

PROPOSAL TO DEVELOP EDUCATIONAL CONTENT DESTINED TO HYBRID TV OF A REGIONAL CHANNEL

Sean Acosta¹, Gustavo Moreno², Hernando Recaman³, Adriana Reyes⁴

¹ Sean Igor Acosta. PhD(c), Research professor, Communication School, siacosta@elpoli.edu.co

² Gustavo Alberto Moreno, PhD(c), Research professor, engineering school, gamoreno@elpoli.edu.co.

³ Hernando Recaman Chaux, M.Sc, Research professor, engineering school, hrecaman@elpoli.edu.co

⁴ Adriana Xiomara Reyes Gamboa, PhD(c), Research professor, engineering school, axreyes@elpoli.edu.co

ABSTRACT

The hybrid TV is an alternative for the regional channels of terrestrial digital TV. It allows to develop and deliver content and applications for broadcast and broadband. This article introduces the concepts of HbbTV, Hybrid TV, proposed scenarios for hybrid TV, a proposal to develop contents for hybrid TV, and a simulated prototype called educaTV that apply Agile Model of Development Educational Content for Interactive Digital Television (MADCE –TVD). This proposal was submitted for review through an online survey to different people. The results shows that almost 83% believe it is possible to educate yourself with the consumption of this type of content on TV. This research is part of the project "Development and application of edutainment contents in TDT and hybrid TV in the regions of the Antioquia department".

Keywords: Educational; content development; simulation; regional channel; Hybrid TV.

Recibido: 18 de Marzo de 2016.

Aceptado: 28 de Junio de 2016

Received: March 18th, 2016

Accepted: June 28th, 2016

PROPUESTA PARA DESARROLLAR CONTENIDOS EDUCATIVOS DESTINADOS A LA TV HIBRIDA DE UN CANAL REGIONAL

RESUMEN

La televisión híbrida es una alternativa para los canales regionales de televisión digital terrestre. Permite desarrollar y entregar contenido y aplicaciones para televisión y banda ancha. En este artículo se presentan los conceptos de HbbTV, TV híbrida, escenarios para la televisión híbrida, presentando una propuesta para la elaboración de contenidos para la TV híbrida, y un prototipo simulado llamado educaTV que utiliza el Modelo Ágil de Desarrollo de Contenidos Educativos para Televisión Digital Interactiva (MADCE –TVD). La propuesta fue presentada a diferentes personas para su revisión a través de una encuesta en línea. Los resultados muestran que aproximadamente el 83% cree que es posible aprender por si mismos a través del consumo de este tipo de contenidos emitidos por televisión. Esta investigación es parte del proyecto "Desarrollo y aplicación de contenidos edutainment en la TDT y la televisión híbrida en las regiones del departamento de Antioquia".

Palabras Claves: Educativo; desarrollo de contenido; simulación; canal regional; TV híbrida.

Cómo citar este artículo: S. Acosta; G. Moreno; H. Recaman; A. Reyes, "Proposal to develop educational content destined to hybrid tv of a regional channel," *Revista Politécnica*, vol. 12, no. 22, pp. 57-64, 2016.

1. INTRODUCTION

In many parts of the world has been installed or progress has been made in digital terrestrial television, as in the Colombian case with the DVB-T2 standard [1], but there are several traditional channels of TV and current implementations that do not have the bidirectional network to offer other services such as TV by demand, applications, among others, which limits the context of interactivity.

The digitization and convergence trends allows the rise of the TV with capabilities to connect to the Internet, and proposals such as HbbTV (Hybrid broadcast broadband TV) that enables new options to the industry and better user experiences. The stage of connected TV is divided into two large groups, the Smart TV, which have their own operating system to run proprietary applications by each manufacturer or operator independently, and the Hybrid TV mainly represented by the HbbTV standard [2].

As Klaus Merkel suggests [2], the HbbTV "is a way of complete TV experience "because it offers the traditional broadcasted TV with other content services which may or may not be complementary through the Internet. Several authors have worked on the issue and done Hybrid TV, [3] with a TestBed for HbbTV, [4] with an opened platform of TV service based on terrestrial digital TV. Jovanović [5] describes a proposal for a concept of recommending HbbTV applications, and C.A. Martín [6] explains how access services can be provided by means of HbbTV applications. Some work in Latin America, Chicaiza et al [7] presents a model that be adapted to the Brazilian Digital TV System (ISDB-Tb) with the European one (HbbTV), and Dos Santos et al [8] presents the integration of a web-based NCL player and the subsequent testing using an HbbTV emulator, among others. But few have focused on presenting a proposal for a regional channel of digital terrestrial television.

These investigations do not focus on educational content or context of regional channels. The aim of this paper is to development of content for hybrid TV, and prototype development for a regional channel of the Antioquia department. In the first part is shown contextualization and concepts of hybrid TV and HbbTV. In the second one, it is validated a development proposal content and case study with EducaTV. It will be the example used to create programs content educational for rural regions of

the Antioquia department. In addition, it provide an interactive learning environment with the potential to enable people to access learning activities and content from your home. Finally, the conclusions of this work are presented.

2. MATERIALS AND METHODS

2.1 Hybrid TV and HbbTV

A hybrid terminal, in this case the TV, is one that has the ability to connect to two networks in parallel. On one side it can connect to the network broadcast (for example DVB -T2 for terrestrial television, or DVB-S2 for satellite), and on the other it can connect to the internet via a broadband interface, allowing two-way communication with the application provider [9].

Then the hybrid TV provides content services in both the broadcast network and the Internet network, enriching the user experience (especially in interactivity). The HbbTV or Hybrid broadcast broadband TV is a standard originated in Germany and France with the support of the European Broadcasting Union (EBU) standard. It is an opened standard for connected TVs and set-top boxes (STB) for content delivery in broadband and broadcast networks. It allows a hybrid between the two networks [10].

In June 2010, the ETSI released version 1.1.1 of HbbTV, and several European countries, in the same way as France and Germany, continue with its implementation such as Spain, Denmark, Finland, United Kingdom, among others. The process begins when the user presses a specific key on the remote control of the TV (red button) to access the application configured for broadband. At the head of TV, there is an equipment that has the role to generate tables that indicate the HbbTV application. This equipment also manages the EPG (Electronic Program Guide). In DVB, these tables are called AIT. Then in the transport stream, it is added information relating to the application (HbbTV), such as the web address where the services are located.

2.2 Proposed scenarios for hybrid TV

The following figures present two scenarios for hybrid TV. The first scenario is the hybrid TV with HbbTV, **Fig. 1**, in which the channel or TV provider also has interaction with the broadband network (internet), and the experience is better for the user

(in aspects of interactivity, among others). This is the ideal scenario.

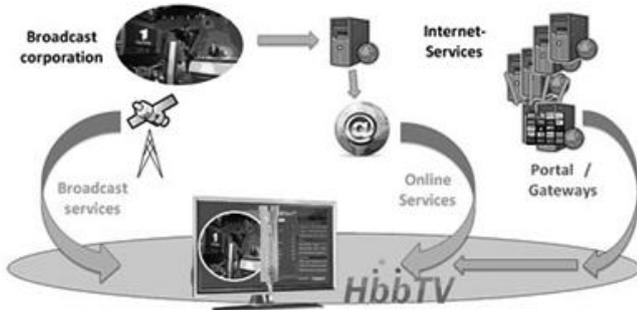


Fig 1. Scenario of hybrid TV with HbbTV
Source: www.hbbtv.org/

The second scenario is that of hybrid TV limited to the connected TV, **Fig. 2**, where the channel or TV provider is limited or has no interaction with the broadband network (internet), i.e. the broadcasted programs are not synchronized or configured with applications on the Internet, and the user receives the TV program by broadcasting and would have to access to the additional content/application by other means through Internet (in the Internet browser of the connected TV).

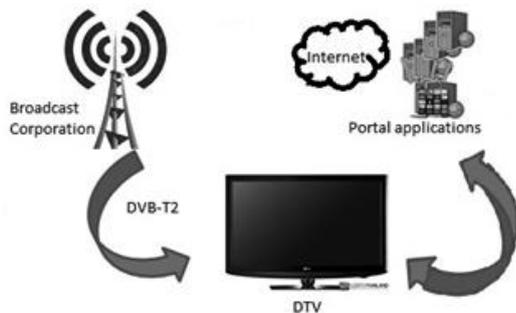


Fig. 2. Scenario of connected TV
Source: Authors based of www.hbbtv.org/

2.3 MADCE-TVD Model

MADCE–TVD [11] model. This model has three phases: Pre -production, production and post – production.

Pre- Production

In this phase the planning for the development of the content is performed. The activities carried out in this phase are organized as follows:

Technical aspects.

1. Identify the standard to deploy the content.
2. Select the tools that will be used to develop the content.
3. Organize the development team.

Pedagogical aspects. At this point it is necessary the definition of:

1. Objectives
2. Level
3. Content
4. Activities
5. Educational Content
6. Ownership and Application

Customization: the customization of the interface is done by defining:

1. Text
2. Colors and contrasts.
3. Interface.
4. Images and I-frame
5. Animation or games.
6. Navigation
7. Icons
8. Forms
9. Interactivity

Production

The production phase focuses on the development of content, this is done in an iterative and incremental way, for this phase it is defined some templates that allow control of the process that takes place during the iterations and revisions.

Post- Production

Closure. At this stage the product delivery takes place, manuals and documentation are delivered also the product is deployed in the production environment.

Lessons learned. This step allows a review of the process performed. To design content for the interactive digital television, it is proposed to develop an App that allows to generate an appropriation of the content delivered as explained in section five.

3. RESULTS

3.1 Proposal of content development for DiTV

To develop the content applies MADCE-TVD.

Pre-Production:

As a result, this phase is defined:

- Use as HTML5 development tool.
- The content focuses on the theme of fish breeding because it is part of the academic programs offered by the Colombian and the television program "field school" the channel Telantioquia Polytechnic.
- Based on the content they defined User Stories
- Powers to reach and target audience, which corresponds to students of agricultural technology.
- As a result of the design of the visual identity design different proposals were developed. See Fig. 3.



Fig 3. Visual Identity
Source: Authors

It is important to mention that this structure can be reused for any academic topic of interest. To design content for the interactive digital television, it was proposed to develop an App that allows to generate an appropriation of the broadcasted content. The first step was to create a visual identity of the proposal, as seen in the following images, different design proposals were developed:

It was sought an image that integrates the connection between knowledge and entertainment, several proposals were designed, until it was decided for the brain and TV. The name is important in generating and positioning an image. In this case, after multiple proposals, we decided to use EducaTV because it condenses the overall

concept of the App that is developed. Then it is designed several layout proposals for the App that would be used for the contents of a television program in Teleantioquia. The Fig. 4 is one of such proposals:

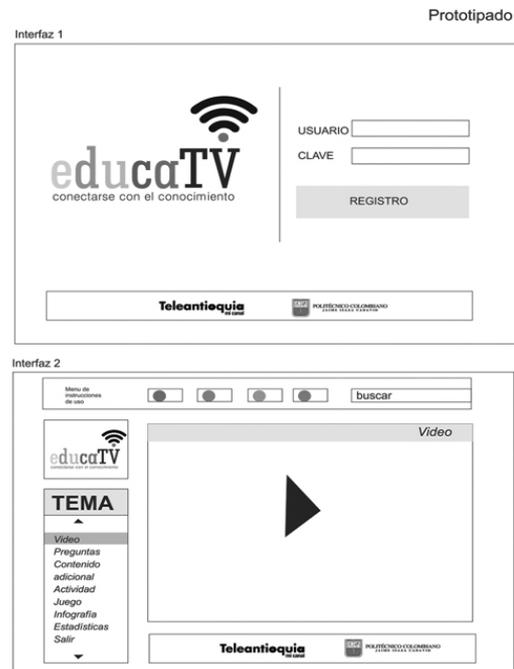


Fig 4. Proposed Layout
Source: Authors

For the aspects of customization that starts with basic data capture as the target audience they are:

- Age
- Sex (F-M)
- Place of residence
- Stratum (1-6)
- Level of education (primary, primary, secondary, university)
- Use of technology (low, medium, high)
- Disability (auditory, cognitive, motor, visual, language, None, Other (- which))

These data are important to define the context of the group which will design the content and UDL (Universal Design Learning) applies to define aspects of personalization by applying the first principle defining UDL. Principle I: Provide multiple means of representation.

Production

Production phase focuses on the development of content, this is done iteratively and incrementally, for this phase templates that allow control of the process performed during the iterations and revisions were applied.

Iterations follow the definition given by SCRUM [12] for the sprint, each defined by 2 weeks and 4 iterations were performed in each inputs are user stories selected to be developed in each iteration. The process of developing the educational content is performed on each iteration following the philosophy of Driven Development Behavior or BDD [13], which is a process that extends the ideas of test-driven development TDD and combines them with other ideas of software design and business analysis to provide a process (and a number of tools) to developers, with the aim of improving software development.

The development resulted in the application shown in **Fig. 5**.



Fig 5. Interface EducaTV

Source: Authors

Post-Production

Lessons learned: This step allows a review of the process undertaken, at all stages of the project, identifying each of the strengths and weaknesses identified in each of the phases and the strategies applied and the result of its application to identify to be improved and which strategies were successful to seek improvement in subsequent projects.

3.2 Design and simulation for hybrid TV. Experimental Case

Because the regional TV station does not have the infrastructure and the platforms that support the development and deployment of interactive applications, the bidirectional network (backhaul) and standards such as Multimedia Home Platform/ Globally Executable MHP (MHP / GEM) or HbbTV, it is opted for the design and simulation of the prototype the scenario of hybrid TV limited to a connected TV.

This scenario contains the following:

1. An enabled TV to receive signals in the DVB-T2 standard, currently being implemented in Colombia, where the regional channel program is received.
2. The TV also has an interface to connect to the Internet.
3. The additional content/application is designed, developed and hosted on a hosting (web server).
Sample Design for TV resulting from the research project

As a result of researching the state of the art, it was designed and programmed the application educaTV that contains educational and entertainment (edutainment) content about the topic of fish reproduction. Its main options are: User management, Videos, Questions, Additional content, games and Statistics.

In EducaTV you learn by watching videos created by the Teleantioquia program "Country School". Through this audio-visual aid, it is intended to improve learning in rural areas with access to the public channel signal. It is observed that meets the characteristics of the font size, colors and layout recommended by the literature [14]. The navigation is highly adequate for using with remote controls, among other devices.

It offers content that favor the expansion of the topic and links of interest, it also conducts assessments on the subject covered. Assessments can be seen in **Fig. 6**.

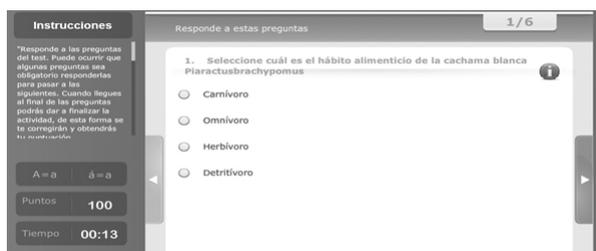


Fig 6. Interface for self-assessment
Source: Authors

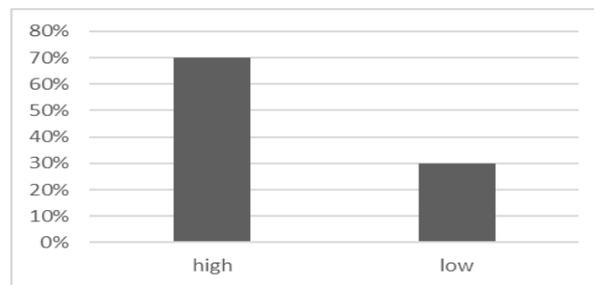


Fig 7. Results video contents is relevant.
Source: Authors

4. ANALYSIS RESULTS

This proposal was submitted for review through an online survey, the sample that was applied in the survey was 10 students. This sample was taken from a population of 250 students of the first two semesters of the career of agricultural technology; the selected sample represents 4% of the population. This population is divided according to their academic average:

- (A): Average > 3.0,
- (B) Average > 3.0 and <= 4,
- (C) Greater than 4.0 average.

The distribution is as follows:

- A) Total 75 students. Corresponding to 4% 3 students
- B) Total 150 students. Corresponding to 4% 6 students
- C) Total 25 students. It corresponds to 4% 1 student

Out of a total of 250 students the sample is 10.

Here are some of the results:

Almost 70% replied that looked interesting content. On interactive media used 100% mention that seem very useful.

70% mentioned that video content is relevant to understand, **Fig. 7.**

91% mentioned that the organization of the content is appropriate for consumption on the TV. This fact is relevant because each element of the content must be unified to all others for strengthening the main idea issued, **Fig. 8.**

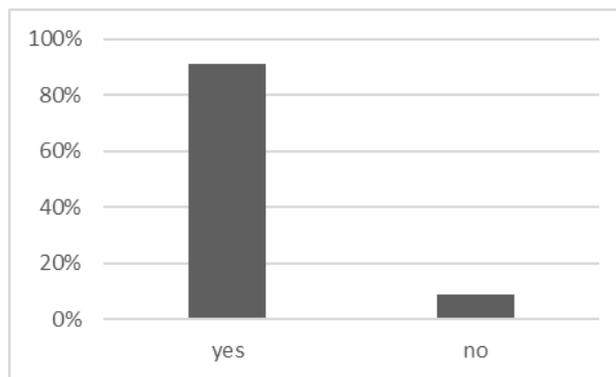


Fig 8. Organization of the content is appropriate.
Source: Authors

With respect to the proper use of color in content elements 83% said yes is the right, showing that the font and color are very important in developing the content of this type.

50% of respondents believe that it is easy to display information on the TV on a computer. This information allows us to demonstrate the proper use of remote control and device interaction with the content broadcast on the television, reinforcing the idea that it is easier to use a remote control than a mouse.

Regarding the possibility that people can develop a complete course in HbbTV, 58% said that it would be very interested and 41% would be with average interest to develop the course, which gives us an indication that this type contents are easy and appropriate to develop this type of academic developments.

In this sense almost 83% believe it is possible to educate yourself with the consumption of this type of content broadcast on TV.

Being so the design of this type of content with the goal of educating, is a way to be explored and exploited by the regional channel.

5. CONCLUSION

Most digital terrestrial television channels, lack a solution for a return channel, a bidirectional network, so a hybrid solution with the Internet is a relevant proposal.

In this research was presented the concepts of hybrid TV, HbbTV, its infrastructure, a proposal for content development, the design and simulation of a case for hybrid TV with its content and application on the subject of fish.

It is presented a proposal for hybrid TV, for an opened regional TV broadcasting channel in Antioquia - Colombia, which on one hand provides the broadcast service that is becoming of more quality with the implementation of digital terrestrial television, with DVB-T2, and secondly to complement the services, content and applications via a broadband channel (internet). This requires having the infrastructure of DVB-T2, support the HbbTV standard, have broadband service (return channel), and web services, and/or that the TV or STB has connection capabilities to the network - Internet (in addition to support interactivity standards MHP, GEM, or HbbTV). The TV operator, if he wants to project, follow the trend of media convergence between networks and devices, must have to look for options to implement the new platforms and deliver content and services to users in a more dynamic manner, empowering interactivity.

It is important when developing content and applications, to follow the recommendations taking into account the characteristics of the TV, considering educational aspects (for educational proposals), look for the quality of the contents, and form a multidisciplinary team.

It can potentiate the TDT hybrid with the HbbTV standard approach as a strategy for the development of interactive applications of greater access to internet via TV. As a future work it is contemplated to perform the actual implementation with a digital terrestrial TV channel.

MADCE-TVD model was applied successfully for validate a proposal to develop contents for hybrid TV, and a simulated prototype called EducaTV. SCRUM Agile methodology can focus innovation initiatives upon developing what customers prioritize and value.

According to the results of development of EducaTV, it reflected a satisfaction in terms of content, organization, interaction with TV and possibilities to implement in educational contexts. This indicates that it is possible to develop educational content based on hybrid TV.

6. ACKNOWLEDGMENT

The authors express gratitude to the regional channel Teleantioquia.

The authors thank the Politecnico Colombiano Jaime Isaza Cadavid by financial support for research.

7. REFERENCES

- [1] Eizmendi, I., Velez, M., Gómez-Barquero, D., Morgade, J., Baena-Lecuyer, V., Slimani, M., & Zoellner, J., DVB-T2: The second generation of terrestrial digital video broadcasting system, IEEE Transactions on Broadcasting, 60(2), 258-271, 2014.
- [2] Higgs, P., & Piesing, J., A Uniform Resource Name (URN) Namespace for the Hybrid Broadcast Broadband TV (HbbTV) Association (No. RFC 7528), 2015.
- [3] Feuvre, J., NGuyen, V. T. T., Hammidouche, W., Marchal, P., Monnier, R., & Dupain, P., A test bed for hybrid broadcast broadband services, In MediaSync2015 Workshop, 2015.
- [4] Ohtake, G., Ogawa, K., & Safavi-Naini, R., Privacy preserving system for integrated broadcast-broadband services using attribute-based encryption, IEEE Transactions on Consumer Electronics, 61(3), 328-335, 2015. [Accessed March 10, 2015]
- [5] Jovanović, N., et al. Predlog koncepta preporuke HbbTV aplikacija i njihovog sadržaja korisnicima. 22 nd 2014 Telecommunications Forum Telfor (TELFOR), Serbia, Belgrade, November, 2014.
- [6] C.A. Martín, et al. Deployment of access services based on HbbTV standard technology. Project HBB4ALL. 2015 IEEE International Symposium on Consumer Electronics (ISCE), Madrid, España, June, 2015.

- [7] Chicaíza, A. F. y P. Meloni, L. Implementation analysis of hybrid functions adapted to SBTVD and HbbTV. IEEE COLCOM 2015, Popayán, Colombia, May, 2015.
- [8] dos Santos, Max R., et al. Interoperability Analysis for Ginga-NCL and HbbTV Application Players. 2015 IEEE International Conference on Consumer Electronics (ICCE), Las Vegas, USA, Jan, 2015.
- [9] ETSI, Hybrid Broadcast Broadband TV. Retrieved from http://www.etsi.org/deliver/etsi_ts/102700_102799/102796/01.01.01_60/ts_102796v010101p.pdf. [Accessed March 8, 2015].
- [10] HbbTV. Hybrid Broadcast Broadband TV. Retrieved from http://www.hbbtv.org/pages/about_hbbtv/introduction.php. [Accessed March 8, 2015]
- [11] Reyes, A., Jiménez, J., Soto, D., MADCE-TVD – Modelo Ágil de Desarrollo de Contenidos Educativos para Televisión Digital Interactiva, IEEE Latino América, 2015.
- [12] Davidson, A. Klemme, L., Why a CEO should think like a Scrum Master, strategy & leadership, 44, 36-40, 2016.
- [13] Vaca, P., Maldonado, C., Inchaurredo, C., Peretti, j., Romero, S., Bueno, M., Test-Driven Development-Una aproximación para entender su utilidad en el proceso de desarrollo de Software. Conaiisi-Cordoba, p. 2347-0372, 2013.
- [14] Moreno, G., Reyes, A. Acosta, S., Fundamentos para el desarrollo de contenidos educativos para TVDi. Versión 1.1. Editorial: Politécnico Colombiano Jaime Isaza Cadavid, 2014.