Project FoSIBLE

Fostering Social Interactions for a Better Life of the Elderly

Responsible

UDE

Participants

All partners

Deliverable

Analysis and definition of the technical infrastructure
D1: Report on the analysed systems and components, comparison results as well as a technical description of the selected target platform. Delivery Date: M6

Abstract

According to the goals of FoSIBLE project, we want to analyze the different platforms and user interfaces to choose the right system configuration. In this document we will first define a set of criteria for the analysis. With these criteria we will analyse different possibilities for social TV's, Sensors, Gaming, User Interfaces and possibilities to start (or use) an online community. The analysis of the different parts should reflect the wide range of possibilities but has no claim to be all-embracing. So based on this document, it should be possible to choose a specific technique to solve a problem or to fulfil a goal in the FoSIBLE project.

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1. Introduction

1.1 Background and Related Tasks

Task 1.1: (Responsible: FhG IMS; Collaboration: UTT, Uni Siegen, UDE, Mauser Care) Definition of criteria for the hardware and software platform evaluation. Criteria are the APIs and SDK offered for the specific media centre application or operating system. Explore available Media Center Platforms.

Task 1.2: (Responsible: FhG IMS; Collaboration: UTT, UDE, Mauser Care) Research on the hardware and software platform components that are currently available on the market as open source or as research prototypes.

Task 1.3: (Responsible: FhG IMS) Tests of the selected platforms according to the criteria of interoperability of the selected system/components. Uni Siegen and Kaasa will accomplish the test of TV overlay capabilities. Uni Siegen, Kaasa, UDE and FhG IMS will carry out feasibility analyses of interweaving media centre application, community systems and sensor systems. FhG, UDE and UTT perform a feasibility analysis of extensions of the media centre platform on haptic sensor systems, different input and output devices and extension to different physical use cases (e.g. different rooms). A feasibility analysis of the technical bases and related structural differences on the markets and possibilities in Germany, France and the Austria will be performed by Uni Siegen, FhG IMS, UDE. UTT, FhG and UDE analyze performance capabilities of the system/components as well as the resource requirements.

Task 1.4: (Responsible: Kaasa; Collaboration: all other WP participants) Selection of the final system and its components. Based on the previous result a final target hardware and software configuration will be selected. This system will serve as the basis for all further hardware/software developments within the project.

1.2 Scope of This Deliverable

According to the goals of FoSIBLE project, we want to analyze the different platforms and user interfaces to choose the right system configuration. Following, we will first define a set of criteria for the analysis. With these criteria we will analyse different possibilities for social TV's, Sensors, Gaming, User Interfaces and possibilities to start (or use) an online communities.

2. Criteria

In the table below we list the main criteria for the hardware and software evaluation separated in 3 main parts: Development and Software, Hardware, and Internet and Carrier.

Development and Software	API: openness of APIs
	API: versatile library existence
	API: support for range of hardware
	Price of Software
	Expertise of the project partners regarding the Software
Hardware	Price of hardware: platform and devices
	Hardware characteristics (size of TV screen, size of mobile display, weight, etc.)
	Connectivity
	Complexity
Internet and Carrier	Capacity of links: Internet links in small cities
	Connectivity quality and reliability in small cities
	Price of connectivity

3. Social TVs

Selected among the 10 emerging technologies for the year 2010 by the Technology Review magazine[1], the social interactive television commonly known as "SocialTV" is presented as the next stage for the development of the interactive television. SocialTV incorporates social aspects to the viewer's interactions with an interactive television system. The system potentially allows the creation of virtual communities by offering the viewers (co-located/remote) the possibility to decide when and how they will watch a program (synchronously/asynchronously), and by allowing them to publish their personal contents, express their preferences and make suggestions on the content which was generated by other viewers.

We could then define the social interactive television as "an interactive television system augmented with social features (applications) accessible directly via the TV or computer screen".

The interactions of the viewer with the system and between the different viewers are managed through the Set Top Box (STB). These management operations are supported by the middleware layer of the Set Top Box that supports these operations.

In the first part of this document we will present a non-exhaustive panorama of the social interactive television systems in order to determine the features that lead to a social use of television. In the second part, we will present the interactive television open standards.

3.1 Social interactive television systems

In the last years, several social interactive television systems have been developed, some of them have been described as a concept, and the others were developed as prototypes and were tested in a lab environment or with a limited number of people on the field.

We analyzed 10 systems of social interactive television which we think representative of what is offered on the market today: Social TV, AmigoTV, Cose, Telebuddies, Ambulant Annotator ConnecTV, Windows Media Center 2BeOn, CollaboraTV, NDS Social TV. We will also present some other systems under developed in terms of functionality, but still interesting especially because some of them are dedicated to elderly people.

All studied systems are intended to be used with a STB, so programs are broadcasted directly to the television screen. The distinction between the systems which are based on the Internet platform (Lycos Cinema, Joost, Babelgum, CBS Watch & Chat Zync, Messenger, TV ...) and those based on the television as a broadcast medium is critical in our study because of the difference between the social experiences that could occur on the two different types of platforms. Social interactive television systems based on the Internet will not be addressed in this synthesis.

[1] http://www.internetactu.net/2010/04/21/10-technologies-emergentes-pour-2010

3.1.1 Social TV

The development of the Social TV system (STV) by Motorola labs held in three experiments with three prototypes STV1, STV2 and STV3 (Harboe & al, 2008)(Metcalf & al, 2008)(Huang & al, 2009). STV is an innovative system that has a set of social features characterized mainly by awareness and synchronous communication tools.

Awareness is represented by a set of features: 1) a buddy list that provides an overview on friends or family members who are connected and what programs they are watching, 2) ambient device (Orb light) that gives information about the presence of remote viewers even when the TV is off and 3) the pop-ups for events. Communication features include, in addition to chatting and videoconferencing: 1) suggestions represented by invitation messages, 2) emoticons (thumb's-up thumb's-down or shout-out) and 3) predetermined messages. The feature that allows users to know the preferences and historical programs for viewers can be compared to a "Social EPG[2]". To interact with the interface of the system, the viewer uses a standard remote control and a wireless keyboard.

Source: (Metcalf & al, 2008)

Fig1. Ambient device placed on the top of the TV

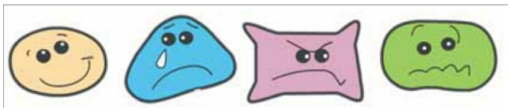
3.1.2 AmigoTV

Considered among the most advanced systems of social interactive television, in (Coppens, Trappeniers, & Godon, 2004), **AmigoTV** is presented as an implementation prototype that combines broadcast communication and community support to take advantage of a rich social experience. The Alcatel marketing manager RikMissault[3] describes AmigoTV as a system which can recreates a virtual salon in which the viewer knows which of his friends are affront the TV at the same time, and what are the programs that they are watching (of course they must accept to share the information before). He can also recommend a program to one of his friends and even invite some people to watch "together" this program. Once the viewers are in the same "virtual room", they can chat using the remote

* Electronic Program Guide

[3] http://www.01net.com/editorial/285477/interview/rik-missault-grace-a-amigotv-regardez-la-tele-avec-vos-amis-dans-un-salon-virtuel-/

control or the voice to discuss during the program. Voice communication represents the main medium of interaction for synchronous communication in AmigoTV. The presence of friends is visible on the screen and represented by avatars (see Fig2), which can be adapted to suit everyone's mood (smile, sad, angry). In addition, everyone can start on the TV screen a small animation as a means of further communication, which is call “emoticons”.



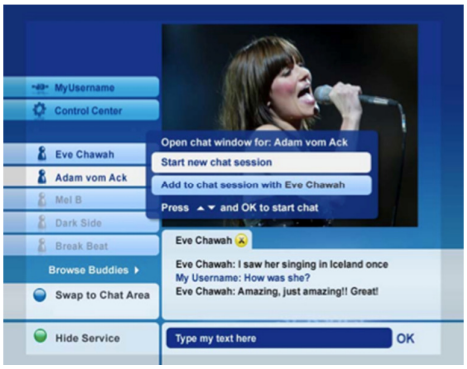
Source: (Godon & al, 2004)

Fig2. Models of avatars in AmigoTV

A market study conducted by the Flemish Business School (Alcatel, 2005) reports that the majority of AmigoTV’s users could be: young persons between 12 and 25 years, families with adult children, or persons belonging to affinity groups such as sports clubs. The potential of AmigoTV can be extended to the network games (Les Echos, 2005).

3.1.3 Communication Services on Interactive Television (CoSe)

Siemens (now Nokia Siemens Network) developed between 2006 and 2007 “**Communication Services on Interactive Television (CoSe)**”[4] a social interactive television system. During his involvement in a series of tests on users on this system (Geerts, 2009) describes that users were able to add friends to their "Buddy List" and see what channel and what program they are watching. They can also start a chat session and send messages to users who are not connected. A wireless keyboard is used for entering text. Users can invite their friends to watch a program with them. In this case when the acceptance is confirmed, the guest switches directly to the channel broadcasting the program. Personal files can be shared through the system (eg. images). Fig 3 presents a body list on the left and a window for an open discussion on the banner below right.



Source: (Geerts, 2009)

Fig 3. CoSe Interface

[4] http://www.engadget.com/2006/02/06/siemens-cose-service-to-enable-interactive-tv/

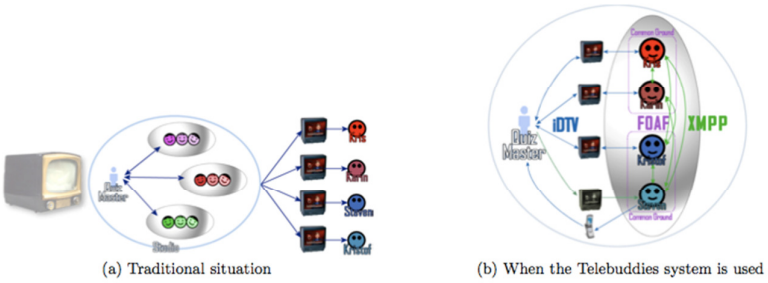
3.1.4 Telebuddies

Telebuddies system was developed in the research institute "The Expertise Centre for Digital Media (EDM)" of the University of Hasselt. The system integrates semantic web techniques to create smart applications that can work with TV programs. The system uses the semantic profiles of viewers in order to create a social experience through television (Luyten & al, 2006).

The concept is implemented through a game show where viewers from their living rooms can form teams to play together and answer the same questions that are asked on the television show. Potential members were identified through the protocol "Friend-of-a-Friend" (FOAF), which defines their common characteristics such as family ties or common interests. Viewers can also chat with each other.

A second version of the system has been developed which includes the use of a secondary displays (eg.Smartphone) to allow players to participate, even when they are away from their television sets.

Telebuddies was tested only in a lab environment. No field test was conducted. Fig 4 shows how Telebuddies FOAF protocol is used.



(a) Traditional situation (b) When the Telebuddies system is used

Source: (Luyten & al, 2006)

Fig 4. Using FOAF protocol in Telebuddies

3.1.5 Ambulant Annotator

The **Ambulant Annotator** system (Cesar, Bulterman, & Jansen, 2006) was developed by the centre of mathematics and computer science "Centrum voorWiskunde in Informatica (CWI)" in the Netherlands. The system allows viewers to capture screenshots or to record parts of their programs to share them with family and friends. Recorded programs and screenshots can be enriched with annotations. A personal navigation structure may also be proposed through shared programs. A second screen (phone, tablet PC…) is used to capture, annotate and send the content to a friend in the buddy list.However, Ambulant Annotator provides no contact information. The second screen is also used to display the navigation scheme and can be used independently of the main screen (see Fig5).The content can be shared asynchronously via television, telephone, and also computer. The Ambulant Annotator system was tested in a laboratory environment.

Source: (Bulterman & al, 2008)

Fig 5. Enrichment content on Ambulant Annotator

3.1.6 ConnectTV

ConnecTV is a system designed by "Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO)" which allows users to watch television together. It includes a buddy list to see what are the programs watched by friends and allows them to initiate a voice conversation. Other features are available such as recommending programs, even if the guest is not connected, the program can be recorded and stored on a server. Users can control the content together. The system automatically tracks a friend with whom the viewer shares a program when it changes its channel. According to (Boertjes, Klok, & Schultz, 2007), being able to switch to the most popular program represents the main innovation of this system.

Also according to (Boertjes, Klok, & Schultz, 2007), the greatest experience for a social interactive television system conducted in the field was on ConnecTV. In fact, 50 households were concerned.

Fig 8 shows a Buddy List with online friends who are green and those who are disconnected in red.

Source: (Boertjes, Klok, & Schultz, 2007)

Fig 6. The buddy list on connecTV

3.1.7 Windows Media Center

Windows Media Center is a multimedia center that was not been developed by Microsoft as a Social TV system. Designed for the Windows PC platform in order to manage the multimedia features of the system, it also offers a set of social features allowing it to be considered as a social TV system.

Windows Media Center offers a GUI optimized for widescreen and high definition television screens (see Fig 7). Once connected, the system can be controlled with a keyboard and a

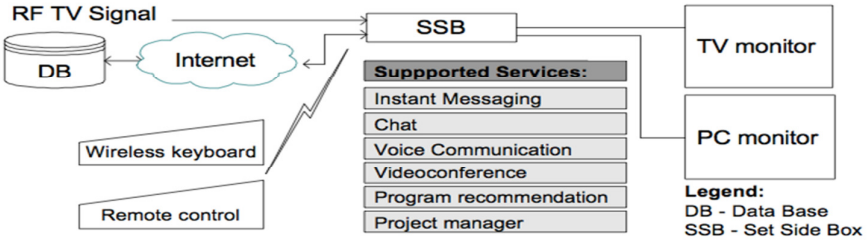
remote control. It offers the ability to watch TV programs, store them, and also to interact with the other users who are connected to the Internet through Microsoft Messenger. The buddy list will be displayed on the television screen.
Users who are connected to MSN and do not watch television can chat with their friends who are using windows media center. This makes the system less oriented toward the social sharing through television programs than other social television systems.

Source: http://www.winsupersite.com/reviews/windowsxp_mediacenter.asp

Fig 7. Windows Media Center interface

3.1.8 2BeOn

The main purpose of the **2BeOn** system (Abreu, Almeida, & Branco, 2002) is to allow TV users to be always connected ("To Be On Line"). The system was developed by the University of Aveiro in Portugal. 2BeOn has a set of basic social functionality that allow people to stay in contact during a television broadcast by recommending TV programs, by the buddy list, by sending predefined messages and e-mail, by chatting… Other features are specific to the 2BeOn system, as asynchronous communication, an interface engine that may be involved in the communication process to highlight the service which is the most attractive for the user (for example, automatically enlarge the size of the chat window if the user is inputting text more than watching programs and a system that analyses the main interests of the viewers).
2BeOn was tested as a prototype in a lab environment. The unit system is called Set Side Box (SSB) (see Fig 8) due to the fact that it acts as a personal computer in addition to the features of a decoder (STB).



Source: (Johansson & Berglund, 2004)

Fig 8. 2BeOn prototype

3.1.9 CollaboraTV

CollaboraTV is a system that supports synchronous and asynchronous interactions between viewers (Nathan, Harrison, & Yarosh, 2008). It offers an interactive and attractive way for the users to participate in recorded programs at different times. The virtual audience (see Fig 9) captures the events generated by the viewers. Avatars are used to simulate the presence. They are a means of communication through which users can express their emotions through gestures or temporary text annotations. For example, when a user selects "happy", his avatar turns to the viewers with a smile on his face. The system also allows recommending content based on social data. Interest profiles are created by interpolation from a series of data collected on the review (positive and/or negative) during the programs broadcast.

Source: (Morris & Smith-Chaigneau, 2005)

Fig 9. Virtual audience on CollaboraTV

CollaboraTV system is not yet available on STB, but given the variety of social features it offers, we felt that it was interesting to present it in our project.

3.1.10 NDS Social TV

In their study on the impact of the User Generated Content (UGC) and the social networks on the ecosystem of digital TV, **NDS France** (Alliez, 2008) developed a system with a set of features that allow users to publish content in their social network and stay connected to their community while watching television. The purposes of the project are to extend all the available interactive television services to support the User Generated Content and use these services to import the characteristics of social networks in the TV.

The user is able to share his television experience with his friends through a function in the decoder that allows him to publish a short excerpt of what he is watching on his blog (see Fig 10). The system is also coupled with a social network (tested with MySpace, but it can be any other network), so the user can evaluate programs posted on their profile. The user can also follow the recommendations of his community members to watch television programs, and he can also see how many members of the community are watching some television programs.

Source: (Alliez, 2008)

Fig 10. A recommendation post

3.1.11 Other systems

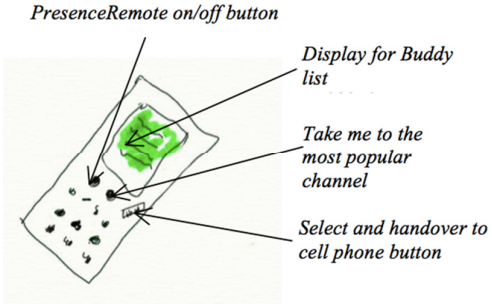
In addition to the systems described above, there are other social interactive television systems, certainly less advanced or still in concept stage but which are also interesting for our project, particularly for a use by elderly people.

Ticket-To-Talk-Television

Svensson and Sokoler(Svensson & Sokoler, 2008) present a unique perspective on the field of social television by proposing the concept of **Ticket-To-Talk-Television** dedicated to the management of the social engagement in everyday life of the elderly. Social relations and especially the emerging moments of meetings (daily activities, such as take a walk, gardening ...) result in a ticket to talk as a starting point for discussion.

By combining the results of the observations analysis on how older people socialize in everyday life and a series of workshops focusing on system design, Svensson and Sokoler want to transform a simple meeting through the television into a "ticket-to-talk", which would lead to the development of the social interactions of the elderly.

Two models were proposed. A sketch of a remote control "PresenceRemote" (PR) (see Fig 11), that is basically a TV remote control with a small colour screen and three additional buttons. The second prototype is an application that allows calling a viewer directly with the remote control by establishing a Bluetooth connection with the mobile phone.



Source: (Svensson & Sokoler, 2008)

Fig 11. PresenceRemote Sketch

TriblerTV

TriblerTV is a Social TV system based on the peer-to-peer sharing protocol "BitTorrent" (Fokker & al, 2007). Developed by the researchers of the Delft University of Technology and the Vrije Universiteit (Hattem & Vliegendhar, 2007), this system allows a set of features, like downloading, video on demand (VoD) and live streaming. However, it is essential that users cooperate voluntarily and massively.

In (Pouwelse & al, 2007) Tribler is presented as a social system that exploits social phenomena by maintaining social networks and their contribution in the research and recommendation of content and cooperative downloading. Tribler enables the import of user's contacts from other social networks, and introduces a permanent ID (PermIDs).

Leaving@Room

(Ghittino & al, 2007) present a concept of social interactive television based on STB which allows viewers to have the sensation of being in the same room. It consists in a virtual room that permits remote users to share the same space, the same remote control and to watch the same content. The principal element of the system is the possibility to share the remote control through a peer-to-peer network. The functionalities offered by the system are: chat and the videoconferencing to support remote interactions.

e-lio

The e-lio[5] system is the first success of the Technosens company. It is a small device that allows users to communicate remotely with their relatives on the television screen and to send them messages, photos and videos from any computer (via www.e-lio.fr and e-liophone - downloadable for free) or any phone around the world. The ergonomics of the remote control (Fig 12) and the intuitive navigation allows the system to be adapted to the capabilities and constraints of elderly users, in order to provide them the optimum comfort - text size, sound volume, automatic hung up when the user is near the handset when ringing.

Source: http://www.technosens.fr/1-4551-La-Solution-e-lio.php

Fig 12. e-lio system

ICI-TV

The ICI-TV project is part of the OMTE (Opération de Maturation Technico-Economique)

[5] http://www.technosens.fr

program from the Digiteo[6] french Research Park. The idea is to provide elderly people a simple and intuitive interface to access TV channels and to stay in touch with their entourage. Being in touch with others is as simple as switching between channels. The users will be allowed to choose between three levels of interaction: 1) indication of the presence and activity, 2) exchange of messages and photos, and 3) audio-video conference. The start-up Praestowas has been created to market these services during the year 2010.

Generally speaking, a social television system can support synchronous and/or asynchronous interactions for co-located and/or remote groups of viewers. To **conclude**, we will present a synthesis of the social functionality offered by the social interactive television systems we studied (Table 1 presents an overview of the major social characteristics of this systems). This synthesis will enable us to subsequently determine the social features that could fit the needs of seniors through the implementation of our design process.
The main functionalities proposed by the studied systems are:

- Text chat
- Voice chat
- Videoconference
- Awareness (buddy-list- the programs users watch, ambient device)
- Sending predetermined messages
- Sending invitation - follow a friend on a program
- Switching to the popular program
- Sharing content
- Annotating content
- Avatars
- Emoticons
- Social Electronic Program Guide (Social EPG –user'spreferences and history programs - Social rating)
- Multiplayer games

Beyond usability testing for the proposed services, few studies have been focused on the design of social applications based on the television, which would also be accessible for the elderly. In our study we have introduced three systems dedicated to elderly,which are still at the concept stage: e-lio, ICI-TV and Ticket-To-Talk Television.

[6] http://www.digiteo.fr/

	Synchronous interactions	Asynchronous interactions	Text Chat	Audio/Video communication	Awareness	Content annotation	Content sharing	EPG Social	Avatars	Ambient device	Emoticons	Multiplayer games
Social TV	ok		ok	ok	ok			ok		ok	ok	
Amigo TV	ok		ok	ok	ok				ok		ok	
CoSe	ok		ok		ok		ok					
Telebuddies	ok					ok						ok
Ambulant Annotator		ok				ok	ok					
ConnecTV				ok	ok		ok					
Windows Media Center	ok		ok		ok							
2BeOn	ok	ok	ok		ok							
CollaboraTV	ok	ok			ok	ok		ok	ok			
NDS-Fr					ok			ok				
Media Center Buddies	ok		ok		ok							
Ticket-To-Talk-TV	ok			ok	ok							
Tribler TV					ok		ok					
Living@room	ok		ok	ok			ok					

Tabelle 1: Overview of the social interactive television systems studied

3.2 Interactive television open standards

If the transmission standards are already determined, it is rarely the case for the middleware on the STB. The standardization of the application layer on digital decoders and the adoption of a common language (API) are now in the centre of the debates. Indeed, service developers are constrained to set different versions of their applications to be adapted to the technologies chosen by the broadcast networks.

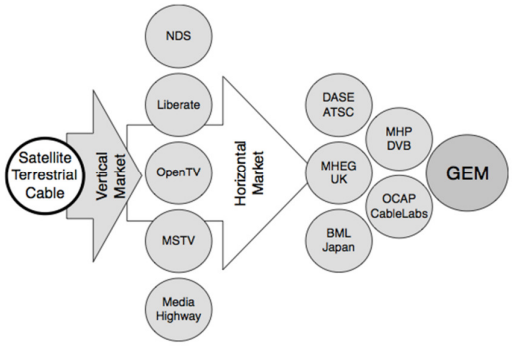
Proprietary middleware solutions are available form several years on the market by interactive platforms suppliers such as Canal + Technologies, OpenTV, LiberateTV and Microsoft. Table 2 presents the solutions proposed by them and the areas they occupy on the world market.

Table 2. The market development platforms actors

Les acteurs du marché		
Les acteurs	**Les solutions**	**Les zones à forte pénétration**
Canal+ Technologies	Mediahighway Interactive TV (API)	Europe, Asie
OpenTV	O-Code (langage proche du C)	Europe
LiberateTV	TV Navigator (API)	Amérique du Nord
Microsoft	Microsoft TV	Amérique du Nord

Source: http://www.journaldunet.com/solutions/0204/020422_tvi.shtml

Of course, the operators have opted for different platforms, which led to the development of a vertical market for middleware (Morris & Smith-Chaigneau, 2005).In a vertical market, set-top boxes represent the greatest financial burden on an operator network. Using an open standard for middleware layer enables interactive TV set-top boxes manufacturers to target multiple markets beyond the specifications of the broadcasters.
Several actors for the digital television start to develop a standardized language and enabling the broadcast of interactive services, is the step towards standardizing the application layer. This initiative aims to solve the fragmentation problem of the interactive television market, and the establishment of a horizontal market (see Fig 13). However, as the middleware open standards are developed by the same organizations that have developed standards for digital television in Europe, the United States and Japan. The result was that several open standards have emerged.



Source: (Morris & Smith-Chaigneau, 2005)

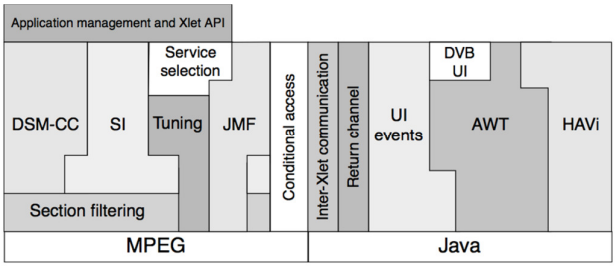
Fig 13. The middleware market development for iDTV

The development of interactive services with features favouring a social experience through the television is based on the middleware open standards of the interactive television.

3.2.1 The DVB-MHP standard (Multimedia Home Platform)

MHP (Multimedia Home Platform) is the open middleware standard for interactive television defined and designed by the Digital Video Broadcasting (DVB) group to be compatible with all DVB transmission technologies. It is the middleware layer that includes a set of application programming interfaces (APIs) that enable applications and interactive services to be accessible regardless of the hardware platform. MHP defines a number of java APIs that allow interactive applications to access various features of the decoder. The MHP applications can also be written in HTML.MHP can be described as a set of instructions that tell the operating system of the digital decoder how to deal with the execution of interactive applications it receives.

A notable feature concerning the APIs of the MHP standard is the modular approach. Many of these APIs can be established on each other to form the software stack (see Fig 14) and be used by the MHP applications. The MHP APIs can be divided into two main parts. One of these parts deals with services related to MPEG. The other part provides services based directly on APIs that are part of any Java platform.



Source: http://www.interactivetvweb.org

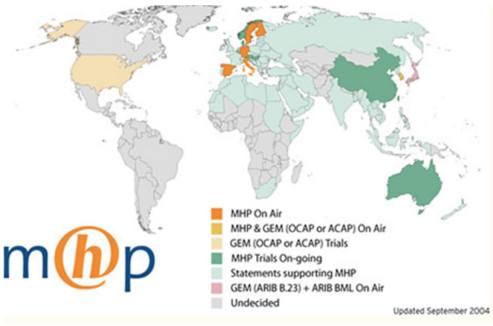
Fig 14. MHP software stack

In addition to JavaTV APIs, MHP uses a number of APIs to control other specific functions to digital decoders, like providing access to the DVB information service and MPEG stream data, display graphics and user interfaces and many other functions. Application developers can also use most Java APIs. In general, the MHP APIs are categorized as follows:

- MPEG low-level access
- Data dissemination Access
- Audio video control
- Lifecycle Applications
- Graphical and user interface
- Server Communication and other applications
- Physical access to the decoder and its peripherals
- Security

3.2.2 The DVB-GEM standard (Globally Executable MHP)

To facilitate the use of the standard MHP in other configurations, DVB has adopted its core to be compatible with the non-DVB systems. This involved removing all specific elements of DVB project from the MHP standard. **GEM (Globally Executable MHP)** is a standard based on MHP 1.0.2, which was created from the collaboration between the DVB Project and CableLabsto consider the various problems of interoperability between the open standards middleware. Like MHP, GEM is based on javaTV APIs. The International Telecommunication Union (ITU-T) recommends the open standard GEM for interactive television. There are over 33 million compatible devices already deployed on the GEM market with 21 million Blu-ray players and 10 million MHP receivers[7]. A map taken from MHP website (see Fig15) gives an overview of the deployment of MHP and GEM standards worldwide.



Source: http://www.mhp.prg

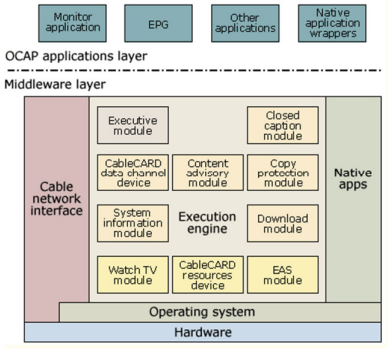
Fig. 15 The deployment of MHP and GEM

3.2.3 The OCAP standard (OpenCable Application Plattform)

The open standard OCAP (OpenCable Application Platform) is implemented by The U.S. organization CableLabs (created by in the cable industry in the United States in collaboration) with the collaboration of the DVB group. This standard was based on the MHP version 1.0.0. Recent versions of OCAP are based on the standard GEM, while referring to certain elements of MHP that are not included in GEM.

The software stack for the OCAP middleware layer is essentially in the execution engine, which is divided into a number of separate subsystems (see Fig 16). These modules represent the JVM, HTML browser for STBs that support HTML applications, and various APIs that allows viewers to watch television and run OCAP applications. HTML application support was added in OCAP version 2.0.

[7] http://www.mhp.org



Source: http://www.interactivetvweb.org

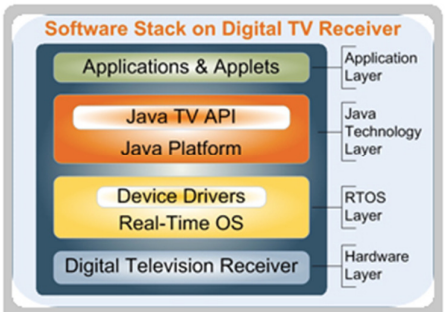
Fig 16. OCAP software stack

3.2.4 The ACAP standard (Advanced Common Application Platform)

The **ACAP** standard or Advanced Common Application Platform is created by the Advanced Television Systems Committee (ATSC) to be common to all interactive television systems in the U.S., whether cable, terrestrial or satellite. ACAP is also based on GEM and takes a few elements from the OCAP standard that fit the U.S. market.

3.2.5 The JavaTV Standard

JavaTV is the Sun Microsystems API that was designed to support platforms of interactive television. The standard is used as a component of other standards rather than a middleware platform. What distinguishes it from other standard is that it is explicitly neutral. Unlike MHP or OCAP, JavaTV can be adapted on any open standard. The purpose of JavaTV is to provide a common set of APIs for other standards such as MHP, OCAP ... The Java TV environment consists of a real time operating system (RTOS), which controls the "hardware" with a series of dedicated drivers (see Fig 17).



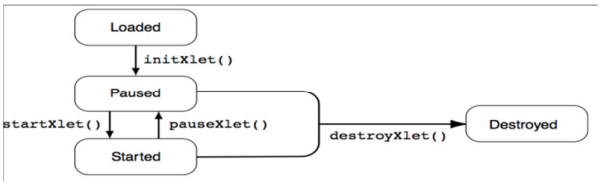
Source: http://java.sun.com

Fig 17. Typical software stack on a digital receiver

JavaTV API allows running Java applications called "**Xlet**"or "**DVB-J**" on TV sets connected with STBs[8].Xlets represents a similar concept to java applets. It was introduced in JavaTV Sun's specification and adopted as a java application format for MHP open standard (DVB-J).

[8] http://blogs.sun.com/arnaudblog/entry/java_et_la_tv_interactive

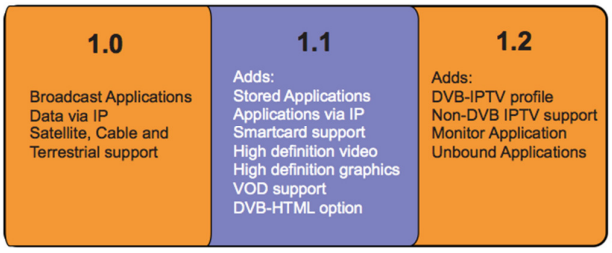
The interface Xlet (javax.tv.xlet package) allows an external source (the application manager) to start and stop an application, as well as to control it. The main difference with the java.applet.Applet package lies in the methods. If both packages have methods to initialize, start and stop an applet, the Xlet can be paused and restarted (see Fig 18) to free the material resources for applications that are used by the viewers.



Source: ETSI TS 101 812:2003 (MHP 1.0.3 specification)

Fig 18. Xlet life cycle

Using HTML to develop applications on the MHP standard interests many companies and developers. DVB-HTML application support was added by the MHP version 1.1 (see Fig 19).The DVB-HTML includes a modular version of a set of Internet standards: XHTML 1.1, CSS Level 2, DOM level 2 ECMA Script and a number of extensions defined by DVB. Although the DVB-HTML has been integrated for no longer, it has not been sufficiently tested to be widely deployed and used in open standards.



Source : http://www.mhp.org

Fig 19. MHP versions

DVB-J and DVB-HTML Coexistence

Digital decoders equipped with MHP 1.1 or OCAP 2.0 versions are able to run Java and HTML applications simultaneously. It is therefore possible to integrate a DVB-J application in a DVB-HTML application and vice versa. This integration is known as the "Inner Application" and allows Xlets to act as an applet that is embedded in a web page, and also to include an HTML component.

3.3 Conclusion

We have noted during the interviews we conducted that the majority of the features desired by the participants are not included in the social interactive television systems which we studied; we did not find any system that encompasses all the cooperative functionalities desired by the participants. According to our readings, Motorola's SocialTV or Alcatel's AmigoTV seem the most mature systems which have overall communication capabilities and awareness that could satisfy our end-users. SocialTV is also the only system equipped with an ambient device. Moreover, these systems have benefited from several tests on candidates, but the young audience was obviously targeted. Our task would be to start from these two systems and to try to develop and adapt the functional and control features for the elderly. Further research on the technical architecture and open standards for the middleware layer used by both systems should be conducted. In France, e-lio remains as an option. About the control interface, we think that a multimodal interface should be the most appropriate for the system that we will implement.

4. Systems, Technologies and 3D Sensors for Gesture Recognition

4.1 Introduction

4.1.1 Gesture Recognition in the FOSIBLE Project

In the FoSIBLE project we aim to realize gesture recognition and extended functionality (gaming control, presence detection). For the sake of reliability the goal is to integrate a three dimensional (3D) input device for these functionality. The main functionality of this device will be the recognition of (arm) gesture to control the media center. The device itself may not produce an image, but can be an optical device depending on the requirements that will be set forth in the FoSIBLE project. The following section lists devices that can be potentially used in the project, discusses their advantages and disadvantages and draws a preliminary conclusion. In the next section, a well know side-effect of gesture recognition is described that must not be neglected when the gesture recognition input within this project is addressed.

4.1.2 "Gorilla arm"

"Gorilla arm" was a side-effect that destroyed vertically-oriented touch-screens as a mainstream input technology despite a promising start in the early 1980s.

“Designers of touch-menu systems failed to notice that humans aren't designed to hold their arms in front of their faces making small motions. After more than a very few selections, the arm begins to feel sore, cramped, and oversized—the operator looks like a gorilla while using the touch screen and feels like one afterwards. This is now considered a classic cautionary tale to human-factors designers; "Remember the gorilla arm!" is shorthand for "How is this going to fly in real use?". Gorilla arm is not a problem for specialist short-term-use uses, since they only involve brief interactions which do not last long enough to cause gorilla arm. “ [http://catb.org]

Therefore we will aim in FoSIBLE to utilize gesture recognition only for a few short gestures that help the person to interact with the system (switch on/off, change applications, simple yes/no decisions). Extension of the functionality to gaming is possible; however the above mentioned effects have to be taken into account. A further way to utilize the sensor in FoSIBLE is to detect the presence of the person itself and (with restrictions) the behaviour of the person, as well as to sense if there are visitor in the room to derive the ‘social/emotional’ state of the person. Has he/she been visited, and how often?

4.2 Analysis of existing systems

4.2.1 Market and technology analysis

The market and technology analysis for 3D input devices was performed under the following aspects:

- Existing commercial (consumer and industrial) human-machine interfaces for 3D detection (even if currently without gesture recognition functionality).
- Existing commercial human-machine interfaces for gesture recognition.
- Experimental human-machine interfaces as found in scientific papers or publications as long as they are available on time for the project.
- All devices should work without additional markers or so called „3D mice“ which must be attached to the user or require to be held in the hand(s) of the user.

4.2.2 Preliminary technical requirements

From the setting that can be derived from the requirements and scenarios described in the FoSIBLE document Deliverable D2.1 [??] we have defined the following preliminary requirements that the analysed systems will be assessed against.

Technical requirements of the 3D Sensor, preliminary

pixel resolution:	> 128x128
depth resolution @ 2m:	t.b.d.
depth range (gesture det.):	0,8m – 3,5m
depth range (activity):	0,8m – ∞
field of view (FOV) H/V:	60°/40°
output:	abstract gesture detection and background activity information
size:	??
interface:	ethernet or usb
fps:	min. 20 equiv.
temperature range:	0 – 40 °C
power:	max 20W
price:	< 700 € ??
illumination:	> 200 Lux

4.2.3 List of existing Systems, technologies and 3D Sensors

The next Tables show an overview of all analysed system with their key technical specifications as well as with its availability and a price if available. Therefore we split the sensors into “normal” sensors and special gaming sensors.

Overview

B40	Table 1 – 28	Sensor
BumbleBee 2	Table 2 – 29	Sensor
CamCube 3.0	Table 3 – 30	Sensor
S3	Table 4 – 31	Sensor
SR4000	Table 5 – 32	Sensor
UCOS2	Table 6 – 33	Sensor
Kinect	Table 7 – 34	Gaming
WiiMote	Table 8 – 35	Gaming
PlayStation Move	Table 9 – 36	Gaming
PlayStation Eye	Table 10 – 37	Gaming

Sensors

Device	**B40**
Supplier	Fotonic (Kamera) / Canesta (Sensor)
Source	http://www.fotonic.com/content/Products/Default.aspx
Technology	TOF
Remark	
Output	3d Bild
Size (cm)	9 x 9 x 12
Interface	USB 2.0 / Ethernet
Fps	75
Resolution	160 x 120
Angular/spatial resolution	0,25°
Pixel (µm)	50 x 50
fov (°)	40 (H) x 30 (V)
Range (m)	0,4 - 10
depth resolution	1cm (0,4m - 3m) 2cm (3m - 10m)
Op. Temp (°C)	0 - 40
Power(W)	Max. 15
Price (€)	?
Commercial/experimental	kommerziell
Availability	

Tabelle 2: B40

Device	**Bumblebee 2**
Supplier	Point Grey
Source	http://www.ptgrey.com/products/stereo.asp
Technology	StereoVision (12cm baseline)
Remark	std. CMOS x 2; 3d läuft auf PC;
Output	CMOS Data x2
Size (cm)	15,7 x 3,6 x 4,7
Interface	1 x FireFirwire; 4 GPIO
Fps	1 mio pixel / s
Resolution	648 x 488 (48 fps) / 1032 x 776 (20 fps)
Angular/spatial resolution	?
Pixel (µm)	Sony ICX424 Sony ICX204
fov (°)	97/66/43 (H)
Range (m)	zB 0,5 - 4,0
depth resolution	0,2cm - 7cm
Op. Temp (°C)	0 - 45
Power(W)	2,5
Price (€)	?
Commercial/experimental	kommerziell
Availability	

Tabelle 3: Bumblebee 2

Device	**CamCube 3.0**
Supplier	PMD
Source	http://www.pmdtec.com/products-services/pmdvisionr-cameras/pmdvisionr-camcube-30/
Technology	TOF
Remark	neu
Output	3d Bild
Size (cm)	60x60x60 (Camera) 2x 60x67x60 (Illu.)
Interface	USB 2.0
Fps	40/60/80
Resolution	200x200 / 276x144 / 160x120
Angular/spatial resolution	?
Pixel (µm)	?
fov (°)	40 (H) x 40 (V); CS f=12,8mm, F1,1
Range (m)	0,3 - 7
depth resolution	
Op. Temp (°C)	0 - 50
Power(W)	?
Price (€)	?
Commercial/experimental	kommerziell
Availability	

Tabelle 4: CamCube 3.0

Device	**S3**
Supplier	PMD
Source	http://www.pmdtec.com/products-services/pmdvisionr-cameras/pmdvisionr-s3/
Technology	TOF
Remark	industry approved, indoor, outdoor
Output	3d Bild
Size (cm)	?
Interface	Ethernet 10/100
Fps	20
Resolution	64 x 48
Angular/spatial resolution	?
Pixel (µm)	?
fov (°)	30 (H) x 40 (V)
Range (m)	0,5 - 6,0 (7,5)
depth resolution	0,5cm - 1cm (white) - 7,4cm (black)
Op. Temp (°C)	-10 - 50
Power(W)	16
Price (€)	ca. 2500
Commercial/experimental	kommerziell
Availability	

Tabelle 5: S3

Device	**SR4000**
Supplier	Mesa
Source	http://www.mesa-imaging.ch/prodview4k.php
Technology	TOF
Remark	indoor use
Output	3d Bild
Size (cm)	65 x 65 x 68
Interface	USB oder Ethernet 10/100
Fps	54
Resolution	176 x 144
Angular/spatial resolution	0,24° oder 0,39°
Pixel (µm)	40 x 40
fov (°)	43,6 (H) x 34,6 (V) oder 69 (H) x 56 (V)
Range (m)	0,8 - 5 oder 0,8 - 8
depth resolution	1cm oder 1,5cm
Op. Temp (°C)	10 - 50
Power(W)	?
Price (€)	?
Commercial/experimental	kommerziell
Availability	

Tabelle 6: SR4000

Device	**UCOS2**
Supplier	AIT
Source	
Technology	Silicon RetinaCMOS Stereo
Remark	indoor use; no image; motion detection
Output	3d motion information
Size (cm)	18 x 11 x 9
Interface	Ethernet 10/100
Fps	100
Resolution	128x128
Angular/spatial resolution	
Pixel (µm)	40 x 40
fov (°)	60 (H & V)
Range (m)	3
depth resolution	60cm @ 3m
Op. Temp (°C)	10 - 35
Power(W)	4
Price (€)	ca. 1000 (qty.100)
Commercial/experimental	kommerziell
Availability	available

Tabelle 7: UCOS2

Special gaming sensors

Device	**Kinect**
Supplier	Microsoft (Kamera) / PrimeSense (Sensor)
Source	http://store.microsoft.com/microsoft/Kinect-for-Xbox-360/product/C737B081
Technology	structured light / CMOS Kamera;
Remark	3d + Farbe (1600x1200) + 4xAudio; physical Tilt (Motor): 27°; Programming, licencing unclear
Output	3d Bild + matched RGB + 4 Audio
Size (cm)	
Interface	USB 2.0
Fps	30
Resolution	640 x 480
Angular/spatial resolution	
Pixel (µm)	?
fov (°)	57 (H) x 43 (V)
Range (m)	1,2 - 3,5
depth resolution	
Op. Temp (°C)	0 - 40
Power(W)	
Price (€)	150
Commercial/experimental	consumer
Availability	10.11.2010

Tabelle 8: Kinect

Device	**Wii-Mote**
Supplier	Nintendo
Source	http://de.wikipedia.org/wiki/Wii-Fernbedienung
Technology	Infrared Camera, Speaker, Accelerometer, Rumble Functionality, Bluetooth
Remark	3d Vision through Position and Size of "Sensor Bar" on top of TV -> Triangulation; Motion Sensors; Disadvantage: Device in hand; Established Developer Community
Output	Motion Detection, Gesture Recognition, Position
Size (cm)	18 x 4 x 3
Interface	Bluettooth
Fps	?
Resolution	?
Angular/spatial resolution	?
Pixel (µm)	?
fov (°)	?
Range (m)	?
depth resolution	?
Op. Temp (°C)	?
Power(W)	2x AA Batteries
Price (€)	25
Commercial/experimental	consumer
Availability	2005

Tabelle 9: Wii-Mote

Device	**PlayStation Move**
Supplier	Sony
Source	http://en.wikipedia.org/wiki/PlayStation_Move
Technology	Acceelerometer, Gyroscope, Rumble, Magnetometer, Bluetooth, Light Orb
Remark	3d Vision with PlayStation Eye
Output	Motion Detection, Gesture Recognition, Position
Size (cm)	
Interface	
Fps	s.u.
Resolution	s.u.
Angular/spatial resolution	?
Pixel (µm)	?
fov (°)	s.u.
Range (m)	
depth resolution	
Op. Temp (°C)	
Power(W)	
Price (€)	move + eye: 53
Commercial/experimental	consumer
Availability	15.09.2010

Tabelle 10: PlayStation Move

Device	**PlayStation Eye**
Supplier	Sony
Source	http://en.wikipedia.org/wiki/PlayStation_Eye
Technology	CMOS-Camera, Microphone, 4 MicroPhone Array
Remark	3d Vision with PlayStation Move; SDKs for gesture recognition, face detection available, Licence Situation unclear:
Output	
Size (cm)	
Interface	
Fps	60 / (120)
Resolution	640x480 / (320x240)
Angular/spatial resolution	?
Pixel (µm)	?
fov (°)	56 / 75
Range (m)	
depth resolution	
Op. Temp (°C)	
Power(W)	
Price (€)	35
Commercial/experimental	consumer
Availability	2007

Tabelle 11: PlayStation Eye

4.3 Sensor systems for determination of the behaviour

Using different sensor systems, which are integrated in the living environment, the occupant's behaviour can be determined. The sensors might be integrated in following functions or places:

- reed contacts for drawers and cupboards doors
- occupancy sensors in bed or armchairs
- motion detectors
- bus system for building automation (also for tracking the events in the living environment)
- "trackpads" as new input devices and
- e. g. proximity sensors, RFID technology or foil-touch systems for creating new input devices (see chapter Special input devices).

For a complete integration it is important, that the sensors have small dimensions to hide them completely in the furniture without much room consumption. Therewith only little heat development is allowed so that no fans or complex ventilation systems are needed. The hardware criteria are complemented by the software criteria. To collect data from the sensors or send commands to the actuator a bi-directional gateway/interface is needed.

Summery of criteria for potential sensor systems or components	
ability to integrate (small installation size, interfaces)	for new kinds of furniture the sensors should be integrated completely (non visible) into the furniture
only little heat dissipation	Only components are capable which develop only little amounts of heat. Because of the noise emission, no fan based systems should be used.
SELV	Safety Extra Low Voltage: for safety reasons only SELV should be used in the furniture (<50 V)
interfaces	open programming software interfaces are needed
bi-directional gateway	for connection the sensors and actuators a bi-directional communication is needed
price	for a saleable product the price of the used components is one criteria

In the following some technologies and standards are listed that might be interesting for this project. The listed prices are no concrete offers and should only be used as an orientation.

4.3.1 EIB/KNX

EIB/KNX KNX is a standardised communications protocol for intelligent buildings based on the osi-modell. EIB is used for building automation. Every device is connected with the EIB bus system. All components are installed on one bus. The topology is selectable (line-, tree-, star based structure, or mixed). The maximum line length is limited to 1000m.

The following components are available on the market and might be used in the project:

- Universal interface (ca. 90 €)
- Motion/presence detector (ca. 100€)
- switching actuator (ca. 140 – 550 €)
- Jalousie actuator (ca. 240 – 430€)

Radio EIB

A possibility for retrofitting EIB into an existing environment is using radio EIB components. The reach is limited, thus the sensor components must be placed within a 10 to 25 m radius. An extension of the reach using repeaters (like EnOcean) is not possible. The battery state is not retrievable on remote.

Examples of some EIB/KNX components (universal interface, switch-button interface, jalousie actuator):


Source: www.eib-home.de

EIB/KNX	
advantages	**disadvantages**

standard for building automation (EN 50090) lots of sensor components in the market radio based components for retrofitting	installation only by qualified personnel dimensions of the sensors wired or battery-based radio components price

Other radio-based systems for building automation:

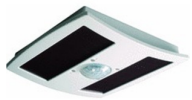
4.3.2 EnOcean-technology

Another technology for home automation is called “EnOcean”. This radio based technology uses energy harvesting for energy supplement. The amount of energy needed for data transmission is gained from the environment. The following kinds of energy transformation are used: motion converter, solar, thermo converter, rotation converter, vibration converter. In the market there are several devices from different manufacturers available. The following EnOcean based sensor components might be interesting for the project:

- switch-button interface (ca. 90 €)
- motion detector (with or without using batteries) (ca. 230 €)
- motion- & brightness detector (ca. 220 €)
- in-wall -/socket actors (ca. 110 €)
- window/door contacts (ca. 80 each)
- window handle (ca. 80 €)
- occupancy detector (ca. 80 €)
- temperature (ca. 100 €)- & humidity sensor (ca. 280 €)
- Wall switch-button (ca. 80 €).

For analysing the behaviour the sensors and actuators must be connected to the homestation. On the market there are different kinds of gateways available (USB (~ 70 – 120 €), TCP/IP, RS485). The installation of the sensors might be done by a janitor; the actuators except the socket plug must be installed by professional personnel. The range of the components can be increased by using repeaters.

Examples of EnOcean components:



Sources: www.detech-shop.de www.enocean-alliance.org

EnOcean	
advantages	**disadvantages**
radio based, no wiring little servicing because of energy harvesting retrofit able increase of range/reach using repeater for sensor installation no professional personal needed	installation of actuators by professional personnel dimensions of solar components / not completely hide able price

There are other building automation systems available. Some manufacturers are exemplary listed below:

- Berker Funkbus – radio bus system
- Kieback&Peter Kleinstellantrieb MD15-FTL
- Merten radio-system CONNECT
- Heinrich Kopp GmbH Kopp Free-control®
- eQ-3 AG HomeMatic Funkhaussteuerung – radio building control
- IMST GmbH Radio module iM860A und iM240A
- Crestron prodigy Licht- und Klimasteuerung – light and climate control
- Busch-Jäger Busch-Funkcontrol - radio control
- B.E.G. Luxomat Smarthome
- Akktor RATIO
- **RWE Smart Home**

Source: www.rwe.de

4.3.3 Basic criteria for media furniture

The basic criteria for "media furniture" with regard to the user scenarios depend strongly on the spatial context. Hence the access to new media should not solely exist in one area; rather it should consist of plenty of services spread to all domestic areas like living room, home office, bedroom, kitchen and bathroom.

A new trend in house building is the mixture of the above mentioned distinct regions. Another field where the spatial adjacency plays a key role is the refurbishment of senior residences. In advanced age the conditions of infrastructural surroundings become more and more important; particularly regarding the bed environment, which is a core area of habitation for people with supportive needs.

Furniture and their extension components can make a good contribution to the negotiation of structural barriers.

These portable furniture elements should have an adaptable character to be free of stigmatisation and supportive and easy to use in every circumstance.

The challenge of integration is rather a challenge of integrating a variety of stand-alone devices but rather the integration of intelligent furniture into existing facilities. Thus we seek to enrich intelligent components with simple and ready to use comfort additions. Furthermore we need to improve the acceptance for daily use even of non technique experienced people.

When integrating hardware components and user interfaces into furniture the following selection criteria should be considered:

- **mass and force dimensioning** (e.g. moveable furniture components like screen mountings and lift mechanisms)
- **heat dissipation and ventilation** of integrated hardware components
- **humidity resistance**
- **shielding characteristics when using radio components**
- **flexibility concerning placement of cables and plug connectors**
- **minimalistic dimensioning, even for very small rooms**
- **surface durability for life long use of the furniture**

There are plenty of possibilities when it comes to choosing which material to take for furniture manufacturing. Wood and wooden fabrication materials, steel plates, metal, aluminium and plastic profile rail systems, metal fittings, system components, bonded systems and so forth are applicable. Dedication and selection of the right material depend on the place of installation and use context. The surfaces of the furniture can therefore diversify completely for example between the kitchen and the bedroom although a similar media access is needed.

Thus limitation to fabrication materials is only possible for each particular area. To satisfy a large user group focusing on a single material technology is not advisable.

The project findings about personal user behaviour, taste and specific needs should not be restricted by a predefined choice of material.

The manufacturing methods depend on the specific material choice.

Mauser Einrichtungssysteme has a broad spectrum of manufacturing facilities (wood, steel, wire and plastics) so that it is possible to use different kinds of materials and assembly methods.

The simulation, testing and evaluation of chosen materials, components and the final furniture will take place in a 1:1 testing environment, a service apartment, in the Fraunhofer inHaus-Innovation-Centre.

4.3.4 Sensor interface - home station

All sensor information must be collected and analysed at one point – the FoSIBLE home station.

The requirements for the home station device are listed below. If new requirements come out during the development process the list will be completed:

- 24/7 – permanent running
- little noise emission
- little current consumption
- small dimensions
- robust against sudden power breakdown
- Interface for the sensors (to be defined)
- Interface for data transfer to gaming device (to be defined)
- Interface for configuration/installation/service
- (User interface)
- auto boot on power-up

The following special requirements for the processing unit are due to the requirements for the home station:

- 1-2 Gigabit-LAN connectors
- SSD
- no fans
- WLAN (optional)
- 2 GB RAM
- operating system: Windows or Linux
- small heat emission / good heat dissipation
- (User interface)

5. Gaming

Games have always been an important thing for people throughout the centuries. Computer games are having an increase in popularity throughout all generations. Especially the new generations of home and handheld consoles have opened up new markets for hard- and software manufacturers.

Requirements:

The games for FoSIBLE should be suitable for the target group, fun and easy to understand. The software needs to support various languages and has to have a community implementation. Taking the actual user base into account and the technical possibilities of gaming platforms it would be good if the games can be used for prevention or rehabilitation if played regularly.

The increase of popularity of gaming consoles in new target groups is simply based on the input mechanisms for the user. Typical gamers are used to their game pad with numerous buttons and joysticks but this input device is not suitable for elderly people as it is too complicated.

Current commercial platform that suit these requirements are the Sony PS3, Microsoft Xbox360 and Nintendo Wii.

From an input device perspective (picture of the different input devices will be inserted here) the Nintendo Wii with its Wii Remote is the best fit if you look at it from setting up the console until final usage with suitable software components.

Within all game console environments you need to use the software development kits (SDK) that the manufacturers of the hardware (Nintendo, Sony or Microsoft) are providing you. These SDKs give you various possibilities to programme suitable software but does also include restrictions. Most often some restrictions may result in features of a game being removed from the actual concept.

From a Gaming perspective for the selected target groups the Nintendo Wii is the best fit possible. It can be connected to a normal TV set through a RGB or Scart connector what is the current standard for TV sets. No new hardware would be required. The price point of the console is very attractive to the user as well as its designed casing. The usage of the Nintendo Wii is also well known to a lot of people and from experience we know that people who are using the console for the first time understand the usage concept very fast as it is quite intuitive. The only input device is the Wii Remote that is pointed towards the TV set on which an infrared sensor is placed to capture the motion of the Wii Remote. A disadvantage of this of course is, that the Wii Remote has to be carried by the using person to interact with the software interface.

Within the Nintendo Wii user environment there are peripherals as for example the Wii Balance Board that open up various possibilities for useful game integrations. Nintendo has also announced the release of a vitality sensor that will be able to

provide heart rate data into the Nintendo environment. Both peripherals allow an innovative an useful integration of the user's health into console gaming.

As the target group of the project are elder people we believe that the gaming part should also include prevention and rehabilitation aspects. By putting exercises that have a medical background into a game environment the user will be more attracted to do the exercises. The games that include the exercises can be played alone or in a competition mode against other users of the project.

For the multiplayer option there are different possibilities how the competitive character can be established:

- direct play 'one-on-one'

A game where two or more users play against each other at the same time.

- Competition via high score list

Each user can play the games at home and the results are stored on a server on a global high score list. The users can get into the competition by trying to be the best on the list.

Results could also be sent to direct friends to invite them to accept the challenge and to try to beat the achieved score. This way two or more parties can push each other to be active in front of the TV set.

6. User-Interfaces

To get an overview about existing possibilities for Input- and output interfaces (IO-Interfaces) this document tries to analyze different approaches. Because it is not possible to list all kinds of IO-Interfaces we will focus on some main IO possibilities. To get the right focus, all listed IO-Interfaces or approaches are with regarding the project goals.

Overview

To describe the important IO-interface devices it is necessary to get them together in groups:

- Gesture recognition
- Speech in and output
- Mobile interaction
- Special input devices

These groups represent the common and uncommon IO-devices we can use in our project. Because Speech and gesture recognition is already described above as a standalone system they will not find place in the following chapter. In the following these groups will be described according to the Criteria for the System in FoSIBLE Project.

6.1 Mobile Interaction

In following table we provide main criteria for the harware and software evaluation separated in 3 main parts: Development and Software, Hardware, and Internet and Carrier.

6.2 Tablets and mobile phones

System / Device	Size	Pricing	Availability	Connectivity	Interfaces
Android	Various: 2,5" - 5"	Device dependent: 150€ - 600€	Good	Device dependent: Bluetooth, Wi-Fi, EDGE, GPRS, HSCSD, HSDPA, HSUPA	tv out (few devices - only video playback and image), micro USB, various dockingstations
Android Pad	Various: 2,8" - 10"	Device dependent: 100€ - 600€	Good	Device dependent: Bluetooth, Wi-Fi (EDGE, GPRS, HSCSD, HSDPA, HSUPA)	tv out (few devices - only video playback and image), micro USB, various dockingstations
iPhone	3,5"	500€	Good	Bluetooth, Wi-Fi GPRS/EDGE/HSDPA	Docking station, tv out

iPad	9,7"	500€-800€	Good	device dependant: Bluetooth, Wi-Fi ,(UMTS/HSDPA/GSM/EDGE)	Docking station, Tv-Out (programmable)
J2ME Midp 2.x	Various:min. 96×54px, common: 128x128px, 240x320px, larger displays in Smartphones	device dependent: small, non smartphone devices available	Good	Bluetooth, GPRS, EDGE, HSDPA, IR	usually (micro)USB, headset/speaker

System / Device	**Pros**	**Cons**	**Experiences**
Android	Pleasing development kit, Open source, No censorship by Google, Rapidly growing devices base	Fragmentation of versions (each manufacturer decides which version to use => application developers always have to keep in mind which features and which android version their app requires)	Development of an application to communicate and interact with a accelerometer-sensor
Android Pad	Open source, No censorship by Google, Rapidly growing devices base	Android wasn't designed for tablets, Strongly customized android versions tend to make development for particular devices tiresome	Development of an tablet-application to assess the lifestyle of elderly
iPhone	Good SDK (Software Development Kit) License to develop software costs 99€, Development easy because only one screen	Closed source, Apple has the right to reject software	none

	format		
iPad	Good SDK (Software Development Kit) License to develop software costs 99€, Development easy because only one screen format	Closed source, Apple has the right to reject software,	none
J2ME Midp 2.x	High availability, OTA Provisioning, JVM available in standard handsets and smartphones	Limited HW accessability from JVM, J2ME has limited capabilities compared to standard Java environment, small devices with limited resources	Development of various applications and interfaces

6.3 Speech in- and output

The simplest and most intuitive input method for the FoSIBLE system would be the user's own voice. Throughout the years technical capabilities have increased dramatically. For this analysis we have contacted several developers of speech recognition software as well as integrators e.g. car manufacturers and microphone manufacturers to understand the difficulties of integration such a system. In addition to that Kaasa has been part of several projects in which the same kind of integration was an option.

- HMI
- Peiker akustik
- Nuance

Requirements:

Integrating a speech input system into the project has several points that need to be fulfilled especially when having the target audience in mind. The system needs to work directly without having to teach the system, it needs to be easily integrated into the technical environment, it needs to work user independently, it needs to work with several languages at the same time as well as in different acoustical surroundings of a home. Speech input should be the universal input device for the FoSIBLE system.

Recognising different user's speech with accent or different language is nowadays not a big problem. The available software components on the market are able to distinguish between several languages at the same time without the need of rebooting the technical environment. Due to the goal of the project that the system

will be placed within a user's own home environment we are confronted with various scenarios especially from an acoustical perspective. The size of the living room differs as well as the objects that are within the room. It is very difficult to place a microphone into the living room of a household for such a purpose and always receive the right result. The best case integration would be that the system is always "listening" to the user when it is on. It becomes difficult when the user is watching a movie, having a video call, listens to the radio or has a normal conversation with another person. The system will be trying to make sense out of the sentences it hears and will react accordingly even though this is not the aim.

A solution could be to provide the user with a microphone that is attached to the user directly. This would result in an increase of cost for the whole system as such a microphone would need to have special characteristics that cancel out surrounding noise. This way of integration would also not cancel out the possibility that a normal conversation of the user with another person in a completely different context would result in an interaction with the system.

In conclusion you can say that speech input is unfortunately not the right system to be integrated in a system within the target audience's home.

7. Online Community

7.1 Standard functions for an online-Community

At first it is important to define standard functions of an online community tool so that we get a better understanding about what we have to discuss. Because there is no official list or pool of standard functions we will use the following functions based on successful existing online communities like Facebook or MySpace as standard in this chapter:

Profile

One of the most important features of an online community is the opportunity to have your own profile with information's about the profile owner. Here at least it should be possible to write a rough description to identify yourself among others, up to publicize detailed information to express yourself. Here the profile owner should be able to choose who get what information?

Connections

Another feature which describes an online community is the connection between people or their profiles. People should be able to connect with close friends to share special information's only with them. They should be able to find or start groups of interests or other collaborative space. This feature is deeply connected to the privacy issues of a community.

Blogging

In an online community you should have the opportunity to share thoughts, opinions or other texts via a blogging system. Therefore every person should have an area on their profile to post/write texts with user-defined content. Important is that other member of the community should be able to find these posts and react to them by writing i.e. comments. Those posts can also be managed by an interest group space where you can post opinions (or other) to a specific topic. The visibility of the posts and comments should be adjustable according to the privacy features of the network.

Chat

An online community should offer the possibility to use a live chat between two or more users. This chat can be used to communicate with friends or to meet new one. Those chats can have

Sharing media (video, audio, pictures)

People should be able to upload self-made or other videos, pictures or audio files to express them in their profile or to share them with their friends. Here it is important that the online community has functions to do this easily.

Further it is necessary to understand the motivation of users to participate in virtual communities. Wise et al. identified four attributes for an successful online community: “size of community, frequency of messages, presence of moderation, and interactivity of messages”.

These standard features should help to find a way to build a new community or to choose an existing one for the project. To find the right approach an analysis of existing possibilities, for building an online community, will follow. Because you can find endless possibilities to build an online community we will only pick up the most successful or famous approaches and analyze them. To get the right overview we choose examples out of different approaches with different levels of support and accessibility. Beginning with the basics we analyze two Content Management Systems. Then there are two options. First you can connect the CM System with your own content and start your own social network or you can connect to existing communities and integrate their information (maybe filtered) in your social network. Therefore we describe two possibilities to connect with successful existing communities. At least we take a look to approaches which start a new social community via predefined templates and layouts. Every approach should be analyzed regarding to the FoSIBLE project goals.

7.2 Content Management Systems

Content Management Systems (CMS) are able to build an online community with all features described. CM Systems are very adaptable and variable because you can do whatever the program or script language let you do. At this point we would analyze two famous open source CM Systems but it exists a lot more than these two.

7.2.1 Joomla

"Joomla is an award-winning content management system (CMS), which enables you to build Web sites and powerful online applications. Many aspects, including its ease-of-use and extensibility, have made Joomla the most popular Web site software available. Best of all, Joomla is an open source solution that is freely available to everyone" [Joomla Website]. Joomla is a common example for an open source CM System which is used by the following examples:

- MTV Networks Quizilla (Social networking) - http://www.quizilla.com
- IHOP (Restaurant chain) - http://www.ihop.com
- Harvard University (Educational) - http://gsas.harvard.edu
- Citibank (Financial institution intranet) - Not publicly accessible
- The Green Maven (Eco-resources) - http://www.greenmaven.com
- Outdoor Photographer (Magazine) - http://www.outdoorphotographer.com
- PlayShakespeare.com (Cultural) - http://www.playshakespeare.com
- Senso Interiors (Furniture design) - http://www.sensointeriors.co.za

Joomla provides an easy interface to build websites, produce content and to store the content in a database lime mySQL. You can build a total new community based on Joomla. The community for Joomla is very big so it is possible to find support in many forms. Also it is possible to use various templates and designs to start with. Every template and design is fully accessible and adaptable. Joomla is able to work with every internet script language your server supports (HTML, PHP, Java Script …)

7.2.2 Drupal

"Drupal is a free software package that allows an individual, a community of users, or an enterprise to easily publish, manage and organize a wide variety of content on a website. Hundreds of thousands of people and organizations are using Drupal to power an endless variety of web sites, including

- Community web portals
- Discussion sites
- Corporate web sites
- Intranet applications
- Personal web sites or blogs
- Aficionado sites
- E-commerce applications
- Resource directories
- Social Networking sites

The built-in functionality, combined with thousands of freely available add-on modules, enables features such as:

- Electronic commerce
- Blogs
- Collaborative authoring environments

- Forums
- Peer-to-peer networking
- Newsletters
- Podcasting
- Picture galleries
- File uploads and downloads
- And much more.

Drupal is open-source software distributed under the GPL ("GNU General Public License") and is maintained and developed by a community of thousands of users and developers. If you like what Drupal promises for you, please work with us to expand and refine Drupal to suit your specific needs."[Drupal Website] The Attributes of Drupal are almost the same as the Attributes of Joomla. You can use existing Templates and adapt them as you want. Drupal works with nearly every language you server supports and you can use Drupal to start a community as you want.

The support Community to these two open source CM systems is very strong so you can get a lot of support there. Further both Systems are well proved by many existing websites. The benefit to use such a CM System is that you can generate you community in the way you want. They present a very open System which you can also use to access existing online communities like Facebook or MySpace through their APIs. Also you can add all forms of online features. There are nearly no boundaries or borders on the site of these CM Systems. The problem is that you have to build the community software by your own or you search for a good template and add the features you need. Therefore you need experience with HTML, PHP and so on. Regarding to the project it is not a good option because it needs a lot of time and manpower to make the community working. Especially if you try to start a new community without using the information's or profiles of other networks. To recruit enough people which use this network for testing will be very hard.

7.3 Access to existing online Communities

To access existing online communities would provide the andvantage that we have an fully grown community with lots of people using it. There already exists much content in different form. Important is that the people which use the community like the system, otherwise they won't use it. To analyze this possibility in the following the two most famous social online communities will be analyzed.

7.3.1 Facebook

Facebook is one of the strongest online communities in the web. With approximately 500 billion registered users, with wide range of personalities, it represents a social network with an interesting database for our project.

Facebook presents a developers area where a set of APIs to build own Facebook applications for

- mobile- ,
- desktop and
- web applications

can be found. The APIs give access to the social graph data of Facebook and provide methods to read and write data on registered Facebook profiles. The social graph represents the information of a Facebook profile with every connection. To access and use this data can be a very interesting approach for the project, because we can access an existing and successful online community with all stored information's. Also the Facebook community contains profiles from different people with different interests and age. This is very important for our project because all members of a family can have access to and benefit from this community. To get access to all data on the social graph and to protect the privacy of the Facebook members it is necessary to authenticate the program or website.

Authentication process

To get all information from the social graph of Facebook for an extern program, website or tool it is necessary to get the user's permission to access their profile with a short "Request for Permission Screen" like in *illustration 1*. Therefore it has to use the *OAuth 2.0 protocol*.

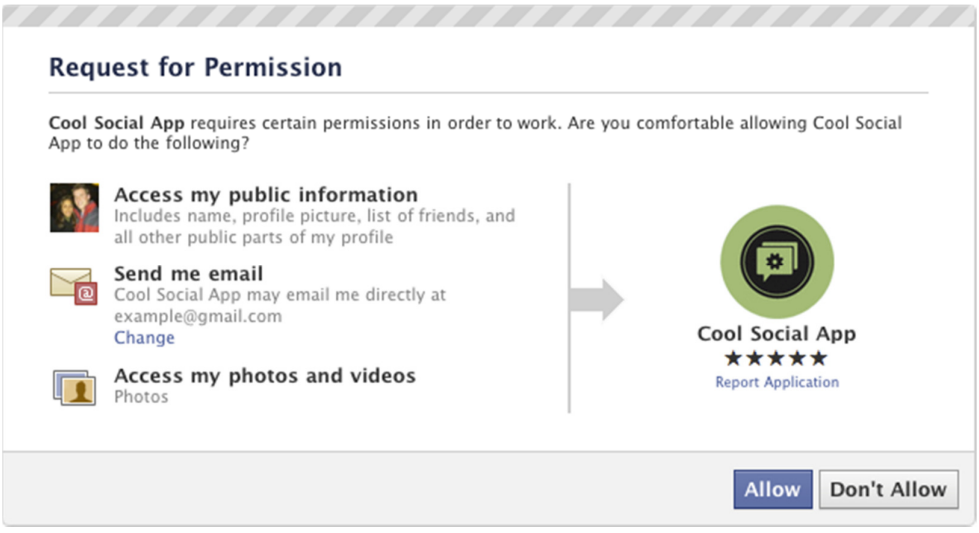


Illustration 1: Facebook Request for Permission Screen

After the authentication through the user the program gets the users Facebook ID. With the Facebook ID you have access to all default information's of a user-profile (i.e.: name, profile picture, gender and friends). If an application needs further access on private data (i.e.: photos) the program can ask access for extended permissions. The authentication can be done via different platforms like:

- JavaScript-based: JavaScript SDK

- Desktop application: Facebook's OAuth implementation does not include explicit desktop application support but if the desktop application can access a Web browser it can use the same SDK application like JavaScript-based programs.
- Mobile Web; The access on mobile platforms can be done with: iOS SDK (for iPhone, Ipad); Android SDK or Blackberry SDK. A support for the Windows mobile (or phone) isn't possible via a special API but it should be possible to use web requests via JavaScript. So nearly every Mobile platform should be supported by the different Facebook APIs.

Examples for the authentication process can be found on the Facebook developers' area.

How to Access data:

Information about a user can be acquired through the Facebook Graph API. The API presents simple code snippets which explain how to get the data from a profile. To get the data it is important that the application is authenticate by the user. For details see *Authentication process*. To get information's of every object in the social Graph of Facebook has a unique ID. With this ID a program can ask for any information of the site which the user has give permission to. Alternative to this method the usernames can be fetched using the name as an ID. All Responses of the Facebook social Graph are JSON (JavaScript Object Notation) objects.

Characteristics

- The Facebook API is a free way to get access to an existing community with many users every age.
- Highly adaptable through own applications or websites
- Small templates already exists to integrate them in own solutions but no templates for layout or architecture and so on.
- It is possible to write extensions like small apps or add-ons

7.3.2 MySpace

The MySpace community also provides a developers area. Here you can find several APIs for different platforms. Like the Facebook API it provides support for mobile, web and desktop applications. The toolkit is supported by many other companies for different needs (Microsoft and *unity* for Frameworks, Plugging and Hosting; *PayPal* for Monetization and *apigee* for Analytics and Mobile).

To access and manipulate the data of a Profile MySpace provides the RESTful API. These API adheres the principle of REST architecture. The RESTful API has subAPIs for accessing the activities, the albums, applications, and more of a user Profile. Every API has his own documentation with short code snippets to help starting your own tool. The MySpace API supports different programming languages like Java, .NET, Ruby, Python, Objective-C, and ActionScript. With these languages it is possible to access the data via different platforms from mobile to desktop

equipment. Especially the direct support of objective-C is important if we consider the use of an iPad or iPod for the Project.

The Facebook APIs and the MySpace ToolKit are representatives for the possibility to access existing communities and to use the data in an own program, tool or website. Important for the project is the possibility to access already existing profiles from members with different interests and age. So it is possible to connect whole families via a non experimental community with an own interface or tool in an easy way. We can add any IO-Devices we want and connect them through the APIs with the data. This would give us great opportunities for our project. This approach can be combined with the other approaches described in this chapter because it is more a way to access data without starting a complete new online community. For example we can start an own website or desktop tool and aggregate special data from these communities and present them in the way we want. On the other hand to use these developer kits you have to write (or provide) a solution which handles and presents the information and the user input. So it would be up to you to develop such an environment.

7.4 Community Building Toos / Social Web Kits

Alternative or in addition to these open methods to access existing communities you can use a Community building tool or social Web Kit. These tools are mostly easy to use and provide a wide space of templates or layouts you can use. With these it is possible to start a web page or social platform via minutes after registration. The most of these tools are bound to monthly costs for the use of them but some have a small access for free. This free access provides the user with a small package of features and contingent of bandwidth and so on to test the product or to run a small community. Because the most of these tools are not open source or free to use for every detailed product described below it will be a table with prices and packages for small & middle solutions. Further for the most of these ToolKits or Web Kits it isn't possible to test it without the buying a small access or account first.

7.4.1Ning

Ning is a community building tool which creates a community in a few moments. It provides a wide range of layout designs and the freedom to create new layouts. New Layouts can be created via CSS files. Also you have all standard functions like profiles, connections, sharing multimedia files like videos and photos, chat and groups. Ning seems to have a detailed privacy structure so you can moderate every photo, video or the whole site and choose to make them private or open for all. But how detailed the privacy properties are not visible without a registration. Also you can add short applications or tools. For example you can integrate Applications for Video conference or interaction with media objects like videos or pictures, have access to an online game communities with many short games (like Sudoku) through these applications.

Some of the existing applications:

- Calendar and event planer
- Video Chat
- Interactive video streaming access
- Access via mobile devices
- Radio talk – start your own radio station
- Group text messaging service
- Business finder
- Collaborative workspace
- Quiz – make your own quiz
- And more …

Ning seems to be a big platform with over 76000 hosted network solutions and a strong community and represents a solid network community structure for a social platform.

Costs:

Ning has a 30 day free Trial version to explore the application more detailed. But the free trial can only be accessed via a real account and a dismissal before the 30days end. For a real access see the following prices:

	Mini	**Plus**	**Pro**
Price / month	2,95$	19,95$	49,95$
Members	150	Unlimited	Unlimited
Storage	1GB	10GB	20+ GB
Bandwidth	10GB	100GB	200+ GB
Additional informations	Go ad-free or run your own ads Blogs, forum, photos and video Basic member controls	Go ad-free or run your own ads Custom design and URL Blogs, forum, photos and video Groups, events and chat Access to more than 100 Ning Apps Viral tools	All ning plus features Branded media players Upload music and video API access (coming soon) Exclusive upgrades and add-ons Premium support

			Language filter

Characteristics:

- Fast start, the first version of the community runs via minutes
- The interface and the layout is adaptable with special limitations according to the ning tool
- Third party applications can be used for a small amount

7.4.2 KickApps

KickApps is a community building tool which allows you to build up your own community. Therefore they provide a standard set of community functions like blogging, chat, sharing media. Also you can have your own profile and connect to other members. KickApps provides a standard Layout for the community site which runes direct after registration. You can modify this Layout in a very variable way. Therefore the KickApps developer area prepares many pre defined code snippets which you can use to modify the look of the site. Also you can modify it by your own without these snippets. Further the KickApps tool provides many third party applications which you can use to improve the feeling, the handling and the functionality of you community. For example you can integrate Applications for Video conference or interaction with media objects like videos or pictures. Also access to an online game community with many short games (like Sudoku) can be integrated through these applications. These applications seem to be the same application like in the Ning community tool above. For a short list with example applications see the list in the Ning description.

The biggest opportunity of this tool is that beside the standard layout you can use parts of the KickApp site and integrate them into your own webpage through the REST API. Therefore KickApps supports other web applications like Wordpress, Drupal or Joomla.

Characteristics**:**

- Fast start with standard layout and functions
- Highly adaptable
- The most functions can be integrated into you own webpage (wordpress, joomla, Drupal)
- Many Applications from third party developers can be integrated easily into you KickApps community.

KickApps represents a solid community solution with highly adaptable parts and a good integration in other existing solutions.

Costs

KickApps has a 30 days free trial version. For a real access see the costs for small businesses and organizations below:

	Starter	Basic	Pro	Advanced	Premium
Price	9,95$ / month	19,95$/month	39,95$/month	99,95$/month	299,95$/month
Pageviews/month	2500	5000	10000	20000	50000
Traffic/month	5GB	10GB	30GB	100GB	300GB
Storage	5GB	5GB	10GB	20GB	60GB
Domain	Kickapps domain	Custom	Custom	Custom	Custom
Support	Support center	Support center	Support center	Support center + 24hr Support Ticketing	Support center + 24hr Support Ticketing

7.4.3 Other usable community building tool / or Social Web Kits:

In the web are many usable social web kits like Ning or KickApps. Every of these web Kits or Tools have their own area or working space with pros and cons. Because it is not possible to analyze all of these it is is necessary to search for the right social Web Kit which fits to your needs if we want to use such Web Kits in our project. To give an overview we aggregate a small list of such developer kits:

- GoingOn http://www.goingon.com/
- CollectiveX http://www.groupsite.com/
- Haystack http://www.haystack.cerado.com/html/haystack_directory.php
- ONEsite http://www.onesite.com/go/view/why
- Jinity http://www.jinity.com/
- Twingr http://twingr.com/
- Socialengine http://www.socialengine.net/

To use such toolkits for starting a new community, is a good way to build open an own approach for the project. But to get enough users so that the online community becomes the right dynamic will be very hard. Maybe it is possible to access the data of the community building tool (or web kit) so that it might work to integrate profiles from Facebook or MySpace. At least some of the community building tools are able to integrate Facebook profiles or more. For example KickApps allows the users to login via the Facebook profile. So it should be possible to connect to the Facebook data as well. Unfortunately it isn't possible to verify this without starting a community there.

7.5 Note for Valuation

If we decide to use one of the described approaches, we have to look in detail what the specific solutions can do so that we can choose a specific platform. For this we can use the trial version of the solutions and verify the usability and the accessibility

of the data. The easiest way to start a new social community platform seems to be to write an own tool for our devices which connects to the Facebook profiles and information's. So we have good existing data from a network which are used by different people. The popularity of Facebook could help us to find good test users (or whole families which communicate already via facebook) and we can manage and manipulate our own interface easy for any device we need. If we want to use a website we can easily take a community building tool like KickApps or Ning and try to integrate the Facebook data.

7.5.1

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