

Turning older people's experiences into innovations: Ippi as the convergence of mobile services and TV viewing

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B. Östlund, K. Lindén. Turning older people's experiences into innovations: Ippi as the convergence of mobile services and TV viewing. Gerontechnology 2011; 10(2):103-109; doi:10.4017/gt.2011.10.2.003.00 This paper presents the results of a research project in which a patented system for asynchronous communication ('ippi') is used as the basis for a prototype communication device utilizing the participants' televisions as the primary interface. The aim was to study the extent to which older people's lifelong experiences watching TV reduced their uncertainty when faced with TV-based applications. The study examined the factors that explained participants' continued use of the application. The implementation and testing of the system was structured as an iterative design process including conceptual development, a six-month test period in the homes of eleven users with usability tests and interviews, monthly focus groups and information gathered by a back-up function that also provided the users with immediate help with the technology if necessary. The results show that while the use of TV as a metaphor or platform succeeded in getting the older users to try out and use the ippi prototype, it did not contribute primarily to using the ippi on a daily basis during the test period. Rather, participants' access to a social context or a social network determined the extent of usage. There was a difference between what was easy to use in terms of the interface, and what was easy and worth using in a social everyday context on the other. In order to be used, a new product of this type must add value and that value depends upon integration into daily communication.

Keywords: mobile services, TV viewing, communication device

The research reported here was a collaborative project in which the research team worked with a group of older people to investigate a television-based system, ippi. The older people were 'participant innovators' in that they proposed the research project and acted as expert evaluators because of their experience using the television interface. The research explored the usability of the system, and sought to determine whether using a familiar interface (i.e., TV) would have a positive impact on users' subjective response to the system, as recommendations suggest that systems based on familiar artifacts are more successful for older users than those based on the computer paradigm¹.

According to recently published recommendations, using older people's extensive experience when trying to meet their needs can be more successful for promoting a new product or service than relying on interaction patterns based on the computer paradigm². The objective of this research was to explore the impact of older people's extensive experience in watching television and using TV equipment on shaping the content and the design of a new TV-based communication tool. Older adults watch more TV than any other age group³, and TV watching increases over the adult life span⁴⁻¹⁰. Older adults have lived through sweeping developments of the TV medium^{11,12}. Familiar artefacts and tangible computing have been

used successfully to support older people's memory¹³⁻¹⁵. However, tests of interaction styles representing changes in the interfaces of consumer products during the late 20th century show that the user's 'technology generation' seems to be more important than age. Earlier experiences gained in the user's formative period, before the age of 25, are more important than later experiences¹⁶.

Research suggests that the use of television as the platform would reduce new users' uncertainty^{17,18}. Based on this previous research, television was believed to have a relative advantage over the Internet and mobile phones in terms of users' self-reported motivations for starting and continuing use of the system. Usability testing in a controlled environment is insufficient for deciding whether a technology benefits the user¹⁹; users' social contexts were also explored. Older people themselves should be seen as active subjects throughout the design process and not simply viewed as passive objects for research²⁰.

This project began as a request from users in the third age living in the city of Stockholm who perceived a need to strengthen their social networks, and was developed and evaluated by the Department of Design Sciences at Lund University and the InView AB company. The user group participated in every step of the design process. This project was a radical attempt to begin with what have been described as important features for users who participate in innovation processes: being experienced as TV users, pragmatic, critical and patient²¹⁻²³.

THE IPPITM PROTOTYPE

The prototype tested, ippiTM, is based on a technological convergence of mobile telephone network services such as SMS (short message service or 'text messages' mediated through mobile phones), MMS (multi-media messaging service involving pictures mediated through mobile phones), e-mail, and a TV terminal. The prototype enables a person with these messaging services to communicate between a mobile phone or



Figure 1. ippiTM

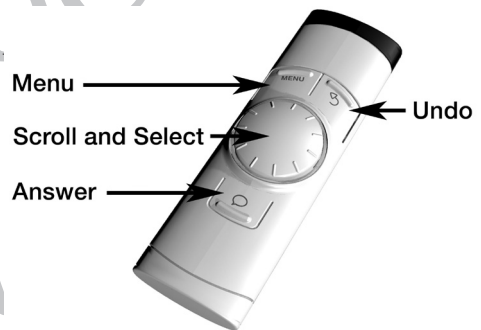


Figure 2. The ippi remote with wheel button

computer and a TV. This added value is achieved without having to learn how to use a mobile phone or computer; proceeding instead from the user's familiarity with the TV. In this way, a new channel of asynchronous communication is enabled with those who use mobile phones and computers.

The ippi consists of a remote control and a base unit, connected to the television by cable (Figure 1). After switching on the TV, the user can communicate with others using pictures, video clips, sound and text. This capacity is enabled by means of the Global System for Mobile Communications (GSM) network's communication services, SMS and MMS, and e-mail. The remote control has three large buttons and a wheel button (Figure 2). The large buttons have the following individual functions: menu, undo (above the wheel) and answer (below the wheel). The wheel button has a dual function: scroll when rotated, OK when pressed. These features were selected to formulate as simple a remote control as possible.

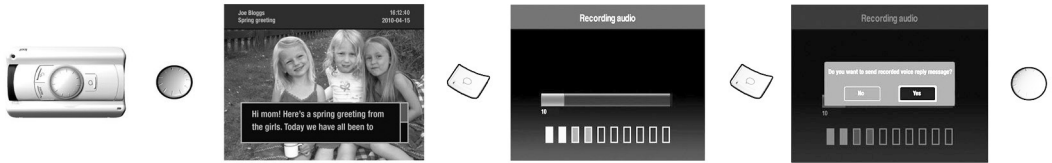


Figure 3. Displayed message, answering function, and initiating a message

The ippi device is always on. It flashes like a telephone answering machine when a message is received. The user opens the message on the TV screen by a single press on the flashing wheel button. The message is displayed (picture and/or text) and the accompanying sound message is played. Pressing the answer button enables the user to reply to the message by recording a voice message, which is then sent by another press of the answer button. From the ippi you can easily initiate a message that can be sent to computers as e-mail, or to mobile phones as SMS or MMS (Figure 3).

Because the ippi uses the GSM network, the user does not need to have a land-based broadband connection in the home or a special computer network. The ippi needs only to be plugged into an ordinary outlet and connected to the TV by means of a standard SCART connector. The ippi has a mobile phone subscription that in its simplest form can be a mobile phone cash card.

METHODOLOGY

Selection and sample

The ippi project was initiated by a group of 11 people (57-80 years old) who had contributed to the large Ageing, Housing, Design project²⁴, which aimed to facilitate older adults' ability to live at home for as long as possible by strengthening their neighborhood social networks. Participants proposed a TV-based application, because everyone had a TV. Researchers at the Department of Design Sciences contacted the company In-View AB about the opportunity to test their application in this context. Ethical approval was received from the Regional Ethical Review Board in Lund; the participants gave their written consent in the form of a contract where they promised to participate in

the ten-month project and test ippi in their homes for six months. The participants were characterized by being active citizens in the third age. They had a wide range of IT equipment: 11 had fixed telephony, 4 had mobile phones and 8 had computers with access to Internet and e-mail. Their role in the project was as problem owners who were part of a larger network including two company engineers, two people acting as educators and back-up and two academic evaluators with experience in industrial design and social science. The project hired the educators and back-up persons from a company running computer courses. The educators demonstrated how ippi worked and were available by phone during the day for questions.

The implementation plan

The project was thus originally a prototype based on the assumption that the television metaphor could facilitate the adoption of new technologies. What the prototype required for the most successful use was not entirely clear. What would justify the use of older people's everyday context? Background explorations in phase one opened up opportunities for users to reflect upon the possibilities of a TV-based prototype. A researcher led a one-day workshop on the theme: What would an ideal day look like in five years? The aim was to inspire people to think about technology in daily life and to creatively use the prototype at home. Participants identified their current network of contacts and what they needed to communicate the practical organization of their daily lives in the future. They decided that contact with others, regardless of the technological platform or use of technology, was crucial. They showed a keen interest in using new technology and discussions on how they could keep in touch over distance dominated the discussion. They

asked for easy ways to communicate directly without having to learn yet another technology, including features that could be linked to familiar technologies. In other words, they asked for technological convergence.

The second phase of the project involved testing the prototype in real life situations in parallel with focus groups and individual evaluations. A two hour training on the basics of ippi and an introduction to the back-up function were carried out. The participants connected ippi to their TV by themselves.

Focus groups, attended by all participants, were organized as two hour sessions once a month throughout the project, for ten months. Focus groups were used to prepare for and evaluate the test period, follow up on user experiences, provide broader perspectives on individual problems and provide the participants with homework to keep up with their use of the technology and to explore users' communication. For example, participants discussed how to send messages to each other and discovered how to regulate functions such as volume. The homework allowed planned usage to be compared with spontaneous use.

Usability tests regarding the interface were carried out individually in users' homes. The researcher sat in and examined the user's problems, helped to resolve them and perform tasks, for example sending and receiving messages. Results led to modifications of the interface: improvement of information organization, avoiding information overload, regulation of the sound and speed of the wheel button.

The social context of the prototype was evaluated in users' homes by a researcher during a one hour period. The interviews tested and evaluated the following assumptions on what decreased insecurity when approaching new technology and what integrated technology in daily life¹⁷:

(i) The relative advantage over other technology with the same purpose, the technology it sought to replace (i.e. another technology or approach). What is the advantage in us-

ing an ippi, in what situations? What are the disadvantages?

(ii) Trialability which determines if the presumptive users in the first instance reject the technology or not. How was the start-up for the user? Are there obstacles?

(iii) Complexity: Does the technology simplify or complicate life in comparison to the alternatives? In what way does an ippi simplify what you want to communicate?

(iv) Observability refers to whether the technology is used by the people you associate with. Were there any comments from relatives and friends? What expectations did participants have or feel as early adopters?

RESULTS

Users reported that watching a TV screen reduced their uncertainty and facilitated their initial use of the ippi. The simple installation that each participant carried out by connecting a SCART cord to the TV and connecting a plug into an outlet in the wall increased participants' desire to try the ippi. For these reasons the trialability requirement was judged to be fully satisfied. Compared with participants' own TV remote control buttons, the wheel was new. The challenge for the participants to use the wheel was primarily at the level of speed and accuracy. As the modifications of the ippi were carried out, these problems disappeared.

The need for the application to be compatible with familiar communication solutions proved to be important: the participants wished for even more far-reaching convergence based on how they actually used their mobile phones and e-mail. Creative thinking about how the system could be used was developed in the focus groups over time. The group began by discussing actual installation problems such as lack of scart extensions, problems with getting pictures and sound. Next, the group became concerned with content or what they used the ippi for. As a result, pictures became a user priority over writing text. Text was reported to be too tiring using the keyboard on the screen. Later, there were discussions about the limitations of the number of ippi users

one could talk to and about for whom and in what social situations an ippi could be most useful. Users concluded that ippi would be most useful for a person in the fourth age. Despite the fact that the participants did not see ippi as a priority for the third age, they missed the application when they no longer had one: "Nothing is blinking at me when I come home" as one participant said at the last focus group meeting.

Being able to view personal pictures in a large format, whether one had received them from others or taken them oneself, proved to be a relative advantage. This surpassed the disadvantage that the ippi had in not being able to compete with other communication channels already existing in the home. For four persons it was at the centre of the home like the fixed telephone. For seven it was connected once a day as an isolated activity, not yet integrated in daily routines. While the TV metaphor worked in getting the participants in the test to want to try the ippi, it did not contribute to using the ippi daily during the test period. Rather, it was access to a social context or a social network that determined the extent of usage. The social network included users' communications with friends, family and others they were connected to or had contacts with. The usage of ippi encompassed reinforcement of trusted groups they were already a part of, spontaneous greetings and coordination of the day. Besides, the users suggested that ippi could be used as a reminder, for example of medication, home help services and other appointments, security regarding who is at the door and self-care such as exercise programs.

DISCUSSION

The benefit of having users involved in this project was that the target group was defined, the content elaborated and the interface modified. Participants' interaction style in this case derived from recent use of ICT rather than earlier experiences. The participants tried to make ippi become more like a mobile phone or the Internet in the way that the information was organized. Well-organized information on the screen is a necessity,

as well as an otherwise user-friendly interface, but is not sufficient to establish usefulness or to initially start using the product. In order to be used, a new product of this type has to be integrated into daily communication and add value as experienced by the user. The TV metaphor increases trialability but it is the routines in the home and the communication patterns that determine if the new technology will be integrated into daily life. Continuous usage of ippi is based on social worlds that already exist or that can be generated. Participants identified people in the fourth age as the relevant target group except for the interest in the ippi as a platform for sharing pictures. These results can be related to the Technology Acceptance Model (TAM) and to a socio-technical approach²⁵. As the ippi project demonstrates, putting technology in its social context is of particular importance for testing if it is of any importance for the user. Mandatory, compliance-based approaches to introducing new systems appear to be less effective over time than the use of such testing to target positive changes in perceived usefulness²⁶. This finding suggests practical interventions to increase the efficiency of the design process. A socio-technical approach applied in a number of studies similarly reveals that heterogeneous groups can construct radically different meanings of the same technology²⁷. By focusing on the user, both the intended and unintended consequences of technologies can appear and be revealed. Old people belong to those who are affected by products but rarely involved in design. This project's results confirm TAM and the socio-technical approach and clearly shows that the input from older people's social context makes a difference both in terms of usefulness and ease of use. Ease of use does not determine use.

Future research

In this project, the television metaphor reflects a long habit of using a particular technology. More studies may show whether this TV metaphor can be applied to different types of technology in the ICT field. The TV metaphor shows advantages based on building upon the experience older people

already have and try to build on that instead of simply focusing on what new technology can achieve. Designs can be optimized by linking the use of new technological opportunities to collaboration with the potential of older people's experience.

Involving older people in design to develop the technology in context requires further methodological development, which could contribute to a more proactive approach to the field of ageing and technology. This holds in particular given the growing proportion of older people who are active in old age and who have a long experience of using a variety of technologies.

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References

1. Danhauer SC, Carlson CR, Andrykowski MA. Positive psychosocial functioning in later life: use of meaning-based coping strategies by nursing home residents. *Journal of Applied Gerontology* 2005;24(4):299-318; doi:10.1177/0733464805277754
2. Dickinson A, Dewsbury G. Designing computer technologies with older people. *Gerontechnology* 2006; 5(1):1-3; doi:10.4017/gt.2006.05.01.001.00
3. Robinson JD, Skill T. Media usage patterns and portrayals of the elderly. In: Nussbaum JF, Coupland J, editors. *Handbook of Communication and Aging Research*. New Jersey: Erlbaum; 1995
4. Mitchell V, Nicolle C, Maguire M, Boyle H. Web-based interactive TV-services for older adults. *Gerontechnology* 2007;6(1):20-32; doi:10.4017/gt.2007.06.01.003.00
5. Nilsson I, Löfgren B, Fisher A, Bernspång B. Focus on leisure repertoire in the oldest old: The Umeå 85+ Study. *Journal of Applied Gerontology* 2006;25(5):391-405; doi:10.1177/0733464806292861
6. Häggblom-Kronlöf G, Sonn U. Interests that occupy 86-year-old persons living at home: associations with functional ability, self-rated health and sociodemographic characteristics. *Austrian Occupational Therapy Journal* 2005;53(3):196-204; doi:10.1111/j.1440-1630.2005.00526.x
7. Nordicom. 2005; www.nordicom.gu.se/common/stat_xls/690_5520_daily_reach_

Conclusions

While the TV metaphor succeeded in getting the older users to try out and use the ippi prototype, it did not contribute as such to using the ippi on a daily basis. Rather, users' access to a social context or a social network is what determined the extent of usage. One contribution to further study is identifying the difference between: (i) what is easy to use regarding the interface and handling of the application and TV equipment, and (ii) what is easy and worth using in a social everyday context. In order to be used, a new product of this type has to be integrated into daily communication and add value as experienced by the user.

- sex_age_2004.xls; retrieved: March 2006
8. Randers I, Mattiasson AC, Olson TH. The "social self": The 11th category of integrity – implications for enhancing geriatric nursing care. *Journal of Applied Gerontology* 2003;22(2):289-309; doi:10.1177/0733464803022002007
9. Topo P, Östlund B, editors. *Design, Technology & Dementia. Time to get involved. Assistive Technology Research Series vol 24*. Amsterdam: IOS Press; 2009
10. Abdelmassih Waller P, Östlund B, Jönsson B. The Extended Television: Using tangible computing to meet the needs of older persons at a nursing home. *Gerontechnology* 2008;7(1):36-47; doi:10.4017/gt.2008.07.01.004.00
11. Nilsson M, Johansson S, Håkansson M. Nostalgia: an evocative tangible interface for elderly users. *CHI '03 Extended Abstracts on Human Factors in Computing Systems*; 2003; April 5-10; pp 964-965
12. McKay SM, Maki BE. Attitudes of older adults toward shooter video games: An initial study to select an acceptable game for training visual processing *Gerontechnology* 2010;9(1):5-17; doi:10.4017/gt.2010.09.01.001.00
13. Hoven E van den. *Graspable cues for everyday recollecting*, PhD dissertation, Eindhoven: Technische Universiteit; 2004
14. Rowan J, Mynatt ED. Digital Family Portrait Field Trial: Support for Aging in Place. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*; 2005 April 2-7; pp 521-530; doi:10.1145/1054972.1055044
15. Mynatt ED, Rowan J, Craighill S, Jacobs A. *Digital Family Portraits: Supporting Peace of Mind for Extended Family Members*.

- CHI '01: Proceedings of the 47th SIGCHI Conference on Human Factors in Computing Systems; New York: ACM; 2001; April 5; pp 333-340; doi:10.1145/365024.365126
16. Docampo Rama M, Ridder H de, Bouma H. Technology generation and age in using layered user interfaces. *Gerontechnology* 2001;1(1):25-40; doi:10.4017/gt.2001.01.01.003.00
17. Rogers EM. *Diffusion of Innovations*. 4th edition. New York: Free Press; 1995
18. Östlund B. Watching Television in Later Life: A deeper understanding of the meaning of TV viewing in the homes and in geriatric care contexts. *Scandinavian Journal for Caring Sciences* 2009;23(4):623-825; doi:10.1111/j.1471-6712.2009.00711.x
19. Oudshoorn N, Pinch T, editors. *How Users Matter. The Co-Construction of Users and Technology*. Cambridge: MIT Press; 2005
20. Sokoler T, Svensson MS. Embracing ambiguity in the design of non-stigmatizing digital technology for social interaction among senior citizens. *Behaviour & Information Technology* 2007;26(4):297-307; doi:10.1080/01449290601173549
21. Porter ME. *The Competitive Advantage of Nations*. New York: Free Press; 1998
22. Eliasson G. Innovationer, affärsidéer och sysselsättning [Innovations, business ideas and occupation]. In: Carlsson B, editors. *Fyra essäer om innovation, tillväxt och sysselsättning* [Four essays on innovation, growth and labour]. Stockholm: The Swedish Board for Work Life Research; 2000
23. Hienerth C. The commercialization of user innovations: the development of the rodeo kayak industry. *R & D Management* 2006;36(3):273-294; doi:10.1111/j.1467-9310.2006.00430.x
24. Östlund, B. Report on phase 1 Ageing, Housing, Design: Modern Ageing. [Redovisning av etapp 1 Äldre, Boende, Design: Det moderna äldre livet.] Report 3 / 2006. Lund University: Department of Design Sciences, Division of Rehabilitation Engineering, report 3, 2006. Certec rapport 3 / 2006. Lunds Universitet: Institutionen för designvetenskaper, avdelningen för rehabiliteringsteknik; 2006
25. Venkatesh V, Davis FD. A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Studies* 2000;46(2):186-204; doi:10.1287/mnsc.46.2.186.11926
26. Davis FD. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 1989;13(3):319-339; doi:10.2307/249008
27. Oudshoorn N, Pinch T. *How Users Matter. The Co-Construction of Users and Technology*. Cambridge: MIT Press; 2005