

# "HausTeleDienst" - A CATV-based Interactive Video Service for Elderly People

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**Abstract:** Since 1991, 17 elderly persons (aged 75 to over 90) in 15 households have been connected *via* TV-videophones to a service centre. A standard CATV network was modified to support a reverse channel. This has been world-wide the first fully interactive broadband video communications project implemented in a real setting and operating over an extended period of time. The overall *aim* has been to prove the ability of frail elderly and mobility-impaired persons to live independently, and to demonstrate strategies for reducing the load on social and health care service resources. Service components include remote care; information and assistance; emergency, counselling, training and exercise services. Practical experience, both from the side of the service provider and that of the users, is discussed. Simplicity of technical design and ease of handling contributed to a feeling of being empowered by the technology. In addition, the very personal and close relationship to the staff-- which was strongly supported, not inhibited by the video communications-- was a major factor in acceptance of the service. It proved a highly successful activity with a great potential for the future: In different contexts with newer technology, market trials are underway to commercialise this service.

## 1. Introduction

In the pilot service set up since 1991 in Frankfurt am Main/Germany, 17 elderly persons (aged 75 to over 90) in 15 households (a few have died in the meantime) have been connected *via* specially developed videophones to a service centre located in a residential care centre. The clients are connected to the service centre using a standard cable-TV network. This network was modified to support-- on a frequency band not used by CATV-- reverse channels to also carry analogue audio and video signals from the client to the service centre. The quality of the video pictures-- thanks to the broadband technology used-- was of high TV quality. The service centre uses a special one-way mirror onto which the picture of the elderly person calling is reflected and behind which the camera transmitting the picture of the service person has been placed. This results in a very high quality "face-to-face" or "direct-eye-contact" conversation, which has proven very important for a congenial communications atmosphere.

A number of services were developed and implemented during the pilot phase. All clients had the same high-quality communications facility with the same service centre personnel, but unfortunately, due to technical limitations, did not have direct communication with each other. However, a three-party conference call with an outside expert could be arranged.

The services, named "*HausTeleDienst*" (HomeTeleServices), are run by the *Frankfurter Verband für Alten- und Behindertenhilfe e.V. (FV)* in Frankfurt/Main Germany; it is a social care and services organisation providing the majority of sheltered housing, old person's ho-

mes, and daycare facilities in the city. In addition, it provides telephone alarm services to over a thousand clients in the area.

To our knowledge, this is indeed world-wide the first fully interactive broadband video communications project implemented in a real setting and operating over an extended period of time.

## 2. The Service Concept

The services in Frankfurt have the overall *aim*

- of proving the ability of elderly and mobility-impaired persons to live independently, and
- of demonstrating strategies to reduce the load on social service resources required to support this.

Investigation of current service provision and consultations with various providers of care services led to a number of service "components":

### 2.1 Active Information and Care

This service component was expected to be most useful for those elderly (the vast majority) living alone and who are, therefore, prone to depression and withdrawal. As this group is also often cut off from normal levels of contact with people outside their homes, the regular video and speech contact with service centre personnel provides a minimum support level by acting as a vital social link.

### 2.2 Remote Response to Emergency "Alarm Service"

Clients who know or fear that they may be in a situation difficult to handle can call the service centre and receive reassurance and help. This service component is an advancement on traditional phone-based emergency intercom systems, providing the opportunity of a visual assessment of clients' needs and their actual situations.

### 2.3 Remote Care on Demand

The users benefiting from this service are mainly family members who care for elderly and disabled relatives in their homes. In many cases, even short periods of absence are hardly possible or involve great difficulties, reliance on others, or stress and risk. Since care-givers are often unable to ask someone else to come to their homes, remote care can provide care-givers with some relief from their 24-hour jobs.

### 2.4 Information and Assistance

The aim of this service is to support continued competence of the elderly in mastering everyday problems. Clients are helped in filling out forms, in understanding complex bills, and with a whole range of organisational tasks-- including, for instance, arranging senior citizen vacations.

### 2.5 Remote Access to Expertise, "Counselling Service"

The counselling service is designed to give clients opportunities to put questions to experts on specific topics, helping them gain access to information relevant to their needs. Appropriate

experts are those in fields of which regular service staff cannot be expected to gain detailed knowledge, such as law, specific rights to state benefits, or detailed dietary plans.

### *2.6 Training and Exercise Service*

This service component covers a large range of training types, including communication training, memory training, and physical exercises. Those receiving some forms of psychotherapy can be given short refresher sessions of exercises in the intervals between full personal sessions. These services can also be offered in part using videotapes.

### *2.7 Support for Carers*

The system enables service staff to provide support for non-professional care-givers who have to carry out tasks such as bathing, or changing clothes. Correct care techniques are often unknown by family care-givers with no training. Remote advice can enable them to fulfil even more difficult tasks.

Although the service concept consists of different service components, it is necessary to note that these components are based on regular and close contacts between the service providers and the pilot clients. Based on these relationships, needs could be identified which would otherwise not have been discovered by regular staff. Personalised help could be offered, creating a feeling of security and integration.

## **3. Evaluation Results**

### *3.1 General Service Usage Patterns*

Overall, the average usage pattern by all households taken together was almost eleven calls per day, i.e., the majority of people had video connections with the service centre daily.

A sizeable minority of calls (39%) lasted less than five minutes. 16% of the calls lasted between 5 and 10 minutes and 22% between 15 and 30 minutes. In 9% of all cases, contact between client and service centre was established for longer than half an hour, some of them reaching up to an hour and a quarter in length. A trend towards a slight increase of conversation time was observed.

Analysing the development of the number of calls in comparison with the overall length of contact reveals that the length of calls increased relatively fast in the beginning, as clients got used to the system. This high level was reached early, and since then the figures have changed only slightly. The clients' need for contact is high. The average duration of all calls was over 11 minutes; this number has since then varied only slightly.

Given that intensive human relationships are involved in the pilot service, one main concern in the research was to find out if there is any evidence of discrimination for or against individual clients. With the exception of 3 participants, all other pilot clients can be regarded as frequent users. They differ only in the regularity of their calls. Some call twice or three times a day. This consumes three-fifths of the total speaking time of the service providers. Others call very regularly, once a day. The average connection time of this group is 12.3 minutes, only half a minute shorter than the group described before. A third group of frequent users calls on average every second day. The group of infrequent users contains a total of 3 users. As expected, the calls of these infrequent users are less extensive than calls by frequent users. At 4.23 minutes, one person in this group exhibited the shortest average connection time. It is worth pointing out that a trend for increasing call length was observed not only for those clients who frequently call the service centre, but also for those who could be described as infrequent users.

Interview data revealed no evidence of any significant discrimination of specific users. Those who used the service infrequently did so of their own accord. The duration of calls can be regarded as an indicator for the intensity of the conversation, as well as for the quality of all contacts. In both respects, the results are very positive and promising for a future regular service.

### 3.2 Service Provider Experience

The picture component of the integrated alarm service enables the service provider to assess an assumed or real emergency situation much better. Such a videophone-based emergency system is far superior to a regular telephone-based emergency intercom system. In an emergency situation, it helps to create a feeling of security while emergency services are on the way.

Most of the calls made by clients could be associated with the active information and care service component. The ongoing and regular possibility to ask the service provider whenever there is a need seems to be especially important to the elderly. The service persons believe that this service element is the most important one for the pilot clients. Many senior citizens obviously just need someone to talk to when they feel isolated and/or lonely.

The remote-care-on-demand service also has a high potential. This service component offers a real and direct help to the relatives. It allows them to continue a "normal" way of living by offering a secure way of caring *via* videophone. This element also enables relatives to get advice, e.g., with specific care techniques.

Although the counselling service was very time-consuming in preparation, it is a useful source of help for elderly people, enabling them to get in touch with expertise which they would not get if experts had to visit them in person. It reduces the fear of asking experts, because the well-known service person can lower inhibitions by mediation between the experts and the elderly.

The training and exercise lessons were frequently joined by several of the pilot clients. Remarkable improvements could be observed in the case of a lady who frequently joined memory training exercises. The physical fitness training motivated people to do some additional exercises at a senior citizens' club; i.e., the service animated them to leave their home and to search for new contacts.

This very positive effect could also be observed in other situations, e.g., due to regular meetings in person (supported by transportation services of the service provider) of all participating clients, or to the arrangement of meetings outside the home through video communications. One lady who lost her husband was helped in reorganising her life, gaining a new sense of order and commitment (through a regular early morning call), and was supported in establishing new outside contacts.

The service provider staff and the service provider organisation summarised their experiences with the new service as follows: "The video-based *HausTeleDienst* fills a serious gap in social services". Fast and effective help is possible. One of the biggest advantages of the new system is to reduce unnecessary travel time, thereby allowing for more or better services with the same personnel resources. During regular service hours (research funds did not allow a 24-hour service), an opportunity for communication exists. This ongoing connection leads to a close relationship to the clients, enabling the service personnel to activate and motivate the elderly. A feeling of security can be conveyed. The close and regular contacts lead to a measurable improvement in personal health and well-being.

A wide range of services is thinkable, supporting the work of regular out-patient caregivers in the field. This example emphasises at the same time the most important limitation of the new service-- the *HausTeleDienst* was not designed to replace, but to support and augment direct personal contacts.

After a relative short period of time, the personnel at the service centre felt comfortable using the new technology. Even when technical problems occurred during the first months, they could handle the system. This issue was also of less importance than expected for the elderly, as it will be described next.

### 3.3 Service Use Experience

Issues of acceptability of a video camera in the home were much less important than involved researchers, and especially the service provider organisation, expected. The camera was placed inside a set top box on a regular TV and could be closed and opened by sliding a simple, relatively large shutter back and forth. Because every client was able to handle it without any problems, it immediately gave them security and a feeling of being in power over the technology-- at a glance they could see whether the camera was able to transmit pictures or not. It was a high-quality camera, allowing for an acceptable quality of pictures to be transmitted even with relatively dim lighting in the room.

Much effort was also invested in designing a most simple, easy-to-use remote control unit. It is relatively large in size, about the size of a larger paperback. On the top, it contains 10 large buttons to control the TV; on the bottom, there are 4 large buttons to control the video communications. Both functions are separated by a sliding shutter. Thus, the often severely limited abilities of elderly persons to see and to handle technical devices with little which do not provide sufficient contrast and are not attuned to their declining skills was taken into account. Even very old ladies in their nineties were without any difficulties able to manage the technology.

A more important problem was the fact that at the beginning, the system was not completely reliable. Technical problems led to criticism by some users, stating that technical improvements were necessary. Later, none of the clients had complaints about the technical system, its usability, or its functionality.

In general, the "*HausTeleDienst*" was rated very positively by users. Suggestions for improvements concerned additional personnel and longer service hours, if possible 24 hours a day. The most valuable service component was the active care and information service, although the users did understand the *Haus-Tele-Dienst* services as a general service consisting of different service elements. 10 of the users pointed out that the opportunity to get in contact with someone when *they* want it is most important for them. The second most important advantage of the service is the possibility for immediately getting direct help, if needed.

Almost all of the users emphasised their very personal and close relationships to the staff-- which were not inhibited by the video communications. The new service has had quite an impact on their lives. Five of them believe that the service directly changed their lives. Statements range from "I don't feel lonely anymore" to "I have a more regular daily routines, I've regular meals again" or "I have more joy in my life". Much better than any other research results can these statements describe the real, lasting, positive impact of this video-based social support system on its clients' quality of life.

## 4. Ethical and Social Aspects in Service Delivery

### 4.1 The "Big Brother" Syndrome

There is a big fear in society, mainly within younger generations, that there will be no privacy anymore. Any attempt to implement video communications strengthens these feelings: George Orwell's vision that "Big Brother is watching you" becomes reality. Here we are concerned with the ethics of freedom, self-determination, replacement of personal contacts, privacy, etc., versus the ethics of control, dependence, etc.

Our experience has shown that the elderly have far less fear of being observed than researchers expected. None of the participants of the pilot ever used the built-in mechanical shutter to close the camera's lens-- probably because it was so obvious to them that they could manage it whenever they felt like it. Most of them stated that they did not need to have the "picture free-button" to allow the service provider staff to have a look into their flat. Some of them even pointed out that they would like to be observed permanently because "that would give me more security". For most of the younger service provider personnel and the researchers, this has been unthinkable. This example demonstrates that there are different needs and, related to those, different perceptions of the same issue even within one society.

The passing-on of personal data has to be limited and strictly controlled. Nevertheless, there is some need to pass on data: a close cooperation between different outpatient services makes some data-transfer necessary. A responsible use of data, e.g., on chronic diseases and special physical limitations, is mandatory to prevent miss-use. Technical limits and, more importantly, education and training of staff have to assure that there is no unnecessary passing-on of personal data.

#### 4.2 Replacement of Personal Contacts

The main concern against developing and implementing social services based on video telecommunications is probably the fear of replacing direct social communications and relationships with remote connection to an unknown person or, more drastically, to a machine. Such services seem to be helpful and acceptable to most people in a business environment, and sometimes even in a private environment. In the social field mainly, in the field of the elderly and mentally impaired people, this does not seem to be the right way. However, the question one always should keep in mind is: "Do we indeed want to *substitute* personal services with artificial (i.e., telecommunication-based) services?" If this were really the case, ethical criticism would be fully justified.

Rather, however, videophone-based services should be implemented *only in addition* to existing outpatient services. Any service development concept should focus on integration into existing outpatient service networks. Major reorganisation efforts might need to be considered if a more efficient, effective, and client-addressed videotelephone-based social support service is to be implemented. This will lead to additional costs in the beginning of the implementation process; however this will later enable organisations to optimise service delivery.

#### 4.3 Self-Determination

A further key issue is the right of self-determination. Especially in social care, self-determination is a frequent point of discussion. There are countless examples where self-determination is not taken into account, although personnel know that the personal will of the elderly should always be fulfilled. Sometimes there are organisational needs which do not allow the time necessary for persuading an individual to do something, e.g., drink or eat. Sometimes the basic right of self-determination can even mean that the personnel of a facility or of outpatient services have to accept that someone has decided to die. What is to be done if someone just does not want to drink anymore? Is it ethically legitimate to watch someone dying, or would it be more justifiable to force-feed the patient?

As long as service provision can assure self-determination, ethical issues are relatively easy to handle. In our project, this issue did not become important because users were always in the (technical) position to terminate the service (block the camera), or to refuse an incoming call. If this were not the case, but rather for instance the video-phone were used as a monitoring or surveillance instrument-- e.g., for night-time coverage-- then the question is

more complicated. In such a case, people would often not be aware of the fact that they were being observed. On the other hand, if one observed the regular practise in night-time care (coverage), one might suggest different ways of service delivery. Is it humane for older people in nursing homes to be awakened by staff just because they are on their regular duty round, or would it be more humane if service provision could be more flexible due to technology which allows personnel to check if a patient is sleeping or not? Among experts, it is unquestioned that uninterrupted sleep is extremely important for the elderly. A humane technology could help do this, but only if the client agrees to this kind of observation.

#### *4.4 Privacy*

Another critical point, related to the coverage of the living area, is privacy. This question is ambivalent and can be discussed from different points of view, too. Regarding emergency coverage, it might make sense to cover the whole flat with several moveable cameras, but, respecting privacy, this does not seem to be a desirable aim. In several surveys, some heads of nursing homes brought up this issue by pointing out that most accidents happen in the bathroom or toilet of the flat. They argue that a camera in those rooms would be most helpful for emergency coverage.

Obviously, these rooms especially seem to be the most critical, and at the same time, the most sensitive ones. Does one really want to be observed on the toilet or under the shower? For most of us, this seems to be the ultimate private area of each flat. For some of the elderly, this is obviously different. In interviews, some of them suggested that they would certainly need a camera in this area.

#### *4.5 Budgeting and Social Policy*

One major deficit in the situation of the elderly is that there is little money available for social integration, prevention, and rehabilitation for older people living at home. All experts agree that prevention will become more important in the future. Research in gerontology has proved the importance of prevention. Gerontologists are trying to use benefit/costs models to persuade policy makers and economists. If policy-makers accept those long-term effects, there is a possibility that prevention activities will be financially covered in the future. First concepts along these lines can be observed in Germany. The new elderly care insurance system will support technical aids like alarm systems and, hopefully, video telephony services in the future.

Besides this scientific gerontological argument, there is a more pragmatic one: the new generation of the elderly will be able to spend more money and more time on their personal health, i.e., new markets will open. Health classes, special courses for the elderly, etc., are becoming popular. They are already offered by various organisations. This new attitude towards aging will result in new demands, which will necessitate a change in social services policies. New public and individual services need to be offered to fulfill these needs.

### **5. Outlook**

This pilot has proven that video-telephony has a realistic potential to ensure social interaction, medical support, and safety for the elderly and disabled, independently of whether they are living in their homes or in service flats. An integrated service concept can significantly improve the quality of life of the elderly and disabled. It could be shown that the telecommunications component can also support the professional work of personnel in sheltered housing facilities.

All in all, we strongly believe that video-based communications services can be one important brick in the construction of the future "barrier free" house for all concerned. The integration of video-communication-based social and medical support services will add a fundamental dimension to such a future home. An independent but isolated life without social relationships and without access to medical services will hardly improve the quality of life.

So far, our pilot service has survived due to financial support from various sources, not the least being research funds from the European Communities. However, the analogue technology is outdated now, and various experiments are underway to replace it with modern digital CATV and/or ISDN-based video telephony systems. Large social service providers are looking for new activities in a highly competitive market, huge housing cooperatives want to retain reliable tenants and to provide new value-added services, and a now competitive market for telecommunications services provides a new market environment in Europe. All of this will lead to a broader introduction of such services in the foreseeable future.

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# The Impact of Telemedicine on Health Care Management

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