EXPERTS @ HOME

Håkan Hasewinkel & Peter Berggren

Swedish Defence Research Agency (FOI)[1]

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Abstract

Tomorrow we will be living in computers which look like homes. These homes of the future will be more like a personal assistant than a residence, supporting us in every way possible. This personal assistant will contain the latest technology. A technology that a couple of years ago was considered to be state of the art, reserved for governments, research centers and high tech corporations. This technology has now become a new kind of consumer technology, used in everyday life, with a natural place in our homes. The drive behind the development and adoption of this consumer technology is according to what functions and services people are prepared to pay for. Usually this means entertainment and recreation. However, consumer technology in the home could be used for more things than just entertainment and recreation. It could be used as a node for experts, working from home, becoming participants in virtual teams.

This is especially interesting in areas where only a limited number of experts exist, were the working conditions are demanding, and also considering that it takes a long time to train and educate people to become an expert. One such area is disaster and emergency management.

The aim of this paper was to discuss a dual-use possibility of how consumer technology, bought for recreation and entertainment, also could be used as tools for experts working from home. The consumer technology would make it possible for the experts, at home, to support personnel working in rescue operation, emergencies or accident. This is exemplified with real-life scenarios from Swedish disaster and emergency management.

Introduction

The future is not what it used to be. TV shows and films of the past promised that by now we would be visiting other worlds, travelling through time, or at least commuting in flying cars. What ever happened to the technologies of tomorrow? Have all these predictions of the future, its new technology and its use been an activity fraught with errors of human thinking, assumptions, estimations and dreams of the good and pleasant life or has it actually had any effect on our daily life?

It is difficult to give any simple answers to this question, even though it is possible to discern some common tendencies as a consequence of the new and ever pacing technology development. The tendency is that people use more technology and more gadgets, and this has entailed changes in life and social patterns. For instance, many people today live a mobile life, having both their work and leisure in their pocket. Practically this means they have it at home. It also means that the lines between work and home have been erased, creating a sliding scale regarding when, where and how work and leisure is divided.

[1] P. O: Box 1165, SE-581 11 Linköping, Sweden
hakan.hasewinkel@foi.se and peter.berggren@foi.se

Technologies that just a couple of years ago were reserved for governments, research centres and state of the art industries have now become everyone's property at an affordable price. It has become a new form of consumer technology, sold everywhere, now invading our homes. This consumer technology range from cell phones, PDA's and high quality laptops, via white goods, with built-in computers and home theatres with image walls and 3D sound, to home safety- and security devices with possibilities to remotely control the carport, coffee brewer or energy consumption, almost giving us the future home today.

This article is written in the spirit of enabling the extension of consumer technology, used for entertainment and recreation, to be used by experts, participating in Virtual Teams. It is about the expert working from home, supporting personnel working in rescue operation, accidents or other emergency situations, by using consumer technology as collaborative technologies. The aim with the article is to illustrate how consumer technology, primarily developed for entertainment and recreation, could have a dual use.

The remainder of the article is as follows. First, a description outlining our view of the technology- and gadget based home, how it is dominated by game- and entertainment technology, and why this technology could be of interest to experts working from home. Next is a short description of the increasing pressure on the rescue service to mange a growingly complexity in society with decreasing resources. Finally, thoughts of dual-use possibilities tied together, by relating them to the ongoing work at Sony and Microsoft.

Home sweet home

When people say they are home, what do they actually mean? Is it when they have reached a goal, solved a problem, closed a deal or passed through the outer door and entered the apartment? Obviously, the word home is full of nuances, having different meaning depending on whom you talk to about what, which is naturally as it could be a noun, adjective, or an adverb. Generally the word is used as a noun meaning a house, residence or household. However, in our technology driven society is the word no longer sufficient to describe the home of today. The reason is that most homes at present have become more then just a living quarter were you sleep, eat and store your stuff, it has also become some sort of pedagogic multimedia centre constituting a technology node in the continuous connected life we live, even an extension of our work. This is due to the fact that more and more technology and gadgets have entered the home. A steadily increase, which have made an escalation in the ending of the 20th century as we now have so much technology and gadgets in our homes that its almost impossible to ignore that we live in an acquisitive society. Fortunately, all this is starting to change. It is becoming more common to regard the home as a system solution, rather then a techno-, acquisitive gadget home. This being the case becomes obvious when we look at all the terms and expression used for describing the technologyfication that exist, fore example who have not heard expressions like the connected life, smart living, smart home, intelligent home, the connected home etc. Through these expressions it is possible to verify that living and home have become a concept. However, what does it mean to use words like smart or intelligent to describe technology integrated in the home?

What is a smart or intelligent home?

When expressions like smart or intelligent is applied on words like living or home and it appear in the daily life, is it often used with confusion, as these abilities normally are associated with human qualities. When it comes to technology and gadgets the expression is usually associated with the interactive refrigerator, which has become to stand as a symbol for the smart and intelligent home. But smart and intelligent living is much more then this. What is intended in a smart or intelligent home is the use of technology, services and architecture in a smart way in aim to simplify everyday life and liberate time for more value aided activities, which is emphasized in the following three definitions:

"A house that contribute to quality of life, convenience, safety, security and comfort for the housing through solutions, technical or non technical that suit just the individual it effect."
Vattenfall Utveckling, ELAB-project Report UG:991 1999

"The goal is to attain a better utilization of resource in housing and society at large"
Everman, A. (1992). "Intelligenta Hus – State of the art BFR T30:1992.

"Houses were different functions are controlled automatically and simultaneously at the same time as the different functions cooperate in a network"
Miljöteknikdelegationen: Smarta hus – bra miljö, Report 1999:1

These definitions all emphasize that a smart or intelligent home is an integration of the social space with the technological space (Venkatesh, 1996). They also point out that technology no longer is regarded to be for use in work related tasks or as fun and cool gadgets, but also as every day household technology, which it has become today. This development creates new interesting thoughts, ideas and possibilities of how the home can be exposed for other services than the traditional ones, which could be studied and evaluated in terms of domotics[2], which is applied information and communication technologies for more comfort and convenience in and around the home.

A Plug-In home

The smart and intelligent home could be regarded to constitute two parts, an infrastructure part and plug-in part. The first part, the infrastructure, is all convenience functions we now take for granted that are built into the home and provided by the landlord or society. Fifty years ago it was electricity, hot water, heat, etc – today it is much more, it's cable TV, Internet, broadband and all other indispensability that we now take for granted and presume a landlord have in readiness for a us as a result of paying the rent. The development and expansion of this infrastructure part, is however, pacing slowly, even though building companies are trying to pay attention to the technology- and society development when constructing new homes. This slowly development is due to a number of reasons such as; homes have a long life span, inconsiderable constructions of new homes, building new homes are expensive and governed by regulations, etc. All this makes the infrastructure part to a neglected area.

The same could not be said regarding "plug-in". Every device, gadget or other consumer electronics acquired are assumed to be plug-in to the home or connected to other devices and gadgets for increased benefit, pleasure and amusement. This tendency of an ever-increasing amount of consumer technology bought and used in every day life does not evince any inclination to decrease; on the contrary, it is a continuous growth that diversifies to new fields of application. The major driver behind the development and adoption of this consumer technology is according to what functions and services people are prepared to pay for. Usually this means gaming, entertainment and other sorts of recreation.

Entertainment and recreation technology

Gadgets and devices in a home today are foremost intended to increase and maximize individual experience within gaming- and entertainment, they are rarely aimed at business that shape our everyday life, homes and our existence. This statement may sound provocative and annoying, but a moment of reflection over what people spend their money on and what they now have, or soon will have, in their home provide interesting insight. Most people today have Text TV with wide screen, surround sound, video, DVD, CD, stereo including speakers, earphone, tape recorder, tuner, often integrated into some sort of home theatre concept. They usually also have a PC including scanner, Internet connection, CDRW/DVDR, printer, web- or

[2] The term domotics is a contraction of the Latin word domus, which means home or house and word robotics, in this case aiming at automation.

digital camera etc. If they have children, they are likely to have game consoles, like PlayStation, Xbox or GameCube, with joysticks, steering wheel gamepads etc. and a video- or digital camera to immortalize there little ones.

In a future, not to far away, most people will have more sophisticated devices for presentation, such as devices for 3D-sound, 3D- and stereo vision and haptic feedback. They will also have better interaction devices that support voice, gaze- and body motion command, - all which will create the virtual presence that for so long has been languished for by researchers, fiction writers and consumers, so we will get a personal maximized experience when we relax, just like the crew in Star Trek Voyager when they are using the Holodeck.

However, in Star Trek Voyager the Holodeck is used for more then just entertainment and recreation. It is used for a great variety of purposes such as simulating accidents, performs task analysis, mission rehearsals, or as a distributed command post to support missions.

– What if this was possible with today's entertainment and recreation technology?

Entertainment and recreation technology in society service

The use of entertainment and recreation technology for society services is not a new idea, it is well documented in recent literature, were it has been used in education of children, long-term medical treatment, rehabilitation, telemedicine and in different kinds of conferences and meetings (Söderberg & Kylesten, 2000). This use has some common denominators such as; the technology is used in a public or semi-public buildings environment, like schools, hospitals and nursing home and offices, not in the home which it have been developed for; the target group is mostly children and senior citizen. In exceptional cases have the target group been persons exercising a profession for example middle managers wanting to reduce travelling and doctors supporting colleagues in remote sites (Turkle, 1997).

After reviewing this literature it could be established that today's use of entertainment and recreation technology in society services not is used in the context it have been developed for – the home. The technology is used as a cheap alternative to traditional technology in areas that have been subjected to heavily reduced funding and recourses.

Surprisingly little effort have been made to use the technology for society services, in the environment and context it have been developed for – the homes, by persons interested in the new technology, who often buy it anyway, persons in the career, in the middle of life, where time and pleasure are essential.

It is particularly one area were this technology have the potential to be used for society services, experts working from home.

Experts @ home

This technology is of special interest for experts working for the government to support the society in severe strain, catastrophes, disasters and major accidents. Normally these experts are assigned to support decision makers and personnel working at the scene, with expert knowledge in much specialised subject fields. Fortunately, these kinds of emergency situations are not frequent in occurrence, but when they occur are the consequences severe. It is therefore very difficult to prepare for these kinds of situations. The most common way to prepare society for this is to perform different kinds of preventive steps such as; planning, training, perform analysis and foremost have people prepared to take action 24 hours a day, 365 days a year.

This is a difficult balance, readiness in relation to funds, as it costs money and tear on people's strength and spirit, particularly the experts. As Sweden is a small country, the access to experts in certain areas is limited, especially during holidays, which is due to problems recruiting persons with the right background and interest, train them for their roll and keep them

employed for a long time. It becomes especially difficult for the employer to keep them, when these experts are in the career, in the middle of life, were time is essential, specially spend with the own family at home. As an expert in a certain area is also easy to get a better paid work with better working conditions in the private sector.

The entertainment- and recreation technology could therefore have a dual use possibility, as a distributed support function, a networked node, for the expert to participate in a Virtual Team, supporting the society during severe strain.

Even if the entertainment and recreation technology today is state of the art and in many areas constituted the frontier in research, it could always be thought of as not good enough, suitable enough, efficient enough, - enough compared to what? Other types of technology? Or good, suitable and efficient enough compared to be on the spot?

True, but how big is the probability that you actually are on ground zero at the right time? And one can never know what will happen, if you know, it would not be so difficult to eliminate the probability to a severe situation in the first place.

How can these assumptions then be related to incidents and catastrophes that have occurred in Sweden during the last two decades?

Rescue Service - Scanning the past

Naturally, is it easy to criticize the past, to speculate and establish what should have been done, which technology should have been used etc., but that is not the issue. The issue is to highlight and emphasize how gaming- and entertainment technology in terms of COTS[3] can have a dual use in rescue- and emergency management. Before doing this, lets scan the past for incidents that can elucidate the continuing discussion.

For convenience and simplicity incidents could be divided into two categories, static and dynamic. A static accident does not deteriorate if time passes and people do nothing. An example is the freight train that 17:30 at Friday the fourth of July 1998 go off the rails a couple of kilometres outside the village Kälarne in Jämtland. The train had 37 wagons, seven of them with dangerous goods, ammonia, acetaldehyde, ethylene oxide, sulphur dioxide and a corrosive organic acid. Ammonia and ethylene oxide are two very poisonous gases. Besides this is ethylene oxide also highly inflammable. No one of the wagons broke or where damage during the derailment. Thus, as long as the wagons are lying were they are, nothing happens, – the accident is static. The rescue command decides to lift the derailed wagons back on the rail, as there was a risk for tank damages. They decide to evacuate the village Kälarne, as it is within the three kilometres of the estimated risk distance. The rescue work passes without complications and no people are injured (Carnerö, 1998). To use the gaming- and entertainment technology in this type of accidents is of no interest as time not is essential and therefore creates the possibility to gather personnel needed at ground zero for handling the accident.

In the dynamical situation the circumstances are quite different, time is essential and peoples' lack of action entail that the situation becomes worse – the accident is living a life of its own. This is typical for nature disasters, fires, dangerous goods and gas leaks etc. Unfortunately there are many real life examples of this:

Wednesday at 16:04:30 the 30 of November 1977 did a landslide occurred in Tuve, just outside Gothenburg. The area was around 280 000 square kilometres big. Within this area were approximately 650 persons living and some of the houses slide 150 meters with a speed of two

[3] Commercial Of The Shelves

meters per second. At 16:09:00 was everything over. No one got killed, but the material loss and costs were high (Hådell, 2002).).

In November 2000 is the village Arvika in Värmland flooded when the water level in Glafsfjorden raises to 48.36 meters above the water level, which is 3.14 meter above normal water level. No one got killed, but the material loss and costs were high (Magnusson & Mill, 2001).

The night to the seventh of April 1990 a fire breaks out on the ferry Scandinavian Star, that traffic the route Oslo in Norway and Fredrikshamn in Denmark. On board are 500 people. The fire, that is suspected to be the work of an incendiary, rapidly spread in cabins, corridors and other parts of the ferry, with a heavy smoke development as a consequence. 158 person dies and 360 persons are saved by the lifeboats (Almersjö, O & Kulling, P (1993).

At 23:46 Thursday the twenty-ninth of November 1998 is Lundby fire department in Gothenburg called to a fire in a festival local at the Hercules street. An hour later is it established that the fire at the discotheque is Sweden's, through times, worst fire disaster in modern time. 63 young people dies and 162 become injured (Wickström & Ingason, 2000).

The thirteen of February 1998 at 06:30 is the Stockholm fire department alarmed regarding a leaking liquefied petroleum gas truck at Tegeluddsvägen in the middle of a residential area. During 90 minutes seven ton of propane is leaking out from the truck. It's rush hour and propane is highly flammable. If the tanks in the lorry and the trailer had exploded a fire sphere with a diameter of 115 meters and duration of 8 seconds would have emerged. A person 250 m from the exploding tank would have gotten 2nd degree burn on unprotected skin areas. The rescue command makes the right decisions and everything passes off well (Castenfors & Stenström, 1998).

Discussion

These are only a few examples of the probability that the improbable can and will occur. It could always be speculated on and made qualified assumption regarding when, where and how the next severe incident will take place. One hot area today is tunnel accidents. The society are building more and longer tunnels while, at the same time, traffic in them increase rapidly. Tragical examples exist from the Gotthard tunnel in Switzerland 2001, and similar accidents can occur in tunnels and subways in Sweden. Another hot area is cable fires in places that are difficult to access. As the society moves towards a rapid population growth in sub urban and urban environments the pressure on infrastructure is increasing rapidly, with increased demand on the supply of electricity as a consequences. This also increases the vulnerability of these systems. A recent example of this is the fire in Akalla tunnel in Stockholm (Fors, A. 2002).

However, these are the problems and risks of today, - what about the problems and risks of tomorrow? What about the technology to prevent, prepare and manage these and new problems and risks?

The problems and risks of tomorrow are difficult, and to some extent, almost impossible to hypothesize about, and it is also outside the aim with this article. Nevertheless are some assumptions possible to make regarding the society and its citizens needs in severe strain, catastrophes, disasters and major accidents. Society's vulnerability and sensitivity for different types of threats and risks are increasing due to the complexity of the society infrastructure. Even if the society during the last decades have had an increased awareness regarding safety most citizens and companies are deliberately taking risks in aim to satisfy their needs of profit, convenience and comfort, counting on the rescue service and its experts to be there if something unlikely occur. The rescue service has, however, got more and more difficult time to live up to these requirements and expectation. They have, like many other community services,

to struggle with decreasing funds and resources and still keep pace with the rapidly growing complexity in the society. The growing complexity in society forces the rescue service to spend more and more time to prevent and prepare for potential incidents. This work is time-consuming and comprises everything from inspection of fire prevention arrangements, make analyses and develop insertion plans, to hands on training and developing new methodology, tools and technology to be able to cope with tomorrow's demands.

The last part, developing new methodology, tools and technology is becoming an growing black hole, consuming large parts of the meagre resources and funds available. This includes everything from ordinary communication systems used by fireman equipped with a smoke helmet to advanced command and control systems, used in a command post by the rescue command. Even if resources and funds are divided according to plans, priorities and needs in aim to guarantee best use, it is common knowledge that command and control systems in the government sector often consume more resources and funds than planned and rarely fulfil the demands placed by the receivers (Ref). The reasons for this are various. The interesting aspect from this article's point of view is the thought that it might not be defendable to spend years developing large systems for command and control of the fast pacing unknown and unpredictable environment, as today's most larger software program development projects are more prone to fail than to success (Jönsson, 2001; Brander, 2002). Thus, the most important thing to manage is the risk and consequences associated with the development and support of a new major software intensive command and control system.

The three main risk factors are; the planned command and control system does not meet planned performance requirements; the development project overruns its budget; and the system is delivered too late or not at all (Ahlenius, Undall, & Andersson, 2003). This being the case is due to many reasons, where one of the most common and obvious is the fundamental principle to develop a huge new specific system for tasks in the future that are almost impossible to anticipate. This has lead to significant changes in software development practice over the past ten to twenty years. It has become more common to build command and control systems incorporating pre-existing software in order to keep overall development and maintenance costs as low as possible. This approach has been called Commercial-Off-The-Shelf, COTS.

COTS based solutions

The basic principle with COTS is to use pre-existing software and commercial vendors as a source to supply self-contained off-the-shelf components that can be plugged into a larger software system, to provide capability that would otherwise have to be custom built. The two primary distinguishing characteristics of COTS are that its source code is not available to the system developer, and that its evolution is not under the control of the system developer (Fisher 1991). To use COTS is therefore not solely advantages, as occurrences of the following risks are possible:

- No control over a COTS product's functionality or performance,
- Most COTS products are not designed to interoperate with each other,
- There is limited control over a COTS product's evolution, and
- COTS vendor behaviour varies widely

This in turn leads to some basic risks and scepticism inherent with using COTS components, such as:

- Immaturity of the product and/or the vendor,
- Inexperience of integrators and/or users with the product,
- Incompatibility of the product with larger applications, platforms, or other COTS components in the system.
- Lack of control over the product's current and future functionality,
- User view that COTS integration is Plug-and-Play.

This critique is justified. The existing picture and criticism of COTS is however starting to change, from being almost everything not specially made for a single costumer to today's opinion to equalise COTS with consumer technology bought by individuals for personal use. This has lowered the price tag for COTS even further. But it does not only lower the price, it also changed the opinion of what COTS really is. Today COTS are regarded as consumer technology used by families in and around their homes for simplicity, efficiency everyday work and to have fun and recreate oneself. It is almost as if it is a second COTS revolution going on, this time supported by de government as they actively is pushing out the IT-infrastructure towards the citizens, their homes and everyday life. On the other end are the manufacturers, pushing cheap and inexpensive consumer technology towards the citizens. This is causing a clash of interests. The government have a society perspective in long term as a goal, whereas the consumer industry have a short term goal, to provide the citizens with cool, easy to use gadgets, that are outmoded within twelve to eighteen month, so they can sell new stuff again. This may sound cynical and could be regarded as a bad or negative thing, but it is not. It is the drive for user-friendly development of technology that could be plug-and-play within the infrastructure supported by the government. It also creates short product evolution cycles, which quicken the enhancement of a product (cf. cars, developed for approximately 100 years, compared with personal computers that have been developed for 20 years).

Towards the future

It is when these two extremes are meeting and forced to perform iterative cooperation that new possibilities are created. This new possibility, to blend game and entertainment technology, with traditional command and control technology, for use as complement and substitute to existing systems and command and control centres is therefore of great interest and deserves to be further tested and evaluated. This is not a unique and radical suggestion, it appears every time cutting edge technology becomes a natural part of the weekday, and we as humans are forced to adapt to it whether we like it or not. For a conservative[4] organisation like the rescue service[5] does this mean that they will be forced to change their apprehension of themselves and their way of working? The assumption that the command centre is the hub, the essential part in rescue operations, constituting the natural place for commanders, leaders and experts to be on in case the knowledge is needed, is going to change. As the consumer technology today is more powerful than the technology used in command centre, and the commercial network technology can pump information to individuals at home faster, cheaper and safer then the government supported organisations and their work, it is time to redefine the task and assignment for traditional command centres. They need to go from being placed where command and control personnel, experts etc. are staying physically, to become a coordinator of command- and expert knowledge in a distributed network based environment where the main function is to support the field workers, i.e. to work in an network and distributed organisation where virtual teams are used to solve incidents and severe difficulties in society.

For the rescue service to work in a distributed way is not a new phenomenon, they do it every time incidents occur. Their everyday life and work circle around the fact that they always go out to a remote location, their ground zero, to solve a task, which is a distributed position in relation to their fixed node, the fire station or SOS-alarm. It is therefore no overstatement to assert that the rescue service has a distributed work, a distance work. Their whole organisation, method of working, tactical- and operational principles is based upon this principle – work remotely from a fixed position with a fixed support organisation. Whether they choose to have a mobile prominent command post at site or use the fixed command post at the fire station or SOS-alarm, the rescue leader is connected to a number of sites; the police, hospital; traffic control, community politician and a great variety of experts in case something happens. This

[4] The word conservative should not, in this context, be interpreted as negative or critical, but rather as /caution and carefulness.

[5] The rescue service is not unique in these aspects; the same is true for the medical service, police and the defense etc.

connection is at present some sort of radio- or telephone based system with almost no possibilities to send any other types of information then speech. Even if the rescue service was before their time regarding distance work their use of the latest communication technology have been neglected. It is therefore almost ironical to notice that the rescue service for long has been living and working in the future, thus not having the technology to do so.

Conclusion

Up to now this paper have been discussing three rather different aspects; first, the smart or intelligent living from a consumer technology view, then how this consumer technology could be used by experts to support society, in a distributed way, in severe strain, and finally the increasing pressure on the rescue service to mange a growingly complexity in society with decreasing resources, where more and more special developed systems are replaced with different COTS-solutions. It is now time to tie these objects together to an overall picture.

The core thought, which might not be evident in this paper, is the reflection that today's consumer technology used in the home, mainly for gaming- and entertainment, is of such capacity that it with ease could compete with many components existing in traditional large command and control systems used in government services today. A statement like this may sound well founded but not realistically defendable. However, lets consider some hard core facts, for example the U.S. game market[6].

It had revenue of $8.5 billion in 2000, which will increase to $22.4 billion in 2005 (IDSA). The figures for the world wide game industry, - including everything from arcades to game consoles to PC games, set-top box games, and cell phone games, was in 2000 $41,2 billion, and is estimated to pass $82 billion in 2005 (IDSA). These figures are enormously, beyond the ability to imagine. To place them in some sort of context – the Swedish defence, including the armed forces, the total defence, the defence research and defence industry etc, receiving $4 billion from the government each year (Försvarsdepartementet, webpage).

If the official figures and estimations regarding research and development at different companies and products are put in relation to the Swedish figures, it becomes even more obvious why the total defence should change their opinion regarding consumer technology, specially game- and entertainment technology.

For example, Sony's division for consumer electronics have $6 billion a year in research and development budget, in a long term perspective. Mr Gates spent $5 to $6 billion during two years just to establish Microsoft's Xbox on the market as a game console for the digital living room. These costs increase as each Xbox is sold for $299 but have a manufacturing cost of $450 (Takahashi, 2002). Microsoft are not unique in this behavior, Sony do the same. Their PlayStation 2 have a manufacturing cost of just below $300, but sell for $360 in Japan and for $300 in USA and Europe (Platt, 1998; Sheff,1999), both hoping to make profit on the games and online gaming. How and why should any government compete with this?

To work from home, as an expert, is no simple task and demands that several issues are taken into consideration. For example working in the home when there is family around might make it hard to focus on the task, especially if the expert is going to support rescue operations when severe accidents or catastrophes have occurred. The kids might not be so understanding of why they should be quiet and leave the living when mom tries to interact with the rescue personnel at site. Disturbances, children, neighbours, scheduled activities in the home and expectations on a family member might make it hard for an expert to solve expert tasks from home. Unless it is accepted and approved of that one family member can close the door and expect total privacy, it may not be possible to solve expert tasks from the home. Of course, this is differs depending

[6] The game market, in these figures, includes hardware, software and accessories for computer and game consoles.

on the expert task to solve. Much of these problems are related to the use of appliances and computers, appliances is most regarded as run- and entertainment stuff, for example, while Nintendo see them as toys, Sony views them as entertainment, and Microsoft is starting to regard them as art. When it comes to computers it is the other way around. Most people today, bring a PCs designed for business into the home to do both fun and serious stuff. It is therefore apparent that to be successful and create a dual-use possibility of appliances and computers, they need to be designed with a completely new concept, for the home itself.

Thus, to conclude, from a technological perspective the possibility for experts to solve problems from home exists today, but does any government agency have enough courage to try these possibilities, or do they prefer to do business as usual?

Author Biography

Håkan Hasewinkel, is a Research Analyst at FOI. Mr. Hasewinkel is a reserve officer, has a MBA and a M.Sc. in Computer Science from Gothenburg University. He is currently conducting research on information design in synthetic environments, low-cost simulations and commercial PC-games.

Peter Berggren is a researcher at FOI. Mr. Berggren has a MA in Cognitive Science. He is currently conducting research on collaboration, team performance, experts, low-cost simulation and performance assessment.

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