A Design Case: Interactive Sports Content Broadcasting

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ABSTRACT

Digital television is a new and interesting platform for developing multimedia services. The MELISA platform aims at cross-media broadcasting over digital television and 3G mobile networks. The platform provides presentation of interactive video content, advertisement and gaming.

The devices targeted by these services are Set-Top Boxes and Portable Digital Assistants. A new service, in combination with technology that does not yet allow for very rich interaction, requires careful and inventive design of the user interfaces. The key to gaining consumer acceptance of interactive TV is ease of use.

In this paper we present the system architecture briefly and discuss issues related to user interface design, considering both the type of media content and hardware platforms. We reflect on the design process used and its suitability as we as designers have experienced it.

Author Keywords

User Interface Design, Interactive TV, Non-Functional Requirements, Guidelines, Prototypes, Personas.

ACM Classification Keywords

H.5.2 [User interfaces] Input devices and strategies, Interaction styles, Prototyping.

D.2.2 [Design Tools and Techniques]: Modules and interfaces, User interfaces

INTRODUCTION TO MELISA

The value and invention of the MELISA system lies in the offering of revenue building services, real-time video content, interactive advertisements and real-time gaming. An end-to-end solution for the authoring and delivery of this new media content in real-time provides the infrastructure necessary for the management and generation of services related to cross-media sports broadcasting.

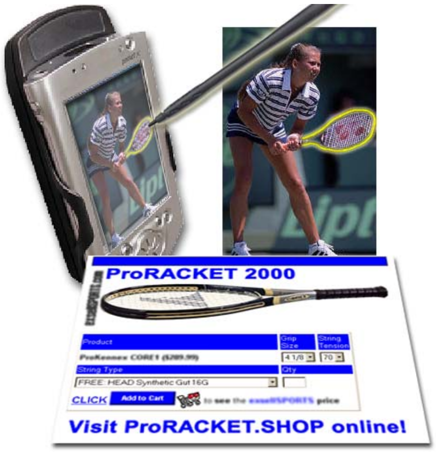
Melisa Broadcasting Platform

MELISA introduces authoring tools for production, encoding and playback of rich interactive multimedia content in MPEG-4 for a variety of devices over wireless and digital television networks.

Figure 1 Interactive enhancement within the video stream presenting additional information to the end-user.

The Melisa platform is an end-to-end system that allows the creation, distribution and viewing of enhanced interactive video content in MPEG2 and MPEG4 format. The Server Platform provides a range of tools for collection and processing of data and video streams, from a variety of input sources.

The service offers the viewers/mobile phone users, the possibility to receive additional content, which better visualizes the information related to a sports broadcast.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to see the excelSPORTS price
Visit ProRACKET.SHOP online!

Figure 2 Highlighted hot spots indicating in-content advertisements presence, leading to a commerce opportunity.

This information leads to more confidence in participating in a betting action, which is also made possible by the same service [1]. Additionally it allows for the so called embedded advertisement. This is an opportunity to be informed in a non-intrusive way about products, eventually in pre-selected categories, worn or used by the favorite athletes of the viewer.

A survey performed within the project showed that 80% of customers prefer personalized commercials instead of today's general ones. Users further said, in the case of the TV platform, they would accept the intrusion of interactive advertisements if this would lower their subscription costs.

UI DESIGN APPROACHES

The requirements of a diverse system such as MELISA are difficult to meet with a single strategy. Many approaches include forming a set of design rules or templates, such as style guides or specific platform guidelines.

The goals at this stage of design have been to focus on usability aspects. We like to follow the ISO 9241-11 Guidance on usability definition of what usability is:

”The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”

As in any project concerned with design and implementation of a novel system this raises a number of issues. The result of the newness of the system is that “the context of use” and “specified users/goals” in the definition above is not known at all or is difficult to make a precise description of. It makes the regular way of measuring usability troublesome.

It has previously been show that usability aspects alone are not sufficient for success when integrating technology with home life [6]. With a larger view on interaction and functionality of technology we also have to consider aspects of flexibility and adaptation to household activities.

There have been attempts to overcome the aforementioned problems. A number of solutions have been suggested, by considering the home aspects and social space of computing [5]. The theoretical frameworks for such studies always emphasize the structure of the social situation. Since the area of sports broadcasting, and specially sports betting, is very well known we are able to draw some conclusions from existing knowledge. Betting companies know their customers in some detail, so we can define them as our “specified users”. This approach is successful to a certain extent: although the definition of user groups is possible, it is not sure this is the proper target group. The system is not intended exclusively for sport fans. A large opportunity lies in addressing new groups of users.

Non-Functional Requirements

Requirements are partitioned into functional requirements and non-functional requirements (NFRs). Functional requirements describe the functions or services of the system that support user goals, tasks or activities. Non-functional requirements include constraints and qualities. Constraints are not subject to negotiation and, unlike qualities, are off-limits during design trade-offs.

One drawback with requirements is that they as a rule are neither specific nor measurable; making it is difficult to know if they are attainable and doable. Gilb [4] makes this point in the following principle:

“Projects without clear goals will not achieve their goals clearly.”

NFRs are notorious for being difficult to express, quantify and test. This is particularly true since the NFRs for each system typically interact with each other, have a broad impact on the system and may be subjective. NFRs are usually evaluated subjectively.

After unproductive attempts we considered NFRs inadequate for methodologically generating designs because arbitrary invention is non-trivial and often results in inconsistent designs. Also, justifying the overall design is extremely hard as different parts of a design cannot be related to one another.

Personas

A subsequent effort to gather input for the design was made by defining *personas*. Personas are often used instead of requirements, in a distinctly different way though.

The persona is a fictional user, with a made-up life.

Making personas is an additional activity. It doesn't prohibit compiling requirements or scenarios the traditional way. On the contrary, it needs this kind of input in order to form good and relevant personas. With personas, we assign our model users general attributes, and formulate the rest in a way that will support later design activities. We have to make everything up to ensure the persona suits our project; we don't design for real users. Real users have idiosyncrasies that don't generalize. These personas are the users we design for.

A persona is “A precise description of our user and what he wishes to accomplish. [3]” Cooper emphasizes that a persona is a tool for communication and design within the group of designers, software developers, managers, customers and other stakeholders. The purpose is to aim at a simple, but good enough description of the user to make it possible to design the system.

The outcome of using personas was partly unsuccessful. Although we as a design team believe in personas as a useful method of practice design, it is not just a matter of going ahead. We ran into problems because of the development group’s lack of understanding of what personas are and how to use them. This was we believe because of lack of training and experience; only few team members had this knowledge prior to the project. Other projects have experienced the same difficulties because the know-how of the method was not sufficiently integrated with existing knowledge and practice [2].

In the end, the work with personas still was valuable as it served as a tool to examine the characteristics of the system and its use. The value was perhaps only for the designers, and not the development group as a whole.

Guidelines

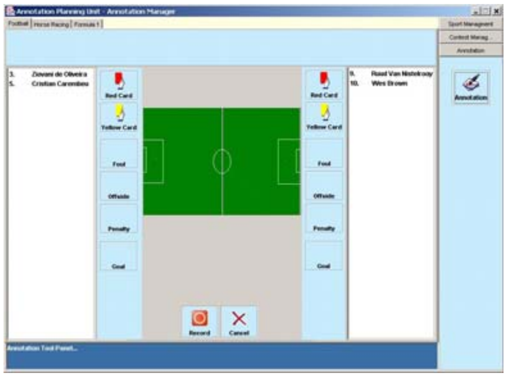
The server side application consists of preparatory tools and production tools used during live broadcast. It is vital that the production tools work efficiently. The most important aspect is the speed of use. The error rate also has to be kept low since there are few barriers between the use of the tool and what finally is broadcasted. The real-time aspect of the system implies that it is highly likely that any user errors will be broadcasted undetected.

The server side applications are to be treated as interfaces for experts. Thereby it is accepted with a longer adaptation period. Ease of learning for the novice users is not regarded as important as long-term speed and effectiveness.

The design process therefore uses a number of iterations to find the desired level of performance. In figure 3 we see the first design of the annotation tool for football. It is used to record the events that are significant for football into a database. Other production tools can then utilize the stored information to create an enhancement in the live broadcast.

In a number of re-design stages we are able to examine the properties and dynamics of the design. The examination results in a re-design of the interface without the identified design flaws. Most of the iterations use inspection techniques intended to find possible trouble areas.

We also use a predefined guidelines/checklist that contains dos and don’ts.



3. Ziovani de Oliveira
5. Cristian Carembeu

9. Ruud Van Nistelrooy
10. Wes Brown

Figure 3 The annotation tool, football view selected.

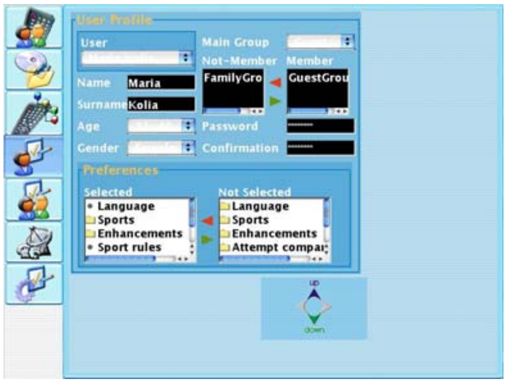
The checklist is project internal, based upon many years of experience in design. The checklist is an effective tool for bringing development up to a certain standard. However, it cannot work as the only design aid, as checklists contain general knowledge that needs educated interpretation. Design is not a question of common sense [7].

Using the combined results from the inspections and the checklist we are able to modify the designs to perform better, and result in fewer operator errors.

Prototypes

Set-Top Box

Current cable television allows broadcasters to do more than just transmit video. With the possibility to communicate with the sender side of the broadcast, we need to include this functionality in the STB remote control. We also have an increasing need to store data into the STB – for example, viewer profiles can be used to control what kind of advertisements are shown. If our profile tells the STB we have children in the family we might get more information about family products compared to someone that has a viewer profile indicating a single family status.



Name Maria
Surname Kolia
Not-Member: FamilyGro
Member: GuestGrou
Password ********
Confirmation ********

Selected:
- Language
- Sports
- Enhancements
- Sport rules

Not Selected:
- Language
- Sports
- Enhancements
- Attempt compar

Figure 4 **The initial STB profile interface design.**

The figure shows a typical GUI on STBs. This design have a number of problems: the design is PC-like in the sense that it is best used using the interaction tools available for such a platform (keyboard and mouse) and low density of information because of low screen resolution.

Interactive TV application

A STB and its TV application are always controlled by a remote control. The newest kind of remote controls include some kind of pointer to allow for improved interaction, but the functionality is still in all aspects very limited. It is hard to provide a satisfactory solution even for simple tasks such as entering text. Being fazed with interactive tools with such limitations one has to focus on redesigning the problem areas:

- We can let the user choose from predefined values instead of having to enter values.
- We can use tab groups to navigate the user interface instead of the freeform navigation, as used by the mouse.
- We need to put more effort in providing better default values. A more intelligent way of finding default values will bring many benefits.

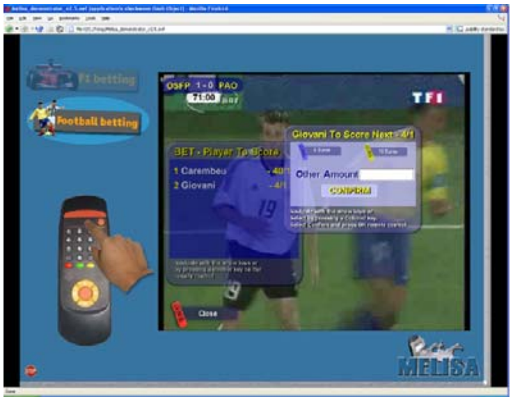


Figure 5 The STB Flash prototype.

A prototype displaying all STB functionality is built using Flash as this allows integration of video, sound and interaction. The results so far indicate that building a prototype to run the scenarios autonomously, without requiring user interaction, is better both at explaining and covering the full functionality of the application. The first attempts with traditional user-driven prototypes it was difficult to ensure the whole scenario was covered. We changed the prototype to instead run through all possible interactions and animate all interaction in the interface. A speaker explains simultaneously the actions displayed.

Personal Digital Assistant

For the purpose of exploring and visualization on the PDA platform a prototype displaying the functionality of the GUI has been implemented. The prototype simulates the scenarios of the project, running inside the bitmap of a well-known PDA. This brings a more realistic look and feel for the evaluation process. This combined with running the evaluation on a touch display simulates the special interaction style without an on-screen cursor.

CONCLUSION

When developing computer systems for novel domains, the role of the user interface is essential. Inadequately designed interfaces will result in low user acceptance. Especially in the cases of consumer devices, as interactive television, correct designs of the user interface are a challenge determining almost exclusively the success or failure of a new service.

The Melisa platform gives us the opportunity to explore several aspects of user interface design. Dealing with user interface design for a diverse set of applications ranging from administration and data management tools to end-user interactive video playback applications, gave us the opportunity to realize that we may have to change the way we handle interaction, especially when the interaction tools have very limited capabilities. The existing design processes and methods have to be adopted in order to address the characteristics of the interactive TV domain.

ACKNOWLEDGEMENTS

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