

SAMBA Project Experiences

Christian Fuhrhop¹, Raju Vaidya¹, Oscar Mayora², and Elizabeth Furtado³

¹ Fraunhofer FOKUS, Kaiserin-Augusta-Allee 31, 10589 Berlin, Germany
`christian.fuhrhop@fokus.fraunhofer.de`,

`raju.vaidya@fokus.fraunhofer.de`

² CREATE-NET, Via alla Cascata 56/D Povo, 38123 Trento, Italy
`oscar.mayora@create-net.org`

³ University of Fortaleza, Avenida Washington Soares 1321, Fortaleza, Brazil
`elizabet@unifor.br`

Abstract. The purpose of the SAMBA project, running from January 2007 to February 2009, was to create a framework for allowing local communities and citizens (including low income population) to access community-oriented content and services by means of iDTV channels, specifically MHP over DVB-T. This paper summarises the project and the experiences gained from it.

Keywords: iDTV, MHP, DVB-T, Brazil, user generated content, Power Line.

1 Introduction

The aim of the SAMBA¹ project was to create a framework that allowed local communities and citizens (including low income population) in Brazil to access Internet-like services, specifically to access community-oriented content and services by means of interactive digital television (iDTV) channels.

The SAMBA project was in part funded by the Information Society Technologies (IST) programme of the European Commission² and consisted of partners from Brazil, Italy, Germany and Finland.

Technically, the SAMBA project was based on MHP (Multimedia Home Platform) as the presentation technology, DVB-T (Digital Video Broadcasting Terrestrial) as the broadcast technology and power line for the return channel.

2 Initial Situation

2.1 Location

The testbed for the SAMBA project was in Barreirinhas, a small town in Brazil with about 50000 inhabitants. The city has a number of atypical features, making

¹ System for Advanced interactive digital television and Mobile services in BrAzil.

² European Community's Sixth Framework Programme - IST-045403.

it an interesting location for testbeds. Barreirinhas is located in Maranhão, one of the poorest and least developed states in Brazil (26th of 27 states in gross domestic product), with an average annual income of less than 2000 Euro. The city is relatively isolated, with the next city, São Luís, about 250 km away. While the connecting road infrastructure is good, due to a recently built, well maintained road, traffic is sparse and consists mainly of goods and a few buses per day to São Luís.

Due to its location close to Lençóis Maranhenses National Park, tourism is an important source of revenue, even though most of the tourists are individual travellers, usually only staying for a day or two, and the total number of tourists is small, due to the lack of other nearby attractions.

Barreirinhas is a fairly compact city, allowing the deployment of range-limited technologies like DVB-T, Power Line Communication (PLC) or WiMAX while still reaching a reasonable number of households, making it a popular environment for testing new technologies.

2.2 Technology Background

At the time the SAMBA project was planned, no decision had been taken which digital terrestrial television system would be used in Brazil (with ATSC, DVB-T and ISDB-T as possible alternatives), so part of the purpose of the SAMBA project was to demonstrate the capabilities of DVB-T and the MHP middleware.

About half a year into the project, the decision was made in Brazil to use SBTVD (a variant of the Japanese ISDB-T system) as the terrestrial digital TV system, with a new development, Ginga, as the middleware.

Due to the decision in favour of SBTVD, showcasing and promoting DVB-T became less relevant in SAMBA and the project shifted more towards the implementation and provision of services. Since Ginga, specifically the Ginga-J subsystem, supported GEM (Globally Executable MHP), MHP applications and experiences from their use would still be applicable in a SBTVD/Ginga environment, even though the specific underlying technology would be different.

2.3 Local Technical Environment

As part of another IST project, named Opera³, a PLC⁴ network has been installed in parts of Barreirinhas. (That PLC network was connected via a WiMAX link to the server system at main government building, though this was transparent as far as the use in the SAMBA project was concerned.)

The PLC network was used as the back channel for the SAMBA set-top boxes, providing good connectivity between the participating households and the server. (An overview is given in figure 1.) However, there was no high-speed link to the outside Internet. There was a satellite link available at the government building (which is a standard feature for all mayors offices in Brazil), which could be used

³ Open PLC European Research Alliance.

⁴ Power Line Communication.

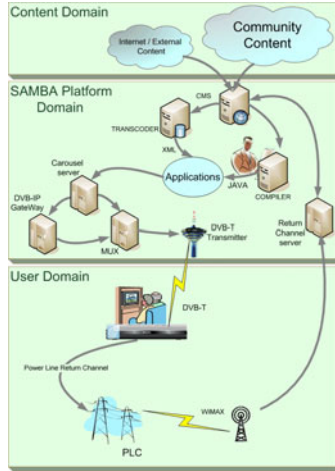


Fig. 1. Overview of SAMBA communication structure

by the SAMBA project, but the bandwidth available for the project was limited and it was insufficient to provide 'regular' Internet access for the households involved in the project.

3 Project Goals

Based on the technology available, the goal of the project was to develop, test and showcase 'Internet-like' applications that could be used on a commercially available MHP set-top box, keeping the cost for the box below 100 US\$.

While it was agreed that it would be preferable to use low-cost computers and direct Internet access, given the local income structure, the price difference between a set-top box and a computer was significant. Additionally, with the move from analogue to digital television and an expected discontinuation of analogue services in 2016, it is expected that residents will be more likely to invest in set-top boxes first, especially since TV services are considered more relevant than Internet services.

Since outside access to the Internet was limited, it was decided to put more emphasis on local and user generated content than originally intended and provide only news as external information.

Based on field studies among the potential users where researchers found out the following order of needs and expectations of the community:

- *Interaction*
- *Information*
- *Education*
- *Entertainment*

For local users the capability of interacting within the community was of higher importance than using it as a means of information. The users' interest in

creating local content and in visualizing and sharing it through TV screen is linked to the fact that television is typically the only vehicle of information for many of the townspeople. Providing the technical means for local interaction was seen as an enabler for information and education and entertainment as well.

4 Application Selection

Services from various areas were considered, including health and government information, community blackboard, price information for local shops, tourist guide, gaming, voting, e-mail, online chat and photo gallery.

Some of these services were equivalent from a technical point of view, since most services that only need to present information on the screen (whether this is shopping, health, sports club or local community information) can be handled by a single application, as long as the visual appearance can be adapted to the specific service.

Other services were difficult to implement, given the constraints of a set-top box. While e-mail was one of the more desirable features from a user point of view, the set-top box did not have any keyboard due to cost considerations, so the users would have to 'type' e-mails by using a virtual on-screen keyboard, which was cumbersome. (Due to user requests, an SMS (texting) service was implemented instead.)

It was decided to implement four applications (plus one additional cross-application function), in order to demonstrate a sufficiently wide range of services and scenarios.

- *Photo Gallery*

This allowed users to upload images from a regular PC, which were then viewable on the set-top box. Intended users were local teachers and sports fans, who could take pictures at school and sports events and make them available for general viewing.

- *Info application*

The info application was a generic application for the presentation of individual information pages and the navigation between them. This was used for a variety of services. The basic data per page was intentionally kept simple (a text block, an image, navigation hints for previous, next and upper level page). To provide variety, as well as providing users a sense of which 'region' of the navigation tree they were in, the layout of the pages was modifiable, so that the appearance of news would differ from the appearance of local event information.

- *Polls*

This application allowed users to post multiple choice questions for a specific timeframe and collect and view responses.

- *SMS*

This function allowed the sending of text messages to mobile phones. It was included upon specific request of the users.

- *Alert-Function*

In addition to the four application, an alert function was added to the system, allowing the presentation of an alert message on the user's TV (specific users could be addressed, as well as all users). Due to the disruptive nature of the feature, it was only intended for emergencies.

All application interfaces were implemented to be switchable between Portuguese, Italian and English, so that they could be used in the Brazilian testbed, an Italian testbed and on international presentations.

5 Application Development

Due to the strong emphasis on services for the local community, users were involved early in the project. A group of HCI⁵ experts from the University in Fortaleza, together with other Brazilian partners in the project, visited Barreirinhas to present the project to local users and gather user demographics and information about their needs and requirements.

To avoid working with abstract information during development, the demographics were condensed to six 'personas', representing typical users in various age groups. These personas were given detailed descriptions, including professions, preferences, technical experiences and goals, as well as (comic-style) representations. For internal project use, real users were then mapped to the closest persona.

During the project, a number of visits were made to Barreirinhas to present the applications in various prototype stages and elicit suggestions and feedback from the users.

Making the users feel part of the project was an important goal. Meetings were not only focused on demo applications but also on establishing a relationship between developers and users. This allowed developers gaining credibility and the involvement of the local organization, content creators and users. Consequently, the users were easily persuaded to create local content by applying collaborative strategies.

Prototypes shown to the users started with hand-drawn story boards showing the planned use of the application, followed by PowerPoint presentations of simplified application views (just grey boxes and texts), then PowerPoint presentation of the applications with proper design and layout, functional demonstrations of the applications in a set-top box emulator and finally a presentation of the near-finished application on an actual set-top box, before delivering the boxes to the users at home.

Beside the obvious advantage of involving users early, which is getting feedback on the applications, it also helped the project in a number of additional ways.

- Users were involved regularly during the course of the project, keeping them interested in the project.

⁵ Human Computer Interaction.

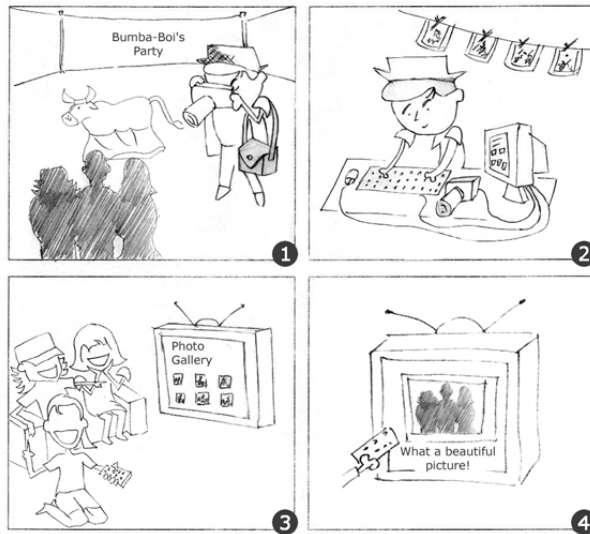


Fig. 2. Hand drawn storyboard for photo application



Fig. 3. Left: Simplified application view Right: Final application

- Users could see the effect of their suggestions on the development of the applications.
- Involving users continuously helped to build a community, which furthered user created content after deployment of the application.
- Establishing a way of communicating user requests to the developers early in the project helped setting up a 'communication pipeline' across spatial, linguistic and cultural distances, which improved communication during the user trials.
- During the content creation process, rules were generally followed and there were no problems with copyright violations and inappropriate content, which is often a problem with (relatively) openly accessible Content Management Systems.

6 Content Creation

Content for the applications came from three sources, RSS feeds, local content providers and users.

6.1 RSS Feeds

For news and other general information, an RSS reader was installed that accessed the news feed of a Brazilian newspaper and automatically converted the information to a format suitable for the info application before storing it in the local CMS⁶.

By using this method, we could ensure that the use of the satellite link was limited to incremental hourly updates and would be independent of the usage patterns of the info applications.

6.2 Local Content Providers

To add content to the info, photo and vote application, Java applets and applications were written. Since these could not be used on the set-top box, they could be accessed from a PC at the office of a local organisation⁷ associated with the project.

Pages for the info application containing information from local businesses, groups and government institutions and the questions and choices for various polls were entered from this PC.

Three local organizations were involved in creating content to promote digital and social inclusion by providing educational, business and tourism information.

6.3 User Created Content

Local users could access the PC designated for content creation to add their own content. This was mainly intended to allow users to upload images taken with digital cameras to the photo application, which could not be performed from home due to the lack of USB or SD card ports on the set-top boxes. Users were also able to create pages for the info application and polls for the poll application.

Since the only available input device on the set-top box was the remote control, opportunities for content creation at the users homes was limited. However, it was possible to write SMS messages and send them to mobile phones and to rate photos in galleries and add one-line comments to them.

⁶ Content Management System.

⁷ SEBRAE, a Brazilian service for the support of small businesses.

6.4 User Training

To enable users in the community to create their own content, two tutorials were given. The first tutorial was given to the local content providers and consisted of a one day tutorial of the content creation tools available at the PC. This tutorial consisted of a short introduction to the tools, followed by a 'hands on' session to create actual content pages. At the end of the day, a questionnaire was used to gather user comments and suggestions.



Fig. 4. Tutorial for local content providers



Fig. 5. Creation of digital content from source material

For the end home users, a two hour tutorial of the set-top box and the use of the applications on the box were given. To learn about adding their own content, if desired, they were referred to local content providers that had finished the one day tutorial.

7 Lessons Learned

While some of the experiences from the SAMBA project are specific to the situation in Barreirinhas, there are a number of issues that can probably be applied to other communities.

The most important characteristic of Barreirinhas is that it is essentially an urban, not a rural environments. This made the use of DVB-T practical, since it has a comparatively small reception footprint, making it less suitable for rural communities. It also allowed to separate 'content creation' from the end users systems, which were set-top boxes with limited input facilities, by providing a central PC for creating content and uploading photographs, which might have been less acceptable for the user community, if the office with the PC had not been literally 'around the corner'.

7.1 Lack of Keyboard

In the planning stages of the project, the lack of a keyboard was seen as a potential problem and it was considered providing a keyboard with the set-top box, but that would have raised the cost of the box substantially. In the course of the project the non-availability of a keyboard for the set-top boxes did not have a significant negative effect. Due to the small urban area covered, using the central PC to add photos or longer pages was not a problem and most comments to photographs were just one or two words anyway (the equivalent of 'nice picture' or 'great') or just a rating from one to five stars. Longer comments were rarely given and the short phrases seemed enough to instil a feeling of community.

7.2 MHP

As the system for the end user applications, MHP was a useful tool, primarily due to being the only standardised system that was low cost and allowed the use a mixture of content from the broadcast stream and from the back channel.

As a presentation tool, it had the disadvantage of requiring every application to be written specifically for MHP, limiting the number of applications that could be provided by the project.

A more Web-friendly technology, such as CE-HTML (a HTML variant aimed at consumer electronic devices like TVs) or some other variation of HTML plus some scripting language would have allowed a mix of existing applications and those written specifically for the project. For example, a user request was to provide an interface to Orkut (a service, popular in Brazil, which is similar to Facebook), which could not be provided in MHP, but could easily be provided in most HTML variants.

At the start of the project, however, there were no sufficiently affordable set-top boxes that allowed the display of HTML pages from the broadcast stream.

7.3 Limited Internet

The primary request of users was to have 'the Internet on their TV'. This was not possible due to two reasons.

1. The MHP set-top box had no full-scale browser, so only content converted specifically for the MHP applications could be presented, but no arbitrary pages from the Web.
2. Only a limited bandwidth was available through the satellite link, so that only content cached at the community server could be made available, but no direct access to the outside line.

While a full browser would have been desirable, no system costing less than 100\$ was available during the course of the project. Using a more expensive system would have defeated the purpose of the project (making features available to low income communities). With specific media processors and falling prices, browsing-capable low-cost set-top boxes seem likely to appear within a year.

This still leaves the problem of providing sufficiently large bandwidth to the Internet, but even just a server for communication within the local community fulfilled a large number of requirements.

The use of the Internet falls clearly into two different categories. The first is the Web 1.0 usage, which is mainly characterized by information gathering and could not be provided within the project except for a rudimentary way. Web 2.0 usage, however, which is mainly characterized by community building, did work well, even in a simplified form, since the primary community, even in the Internet, tends to be the local community of relatives and friends, which could be reached with a local network.

References

1. SAMBA Project Homepage, <http://www.ist-samba.eu/>
2. Mayora, O., Costa, C.: The SAMBA Approach to Community-Based Interactive Digital Television. In: Proceedings of ChinaCom Conference, Shanghai, China (August 2007)
3. Mayora, et al.: User Centric Media in the Future Internet: Trends and Challenges. In: ACM DIMEA conference, Athens, Greece (September 2008)
4. Souza, G.L., Leite, L.E.C., Batista, C.E.C.F.: Ginga-J: Middleware for the Brazilian Digital TV System
5. Furtado, E., Kampf, T., Piccolo, L., Baranauskas, M.C.C.: Prospecting the Appropriation of the Digital TV in a Brazilian Project. In: Tscheligi, M., Obrist, M., Lugmayr, A. (eds.) EuroITV 2008. LNCS, vol. 5066, pp. 293–302. Springer, Heidelberg (2008)