companion screen application that will offer image enhancement capabilities. Moreover ARX.NET will integrate the accessibility services in commercial applications it already develops for TV service providers that it cooperates with. This includes SmartTV applications, set-top boxes, mobile applications, web and desktop applications.

Finally, ARX.NET has and will disseminate the objectives of this project in the form of presentations with several TV service providers that it cooperates with.

7.1.4. EasyTV Exploitable Assets: Service manager

Table 34. Service Manager summary sheet



License
TRL
Ownership
Availability

The Service Manager is the gateway between the Content Owner and the EasyTV platform services. Using it, the Content Owner can easily post jobs and benefits from the accessibility features implemented by the EasyTV services. The Service Manager consists of a Web UI and a Web API that can be used by the content owner as well as a Web API to be used by services inside the EasyTV platform.

Apache 2.0 license

7

ARX.NET SA

<https://github.com/arx-net/EasyTV-Service-Manager>

7.1.4.1 Competitor analysis

The Service manager offers functionality specific to the case of the EasyTV project, opening the EasyTV platform to the outside world of Content Owners, there are no known competitor products that cover the needs of the project.

7.1.4.2 Value proposition

The Service Manager allows the user to create jobs that consist of one or more tasks. Each task has predefined input and output and to maximize productivity, the output of a task can be linked with the input of the next consecutive task. This feature allows the user to create a single job instead of creating many and manually passing the output of one job to the next. Moreover, the job's expiration can be scheduled to delete any asset related to it after a specific date has passed. All this is provided through a web user interface that makes it easy for the Content Owner to enhance their content with accessibility features. Apart from the web user interface the Service Manager also offers two web API's. The first API allows the Content Owner to integrate the Service Manager into their own tools. The second API makes it easy for a new service to be included into the EasyTV platform and then offered to the Content-Owner.

7.1.4.3 Plan for the asset exploitation after the project

Service Manager will be provided as part of the total EasyTV platform and will be provided Open Source under Apache 2.0 license. ARX.NET will introduce Service Manager in other projects which require a complex workflow management processing system.

7.2. CCMA

7.2.1. Company overview

The CCMA, as a public service media, is very sensitized to the difficulties of impaired people for accessing the audiovisual content. With the exploitation of this project, CCMA expects to become a reference broadcaster in the implantation of accessibility services. From CCMA perspective, the pursued target is the growth of the ratios of availability and consumption of accessibility products. The results of this project must confirm the growth in products placed at the disposal of users, consumption of products and so in user's satisfaction.

7.2.2. Outcome/results from the project

We are glad about the results of the pilot and the project. Accessibility in general does not provide larger audiences, but it is very valuable tool to the end user and as a public service media, we must take care about it.

As European society has become more complex and diverse, the external projection of its own audio-visual content is more necessary. A multi-language subtitles offer, contributes to discover new audiences. The realization of the EasyTV project has allowed the CCMA to study and know how to adapt its production, broadcasting and distribution channels to be able to make a real exploitation of multi-language subtitling, and it is not ready yet, but we are close to being able to make a real exploitation of multi-language subtitling. A crowdsourcing model has shown as a reduction in costs option but generates rejection among professional subtitling associations.

In addition, being able to implement the first HbbTV screen application is a great success and the plan is continue with this service beyond the project. Besides, we will study how to migrate the rest of smartTV applications portfolio.

7.2.3. Individual exploitation plan

The CCMA must keep its research and development activities under review, and must (in particular) ensure that an appropriate balance is struck between:

- protect the exploitation of its intellectual property, and
- the value that might be delivered to the public and the EU economy by making new developments widely and openly available.

The source code developed by the CCMA will become available at open source platforms (github), with the proper license:

- HbbTV screen reader demonstrator, under an Apache 2.0 license.
- Multi-lingual editing tool a Creative Commons "CC BY-NC-SA 4.0" approach.

As a public service, there is no commercial interest behind. Decidedly, we have promoted and disseminated project results, on those forums where the message behind EasyTV has a potential impact, and we will continue doing it beyond the project.

7.2.4. EasyTV Exploitable Assets: Multilingual Subtitle production

Table 35. Multilingual Subtitle production summary sheet



License

The language is also a problem of accessibility to content. The solution that the Subtitle Production module offers is based on producing multi-language subtitles that can be used by content-owners, matching an automatic translation cloud service plus the accuracy improvement provided by the editing tool.

Open source, Apache 2.0 License

TRL	7
Ownership	Corporació Catalana de Mitjans Audiovisuals SA
Availability	https://github.com/CCMA-Enginyeria/Multilanguage-Subtitle-Editor/ - https://github.com/CCMA-Enginyeria/CCMATTS

7.2.4.1 Competitor analysis

We could find a variety of subtitles editors on the market. In detail, according to the goals, the candidates are reduced. Many of them allow just translation but also there exist collaborative tools, for that reason are remarkable the three options:

Table 36. Subtitle editors' analysis

Name	License	Formats	Cost	Comments
Amara ³³	GPL	SRT, SSA, SBV, VTT, DFXP and TTML	Free or pay	Open-source and non-profit collaboration community for captioning and subtitling video. A 'Wikipedia for Subtitles'.
CaptionHub ³⁴	Commercial	VTT, SRT, TTML / DFXP, CSV, TXT, SMI, EBU-STL, ASS & SCC	-	Cloud platform for collaborative captioning and subtitling. It pairs automatic speech recognition with a simple, managed workflow for linguists and validators.
SubtitleNEXT ³⁵	Commercial	SUB, STL, SRT, CIP, PAC, DAS	Monthly subscript. available from 350€ - 3000€	Broadcast & authoring tool, speech input, live and offline, fully supported

The variables for analysis include on-line availability or in-house solution and the platform dependency that entails. The supported formats, price, auto-translation, and availability of collaborative native speakers. Even paying, the availability of language reviewers to improve accuracy for languages other than top five popular ones are rare.

7.2.4.2 Value proposition

The benefit from the EasyTV multilingual subtitles production module, includes:

- EBU-TT-D subtitle TV standard support defined styles and regions for placing subtitles. In the analysis, we did not found any tools compatible in this regard.
- Bilingual detection origin language.
- New subtitles creation, to translate burned subtitles.
- Also is a useful tool for other entities beyond broadcast market.
- The cost reduction that suppose the automatic translation, accelerating translation times and improving accuracy thanks to crowdsourcing reviewers.

Above all, highlight the potential of the EasyTV platform that allows orchestrating complex workflows to provide accessibility solutions, combining multiple techniques one of them different kind of subtitles.

7.2.4.3 Plan for the asset exploitation after the project

CCMA plans to integrate some features of the EasyTV platform on its production and publishing workflows aiming to offer new accessibility services, beyond the end of the project. The development

³³ <https://amara.org/it/>

³⁴ <https://en.wikipedia.org/w/index.php?title=CaptionHub&action=edit&redlink=1>

³⁵ <https://en.wikipedia.org/w/index.php?title=SubtitleNEXT&action=edit&redlink=1>

and integration process still requires an industrialization cycle until they reach the sufficient maturity for a commercial exploitation. Starting from those services where CCMA was involved and integrated during pilots:

- HbbTV screen reader service. A helpful aid to blind and low vision HbbTV users, helping them to discover and reach content.
- Multilanguage subtitling service. European societies has become more complex and diverse. A multi-language subtitles offer contributes to the normalization of the Catalan language among new audiences, a more inclusive offer to deaf audience who do not understand contents' original language.

EasyTV platform offer capabilities, i.e Audio description that we already provide. Nevertheless, we will evaluate other interesting and mature developments, in case they could be adopted.

7.3. CERTH

7.3.1. Company overview

CERTH-ITI is a non-profit research organisation and as such it focuses on research and dissemination by publishing results in well-known and widely read international scientific journals, as well as by presentations in international scientific conferences, workshops and exhibitions, web-based publishing, and small seminars and talks organised for specialised audiences. However, contact with industry and the consequent opportunity to link the activities of Research Organisations with the ability of industry to observe and take advantage of opportunities for exploitation is also sought, as CERTH, a leading academic research institute in Greece, is aiming to exploit the results of the current project both in terms of academic research and commercialisation. Firstly, the evaluation of all the project components by real users is expected to lead to the publication of significant results and allow the institute to create synergies with clinical researchers as well as organisations of people with disabilities in Greece and across the European Union. Furthermore, possible commercialisation opportunities will be investigated specifically for the extension of Greek language interfaces (sign language and speech and text) as well as the positioning of these functionalities in multilingual tools with global usability.

7.3.2. Outcome/results from the project

CERTH aims to exploit the following exploitable results that are part of the assets presented next:

- Sign language capturing module
- Gesture/gaze recognition module
- Crowdsourcing sign language platform.
- Realistic sign avatar
- User Model editor
- Mechanism for hyper-personalisation and adaptation of UIs based on user needs & preferences

7.3.3. Individual exploitation plan

CERTH as a research organization will drive the exploitation activities of the scientific findings of all related areas of the EasyTV system harvesting the tangible and non-tangible benefits of achieving scientific excellence. Moreover, CERTH is already participating in the D-cube³⁶ spin-off company, whose mission is to transform cutting edge research to real-life solutions such as, interactive technologies, motion capturing and analysis, web applications, multi-sensor networks etc.

7.3.4. EasyTV Exploitable Assets: Sign Language Production

Table 37. Sign Language Production summary sheet



The EasyTV capturing technology (i.e., Signer3D) provides a low-cost, easy-to-use motion capture solution for Sign Language translation tasks based on animation. These tasks are defined by the moderator of the EasyTV crowdsourcing platform (T5.2) and are distributed to Sign Language experts in order to fulfill them. Since speaking Sign Language involves not only hand gestures but also facial expressions, the motion capture technology has the capability of capturing all this information and includes an accurate hand tracking technology, as well as, detectors for the face and body of the signer. The output of this module includes text, video, and most importantly, motion files. This data is uploaded to the EasyTV crowdsourcing platform as the result of a Sign Language task.

³⁶ <http://www.d-cube.eu/>

The EasyTV service for the realistic 3D avatar will animate signer avatars focusing on realism to increase sign comprehension and offer an increased experience. Sign language gestures, including both face and hand motions, will be recorded with the corresponding capture tool and then will be stored in a crowdsourcing platform with a specific form. Each of these files will include positional and rotational data of specific parts of the body of the signer. The service will receive the animation data through a broadband connection and animate a synthetic avatar, matching the corresponding body parts, which will be rendered on top of the broadcast delivered content.

License	Proprietary
TRL	TRL5
Ownership	Centre for Research and Technology Hellas/Information Technologies Institute

7.3.4.1 Competitor analysis

There are many commercial motion capture (Mo-cap) systems available on the market. Some of the most famous companies offering such systems are Vicon, Qualisys, OptiTrack and Motion Analysis. In order to offer a high-quality motion detection and tracking, these systems tend to be very expensive and their setup is cumbersome, especially for the task of recording Sign Language (e.g. wearing suits, placing markers, calibrating cameras, etc). Moreover, the fact that most systems are based on optical motion capture makes them suffer from occlusion problems (e.g. one hand hiding the other). At research level, most of the efforts on Sign Language detection includes the use of hand tracking gloves. Such gloves can provide accurate tracking for the hand and fingers and can be based on either optical or inertial motion capture technologies. Other research approaches used RGB-D sensors like Microsoft's Kinect or Intel's RealSense sensor. More recently, focus has been given to deep learning techniques for human motion analysis on Sign Language.

Regarding the avatar and animation usage (or not), different approaches were followed both at commercial and research level, reflecting every time the main aim and the purpose of each project or target group. An automated technique for real-time production of lifelike animations of American Sign Language [30] indicates layers transparently over and modifies the primary motions dictated by the segmental model and does so with little computational cost, enabling real-time production and display. Hand Talk³⁷ translator is a free app which has a sign language automatic translation platform and can automatically translate text and audio to Brazilian Sign Language using an avatar as the signer. SiMAX³⁸ is a software tool that can semi-automatically translate texts, videos, etc. into sign language. The translation is, again, signed by a computer-animated avatar. SignAll³⁹ is an automatic sign language translation system mostly used for 1:1 communication between hearing and Deaf individual through a chat UI. The hearing person's words recorded from a speech-to-text tool. Signer's gestures are recorded through cameras and translated to text in the UI using the corresponding sign language database inside the tool.

Value proposition

Our service (i.e., Signer3D) provides a totally unobtrusive capturing procedure for Sign Language since no gloves or markers are needed to be placed on the body, hands and face of the signer. This is a major concern that alleviates the task of the signer and allows more natural-looking recordings, especially for the fast and complex hand movements of Sign Language. Also, in comparison with optical tracking solutions that requires a lot of cameras to accurately reconstruct 3D data, our approach only needs one RGB-D sensor and no calibration process to start the capturing procedure. This makes our service much more practical and a lot less expensive than the competitor solutions.

³⁷ <http://www.handtalk.me>

³⁸ <https://simax.media/>

³⁹ <http://www.signall.us/>

Concerning the realistic avatar service, all body parts involved in the procedure (including face expressiveness) are using the same skeleton for human translator and the high-quality graphics avatar. As a result, a higher level of realism is achieved for the user. With the usage of crowdsourcing mechanism, a massive set of signs could be added in a minimum amount of time supporting the community. Furthermore, EasyTV can literally breaks down barriers worldwide as supports translation from a sign language to another sign language. At the time, only four sign languages will be used, but additional languages could be easily added.

7.3.4.2 Plan for the asset exploitation after the project

CERTH developed Signer3D as a low cost solution to the challenging problem of Sign Language motion capture. The module integrates many technologies allowing full body motion capture (i.e. body, hands, face) through a simple user interface that can be directly used by Sign Language experts and organizations. CERTH aims at enhancing key point detection accuracy, focusing especially on hand detection, and also exploit future technologies for optimal solving/retargeting on realistic 3D avatars. CERTH will investigate additional ways of exploitation of this asset through research or its spin-off company.

7.3.5. EasyTV Exploitable Assets: Hyper personalization

Table 38. Sign Hyper personalization summary sheet



The EasyTV hyper-personalization framework supports recommendations and automatic launching of assistive technologies that are built into different TV operating systems, applications and embedded devices, as well as automatic adjustments of their corresponding setting. The personalization process is based on a hybrid matchmaking technique (both rule-based and statistical) that considers user needs/preferences and possible functional limitations along with historical data coming from similar users. The statistical approach infer user-relevant recommendations based on statistical analysis of users' data. The rule-based approach uses knowledge base and declared rules for inference. The hybrid outcome is the results of combining both approaches using dynamic adjusted weights that consider user feedback.

In addition, the personalization process mines users' data to improve the accuracy of the personalization. Association patterns are mined from users' data and used to improve the rules of the rule-based approach. Moreover, suggestions for improving users' data are extracted from users' history of interaction.

License

Open Source under Apache 2.0 license

TRL

TRL5

Ownership

Centre for Research and Technology Hellas/Information Technologies Institute

Availability

<https://github.com/sgannoum/easytv-user-profile-certh>
<https://github.com/sgannoum/easytv-statistical-matchmaker-runtime-certh>
<https://github.com/sgannoum/easytv-statistical-matchmaker-analysis-certh>
<https://github.com/sgannoum/easytv-rule-based-matchmaker-certh>
<https://github.com/sgannoum/easytv-hybrid-matchmaker-certh>

7.3.5.1 Competitor analysis

Some indicative products that offer personalization services following the HbbTV specification include the following: Dolby AC-4⁴⁰, Vewd & Fraunhofer IIS⁴¹, IRT⁴² and BBC R&D⁴³. Moreover, there are many related research projects such as GUIDE [24], Cloud4All [25], INLIFE [26] project, VERITAS [27], as well as related user modelling approaches like the one proposed by the VUMS Cluster [28].

Value proposition

The main concern of the HbbTV commercial products above is to offer personalized advertisements and none of these products offers any kind of personalized accessibility features. Moreover, although there are various related research projects focusing on personalized UIs, there are not in the TV domain. The EasyTV hyper-personalization framework is mainly based on previous results related to user modelling coming from VERITAS, Cloud4All and the VUMS cluster, as well as the matchmaking mechanism implemented by the Cloud4All project. However, the result is majorly refined/extended in order to cover the special objectives of the EasyTV project. Special focus is given in the accuracy of the personalization process as described in the deliverable D4.2.

7.3.5.2 Plan for the asset exploitation after the project

The hyper-personalization module has a general use and potential for improvements, specially the approach of improving the accuracy of the personalization. CERTH is planning to consider the outcome of the current pilot to enhance the process and will investigate additional ways of exploiting this asset through research.

⁴⁰ <https://www.dolby.com/uploadedFiles/wwwdolbycom/Content/Technologies/AC-4/Dolby-AC-4-Audio-System-for-Next-Generation-Broadcast-Services.pdf>

⁴¹ <http://www.audioblog.iis.fraunhofer.com/ibc-fraunhofer-iis-vewd-mpeg-hbbtv/>

⁴² <https://www.irt.de/en/activities/media-services-and-applications/hbbtv/>

⁴³ <https://www.bbc.co.uk/rd/blog/2018-09-content-substitution-personalised-broadcasting-hbbtv>

7.3.6. EasyTV Exploitable Assets: Crowdsourcing Platform

Table 39. Crowdsourcing Platform summary sheet



The Crowdsourcing Platform, designed in the context of the EasyTV project, is a web platform that provides a set of functionalities to facilitate the sign language and subtitle production procedures with the collaboration of crowd workers. The Crowdsourcing Platform is based on a micro-tasking framework, where content owners can launch and manage projects and define and distribute tasks through web GUIs, while volunteers-workers can contribute from their web browsers towards the completion of the tasks by uploading annotated signed videos or translated subtitles. In this way, the volunteers contribute with their knowledge-based skills to the creation of a multilingual sign language repository and the translation of multilingual subtitles for media content.

License	Open Source under the MIT license
TRL	TRL7
Ownership	Centre for Research and Technology Hellas/Information Technologies Institute
Availability	https://github.com/Thankalv/easytv_crowdsourcing

7.3.6.1 Competitor analysis

Currently there is no known operating web infrastructure that enables the crowdsourcing of tasks for continuous multi-lingual sign language data. More generally we could point to the successful example of a modern platform that enables a crowd-sourced experience of learning through interactive media named Memrise⁴⁴. This platform is an online community that attempts to teach people foreign languages based on user-generated content. The community members participate in the platform by creating foreign-language lessons, enriching them with media content like memes and translated videos and by evaluating the content of other users when they have expertise in the corresponding language. Memrise is an interesting case of how crowd-sourced content, like the one generated in EasyTV crowdsourcing platform, can be transformed into a way that generates value back to the users

Value proposition

Although there are some platforms that enable users to upload signed words, the EasyTV crowdsourcing platform comprises the most significant attempt to create a web platform that gathers continuous multi-lingual sign language data. More specifically, the platform enables users to upload entire annotated sign language sentences in the Greek, Spanish, Italian and Catalan languages. The collected data will be used for the development of machine learning methodologies, advancing research on sign language recognition. Additionally, the EasyTV crowdsourcing platform enables users to upload translations for subtitles, thus assisting content providers to reach out to more users. Finally, the crowdsourcing platform is fully customizable, enabling content owners to define their projects, split them to tasks and distribute them in the way they want. Moreover, content owners can define the users to which they want to assign tasks and the users that want to validate them.

7.3.6.2 Plan for the asset exploitation after the project

CERTH developed the Crowdsourcing Platform to be user friendly and accessible to everyone. The platform is free to use in order to enable a large number of users to upload annotated signed video that can form a multilingual sign language repository. For these reasons, CERTH aims to keep on improving and expanding the Crowdsourcing Platform by enhancing user experience and introducing additional features and functionalities. The multilingual repository that will be created through the platform is going to be exploited by CERTH for research, allowing CERTH's research team to

⁴⁴ <https://www.memrise.com/>

develop accurate and robust sign language recognition and representation algorithms. These algorithms could then be employed in several applications to enhance the accessibility of people with disabilities in media and in other aspects of their daily life.

7.3.7. EasyTV Exploitable Assets: Gesture/Gaze Remote Control

Table 40. Gesture/Gaze Remote Control summary sheet

The Gesture/Gaze Remote Control is an application created in the framework of the EasyTV project that allows users to control the TV using hand and eye movements. It runs on a personal computer (PC) and requires a depth sensor (e.g., RealSense) and an eye tracking sensor (e.g., myGaze EyeTracker) to fully function. It consists of an interface with buttons representing specific functions of the TV set and by clicking them, the application sends corresponding JSON messages to the TV set using the HbbTV technology. The Gesture/Gaze remote control operates under three modes that define the way to control the cursor in the interface of the application:



- Cursor/Hand control: The right hand is raised in front of the user and it is used to move the cursor by making slight movements to the left, right, up and down. The left hand is raised upwards to perform the click on the button of the interface of the application to which the cursor points.
- Gesture control: Predefined hand movements (i.e., gestures) are used to indicate the selection and click of specific buttons of the interface of the application. For instance, raising both hand in front plays/pauses the selected movie, while bringing the index finger of the right hand in front of the mouth mutes/un-mutes the sound of the movie.
- Gaze control: The eye movements are tracked and the cursor moves at the location of the interface of the application, at which a user looks. The fixation of the user's gaze on a specific location for two seconds is interpreted as click on the underlying button.

Finally, the Gesture/Gaze Remote Control receives preferences from the user profile to change the size of the cursor and the text, the language of the application and the mode of operation. Moreover, through its settings, a user can also change the color of the cursor and the font of the text.

License

TRL

Ownership

Proprietary

TRL7

Centre for Research and Technology Hellas/Information Technologies Institute

7.3.7.1 Competitor analysis

Due to the need for remote control of TV, especially from people with disabilities and based on the technological advancements in smart TV technologies, several TV manufacturers have designed systems to control TV using gestures. Some notable examples are LG that designed the LG Magic Remote⁴⁵ that can be used to perform gestures recognized by the TV and Samsung⁴⁶ and Philips⁴⁷ that employ cameras to recognize hand gestures. Moreover, Sony⁴⁸ has also launched its own LF-S50G gesture control system that consists of a device placed closed to the user to recognize gestures. Lately, a few gaze control systems for the TV set has also begun emerging. EyeGaze

⁴⁵ <https://www.lg.com/lk/magic-remote/index.html>

⁴⁶ <https://www.samsung.com/au/support/tv-audio-video/using-gesture-control/>

⁴⁷ <https://philips-tvconsumercare.kxondemand.com/Portal/en/Faq/All/2618>

⁴⁸ <https://www.sony.co.uk/electronics/support/articles/00187472>

Inc.⁴⁹ developed the EyeGaze Edge tablet device and the EyeWorld 3.0 software that enables users to control their TVs, among other near infrared devices by looking at a tablet. Furthermore, Tobii, developed a TV gaze control solution⁵⁰ that is based on the Tobii Dynavox eye tracker and EyeR, which is a Virtual Remote software that enables users to add infrared functionality to any tablet, laptop or desktop computer for control of infrared enabled devices in their surroundings.

Value proposition

The Gesture/Gaze Remote Control is the first service that combines both gesture and gaze remote control functionalities in a single framework, avoiding the need for different technological solutions. It relies on the HbbTV technology and thus it can work on any smart TV brand that utilizes this type of technology, without resorting to specific solutions offered by TV manufacturers. Furthermore, the Gesture/Gaze Remote Control is highly customizable, allowing the easy addition of new gestures based on user preferences, as well as offers disability features, enabling users with low vision to increase text and cursor sizes or users with color blindness to define specific colours based on their visual capabilities. Finally, the Gesture/Gaze Remote Control is a cost efficient solution that avoids the use of high-end systems with multiple cameras or sophisticated eye trackers, as well as the need for expensive deep learning networks for skeletal extraction, such as OpenPose.

7.3.7.2 Plan for the asset exploitation after the project

CERTH has taken all possible steps to create a cost efficient service that can be obtained by any interested party. Furthermore, by allowing both gesture and gaze control of a TV, CERTH developed a service that addresses a larger audience, thus significantly expanding the service's exploitation value. CERTH aims to keep investing on services that can assist people with disabilities in their everyday life. As far as the Gesture/Gaze Remote Control is concerned, CERTH aims to improve its usability by a more user-friendly and feature-rich service, as well as attempt to reduce its cost through more cost efficient solutions. Furthermore, CERTH will investigate additional ways of exploitation of this asset through research or its spin-off company.

⁴⁹ <https://eyegaze.com/>

⁵⁰ https://www.tobiidynavox.com/devices/eye-gaze-devices/eyer-virtual-remote/?MarketPopupClicked=true&utm_medium=organic&utm_source=www.google.com

7.4. Engineering Ingegneria Informatica S.p.A.

7.4.1. Company overview

Engineering Ingegneria Informatica S.p.A. provides a complete offer of business integration, application and infrastructure outsourcing, innovative solutions and strategic consultancy.

With 10,300 employees, 50 sites distributed in Italy, Germany, Spain, Belgium, Republic of Serbia, South America (Brazil and Argentina) and United States, it has a consolidated revenue portfolio in 2017 of more than 1 billion Euro.

Engineering has a firm presence on all vertical markets and operates through its four business units - Public Administration & Healthcare, Telco & Utilities, Industry & Services, Finance - supported by cross-business unit centers of competence and by the Research and Innovation Department.

Telco & Media Market

Engineering's presence in the Italian and international telecommunication market is long-standing: the solutions offered cover the functional and application areas that are typical of this sector (BSS, OSS, VAS for wireless, wireline, converging and broadband services) and support functions in ERP, ECM, EAI, HR and Security environments, etc. Billing platforms to support land-to-mobile convergence management are a key element in their offer.

Referring the media market's segment, in line with its own vocation as a complete IT partner, Engineering supports the various players on the Media market (Broadcasters, Publishers, TV, Portals...) in their interpretation of new business models and relative opportunities, in the realization of operational processes and simplified, efficient infrastructures and in developing innovative, secure modes for managing and using new content. The Media market offer makes use of the Group's Competence Center's know-how and experience: consultancy services, system integration, IT Management services and broadband & media services solutions, enterprise content management and enterprise resource planning.

Engineering offers its skills to mobile and land line telecommunications operators, content providers, media and broadcasters, offering application solutions, platforms and products and forming a reality that can cover the whole multimedia digital services value chain.

Using the synergy between the various areas, offers specialized support to its own clients, which combines management of multimedia content, integration with legacy systems and perfect usability from any channel and any terminal.

7.4.2. Outcome/results from the project

Engineering is involved in several crucial Work Package of EasyTV project.

Therefore, the participation to the project will enable Engineering to achieve a considerable *know how* in multiple domains:

- **Disabilities & Accessibility:** competence in understanding and analysing needs of users with disabilities, to:
 - collect proper requirements and realize a consistent system specification (WP1)
 - foresee the development of innovative technologies solutions aimed at ensuring accessibility (WP3)
- **System integration:** improved capability as system integrator of a complex multi-terminal technical platform containing different services (WP5). Specifically, ENG has implemented and managed:
 - **The EasyTV Service Catalogue** which is a web-based catalogue where a professional user (content producer, an expert user with a high level of expertise in sign language and/or proficiency in translation activities or a technical user) can choose the services of her/his own interest among those running in the EasyTV multi terminal technical platform. It is based on an open source headless CMS solution (*strapi.io*).
 - **The EasyTV Service Registry, which** is a CaaS (*Container as a Service*)

environment built to collect the EasyTV services “packaged” in the form of software images. This environment should also enable external developers to build applications in a “self-service” manner by using the existing set of loaded images as a baseline to develop new modules/functionalities. In order to ease the user interaction and to expand the set of available use cases a web frontend application has been developed and integrated into the Registry environment, thus allowing an authenticated user to quickly get a list of available images and to gather further image details. It is based on Docker Registry.

- **The EasyTV containerization platform** that hosts and interconnects the available **EasyTV services** and takes care of their availability and reliability. By employing **containerization** and **container orchestration** technologies, the EasyTV multi-terminal technical platform provides service scaling and full lifecycle management both in cloud and in “on-premise” environments. The platform hosts the EasyTV services packaged in the form of software images and is based on **Docker Engine** (container execution) and **Docker Swarm** (container orchestration). The whole platform supports scaling over several nodes.
- **Market analysis & impact evaluation:** deep and wide awareness of the current digital media landscape and its socio-economic trends (WP7) along with the strengthening of skills in business management and impact creation activities (WP8).

7.4.3. Individual exploitation plan

The know-how and the results achieved during the whole project duration will allow Engineering to propose itself, on Telco & Media market, as a strategic IT partner for the challenges of the digital era. The participation to the project will enable Engineering to improve its capacity to provide integrated solutions and professional consultancy on IT, to the media sector, focusing strategically, on access services for people with disabilities or impairments. It will also allow it to present its solutions to various European media companies with a significant impact in terms of image return and external communication. This will potentially contribute to improving the company's market share outside the Italian borders.

7.5. Fundación CNSE para la Supresión de las Barreras de Comunicación

7.5.1. Company overview

The CNSE Foundation for the Removal of Communication Barriers is a state-level entity with legal personality, non-profit and associated to the Confederation of the Deaf (CNSE). FCNSE works for access improvement for deaf people at all levels in society, and to promote the development of projects that improve the quality of life of this group. FCNSE aims to carry out R+D to contribute to the development and strengthening of the competitiveness of enterprises, by improving the quality of life and social accessibility of deaf people.

F.CNSE has no profit and his main activity areas are: LSE research, accessibility, dissemination and awareness of issues to Deaf people and LSE, promoting reading among deaf people, training, technological innovation, support for families and education and documentation centre.

7.5.2. Outcome/results from the project

The CNSE Foundation hopes that the results of the project will be permanently adjusted to the real needs of the target users, more specifically the deaf and hard of hearing people in our case. CNSE Foundation expects to continue acquiring acquire knowledge and experience on the state of the matter in terms of accessibility in television that serves to reinforce our organizational position that represents the group and continue to offer expert advice at the user level in future projects.

7.5.3. Individual exploitation plan

CNSE Foundation does not carry out a commercial exploitation of the results. CNSE Foundation contributes to the dissemination of the project through participation in congresses and events that have the participation of users of accessible television. However, in consonance with the non-profit nature of the CNSE Foundation, our organization will continue to participate in the development of products, services and research that promote accessibility to communication and information for deaf and hearing impaired people. The CNSE Foundation may be involved in commercial proposals for exploitation that contribute to this purpose.

7.6. Mediavoice

7.6.1. Company overview

Mediavoice is today focused only on the internal market. The company is going to exploit the project results for commercial purposes to start new business on international markets. We are also investigating, defining and developing new business models which will exploit the results of EasyTV for the distribution of mobile speech applications for blind people on mobile stores, moving away from the current personal computer-based architecture.

7.6.2. Outcome/results from the project

Inside the EasyTV project, Mediavoice is investigating and defining a new Speech Platform, including the emerging Artificial Intelligence technologies based on Natural Language Processing (NLP) and Machine Learning (ML) techniques. The new EasyTV Platform will help us to develop and exploit new products, open new markets and start new industrial collaborations.

7.6.3. Individual exploitation plan

Mediavoice is going to exploit the results of the new technologies that have been developed in EasyTV project regarding the Speech interaction and the Artificial Intelligence technologies (NLP and ML), including them in “Speaky Facile” product and improve the accessibility and usability of the whole Mediavoice suite for Blind and Visually Impaired people.

To design our exploitation plan, Mediavoice is carrying out the following dissemination activities, so to have the right advices from international business partners also:

- Published his participation in the EasyTV project in the company website⁵¹;
- Participated at BIAT 2018 – (Innovation and High Technology Fair) in Naples (Italy) 19-20 April 2018 where EasyTV has been introduced to all new contacts;
- Participated at SIGHCITY 2019 – Exhibition for Aids for the blind and the visually impaired in Frankfurt (Germany) where EasyTV has been introduced to all new contacts;
- Participated to “Autonomic Paris” 2018 and 2019 - Exhibition for Aids for the blind and the visually impaired in Paris (France) where EasyTV has been introduced to all new contacts.

Today, developing a new semantic technological layer, we are planning to improve our products suite, including new high-level semantic services. So that Mediavoice, at the end of the project, will have both an improvement of the Speaky Software Development Kit, and new services available for the users, representing, with their new functionalities, new products.

Mediavoice in this way will develop and exploit all the following new assets under the hat of EasyTV Speech Platform:

- **TTS Service for Screen Reader and Automatic voice synthesis of subtitles:** a set of Web API that can give voice to any HBBTV or Web application simply calling online HTTP/REST service. The Web API includes services that can also create audio subtitles (synchronized audio tracks) starting from standard subtitles files like EBU-TT-D and WEB-VTT formats, simply calling online HTTP/REST service.
- **EasyTV Speech Platform SDK:** a set of APIs that allows third party developers to voice enable any cordova or native android application;
- **Automatic Web Page Voice Interaction** (New Patent by MV): this is a patent pending technology derived from the experience of Mediavoice on managing the new AI and ML techniques explored in the EasyTV Speech Platform component during the project development and will be exploited in new products by the company.

⁵¹ <https://www.mediavoice.it/ricerca-e-innovazio>

7.6.4. EasyTV Exploitable Assets: TTS Service for Screen Reader and Automatic voice synthesis of subtitles

Table 41. TTS Service for Screen Reader and Automatic voice synthesis of subtitles summary sheet

This asset includes three different components:

- Development Tool for generating audio subtitles.
- Text To Speech Service (TTS Service) for the automatic synthesis of subtitles in a different language;
- Text To Speech Service (TTS Service) for the automatic synthesis of Text in HTML/HBBTV applications in different language.



The development tool will be based on two different mechanisms to extract the textual information from the subtitles. The first one will be the extraction and generation of audio track starting from subtitles in a standard text format (e.g. EBU-TT-D). In this case the subtitles and their timestamp attributes will be parsed and directly read by the TTS Service and then synchronized. The second mechanism includes the conversion of graphic format subtitles (e.g. DVB-SUB bitmaps into text by means of an existing OCR system). These services will make available spoken subtitles for a variety of languages, moreover, the development tool will take advantage of the crowdsourcing platform to access the subtitles provided by users for an effective and high-quality multimedia content. Finally, the TTS Service will be also exploded in other screen reading functionalities of the EasyTV platform (i.e. in HBBTV Application as a screen reader of the content navigated by the user with a remote control).

License

Potential licenses may be the following:

- Development Tool: annual license price (annual or monthly payments or as a service);
- TTS Service nCHARS for single language (pay per use).

TRL

[7/8]

Ownership

Mediavoice SRL

7.6.4.1 Competitor analysis

For our audio subtitling Development Tool, we didn't find any complete off-the-shelf tool available. Sometimes companies developing Speech applications can develop such kind of tools. Occasionally broadcasters develop and implement these specific audio subtitle tools or services by themselves. The EasyTV audio subtitling tool could be an off-the-shelf product, open and customizable for specific use with a low cost to make convenient for broadcasters to buy and to have it in their own premise.

Concerning the TTS Service many large companies are on the market so that it can be also acquired externally. The most competitive companies providing this kind of service are:

- Microsoft Azure - with its Cognitive Services that offer both Text To Speech and Speech Recognition services on the cloud;
- Google Cloud – Text To Speech and Speech Recognition
- Other minor companies as: Verbio - iSpeech.

All companies provide API to developers for both Text to Speech and Speech Recognition in Cloud architecture and with a pay per use model, based on the number of transactions and amount of data

used (i.e. number of characters translated from text to audio, or number of transactions for Speech Recognition).

7.6.4.2 Value proposition

Our audio subtitling Development Tool and our TTS Service will be available in any deployment architecture, Cloud or On-Premise Solution.

7.6.4.3 Plan for the asset exploitation after the project

All industrialization activities will be carried out to be able to switch from prototypes, albeit validated, to products.

7.6.5. EasyTV Exploitable Assets: Speech Platform SDK

Table 42. Speech Platform SDK summary sheet



This Asset is identified by the EasyTV Speech Platform, that will enable any user, especially blind, low vision, and elderly, to interact with EasyTV applications using their own voice. The final user will be able to issue voice commands also in a “semi natural way”, performing actions on the applications like a normal user does by his remote control, mouse or using a touch screen device. The EasyTV Speech Platform will be available for a variety of applications and functionalities that will be implemented in the EasyTV project, for example browsing or searching the video library, controlling video playback, multimedia volume, setting TTS properties, managing audio and video tracks and many more. Moreover, the Speech Platform will be available also as EasyTV Speech Platform SDK to allow third parties to develop new voice enabled applications for the TV Domain and more.

License

Potential licenses may be the following:

- EasyTV Speech Platform SDK Corporate License;
- EasyTV Speech Platform – End User License.

TRL

[7/8]

Ownership

Mediavoice SRL

7.6.5.1 Competitor analysis

Nowadays speech services are available on the market by many important companies that provide the basic technology for developers to build specific applications with voice interactions using Text To Speech Engines (TTS) and Speech Recognition Engines (ASR). Developers can use and combine these services to develop speech enabled applications.

We can mention, among these big companies:

- Microsoft and his Azure Platform: Azure Cognitive Services offers both Text To Speech and Speech Recognition services on the cloud.
- Google Cloud – Text To Speech and Speech Recognition
- Other minor companies as:
 - Verbio
 - iSpeech

All companies provide API to developers for both Text to Speech and Speech Recognition in Cloud architecture and with a pay per use model, based on the number of transactions and quantity of data used (i.e. number of characters translated from text to audio, or number of transactions for Speech Recognition).

7.6.5.2 Value proposition

The EasyTV Speech Platform is implemented as a Hybrid architecture: it runs on both Cloud and local devices. This makes their interaction more effective and efficient in terms of reactivity time.

Using architectures and platforms such as Google Home or Alexa, in addition to speech synthesis and recognition services, applications always run in the cloud and pass through the provider's cloud platform. In this way, secure way back communication between the cloud service and the final application, that runs on the end user device, must also be implemented.

EasyTV Speech Platform instead offers to broadcasters the possibility to be independent from cloud platforms of big companies and have the control of their applications and private data

7.6.5.3 Plan for the asset exploitation after the project

All industrialization activities will be carried out to be able to switch from prototypes, albeit validated, to products.

7.6.6. EasyTV Exploitable Assets: Automatic Web Page Voice Interaction

Table 43. Automatic Web Page Voice Interaction summary sheet



This is a patent pending technology derived from the experience of Mediavoice on managing the new AI and ML techniques explored in the EasyTV Speech Platform component during the project development and will be exploited in new products by the company.

License

Potential licenses may be the following:

- recurring subscription fee
- software as a service

TRL

6/7

Ownership

Mediavoice SRL

7.6.6.1 Competitor analysis

This technology is **an absolute innovation: it has no direct competitors in the target markets.** It is the only solution that allows **a full (interactive) voice navigation of any website.**

There are currently **some products** on the market **that might look similar to ours**, they claim to be able to enable 'voice navigation of the web, whereas in fact, all of these products **suffer from at least one of the following limitations:**

- They only allow a 'one shot' web voice search/navigation: that is, they allow the user to give a single voice command that produces results on video or through a single audio response (e.g. Siri, Cortana, Alexa, Bixby, Google Now, Google Home), therefore unusable by the blind.
- They allow a full web voice search/navigation i.e. with interactive dialogue, but only with a limited and predefined website basket (i.e. at the voice question "what's the weather like today in Rome?" the answer is captured from the web somewhere and given to the user as a text to speech or audio file. That's it! there is no interaction with a specific web site or navigation inside your preferred web site that's decided by these assistants). This conflicts with the first objective of the blind that is autonomy of access no matter where (By the way, Mediavoice introduced on the market such solution as early as 2001 - called 'Voice@Web' -, Patented solution: European Patent EP1371057 (A1) - 2003-12-17: METHOD FOR ENABLING THE VOICE INTERACTION WITH A WEB PAGE. (Italian Patent n. 0001323158, 2001-3-12)

Today the only option to browse the web, possible only for the blind and visually impaired with technical skills, is represented by the Screen Readers. However, this option is subject to severe limitations.

7.6.6.2 Value proposition

UNIQUE SELLING POINT AND KEY DIFFERENTIATION

This new solution is the only one that allows the user to perform a full voice Internet browsing, using speech technology by extracting the relevant content, in real time, from the page, and presenting it using voice interaction with the user. The user issues by voice the desired action to perform and iterate this process until gets to the content he/she is looking for. Hence, given all this, because of their power the big players, although not direct competitors, are at least indirect competitors: the hope is that they will become partners in this enterprise.

7.6.6.3 Plan for the asset exploitation after the project

Mediavoice is looking for new financial resources to bring the new technology to TRL9 and then to the market

7.7. UAB

7.7.1. Company overview

UAB is exploiting the project for academic purposes.

Two PhD are part of the project. The first will study the exploitation of a crowdsourcing platform for SL interpreting. The second is looking at the different ways to test with vulnerable users from a new approach: capabilities rather than disabilities.

This project is exploited for the research group image and reputation since it will place us again as leaders and at the cutting edge of research in our field.

The industry-university collaboration is another exploitation for us academics, since it is crucial to have the industry interaction for a meaningful research.

7.7.2. Outcome/results from the project

Academically UAB will study through end user interaction and testing the framework where to test. While the first approach of the project was the Medical Model of Disability (WHODAS 2.0) it will be studied the possible move to the Capability model.

7.7.3. Individual exploitation plan

UAB has written the following publications:

1. Belén Agulló and Pilar Orero (2017) 3D Movie Subtitling: Searching for the best viewing experience. Studi di Comunicazione e Mediazione linguistica e culturale COME 2 (1) 91-102.
2. Orero, P and Tor-Carroggio, I. (forthcoming). "User requirements when designing learning e-content: interaction for all". In Evangelos Kapros and Maria Koutsombogera (eds), Designing for the User Experience in Learning Systems. Springer.
3. Orero, P and Tor-Carroggio, I. (forthcoming). "User profiling in audio description reception studies: questionnaires for all".

7.8. UICI - Unione Italiana dei ciechi e degli ipovedenti (Italian Union of the Blind and Visually Impaired)

7.8.1. Company overview

The Italian Union of the Blind and Visually Impaired, founded in 1920, (DPR 23 December 1978) is a non-profit organization that represent and protect blind and visually impaired people. In particular, the Italian Union of the Blind and Visually Impaired promotes the full realization of human rights, civil and social rights of the blind, the equality and inclusion in all spheres of civilian life, with reference to school integration, cultural training, vocational education, job placement, sports, playful-recreational, assistance given to multi-disabled, older people and those who are in situations of particular social exclusion.

UICI has common strategies with many national and international associations so it is also part of the European Blind Union (EBU), the World Blind Union (WBU) and the Federation of the Federation of National Disabled Associations, F.A.N.D.

UICI is a National association with a pyramidal structure headed by the National headquarter under which there are the regional sections that, in turn, coordinate the territorial sections that work closely and locally with the final users. UICI Section of Rome, partner of the EASYTV project, is very active in the territory of Rome and promote and guarantee inclusion in all areas of life to over 1000 members.

7.8.2. Outcome/results from the project

The outcomes of the EasyTV project for UICI – Section of Rome have been excellent: The Speech platform interface along with a set of ripe and quality services to produce and consume accessibility content is an important milestone from which to start improving the quality of life for blind and visually impaired people.

7.8.3. Individual exploitation plan

UICI – Section of Rome, due to its non-profit organization, does not carry out a commercial exploitation of the results. UICI – Section of Rome will always continue to contribute in the development of the product and dissemination activities. UICI – Section of Rome will continue contributing in this research field to promote accessibility and digital inclusion for blind and visual impaired people.

7.9. UPM

7.9.1. Company overview

As the biggest technological University in Spain, the exploitation plan of UPM for research projects is clearly the future exploitation of the knowledge and industrial propriety in two different ways:

First of all, by means of scientific publications and re-using of knowledge in education (which is not an ancillary exploitation) and secondly by means of the technology transfer to the big industry and SMEs, specially to the UPM associated spin-off companies (based mainly on the UPM science and technology park hosting 50+ UPM spin-off companies), which may beneficiate from these innovative solutions.

Moreover, UPM will promote the academic-industry collaboration by signing different agreements to deploy the technology and to disseminate the resulting platform in Broadcasters (UPM has agreements with a suitable number of regional and national broadcasters for R&I), user organisations, media companies and public institutions, as continuation of the exploitation of HBB4ALL.

7.9.2. Outcome/results from the project

According to the previous plan, UPM will obtain a complete solution for user interaction that may include all its HbbTV accessibility services developed during this project. Thus, this outcome will be later exploited by means of knowledge transfer to these UPM's spin-offs, which can adapt the framework to other industries.

7.9.3. Individual exploitation plan

Firstly, the EasyTV exploitation plan for the UPM will consider the inclusion of the knowledge obtained during the project about not only HbbTV but also about other technologies together with the accessibility research field within the university educational plan. Secondly, UPM will disseminate the outcomes of the project by writing technical papers for the multimedia community. Finally, the knowledge transfer to different UPM spin-offs may help the industrial exploitation of the EasyTV innovative solutions by means of different license schemas.

7.9.4. EasyTV Exploitable Assets: Image Enhancement (face & text detection)

Table 44. Automatic Image Enhancement summary sheet



License

TRL

Ownership

Availability

This service improves the media content accessibility by implementing a new tool for automated face and text detection enabling the image magnification. This may help the visual impaired users to access specific image areas which contains important information for a better content comprehension. It will also allow the users to customize the size of the magnification and even to manually select other parts to be enlarged according to their needs. It also has been developed a Character recognition tool that enables to tag these characters.

Apache 2.0

5

Universidad Politécnica de Madrid

<https://gitlab.com/GATVUPM/easytv-services>

7.9.4.1 Competitor analysis

Our solution is based on innovative deep learning techniques for detecting faces and text within images obtained and evolved from the state of the art. Nevertheless, its final application in the form of a customizable and automated service for magnification which may help the improvement of the content accessibility is a new solution only provided by the project. For this reason, there are no known competitor products that provide the same functionality.

7.9.4.2 Value proposition

This service is directly derived from the final users' suggestions obtained in the initial focus groups of the project. For this reason, it provides a specific solution for existing access problems in the current multimedia environment. Moreover, it will be provided within a companion screen application, helping the integration of all users based on an individual solution that will be designed for an easy interaction. It can be separated in 4 microservices that can work independently from each other, to adapt to any workflow.

7.9.4.3 Plan for the asset exploitation after the project

During the project all the knowledge acquired by our researchers at Universidad Politécnica de Madrid will conduct to publish research papers that will contribute to obtain their Phd or master thesis.

We have contacted some spin-offs from the university to make a deeper competitor analysis. This have conducted to the separation of the service in the four independent microservices in order to have a better reach to market. Finally, the spin-offs are offering different solutions to their clients with the possibility to integrate these microservices.

7.9.5. EasyTV Exploitable Assets: Audio enhancement

Table 45. Audio enhancement summary sheet



This asset will include the different services related to the audio enhancement of the media content in EasyTV. In this way, it will implement an automated descriptive narrative based on audio-visual information extracted from the content such as the text embedded in the image, the character recognition from the image, the object recognition from the audio and the characters diarization. Furthermore, it will also implement a personalized audio equalization and management for improving the content intelligibility, evolving the initial clean audio provided by the broadcaster.

We have taken a similar approach to this service than the previous one, we have separated it into 3 different microservices that can operate on its own.

License	Apache 2.0
TRL	5
Ownership	Universidad Politécnica de Madrid
Availability	https://gitlab.com/GATVUPM/easytv-services

7.9.5.1 Competitor analysis

Our solution is based on innovative deep learning techniques for person characterization, object recognition in audio and text recognition in images that have been obtained and evolved from the state of the art. Nevertheless, this is a service implemented from scratch according to the project requirements. For this reason, there are no known competitor products that provides the same functionality.

With regards of the clean audio and since the service will be focused on providing a tool for helping the users to find the better way of presenting the content audio by means of a personalized management of the tracks, not in evolving the clean audio itself, there are no other products that provide the same functionality.

7.9.5.2 Value proposition

This service will allow the provision of automated descriptive narratives based on the detection of specific elements in the audio and video contents. In the current market, there are different commercial solutions to obtaining audio narratives which imply a high development cost. Otherwise, our solution helps in the content intelligibility by providing an automated tool for describing it in a high level, thus reducing the efforts for obtaining additional information that will improve its accessibility.

7.9.5.3 Plan for the asset exploitation after the project

During the project all the knowledge acquired by our researchers at Universidad Politécnica de Madrid will conduct to publish research papers that will contribute to obtain their Phd or master thesis.

We have contacted some spin-offs from the university to make a deeper competitor analysis. This have conducted to the separation of the service in the four independent microservices in order to have a better reach to market. Finally, the spin-offs are offering different solutions to their clients with the possibility to integrate these microservices.

8. CONCLUSION

In this document has been illustrated a final analysis of the Digital Media market that have led, together with the overview of the European broadcaster and Assistive technologies scenarios, to the definition of the consolidated business model for EasyTV.

A business model was also formulated relating to the economic feasibility of a NewCo based on the technologies developed within the project. To understand the rationale that affects the economic sustainability of the initiative, the following were formulated:

1. A business model updated based on the considerations conducted within the project.
2. A business case to define an indicative value of replacing the technologies currently adopted by a medium-sized broadcaster (CCMA) in comparison to the solutions offered within the project.
3. A study of the economic feasibility of the initiative, with a hypothesis of costs and revenues articulated over a period of 4 years.

The evidence of this approach allows us to define that the technologies developed within the project have their own economic sustainability provided that:

1. Are used in synergy to offer customers a complete solution.
2. After a first sales approach in SaaS mode, there is the possibility of proposing an on premise model, more profitable in the short and medium term, thanks to higher license costs and the possibility of offering value-based consultancy and integration services added and which also guarantee a greater lock-in of the customer;
3. The need to diversify the reference market, both in terms of customer sector, extending the offer to the OTT operators and to other providers able to build their services on the project technologies; both in terms of market, widening the target also to companies not belonging to the countries that participated in the project.

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10. APPENDIX

11. A1: D7.1 “Early Stage” Business Model

Providing a business model for EasyTV is strategic: it allows both to make the project sustainable and exploit its innovation impact.

Therefore, creating a business model for Easy TV means to achieve two main goals:

3. define a strategy to capture and generate value from the innovative solutions;
4. maximizing the project long-term impacts in technology, society and industry.

To describe the logic with which Easy TV will create, distribute and capture value, in the present document an “initial” business model is proposed. It represents, in fact, a first proposal concerning the early stage of the EasyTV project development.

A business analysis has been developed based on the outcomes of the previous analysis of Market, European Broadcaster and Assistive technologies scenarios, and furthermore, considering the findings of precedent deliverables of the project (see D1.1 and D1.2).

Starting from this analysis, an initial business model has been defined to identify the more appropriate offer for the EasyTV solutions and with the objective of increasing the active participation by a large constituency of stakeholders and lower the barrier of adoption.

11.1. Methodological approach

For its success, a business model, firstly, must reach the potential customers and meet their needs. Consequentially, a *customer-oriented* approach has been used in continuity with the general *user-centered* approach adopted for the whole project.

Two different tools, widespread and widely used in business development, have been utilized for the business development of the EasyTV project:

3. the **Value Proposition Canvas (VPC)**
4. the **Business Model Canvas (BMC)**

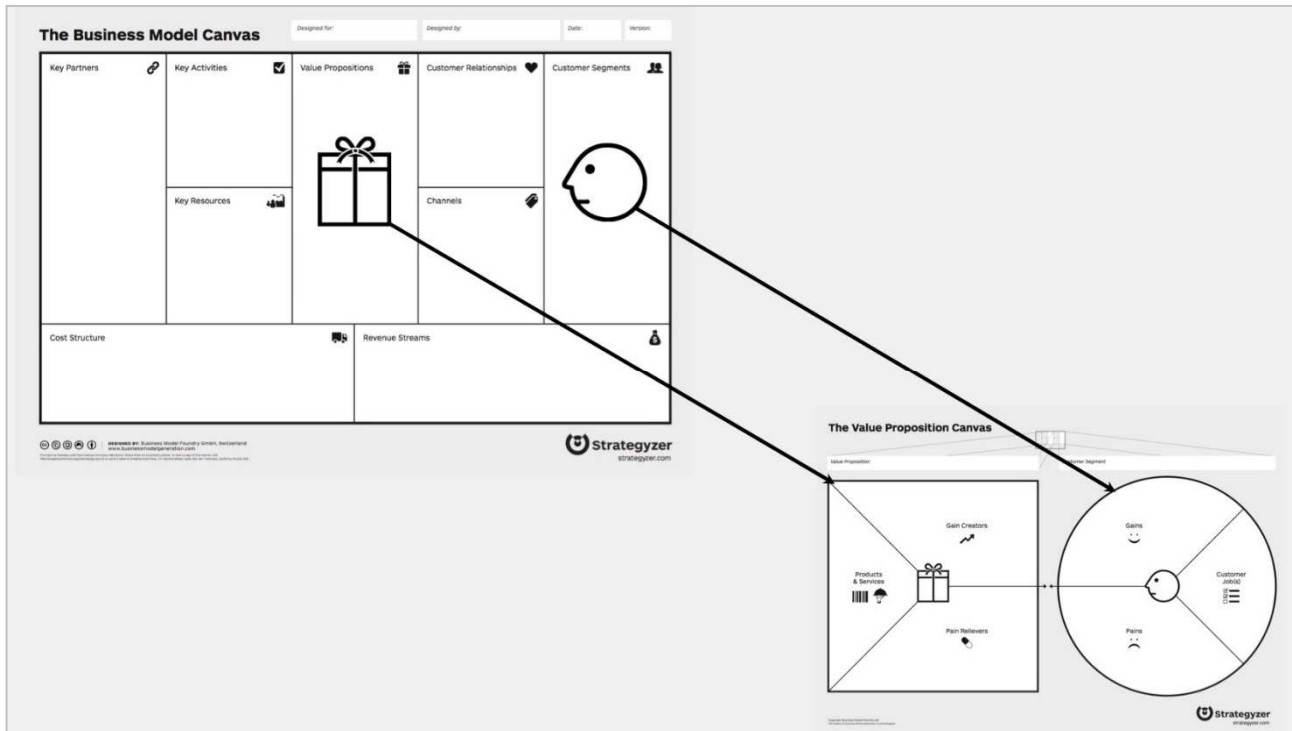


Fig. 27 Connection between BMC and VPC

As better explained below, the Value Proposition Canvas and the Business Model Canvas are connected.

These strategic management tools allow creating a Business model for EasyTV in a structured way and supporting its description using visual charts. Both canvases captures, the core issues around understanding and finding customer problems and designing and validating potential solutions. Furthermore, a visual representation enables an immediate focus on the more significant items of EasyTV project.

The Osterwalder's BMC⁵² is made by nine blocks and every block contains different elements. The most important part of the business model is the relationship between the **Value Proposition** and the **Customer Segment**. To achieve a consistent and effective proposition of value for the different customer segment, the VPC has been used. It zooms into the value proposition and customer segment to describe the interactions between customers and product more explicitly and in more detail.

The process that has led to the initial business model for the EasyTV project consisted of two steps: first, define the Value Proposition Canvas, and then complete the Business Model Canvas.

11.2. Value Proposition Canvas

The Value Proposition is a strategic dimension to create an effective Business model and it refers to the bundles of products and services that represent a value for a specific customer segment.

Products and services create value for the different customer segments when, through them, they can satisfy their needs, solve problems or realize aspirations and desires.

Therefore, to create an attractive Value proposition, a customer-oriented design is the most useful approach to consider. Users/customers, with their differences and similarities, needs and difficulties, are at the centre of the design process, as emerged in other phases of the EasyTV project.

The Value Proposition Canvas, consistently with this leading approach, has been used as a business tool to create, design and implement value propositions for different customer segments. It works in conjunction with the Business Model Canvas and it is a key component. In fact, it is a plug-in tool⁵³ that allows understanding customers' needs focusing on their requirements, to design products and services they want.

The VPC is based on two elements of the business model, the "Customer segment" and the "value proposition". Therefore, it allows mapping out both in more granularity and show the fit between what is offered and what customers want.

This is the first aspect for two main motivations:

3. new products and services introduced into the market can fail to deliver on expectations and not be successful in the market segment;
4. in the specific context of the EasyTV, realize a valid value propositions for the project's main customer segment means, not only create a successful business model, but also create products and services that fit the actual end user needs to achieve the main goals of the project.

The Value Proposition Canvas helps to systematically understand what customers want, why they need a supplier, what they can perceive as an extra value and what they find profitable or disadvantageous.

It's moreover possible to identify customer needs in a visual and structured way.

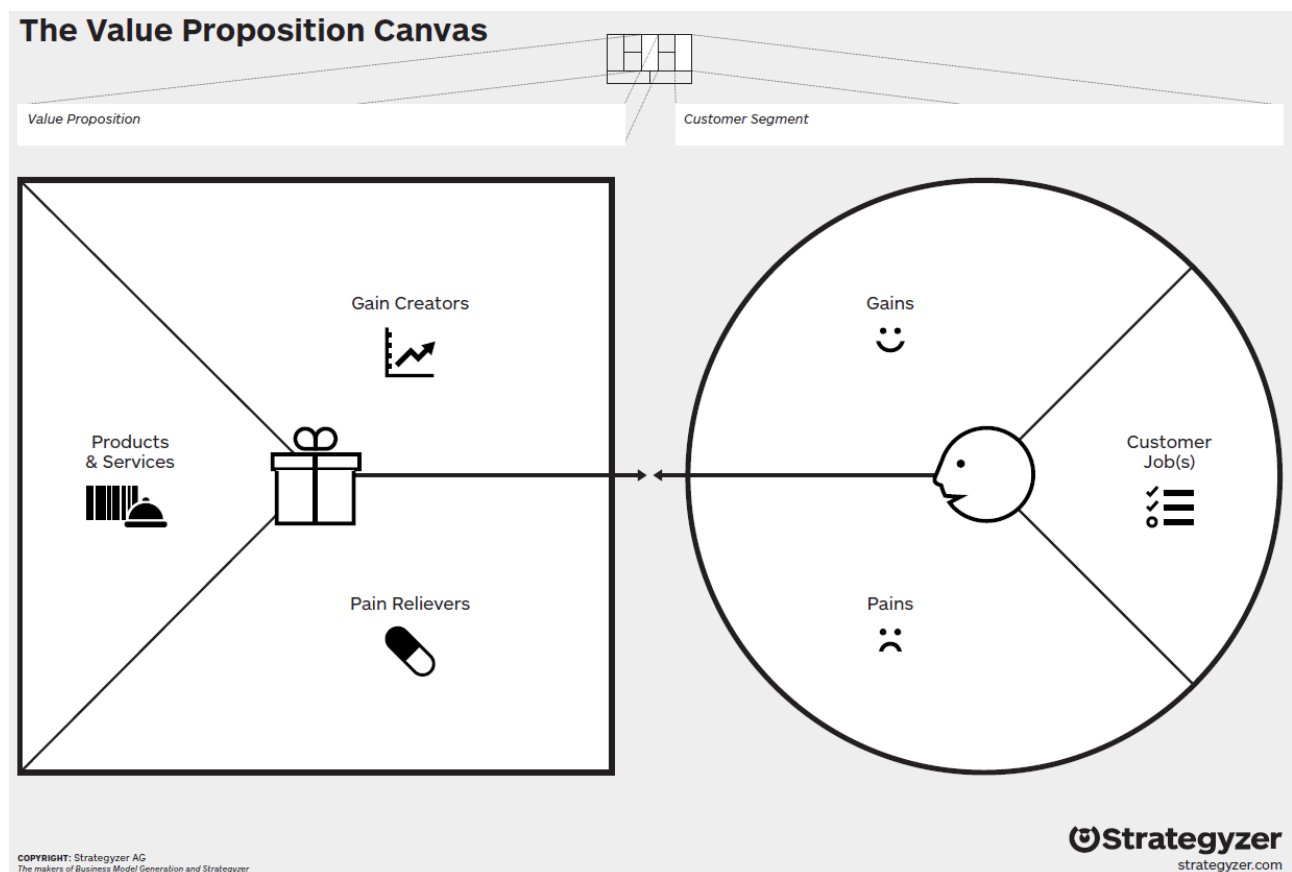


Fig. 28 Value Proposition Canvas

The Value Proposition canvas has two sides that focus on the two key building blocks of the business model canvas:

⁵³ <https://strategyzer.com/platform/training/crash-courses/business-model-basics#video-learn-the-value-proposition-canvas>

3. The Customer Segment is broken down into three boxes:
 - a. Customer Jobs
 - b. Customer Pains
 - c. Customer Gains
4. The Value Proposition is broken down into three boxes:
 - a. Products and Services
 - b. Pain Relievers
 - c. Gain Creators

The Value proposition canvas enables to create products and services that perfectly match user's needs allowing collecting, simply and easily, customer's information.

The canvas traces a parallel line between products and services offered and the needs of customers. Moreover, there are correspondence and dependence among the other panels of the canvas regarding "Pains" and "Gains": the problems that users experience and how these can be solved; what expectations they have and how they can be met by products and services.

With the customer profile block is possible to clarify the customer understanding achieved, otherwise, the value proposition map allows to describe how is intended to create value for that customer. The fit between the two is achieved when one meets the other.

The right side of the canvas is the first to be completed, starting from Customer Job(s) box, and then continue with Customer pains and gains.

- **Customer Jobs** describe the things that they are trying to get done in their work or in their lives. A job can be a task they are trying to perform, the problem they are trying to solve or a need they are trying to satisfy. Customer jobs involve functional, social, personal and supporting factors.
- **Customer pains** revolve around undesired outcomes, obstacles, risks and emotional pains that user can faced. The box describes all the negative emotions and undesired situations which the customer could experience before, during and after getting the job is done.
- **Customer gains** can be classified into required gains, expected gains, desired gains and unexpected gains. It is about what the customer expects and what would surprise him.

A clear image of the client emerges, writing and classifying the problems and the elements of the Customer segment boxes. Subsequently, it is important to manage the customer's biggest pain and gain: these elements will then form the basis of the product or service.

In fact, once the right side of the canvas is completed, it is possible to move over to the left side, in particular on the box "Products and services" and then continue with "Pain relievers" and "Gain creators".

- **Products and services** is a list of all the products and services which the value proposition is built around. They can be tangible, intangible, digital, financial etc.
- **Pain relievers** describe how services and products address the challenges needs and the pains of the customer, how they eliminate negative emotions and undesired or avoidable situations.
- **Gain creators** describe how customers can benefit from products and services offered.

In conclusion, starting from what customer wants, it is possible to understand whether products and/or services are in line with the customer needs.

After understanding the Value proposition canvas structure and the objectives of each section and box, the next phase is fill and complete the canvas with the item individuated.

To substantiate and corroborate the choices made, the process of creation and collocation of the item has followed a first phase of recognition of different issues, topic and solutions collected into the previous documentation (D1.1 and D1.2) or emerged from the analysis present in the different sections of the present document.

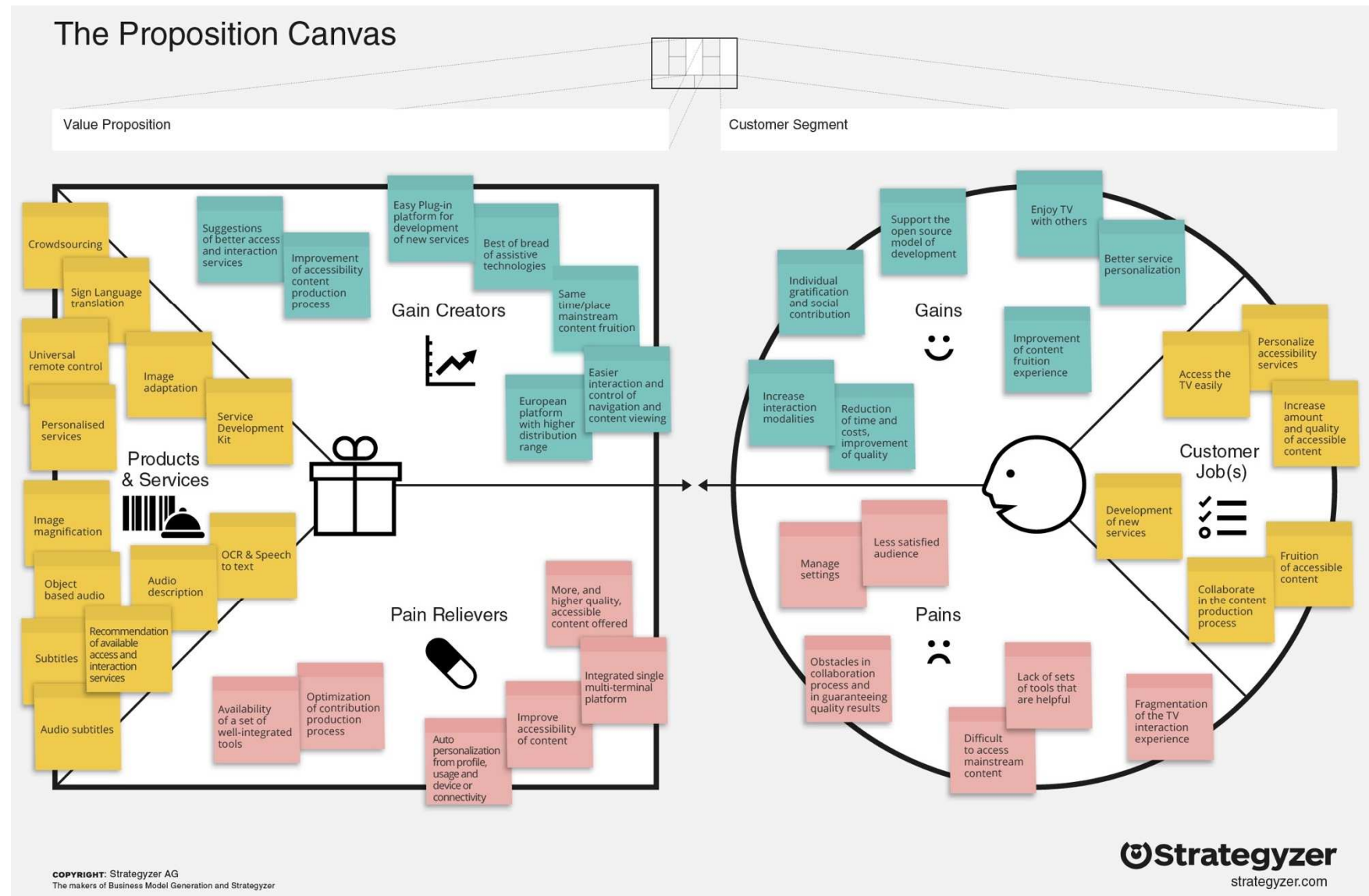


Fig. 29 EasyTV Value Proposition Canvas

11.2.1. Customer Job

Table 46. Value Proposition Canvas: Customer Job

Definition	User	Description
Increase amount and quality of accessible content	BROADCASTER	One of the main jobs for Broadcasters is to make their content available for any type of customer, in order both to reach a wider audience and fulfil policies and regulations regarding media services. But, in many cases, broadcasters are unable to provide all services that allow people (especially people with disabilities) to access media content. This is due mostly to time and cost problems. Consequently, accessible contents cover only partially all of the contents offered.
Personalize accessibility services	END USERS	Customers need to personalize their TV viewing experience, based on their needs that depend on individual skills, context and content type.
Access the TV easily	END USERS	Users need to interact with the TV and the contents in an easy and intuitive way because it is an essential requirement for any type of user.
Fruition of accessible content	END USERS	Customers want to enjoy content made accessible by different services based on their needs and abilities / difficulties.
Collaborate in the content production process	COLLABORATORS OF THE PLATFORM	Expert users want to share their expertise collaborating in the content production process.
Development of new services	COLLABORATORS OF THE PLATFORM	Developers are interested to develop, test and deliver their own services without profit finality.

11.2.2. Pains

Table 47. Value Proposition Canvas: Pains

Definition	User	Description
Less satisfied audience	BROADCASTER	Audiences do not have a fairly amount of accessible content available. This aspect causes frustration and negative emotions with respect to the broadcaster.
Manage settings	END USERS	Customers have difficulty adjusting device settings (TV, mobile devices, desktop PCs, etc.) through which they access TV content.
Fragmentation of the TV interaction experience	END USERS	Multiple devices and platforms are usually used to enjoy accessible multimedia content, so that people with disabilities have "fragmented" access to television content.
Difficult to access mainstream content	END USERS	Among the major pain there is the difficulty to access the mainstream television content. This represents a limitation for users who are not guaranteed equal access to these contents. This barrier prevents them from developing their maximum potential and their personal, professional and social aptitudes.
Obstacles in collaboration process and in guaranteeing quality results	COLLABORATORS OF THE PLATFORM	Sometimes the process of content production is not well structured and managed, this have an impact on the quality of results.
Lack of sets of tools that are helpful	COLLABORATORS OF THE PLATFORM	Lack of availability of set of tools that enable an easier development of new services.

11.2.3. Gains

Table 48. Value Proposition Canvas: Gains

Definition	User	Description
Reduction of time and costs, improvement of quality	BROADCASTER	Broadcaster's aim is to reduce time and costs for producing accessible content and, simultaneously, guaranteeing a better quality to satisfy their audience.
Better service personalization	END USERS	Every kind of user would like to have guaranteed a better personalization service to have a more comfortable and positive fruition experience of media content.
Increase interaction modalities	END USERS	Increasing the ways in which customers can interact with TV set and media content increases the possibility of overcoming the daily difficulties that especially users with disabilities find in everyday life. To have multiple ways of interaction is useful and desirable for any user increasingly able to use new device and technologies, such as, speech interaction with devices (i.e. "Siri" by Apple, "Echo" by Amazon).
Improvement of content fruition experience	END USERS	To improve their experience of use through the modern technologies used daily represents an opportunity for users.
Enjoy TV with others	END USERS	Watching TV together with other people without interfering with their "television experience" is among the main desires for people with disabilities.
Individual gratification and social contribution	COLLABORATORS OF THE PLATFORM	Opportunity to collaborate for social finalities and for improving personal skills.
Support the open source model of development	COLLABORATORS OF THE PLATFORM	Support a model of development of new services that encourages open collaborations among developers.

11.2.4. **Product & Services****Table 49. Value Proposition Canvas: Product & Services**

Definition	Description
Crowdsourcing	Crowdsourcing platform will be used by expert and end-user associations to openly contribute with subtitles and sign subtitles that, furthermore, will simultaneously translate to multiple languages.
Sign Language translation	Sign language translation in different languages, through a multilingual ontology that will map signs to ontology concepts, and realistic sign language avatar animation.
Adaptation	Adaptation of level of content description using standardised DASH streaming services
Personalised services	Personalised services for people with disabilities, including self-adaptive and tailored services, which can learn from users' actions to improve the accuracy of the personalisation.
Recommendation of available access and interaction services	Recommendation of available access and interaction services according to the user's profile, different reproduction speed (slow reproduction) of content presentation and simple reading following grammatical and typographic changes.
Universal remote control	Improvement and development of voice and gesture/gaze recognition to control the TV set and TV applications (e.g., eye movement or head movement). These technologies will be delivered as part of a universal remote control, focused on accessibility, which will also be interoperable between TV sets and personal devices (e.g., wheelchair joysticks), establishing easier interaction and control of the TV in both navigation and content viewing.
Image magnification	Adaptation of the image (to present contrast/edge enhancement or magnification, including algorithms for colour highlighting) targeted at improving accessibility for colour-blind people and people with various visual impairments.
Object based audio	Improve content description by narratives of the content which can be adapted to different play pace, in addition to enhancements towards a cleaner audio using Object Based Audio

Optical character recognition (OCR)	Improve content description with the voice presentation of information.
Speech to text	Improve content description with the voice presentation of information.
Subtitles	Transcription or translation of dialogue or narrative and displayed on the screen.
Audio description	Additional narration track which consists of a narrator talking through the presentation, describing what is happening on the screen during the natural pauses in the audio, and sometimes during dialogue if deemed necessary.
Audio subtitling	Also referred to as 'spoken subtitles', it is the spoken rendering of the written (projected) subtitles or surtitles.
Service Development Kit	Kit of tools that facilitating the integration of new services into the platform.

11.2.5. Pain Relievers

Table 50. Value Proposition Canvas: Pain Relievers

Definition	User	Description
More, and higher quality, accessible content offered	BROADCASTER	Increasing the number and quality of accessible content would enable broadcasters to meet the needs of their audiences who are dissatisfied because of low quantity and quality of accessible content.
Auto-personalization from profile, usage and device/connectivity	END USERS	Possibility to have an automatic customization of accessibility services based on user's profile, the usage and, furthermore, the technical characteristics of devices and type of connectivity.
Integrated single multiterminal platform	END USERS	Opportunity to have an integrated platform that offers to customers the same range of services by distributing them on different devices in a consistent way, so that to guarantee them a better user experience.
Improve accessibility of content	END USERS	Availability of a wider offer of accessibility services that improve the accessibility of the contents that are then actually enjoyed by users.
Optimization of contribution production process	COLLABORATORS OF THE PLATFORM	Improvement and optimization of the process of content production that allows to guarantee a better quality of results.
Availability of a set of well-integrated tools	COLLABORATORS OF THE PLATFORM	Enable application/service developers to have, at their fingertips, a tool which helps them create innovative and efficient solutions.

11.2.6. Gain Creators

Table 51. Value Proposition Canvas: Gain Creators

Definition	User	Description
Improvement of accessibility content production process	BROADCASTER	Improving the production process of accessible contents, optimizing times and costs and guaranteeing high quality.
Suggestions of better access and interaction services	END USERS	Providing suggestions of accessibility services available that may be useful to customers.
Easier interaction and control of navigation and content viewing	END USERS	Easier interaction with the TV set and contents through alternative modalities that are more intuitive for customers: daily activities could be carried out more easily, such as search, recording, navigation of Electronic Program Guide (EPG), time shifting, reminder setting etc.
Best of breed of assistive technologies	END USERS	Ensuring the best of the technologies available on the market to allow user with disabilities an improved experience of use.
Same time/place mainstream content fruition	END USERS	Fully sharing the experience of use, allowing users with disabilities to enjoy the same television content with others, at the same time and in the same place, so as to preserve the social component that belongs to the television viewing
European platform with higher distribution range	COLLABORATORS OF THE PLATFORM	Availability of a platform that distributes content on a wide audience.
Easy Plug-in platform for development of new services	COLLABORATORS OF THE PLATFORM	Availability of a platform that allow easier to create innovative and efficient solutions.

11.3. Business Model Canvas

The Business Model Canvas consists of nine blocks. Each block represents a constituent element of the EasyTV project and it's connected to all the others creating an ecosystem where all elements are interconnected.

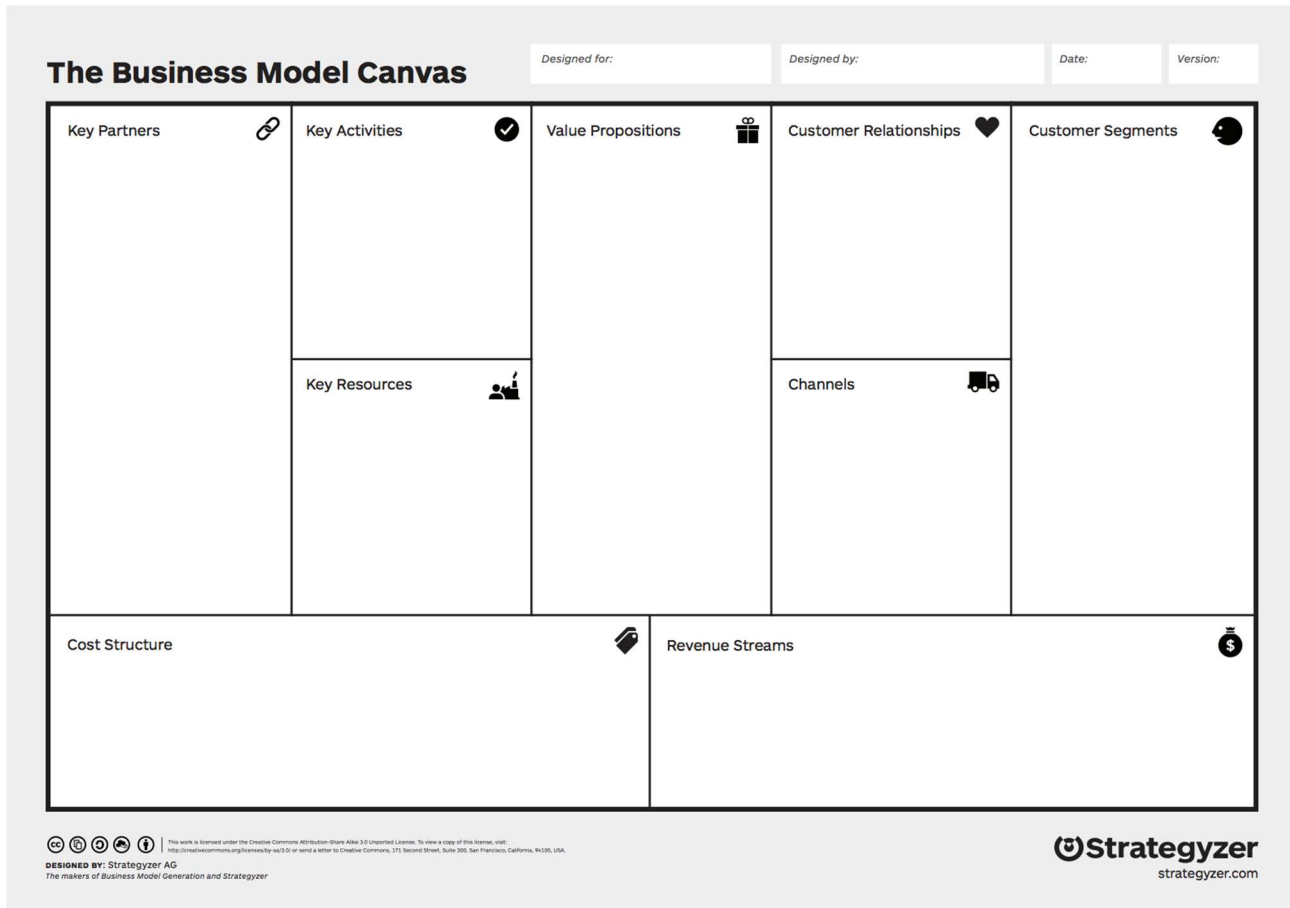


Fig. 30 Business Model Canvas

For the Easy TV business model, the nine blocks are defined as follow:

10. **Customer segments:** the different groups of people, organizations and/or companies that EasyTV is targeting. This block of the Business Model Canvas is fundamental: it allows to build the bundle of products and services around the needs of each specific cluster of customers.
11. **Value Propositions:** the bundle of products and services that represents a value for a specific customer segment.
12. **Channels:** all the channels through which EasyTV reaches a certain customer segment to present, and provide, its value proposition. Channels represent a *touch point* with the customers.
13. **Customer Relationships:** the type of relationship that EasyTV establishes with the various customer segments.
14. **Revenue Streams:** the revenue streams that EasyTV obtains from the sale of products/services to a specific customer segment.
15. **Key Resources:** the strategic assets that EasyTV must have to support its business model. Identify what enables the business model to work.

16. **Key Activities:** the strategic activities that have to be performed to create and sustain value propositions, reach customers, maintain relationships with them and generate revenues.
17. **Key Partnerships:** acting in a larger ecosystem, the network of suppliers and partners is necessary for success of the EasyTV business model.
18. **Cost Structure:** costs implied by EasyTV Business Model. They derive directly from the structure of the blocks related to Key Activities, Key Partners and Key Resources.

The Business Model Canvas is usually divided in two sides. Left side is mainly focused on processes related to products (Resources, Partners, Cost, Activities), instead, the right side focuses on customers and market (Segments, Customer relationship, Revenue). The Value proposition is in the middle to mean that it contains and combines instances both from the market and the development of products.

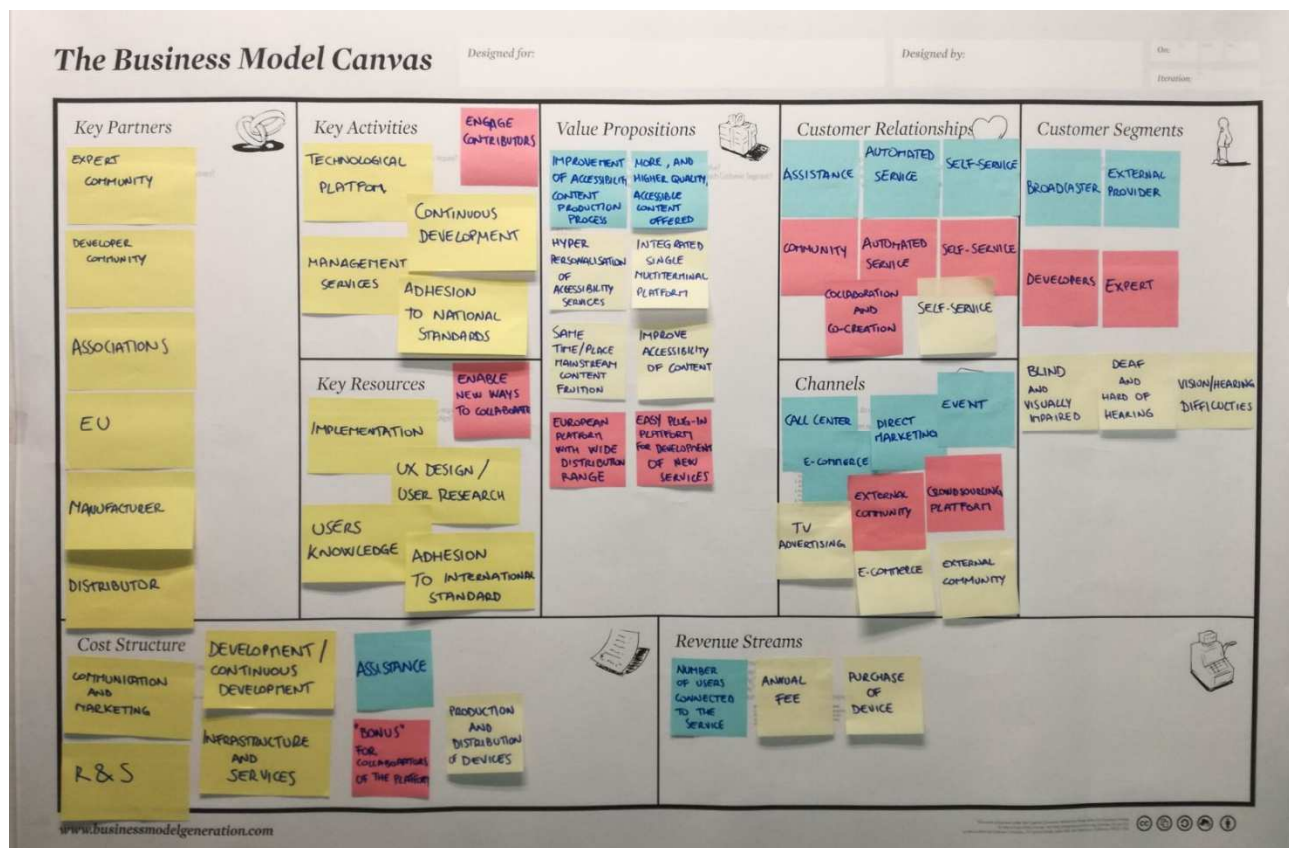


Fig. 31 Design process of EasyTV Business Model Canvas

In the Business Model proposed for EasyTV in each block of the canvas it is possible to find items of distinct colours (Fig. 32). Four colours are present, three of them (blue, red and yellow) are used to discern between the main target segments of the project:

- Broadcaster, media players and companies
- Collaborators of the platform
- End users

This segmentation reflected the multiple directions of the business model suggested for EasyTV.

The first direction is a **B2B (Business to Business) model** that involve services providers and TV content providers: these players will use the EasyTV platform with business purposes.

The second direction is referred to a **B2C (Business to Consumer) model** and it implies the final customers intended as users that will use the platform with personal or social purposes, as respectively end users and collaborators.

The remaining colour, green (which is represented in Fig. 31 above by a wider yellow card), represents more general items. In fact, green cards are mainly placed in the blocks regarding the general infrastructure of the platform that allow to execute the business successfully: Key Partners, Key Activities and Key Resources.

Below, is illustrated in more detail each block of the proposed business model canvas, and each item present is explained.

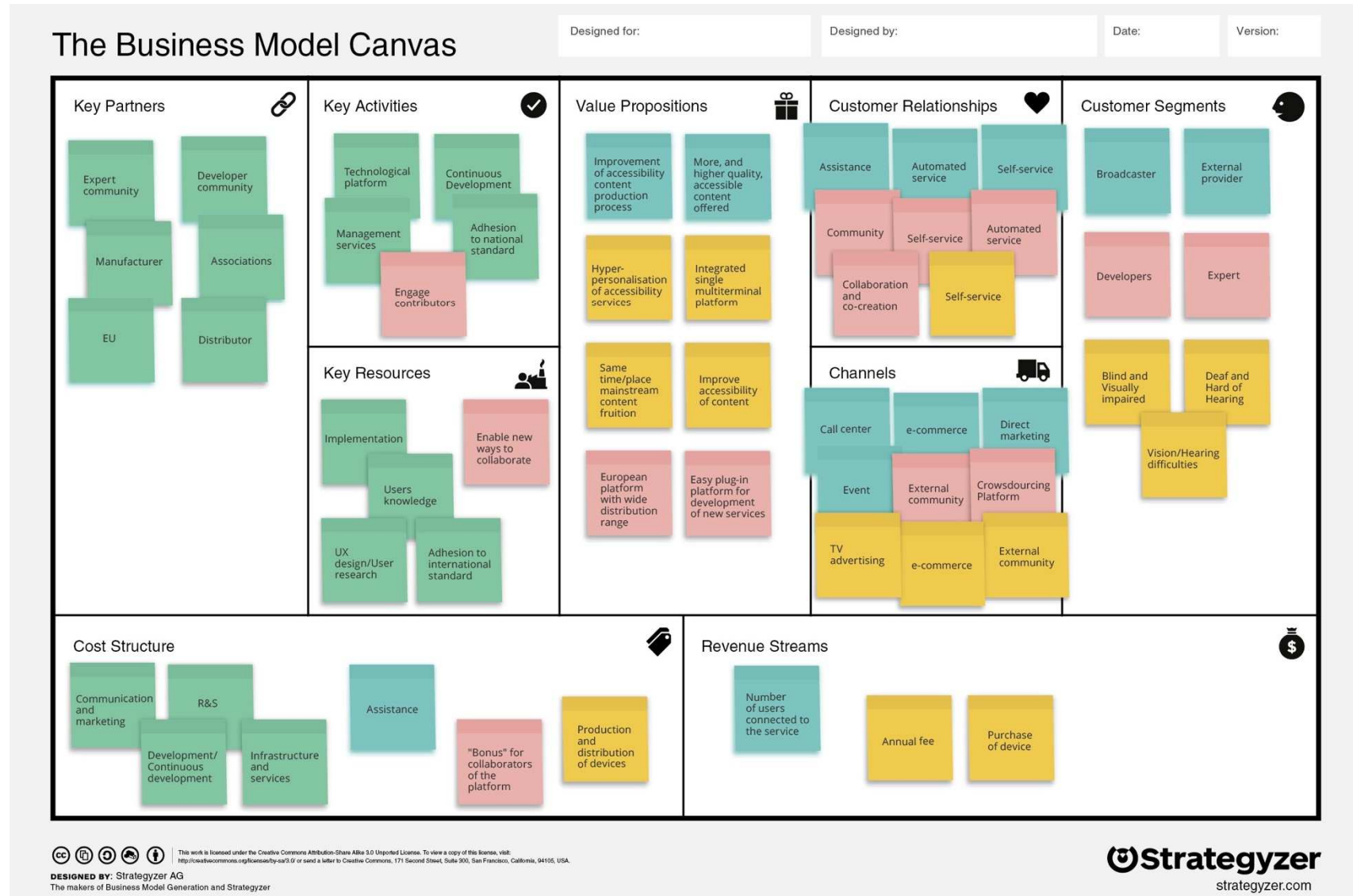


Fig. 32 EasyTV Business Model Canvas

11.3.1. Customer segment

As emerged in the definition of the Value Proposition Canvas, the customer segments identified for the EasyTV platform are divided into three macro categories:

- **Broadcaster, media players and companies:** will use the EasyTV platform and services for business purposes;
- **Collaborators of the platform:** will use the platform mainly for social purposes and, in any case, without profit finality;
- **End users:** will use the platform for personal purposes, as access to TV content having a better user experience.

Below, a more detailed segmentation of the Customer Segment as defined in the Business Model Canvas is presented.

Table 52. Business Model Canvas: Customer segment

Definition	Category	Description
Broadcaster	<i>Broadcaster, media players and companies</i>	Represented by broadcasters, local network television stations affiliates, cable television providers, terrestrial and satellite TV providers, Internet TV's, IPTV's.
External provider	<i>Broadcaster, media players and companies</i>	External software companies that can include, in their business activities, the development and consequently publication of «new» services in the EasyTV multi-terminal technical platform.
Developers	<i>Collaborators of the platform</i>	Developers that might be interested to develop, test and deliver their own services in the EasyTV multi-terminal technical platform without profit finality.
Expert	<i>Collaborators of the platform</i>	People with high level of expertise in Sign Language and proficient in translation activities.
Blind and Visually Impaired	<i>End users</i>	People with high or low visual impairment.
Deaf and Hard of Hearing	<i>End users</i>	People with high or low hearing impairment.
Vision/Hearing difficulties	<i>End users</i>	People with vision/hearing difficulties due to different causes.

11.3.2. Value Propositions

Table 53. Business Model Canvas: Value Propositions

Definition	Category	Description
Improvement of accessibility content production process	<i>Broadcaster, media players and companies</i>	Improving the production process of accessible contents, optimizing times and costs and guaranteeing high quality.
More, and higher quality, accessible content offered	<i>Broadcaster, media players and companies</i>	Increasing the number and quality of accessible content would enable broadcasters to meet the needs of their audiences who are dissatisfied because of low quantity and quality of accessible content.
Hyper-personalisation of accessibility services	<i>Collaborators of the platform</i>	Possibility to have an automatic customization of accessibility services based on user's profile, the usage and, furthermore, the technical characteristics of devices and type of connectivity. Provide suggestions of accessibility services available that may be useful to customers.
Integrated single multiterminal platform	<i>Collaborators of the platform</i>	Opportunity to have an integrated platform that offers to customers the same range of services by distributing them on different devices in a consistent way, so that to guarantee them a better user experience.
Same time/place mainstream content fruition	<i>End users</i>	Fully sharing the experience of use allowing users with disabilities to enjoy the same television content with others, at the same time and in the same place, so as to preserve the social component that belongs to the television viewing
Improve accessibility of content	<i>End users</i>	Availability of a wider offer of accessibility services that improve the accessibility of the contents that are then actually enjoyed by users.
European platform with wide distribution range	<i>Collaborators of the platform</i>	Availability of a platform that distributes content on a wide audience.
Easy plug-in platform for development of new services	<i>Collaborators of the platform</i>	Availability of a platform that allow easier to create innovative and efficient solutions.

11.3.3. Channels

Table 54. Business Model Canvas: Channels

Definition	Category	Description
Call center	<i>Broadcaster, media players and companies</i>	A call center as a dedicated service to support all the Broadcaster, media players and companies to buy and receive assistance and information.
e-commerce	<i>Broadcaster, media players and companies</i>	Web based electronic commerce service for B2B selling and getting information about the product.
Direct marketing	<i>Broadcaster, media players and companies</i>	Reach the main stakeholders through direct marketing actions (by email) to communicate information about the product and services to increase sales and awareness of EasyTV platform.
Event	<i>Broadcaster, media players and companies</i>	Participation in major media industry events to promote the EasyTV platform.
External community	<i>Collaborators of the platform</i>	External community dedicated to topics of interest for the EasyTV project, regarding its main services, to reach the collaborators target.
Crowdsourcing Platform	<i>Collaborators of the platform</i>	Crowdsourcing platform used by expert and end-user associations to openly contribute to the development of accessible content.
e-commerce	<i>End users</i>	Web based electronic commerce service for B2C selling and getting information about the product.
External community	<i>End users</i>	External community dedicated to topics of interest for the EasyTV's end users target: Blind and Visually Impaired Deaf and Hard of Hearing Vision/Hearing difficulties
TV advertising	<i>End users</i>	Commercial messages conveyed through main television network to reach a wide and various audience.

11.3.4. Customer Relationship

Table 55. Business Model Canvas: Customer Relationship

Definition	Category	Description
Assistance	<i>Broadcaster, media players and companies</i>	Customers can communicate with a customer relationship manager to receive assistance during the sales process or after the sale has been completed. It will be possible through a call center
Automated service	<i>Broadcaster, media players and companies</i>	Services that automatically recognize specific user targets and their characteristics and offer them information related to their profile.
Self-service	<i>Broadcaster, media players and companies</i>	No direct relationship with customers but enable them to manage the services offered by EasyTV by themselves in an easy way (for example by user manuals).
Community	<i>Collaborators of the platform</i>	The presence of an online community to involve and support collaborators, reach potential ones and facilitate the connection between members. A Community promotes the exchange of knowledge and the mutual solution of problems. It is a strategic channel to establish and maintain an optimal relationship with collaborators of the platform.
Automated service	<i>Collaborators of the platform</i>	Services that automatically recognize specific user targets and their characteristics and offer them information related to their profile.
Self-service	<i>Collaborators of the platform</i>	No direct relationship with customers but enable them to manage the services offered by EasyTV by themselves in an easy way (for example by user manuals).
Collaboration and co-creation	<i>Collaborators of the platform</i>	Underlining the importance of creating value through the participation of customers and allow them to contribute to the development of new and innovative products
Self-service	<i>End users</i>	No direct relationship with customers but enable them to manage the services offered by EasyTV by themselves in an easy way (for example by user manuals).

11.3.5. Revenue Streams

Table 56. Business Model Canvas: Revenue Streams

Definition	Category	Description
Number of users connected to the service	<i>Broadcaster, media players and companies</i>	Revenue stream coming from broadcaster and media players generated depending on the number of users connected to their services provided.
Annual fee	<i>End users</i>	Revenue stream coming from a fee for the end user that is charged on an annual (yearly) basis. The amount may depend on the number of services accessed.
Purchase of device	<i>End users</i>	Revenue stream coming from the sale/purchase of devices which are an integral part of the EasyTV platform.

11.3.6. Key Resources

Table 57. Business Model Canvas: Key Resources

Definition	Category	Description
Implementation	<i>General</i>	The process that leads to the actual realization of the EasyTV platform with all its component (hardware and software).
UX design/User research	<i>General</i>	The research activities allowing to design a user experience that fits the efficiency and satisfaction requirements for the user.
Users knowledge	<i>General</i>	Access to aspects related to the needs, attitudes, behaviours and aspirations of users.
Adhesion to international standard	<i>General</i>	Following national/international standard to have a reference model and, if possible, improve it or introduce new ones.
Enable new ways to collaborate	<i>Collaborators of the platform</i>	The intellectual resources of collaborators are a strategic resource for the EasyTV platform therefore, is fundamental to enable them to easily find ways to collaborate for the project.

11.3.7. Key Activities

Table 58. Business Model Canvas: Key Activities

Definition	Category	Description
Technological platform	<i>General</i>	The overall integration of software and hardware components of the EasyTV system.
Continuous Development	<i>General</i>	Maintenance of the system and continuous development to guarantee updating of the components and the infrastructure.
Management services	<i>General</i>	Services related to management and problem-solving activities.
Adhesion to national standard	<i>General</i>	Following national/international standard to have a reference model and, if possible, improve it or introduce new ones.
Engage contributors	<i>Collaborators of the platform</i>	Activate actions to engage contributors and find new contributors.

11.3.8. Key Partnership

Table 59. Business Model Canvas: Key Partnership

Definition	Category	Description
Expert community	<i>General</i>	The community of linguistic and sign language expert.
Developer community	<i>General</i>	The community of developers of new services.
Associations	<i>General</i>	Associations and organisations dedicated to disability and accessibility issues.
EU	<i>General</i>	Policy makers at national and European levels who could take advantage of EasyTV outputs. Furthermore, any EU research organisation potentially interested in EasyTV (who could join the community, use facilities contribute to their developments, etc.).
Manufacturer	<i>General</i>	The manufacturers of devices which are component of the platform.
Distributor	<i>General</i>	Actors involved in the distribution process of the devices which are part of the platform.

11.3.9. Cost Structure

Table 60. Business Model Canvas: Cost Structure

Definition	Category	Description
Communication and marketing	<i>General</i>	Costs related to Communication and marketing activities, strategic for the sale of the products and services offered and for their awareness.
R&S	<i>General</i>	Costs related to activities of Research & Development to guarantee innovative solutions and services.
Development/Continuous development	<i>General</i>	Costs related to activities of maintenance of the system and continuous development to guarantee updating of the components.
Infrastructure and services	<i>General</i>	Costs related to activities of building, management and maintenance of the platform infrastructure.
Assistance	<i>Broadcaster, media players and companies</i>	Costs related to activities of support and assistance of Broadcaster, media players and companies intended as a “premium” service for this category of customers.
"Bonus" for collaborators of the platform	<i>Collaborators of the platform</i>	Costs related to “Bonus” given to each collaborator to ensure a deeper engagement and a wider number of collaborators.
Production and distribution of devices	<i>End users</i>	Costs related to production and distribution of devices for end users.