

# Combining Quantitative and Qualitative Data in User Research on Digital Television

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## **ABSTRACT**

This paper presents user grouping for digital TV. First, eight user groups were formulated in a questionnaire study. Then a focus group study was conducted to reveal specific data on selected user groups' expectations and preferences. The resulting user profiles are a combination of these two data sets. The combination represents how the unchanging quantitative data is joined with the dynamic qualitative data. Use of the focus group study method makes the combined user profiles easy to update. In general, user profiles are a valuable source of information for developers of digital TV applications. Discussion at the end of the paper deals with user research issues on digital TV.

**KEYWORDS** : digital television, user research, focus group studies.

## **INTRODUCTION**

Digital television will change the consumer experience as the interactive services and applications become part of the routine TV viewing. There will be a change from passive TV viewing to active application usage. There is also expectations to personalize TV viewing with the aid of Electronic Program Guides (EPG). EPGs reside in the set-top box and they show TV program listings with program information.

Other interactive services and applications include Web browsers and email applications located in the set-top box, online games which are downloadable applets and other online services available in the Internet via a modem such as online banking. Pay per view (PPV) services show chosen TV programs and movies. Then there are applications broadcasted together with the TV program such as interactive advertising and online polls. Set-top boxes can store TV programs into the set-top box memory. Digital TV and the new interactive services will be used if consumers find them easy to access. Good usability is important as TV viewers are not interested in problem solving in their leisure time. It is therefore advisable to know the TV viewers and reveal their thoughts and preferences in user research.

## **Aim of the Study**

The aim of this study is to create understanding of TV viewers on the basis of both quantitative and qualitative user research. The study has three goals: to formulate initial user groups for digital TV, to reveal specific data on users' expectations and preferences on forthcoming digital services and to combine these two data sets together to get comprehensive user profiles.

## **USER RESEARCH FOR TELEVISION**

Television is mostly watched as a leisure time activity. Users watch TV programs and use the interactive services at their discretion. This is in contrast to designers' basic idea of the PC in the office environment as an equipment that is used for completing specific tasks. In home environment, such tasks have no leading role. User research for television should take into account the differences in these two environments.

## **Quantitative User Research**

Quantitative user research takes form in questionnaires, surveys and log files. Some of the data is gathered on a continuous basis. For example Pay TV service providers, marketing researchers, credit card companies and shops providing customer cards gather customer profile databases.

An example of quantitative user research is a survey conducted during year 2000 by OFTEL, the regulator for the UK telecoms industry [12]. The study sample was 2070 adults 390 of which claimed to have digital TV at home (19% of the sample). In UK, this makes it up as much as 4.5 million digital TV households. The survey revealed data on users' actual application usage. It was found that the most popular TV application was EPG as 73% of digital homes were using it. 46% of users were using a 'favourites' function in EPG which produces a customised TV program listing. The most popular online activity was to download and play online games, as 44% of users claimed to use the service. 34% of users had an email and Internet applications, but only 13% and 9% were using the services. The main reason to choose digital over analogue service was to get more and a wider

range of channels. Free set-top box offers encouraged one in four subscribers to take digital services.

Another example of quantitative user research is a survey conducted during years 1991 – 1996 by The British Film Institute [3]. The study consisted of fifteen questionnaire diaries completed by approximately 500 respondents. It was found that most respondents' everyday activities were structured by a clearly organized schedule and that an important part of the pleasure of TV viewing was talking about it afterwards. Common concerns about new technologies and services were based around three key concerns: cost, aesthetics and available time, and the related feeling that perhaps the existing services were quite expensive, unattractive and plentiful enough already.

### **Qualitative User Research**

Qualitative user research takes form in interviews, diaries, photographs, storytelling, scenarios, focus group studies, etc. A simple start is to visit users in their environment and watch them work. If users cannot be observed in their work context we can use 'usability roundtables': we ask users to take samples of their work with them and discuss it together with the designers [1]. These samples can be photographs, user diaries or notes. With these examples and the explanation associated with them, the designers get a picture of which tasks are most important and which tasks occur most often.

Focus group study is a short-term user research method which often brings out users' spontaneous reactions and ideas. Focus group sessions give information about group dynamics and organizational issues. Focus groups reveal thoughts and preferences of 'power users', as advanced users sometimes face needs that will later be general in the marketplace [10]. To get feedback from users on product concepts, there are also theater techniques for focus group sessions [13]. The limitations of focus groups are that they do not show users' actual behaviour in their home environment the way ethnography does. Much of what people do is so automatic that they forget to mention it when just talking about it [4].

Ethnography aims to develop an understanding of users' work practices in their real working environment. The researcher has to reveal, for example, user's tacit knowledge, domain-specific terminology and expert knowledge [16]. The research takes place in natural settings and it develops descriptive understanding in contrast to prescriptive. The research includes for example interviews, mock-ups, analysis of current work practices, document analysis, observation and video recording. This understanding is then passed on for interpretation and visualization.

Ethnographic studies have revealed that when placed in the home environment, digital TV will be integrated within the interactions already existing at home. According to an ethnographic study of a set-top box trial, sharing a home is a cooperative activity [11]. Family members orient their behaviour toward one another by making judgements about who is busy and should not be disturbed, or who is relaxing and thus monopolizing the use of the TV or radio. The home environment and the daily routines also create 'behavioral clusters' as was found during a pilot ethnographic study [8]. The study revealed that families spent most of their time in the 'command and control' and 'hang-out' spaces, which often implied to the living room and the kitchen. Many activities were characterized as communication to support emotional bonding rather than carrying out given tasks.

Qualitative user research data can be visualized with the aid of scenarios, storyboards or 'rich pictures'. 'Rich pictures' are single pictures that depict the primary stakeholders, their interrelationships and concerns, and the transformations that occur in the process of the work [9]. Complex, cooperative work can be visualized with 'wall graphs' including people and their activities and all related data [14]. A communication oriented way to visualize user data of a particular family or a social group is to draw 'lifestyle scenario maps' that visualize users' links with other people [5]. The approach here is that lifestyle researchers collaborate with designers to visualize how people's lives and lifestyles interact to generate communication styles and patterns.

### **DEFINITION OF USER GROUPS WITH QUANTITATIVE DATA**

This section presents how quantitative user data was sorted out into eight user groups for digital TV. The quantitative data was gathered in a questionnaire study [15]. The study was conducted by Suomen Trenditieto Oy, a company providing research and counselling services in the new economy. The study findings are from years 1997 – 2000.

The aim of the study was to get information about the scope of new media in Finland and its innovations among 12 – 60 year old people. In the period of four years, an informed inquiry was prepared each year. During year 2000, the total study sample was 1970 inquiries each consisting of 80 questions. The issues covered ranged from hobbies to work, Internet use, watching TV, intentions in life, etc. During the first two years, the large amount of data was sorted out and interpreted with the aid of neural network analysis.

User Group	Age Median	N	%
Pioneers	21	150	8
Hard-Workers	24	176	9
High-Fliers	29	278	14
Comfort-Lovers	36	280	14
Nondescripts	36	284	14
Committed	38	306	16
Active	38	258	13
Traditionalists	41	238	12
Total		1970	100

**Table 1:** Statistics from the questionnaire study results.

Neural network analysis helps to bring out complex relations and common characteristics among pieces of information in large collections of data. After the first two years factor and cluster analysis were used.

The analysis revealed eight user groups. As can be seen on Table 1, the age median of user groups runs from 21 to 41 years. The biggest user group, Committed, covers 16% of all users and the smallest user group, Pioneers, covers 8% of all users. The questionnaire study revealed that users cannot be divided into groups solely based on age, place of residence or the amount of consumer electronics equipment owned. Instead, the three most important and revealing attributes that define a person are person's home orientation, work orientation and technology orientation (or, the new media orientation). Each user group is a collection of people with the same set of orientation characteristics.

The orientation reveals user's intentions and needs. Person with a strong home orientation is prone to give a positive answer to a claim like 'I prefer spending time with my hobbies at home rather than going away from home'. Person with a strong work orientation is prone to give a positive answer to a claim like 'The content of work is more important to me than the money earned'. Person with a strong technology orientation is prone to give a positive answer to a claim like 'I wait impatiently for more Internet vendors to start a service' or 'I would vote in elections with the help of TV or PC if it was made possible'. The three types of orientation explain the fact that the introduction of new media is not only a matter of trying to fill a technological void in a person's life. New media and the services must answer to consumer's expectations, needs and demands concerning self-fulfillment, learning of new skills and activities with other people.

As the eight user groups were formulated, a focus group study was conducted to reveal qualitative data on a set of selected user groups. The questionnaire study results have a history of four years whereas the focus group



**Figure 1:** An example of an EPG screenshot shown to focus group study participants.

study results were gathered in a few weeks. We selected three user groups which we thought were the most interested in new media and the interactive services. We had two focus group sessions with Pioneers, one session with High-fliers and two sessions with Comfort-lovers.

#### DETAILED USER PROFILES WITH FOCUS GROUP STUDY

To reveal specific data on users' expectations and preferences on forthcoming digital TV in Finland, a series of focus group sessions were held during year 2000. At that time the percentage of TV owners among the total population was 95% and the average daily TV viewing time was 2 hours 48 minutes [6]. The percentage of digital TV or digital set-top box owners was 0% as the equipment was not yet available. First set-top boxes will come to market during year 2001.

Within each focus group session, a structured conversation was held focusing on study participants' current TV use and their expectations about the new interactive applications to come. Altogether 21 study participants took part in the sessions. This is half the amount of people recruited for sessions by phone. Each session included three to six study participants and two interviewers. Sessions were recorded for later inspection.

At the end of each session, we presented color printed screenshots of EPG prototypes as examples of the new applications to provoke conversation with study participants. As can be seen on Figure 1, an EPG screenshot consists of a TV program listing and a short program description associated with each program.

#### RESULTS

This section presents three user profiles. These user profiles are a combination of unchanging data, the questionnaire study results, and dynamic data, the focus group study results. The quantitative and qualitative user data were combined to produce comprehensive user

profiles. The user profiles were shortened for the purposes of this paper.

### **Pioneers**

Pioneers are young people who appreciate prosperity, travelling, adventure, games, shopping, listening to music and the search for excitement. Their age median is 21 years. Nearly half of them are students who want to get the latest entertainment electronics possible. Pioneers go with the new technology and going to work is only a means to make a living. 55% of Pioneers are men and 27% of them live in the capital area. Many are still living at home with their parents. 88% of Pioneers have an access to Internet, 67% have a home PC, 50% have a game console and 42% have entertainment as their main reason for using Internet. Pioneers have a broad interest in chatting and playing online games in the Internet which makes them different from the other user groups.

Focus group study revealed that Pioneers are well-informed about digital TV. In one Pioneer's opinion, *"It would be nice to get background information on sports events while watching the game. One wouldn't be at the mercy of the announcer."* As an opinion to PPV movies, a Pioneer did not like the idea of *"Planning the TV watching in advance. It wouldn't be relaxing anymore, but work."* There was a comment that PPV is considered a good idea as video rental is difficult to use: *"It is not hard to rent a movie, but it is hard to find the time to hand the movie back to the video rental shop."* In one Pioneer's opinion, *"The connection to Internet, if it was fast and an easier way to connect to the Net, could make me do the purchase decision. Today, you have to turn on the PC and it is slow."* *"It would work out to use online banking via television for personal finance, I have no doubts about that. There should be several televisions as not to run out of television screens when someone wants to pay the bills and the other wants to watch TV."* *"What you need the PC for if everything (applications) is on television?"* Some Pioneers said they *"Don't even have time to watch the existing channels."* There was also an opinion for not using home shopping as *"I rather go out for shopping (and to see other people) than to choose on the screen."* *"You got to have a flavor of the product, some more feeling."*

### **High-Fliers**

High-fliers are young adults in the beginning of their career who find their working life rewarding. For them, the most important thing in life is their career. Their age median is 29 years. 27% of High-fliers have a degree from a university or a vocational high school. High-fliers are strongly technology-oriented people more than half of which use online banking for personal or domestic finance. They read more economy and computer magazines than the other user groups. High-fliers have a lot of entertainment electronics at home though they say

it is not important to get the latest equipment available. High-fliers appreciate a career, an education, a recognized position in the society, travelling, going to concerts, theater or opera, listening to music and computers as a hobby. 94% of High-fliers have an access to Internet and 78% have a home PC. 28% of High-fliers have tried Internet shopping which is more than in other user groups.

Focus group study revealed that some High-fliers wanted to have their own screen for reading email messages in private: *"I would send the email from my remote control, and the remote had a small screen. The large TV screen had nothing but a small tag 'You've got mail'. And yet I would like to use my cell phone as a remote control for TV!"* In High-fliers' opinion, *"PPV movies are of more interest to me than the other interactive services. You get the movie when you want it."* *"I could buy some really new movie, or a superior golden oldie."* A High-flier said: *"I would not register for TV chat boxes as I always forget the passwords and they have to be changed too. You should have a smart card to let you just log in."* Some High-fliers were interested in an application that enabled the user to return a lottery ticket at the click of a remote button just before the draw: *"I would (use it) if it was easy to use and fast. You don't bother reading the rules."* *"We would gamble with friends."* *"I could take part in the game if I had my own counter on the screen."* A High-flier said about her digital TV purchase decision: *"I'll buy the set-top when the price is less than US 300\$. Our restriction is that we don't know when the communal antenna for the housing corporation will be updated. I want us to have both TV and PC as to have two ways to tap into the (interactive) services."*

### **Comfort-Lovers**

Comfort-lovers find it important to spend leisure time with the family and children. Their age median is 36 years. Going to work is only a means to make a living and Comfort-lovers do not readily change their place of residence for a new job. Comfort-lovers purchase more videotapes and watch more Pay TV channels than the other user groups. Technology enables them to live comfortably and their main reason for using home PC is entertainment. 79% of Comfort-lovers have an access to Internet, 76% have a home PC and 43% have a game console.

Focus group study revealed that for Comfort-lovers, Web on TV is a good idea: *"It is time to do Web browsing more comfortably than to sit at the writing desk. Let's do it on the sofa!"* Comfort-lovers said about Internet on TV that *"Today everyone (in the family) has his own TV as TV games entered the picture. There should be more TVs then if there is yet Internet use."* *"I'm ready to browse Internet on TV if it is easier than on PC."* *"You got to have PC somewhere for the sake of text editing"*

and the (email) attachments.” Comfort-lovers had an opinion that Teletext and newspapers didn’t give them enough information about movies, documentaries and programs on current affairs, except for a short description. One Comfort-lover was concerned if her children turn out TV addicts: *“If it is interesting and has a lot of information, it is easy to get hooked on television. At present, children get bored to stare into television at some point and rather go out.”* In one Comfort-lover’s opinion the VCR was too awkward to use and the idea of PPV created interest. One Comfort-lover said: *“I would be ready to pay for a self-chosen program if it started right now. Then you wouldn’t need a set-top box and especially you wouldn’t have to pay for a monthly fee. That way you wouldn’t be tied to anything.”* In one Comfort-lover’s opinion, *“There is already too many channels. (It is not the new TV channels but) the new applications that will make me do the purchase decision.”*

## CONCLUSION

Combined user profiles are a valuable source of information for digital TV application developers in the concept development phase. The strength of combined user profiles is that while the unchanging data from the questionnaire study is a result of four years’ work, the dynamic data from the focus group study was gathered in a few weeks. Combined user profiles are fast and easy to update when needed. This refers to, for example, easier allocation in marketing efforts. Combined user profiles can also help in tailoring a product for different customers.

Focus group study revealed some common opinions among the three user groups: all study participants were interested in the introduction of new technology but they first wanted to wait and see what the new interactive services can offer for them. The purchase decision of digital TV was based on the new services, not the new TV channels. Study participants wanted to access email on TV but they were not happy to read their email in the living room in the presence of other family members.

User profiles can trigger future user research based on which applications had an appeal to TV viewers. For example, a High-flier wanted to have her own screen for reading email messages: *“I would send the email from my remote control, and the remote had a small screen. The large TV screen had nothing but a small tag...”* As we know, 94% of High-fliers have an access to Internet and 78% have a home PC. The next step is to conduct an ethnographic study which aims at gathering information about High-fliers’ daily email use in the home environment. The research question is, in which situations are email messages sent and received daily? The information gathered can be presented in the form of scenarios, storyboards or ‘rich pictures’.

## DISCUSSION

Traditionally consumers are divided into groups based on age, place of residence or the amount of consumer electronics equipment owned. Our study took into account person’s intentions and needs. Users were divided into eight user groups according to their home orientation, work orientation and technology orientation. The success of our approach is not easy to evaluate against other user studies as there are no such studies available for a comparison. At present, neural network analysis method is widely used to sort out large databases of research data in economics, linguistics, medicine, electrical and process engineering, etc.

Our study and the eight user groups do not take into account person’s family relationships. Digital TV will be a purchase for the whole family, not an individual family member. For example, it is believed that Committed are Pioneers’ parents as they have a high gross income and can therefore support Pioneers’ desire for the new technology. We could try to produce a user grouping based on different types of families, not just the individual family members. The problem of studying different types of families is that the family members rarely share a common set of attitudes and family values. For example, it might be difficult to find two families with equal home orientation, work orientation and technology orientation values. What we need is some other characteristics or a method to define values, relationships and interdependencies among the family members.

Other implications of this paper for the HCI audience is that the use of focus group sessions is as good as any other research method for revealing users’ expectations on a forthcoming product when the subject of research is a non-existing product such as digital TV. It is difficult for the study participants to comment on questions or application ideas before they have actually used the services! An advantage of focus group sessions is that they produce a lot of information quickly, including users’ vocabulary. Focus group sessions enable the study participants to discuss several alternatives simultaneously.

Focus group study revealed that the study participants were not able to comment on the color printed EPG screenshots. Some study participants tried to discover how the thing works and others’ attention was drawn to the appearance of the prototype. The same need for hands-on demonstrations was found in a series of evaluations of digital TV services [7]. Here the study participants were more accepting of visual aspects (interaction features) that individuals found quite complex when they tried to use them in a user trial. In a usability study of two working EPG prototypes it was also found that users were not interested in specific TV

program information [2]. Instead, they wanted to browse through the alternatives and they wanted to see a general picture of available TV programs. It is therefore concluded that users' acceptance of an application cannot be evaluated without a working prototype.

At the moment, combined user profiles include no visual data. In the long term the lack of user profile visualizations is obvious. For example, every user profile could include both a drawing of an average user profile representative and photos of focus group study participants. Photos are easy to relate to and they add more personality into user profiles. It is known that user profile visualizations help interface designers to relate to users and thus help them to produce design ideas.

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