

# Elderly People and Emerging Threats of the Internet and New Media

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**Abstract.** Today the Internet is a playground for the young. Tomorrow the elderly people will use the same technology and emerging forms of new media in their everyday life. The elderly people of tomorrow have to rely more and more on their technological skills in order to cope with their every day activities, and to contact their relatives, authorities and different service providers. In the near future, technology-orientation will be one of the key requirements for uncompelled and independent life at home for the elderly people. This emerging and increasingly more utilized service channel also raises questions about the user integrity and safety. What kinds of risks and threats the elderly people can encounter when using these electronic service models and what kind of measures must be taken in order to ensure that the integrity and safety of the elderly people is guaranteed in the ever-changing digital world.

## 1 Introduction

Use of the Internet and different new media as part of everyday activities has increased steadily over the past few years [1]. What was first a technology of a selected few has now gained popularity amongst all population groups. At the moment the Internet is one of the most popular and most important service channels in the modern digitalized world. This widespread adoption of the Internet and new

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media has also created an opportunity for crime and abuse. The very first crackers, hackers, phreakers, etc. attacked against technology, focusing on operating systems and hardware. Now, regardless of the increased public awareness, the attacks have become more sophisticated and more social by nature, focusing on the user behind the technological artifact. For example, wide adoption of different Instant Messaging (IM) services has created new ways for implementing social engineering attacks directly on the users. For example, the CERT Coordination Center has received reports on social engineering attacks on users via IM services [2].

What has also changed, and is constantly changing, are the capabilities, approval and utilization of the Internet and new media amongst the elderly people who are quite different today in their attitudes and technology adoption skills than those of tomorrow. What will also change is the technology; what can be considered as cutting edge technology of today, will be obsolete tomorrow. Even though the technology changes rapidly, the younger generation (i.e. tomorrow's elder people) are used to a rapidly changing environment in the ICT sector. However, these changes combined with the need for different electronic service models, for example for the home care or commerce, are creating emerging threats for the user safety and integrity in the near future.

## 2 Macro-level Factors and Development of Electronic Services

At the moment, there are various macro-level factors (economic and non-economic alike), which have an effect on the need and development of different electronic services. The following factors, which affect to the development of electronic health services, have been identified in the literature (for example by, Kestilä et al., [3] and Saritas & Keenan, [4]):

- Health care paradigm shift. More and more of the health care and responsibility of it is changed over to the patients themselves.
- Geographical distribution of the population. The migration from countryside to larger cities and suburbs continues leaving large areas outside the growth centers sparsely populated.
- Need for growing markets for the ICT sector. The technology penetrates more and more lines of businesses when the technology matures and companies seek economic growth outside their traditional business areas.
- Change in age distribution of the population. In western countries the relative amount of elderly people continues to grow creating a need for more cost-effective health care models.
- New socio-technological solutions of the electronic health. In the daily news and trade journals it is possible to see news items about new and emerging service models and innovations for the electronic health (including health and medical informatics, and bioinformatics).
- Increased consumerism. The service users are more aware of different service providers and models, and are inclined to request them.

In addition to the ones listed above, we would like to add the following factors in order to broaden the discussion to cover all forms of electronic services, not just those belonging to the health care, or social, sector:

- Change in technology adoption and skills. More people are competent and familiar with the different forms of ICT and more capable of adapting to changes in it (e.g. Umesh, et al., [5], Grudin & Palen, [6]).
- Preferring of electronic service models. Increasingly, different electronic service models are created, and preferred, by service providers, legislation and customers [7]. This is already happening in banking where electronic services are superseding “traditional“ services, i.e. services that involve personal interaction with the bank clerk.
- Technological maturity. The utilized technologies are slowly growing beyond unique and individual technology pilots (for practical examples, see Blakeley & Matsuura [8]). In addition, especially in the field of electronic health, different standards and principles for information interchange between different applications and service providers have been defined (e.g. standards defined by the HL7 standardizing organization).
- Increased global rivalry. Especially in the public sector, the increased rivalry on a global scale is changing the very nature of the (electronic) service industry. Previously closed and government-controlled markets are becoming more open to competition [9, 10]. In addition, the used procurement models are becoming more transparent, creating a pressure to decrease in-house buying, which has been favored especially by the governmental organizations. An example of a more transparent governmental procurement model is the Public Purch@sing Online project [11], which is a pilot project under Germany’s federal-level “BundOnline 2005” eGovernment initiative. Due to the increased global rivalry, the public and the private sectors are becoming more converged and the private sector is slowly penetrating to the markets, previously limited solely to the actors of the public sector (such as health care districts and other community organizations). Considering the imminent change in the age distribution of the population, hopefully this change will be realized as services of lower costs and better quality.

Considering the pace in which the electronic services are implemented and institutionalized today, covering nearly all parts of everyday life, it is probable that in the near future some of the “traditional” or non-electronic service models will begin to diminish as they are already diminishing, for example, from the banking sector. Also, new services which reach the customers regardless of place or time, such as services offering medical information in the Internet or Internet pharmacies will become increasingly common. This change will cause unnecessary stress especially for the elderly people, since some of the service models they have grown accustomed to use, no longer exist. Although it seems that the currently younger generation will learn to accept even a rapid change more readily when they reach elderly age. This change will also have an impact on the quality assessment of the electronic service models since in some cases the original service provided a point of comparison, or a baseline, for the electronic service models.

### 3 Electronic Services and Elderly People

Amongst others, the electronic services can be categorized by dividing them into synchronous and asynchronous service models. Typical synchronous service models include real-time communication between two or more human participants, or between a human participant and an ICT artifact. An example of such service model is video conferencing, where the participants communicate using a real-time video and audio connection [12]. These kinds of services are used especially in the health care sector where the patient can use the technology to consult the physician over Internet connection. Asynchronous service models are even more commonplace today. These models are used, for example, in banking and in electronic commerce where the user accesses different electronic services using email, Internet browser, or similar.

Both of these electronic service models contain inherent risks to the users. Not to just those with diminished capabilities, but to all users of the Internet and new media. Excluding those with contact to Internet and new media on daily bases (i.e. from home, work or school) we can identify various groups with increased susceptibility to risk. For example the disabled people, those who use Internet and new media without any (direct) support or tutelage, and the ones who have limited access to the used artifacts (such as those who use public computer terminals available in the public libraries). Of the specific user groups, we shall focus on the elderly people, or senior Internet users. The inherent risks related to the use of Internet and new media by elderly people in particular, is somewhat less explored topic. The general studies about the common risks and threats related to the use of Internet and new media fail to take the physical, mental and cognitive declines associated with the aging process into account. Furthermore, the elderly people may have problems with the modern technology since they typically no longer acquire new skills through education or employment, and they have a high risk of being technology-illiterate. Even at the best-case scenario, the elderly people are typically not as familiar with the different forms of ICT as those who use different artifacts on daily basis at their work or on their leisure activities.

In conjunction to these declines, which are always individual by nature, we must take into consideration changes in the user environment. Now, and even more in the future, the users encounter different ICT artifacts in completely new situations and especially the elderly people come into these encounters unaware and unprepared. Different synchronous and asynchronous electronic service models will become even more multiform as different ubiquitous or ambient technologies and services are implemented. This is a key issue due to its potential to enhance and lengthen the period during which the elderly people can stay living at home (or at some other preferred environment).

At the moment, the electronic services are based mostly on existing, non-electronic service models and preferences. Using categorization defined by Kaaya [13], the current electronic services offer initial two-way interaction, or online transactions, leaving comprehensive (government) portals in a minority. The service provides interaction with the user using Internet and predefined forms or e-mail to collect information directly from the user. The more advanced services use different

communication channels and terminals, such as mobile phones and high-speed mobile communication networks. In the electronic health services the more progressive service models utilize a real time connection to the service provider (clerk, nurse, doctor, etc.).

The services and products looming in the horizon of the electronic health include (semi) automated drug dispensers, such as the ADICOL, insulin infusion system [14], health and activity status monitors, such as the IST Vivago® system [15], personal assistant robots, like the Wakamaru [16], and even ambient and adapting living environments, as the ones reported by the British Broadcasting Company, BBC [17].

#### **4 Emerging Risks and Threats for the Elderly People**

As the people live more and more online, as part of vast and infinite information networks, they become vulnerable in unforeseeable ways. Different ICT artifacts exchange user specific information constantly over home networks, and even over the global Internet. Now and even more tomorrow, the exchanged information has an impact on the users, or their living environments, directly. The exchanged information, and the information available in public directories, web pages and other electronic sources, has already given birth to different forms of identity thefts and misuses of personally identifiable information.

The most common form of personality theft is known as “phishing”, where the users are tricked into providing personal information, such as banking access codes to dubious parties, or doing something that users would not normally do on behalf of them. Phishing and other forms of personality thefts are just examples about social engineering attacks, which focus on the users themselves, not directly on ICT artifacts they are using. Those overly trusting users who are not familiar with ICT technologies are more prone to phishing and other forms of personality thefts. This has been already demonstrated by the less experienced and skillful ICT users falling prey to the bank accounts scams. The current elderly people especially fall within this category since the familiarity with ICT artifacts is usually not high amongst them.

As the exchanged information between different ICT artifacts increases and the users become more open about themselves and their activities on the Internet and other new media, they also enable a more exact profiling by the dubious parties. In addition, the users rarely consider the fact that what is put on the Internet for public display can be stored by anyone. It is even said that “what is put on the net, stays on the net”, sarcastically reflecting to the fact that at the moment it is nearly impossible to control the flow of information on the Internet. Even if one is able to delete all references in the Internet (although this is unlikely), it is probable that copies of anything even remotely interesting have been stored on hard drives around the globe and there is a strong possibility of the phenomena repeating after a while. The kind of social benefits that a “forgive and forget” policy can create do not exist any more since the Internet does not forget [18]. This kind of information permanency creates

a possibility to create more accurate user profiles, which may be used for more effective social engineering attacks.

Social engineering attacks focusing on the elderly people create the typical risks related to phishing fortified with the effects of the potentially lowered physical, mental and cognitive abilities. In addition, since majority of the elderly people are also subject to home-based medication, new threats and risks related to the prescription and insurance frauds emerge. The most obvious risks and threats are fraudulent health care products scams, prescription forgeries and falsified insurance claims. This is especially alarming since even the users who do not suffer from declined mental or cognitive capabilities are not able to guarantee the correct medication and health care products from Internet pharmacies due to problems with ICT and media literacy [19], let alone the ones with problems in mental and cognitive abilities.

With the ever-advancing technology, new forms of technology hijacks will probably emerge in this field. For example, the perpetrator could take control of a (semi) automated medical dispenser, or some vital (or costly) ICT artifact and ask for a ransom from the relatives. This way the risks and threats focused on elderly people may have an impact on the relatives and care providers as well.

## 5 Conclusions and Recommendations

In electronic commerce, trust has been identified as one of the key factors for a successful adoption [20]. In more general terms, trust can be considered as a prerequisite for all electronic services. There are various ways in which trust can be achieved. One can trust the technological environment and infrastructure, such as digital signing and used encryption. Or, the user can trust the mediating agent, partner, or the actual service provider. Especially when one examines electronic health services, one can trust the authorities and (other) regulating parties. In order to achieve as trustworthy system as possible from the user's point of view, the user must have trust on the overall socio-technical system, including the aforementioned technical and social aspects.

One of the problems related to the technical aspects of the electronic services from the senior user's point of view is that the services are commonly developed using the latest technology. This creates a problem for the elderly people since many of them have not had any training on the use of the latest technology, nor have they gained any experience on its use through work. To address the issues related to the trust in general, and to the technical aspects of the electronic service, there are only few viable options: lifelong learning, enhanced familiarity and the use of an ombudsman (of a sort).

Lifelong learning, as a concept, is a challenging one and rarely something that can be put into practice by others than the individual in question. To control one's own overall learning endeavor, one requires personal autonomy, willingness and certain level of ability. The individual in question must also have sufficient familiarity with the subject matter to reformulate existing operational models and to reflect the new experiences with the existing knowledge. Considering the population

group in the focus of this article, it is possible that formal institutional support or affiliation might be required to complement the potentially lowered physical, mental and cognitive declines. With formal support, it is possible to create more successful learning experiences, and to help the elderly people with the special subjects, which need more focused attention (such as with a completely new service or communication models).

Enhanced familiarity focuses on implementing the electronic services in the practical terms of the elderly people, using familiar constructs, mechanisms and communication models. In practice this means that when new electronic services are implemented, the existing service models, and models which are familiar to the users, are taken into consideration and used as a point of reference. The problem with this kind of model is the potential burden of the existing, and potentially outdated, technology. It might not be viable to mimic the operation of the legacy systems when more efficient and effective service models are available. Especially if the user groups is more generic, covering different ages and population groups. However, a balance which does not make the systems unusable by an enlarging part of the society must be achieved.

An important aspect, which distinguishes the ombudsman from a civil servant, or some other official, is the person-centricity. On the context of this article, the ombudsman always strives to supervise personal interests of the elderly person in question, not necessarily interests of a certain bureau or compliance to common rules and regulations. Naturally, the ombudsman is bound to follow legislation and to adhere to the rules of conduct specific to one's profession. Often goals of the elderly person and the ombudsman are convergent. In addition to assisting the elderly person in question, the ombudsman can also be a user of the ICT artifact in question (such as in the case of an information system used for medication follow-up). When the ombudsman has multiple roles in relation to the ICT artifact a special attention must be given to the personal interests of the elderly person in question. These interests should be kept as primary especially when the ombudsman uses electronic services in which the actual beneficiary may not be explicitly presented.

What is required of an ombudsman is that he or she possesses sufficient knowledge about the used electronic service models and about the used technology, and the personal characteristics required for acting as a personal advisor or teacher. Especially when operating with electronic services related to the health care, the ombudsman can be used to clarify the used professional jargon and special terms. A problem with this kind of model is that if a (semi) professional ombudsman is used, it is probable there will be costs involved in the form of training or labor. Furthermore, the use of an ombudsman also moves the use of artifacts away from the intended user thus lessening the intended effect and intended cost savings unless the teaching function is the primary one the ombudsman is expected to perform. If the use of the electronic services and ICT artifacts then resides on the ombudsman it must be taken into account when the services and artifacts for the elderly people are designed, or when the existing ones are modified. The shift of responsibilities and primary use from the elderly person to the ombudsman can also increase the potential effects of the digital divide, which is always a risk when the electronic services are utilized.

Even if the future generations are more capable of adopting new technologies and ICT artifacts, they too, like the current generation of elderly people will suffer from more or less lowered mental and cognitive capabilities. This means that even with the future generations being more familiar with the pace of change in the field of ICT, they will eventually need to rely on artifacts or services they cannot fully operate. Design, which takes elderly people and their capabilities into consideration must start now and be kept in mind when designing artifacts and services of the future. Otherwise, we will not be able to lessen the financial and human burden that ever growing elderly population places on the society without cutting down the level of service for this group.

## References

1. OECD, (29.03.2006), *Broadband Subscribers per 100 Inhabitants in OECD Countries*, <http://www.oecd.org/dataoecd/19/45/34083073.xls> (OECD, Paris, 2006).
2. CERT, (29.03.2006), *CERT, Coordination Center. Incident Note IN-2002-03, Social Engineering Attacks via IRC and Instant Messaging*; [http://www.cert.org/incident\\_notes/IN-2002-03.html](http://www.cert.org/incident_notes/IN-2002-03.html) (Carnegie Mellon University, Pittsburg, PA, 2006).
3. T. Kestilä, J. Lahtiranta, M.I. Nurminen, R. Suomi and J. Tähkää, *Sähköinen terveysasiointi: nykytila ja tulevaisuus. TUCS Technical Report 9*, (TUCS, Turku, FI, 2005).
4. O. Saritas and M. Keenan, Broken Promises and/or Techno Dreams? The Future of Health and Social Services in Europe, *Foresight* 6 (5), 291-291 (2004).
5. U.N. Umesh, M.Q. Minh and L. Jessup, Creating Successful Entrepreneurial Ventures in IT *Communications of ACM* 48(6), 82-87 (2005).
6. J. Grudin and L. Palen, Why Groupware Succeeds: Discretion or Mandate? in: *Proceedings of the 4th European Conference on Computer-Supported Cooperative Work, ECSCW'95* (Kluwer Academic Publishers, Dordrecht, 1995), pp. 263-278.
7. T. Moore and P. Flynn, (29.03.2006), *The Changing Role of Multi-Channel Service Delivery, Discussion Paper no.4, Australian Government Information Management Office*, [http://www.agimo.gov.au/\\_\\_data/assets/file/33174/AGIMO-FC-no4.pdf](http://www.agimo.gov.au/__data/assets/file/33174/AGIMO-FC-no4.pdf) (AGIMO, Melbourne, 2004).
8. C.J. Blakeley and J.H. Matsuura, e-Government: An Engine to Power e-Commerce Development, in: *Proceedings of the 2nd European Conference on e-Government, Dublin, Ireland* (Trinity College, Dublin, 2001), pp. 39-48.
9. D. Price, A.M. Pollock and J. Shaoul, How the World Trade Organisation is Shaping Domestic Policies in Health Care, *The Lancet* 354(9193), article 84328, 1889-1892 (27 Nov. 1999).

10. A. S. Preker, A. Harding and P. Travis, ‘‘Make or Buy’’ Decisions in of Health Care Goods and Services: Insights from Institutional Organizational Theory, *Bulletin of the World Health Organization*, **78** (6) 779-90 (2000).
11. Germany. Federal Ministry of Interior. The Procurement Agency (Beschaffungsamt) (BMI). *Informationsbroschüre: Federal Government Procurement Goes Online*, [http://www.bescha.bund.de/media/files/publikationen/englisch\\_online.pdf](http://www.bescha.bund.de/media/files/publikationen/englisch_online.pdf) (Stabsstelle Informationsmanagement und Öffentlichkeitsarbeit, Bonn, 2004).
12. Reuters, (29.03.2006), Medical Robots Start Work at London Hospital, May 18, 2005; <http://www.msnbc.msn.com/id/7896909> (Reuters, London, 2005).
13. J. Kaaya, (29.03.2006), Implementing E-government Services in East Africa: Assessing Status through Content Analysis of Government Websites, *Electronic Journal of E-Government*, **2**(1), 39-54 (2004), <http://www.ejeg.com/volume-2/volume2-issue-1/v2-i1-art5-kaaya.pdf>.
14. European Commission. *Information Society Technologies, Applications Relating to Health, Fifth Research and Development Framework Programme 1998-2002, Final Report, April 2003*, 30 (European Commission, Brussels, 2003).
15. I. Korhonen, P. Paavilainen and A. Särelä, Application of Ubiquitous Computing Technologies for Support of Independent Living of the Elderly in Real Life Settings, in: *UbiHealth 2003, 2nd International Workshop on Ubiquitous Computing for Pervasive Healthcare Applications, Seattle, Washington, October 2003* (Springer. Dordrecht, 2003).
16. T. Tomonaka, R. Hiura, Y. Ohnishi and K. Sugimoto, (29.03.2006), Computer Vision Technologies for Home-Use Robot "Wakamaru", *Mitsubishi Heavy Industries, Ltd. Technical Review* **42** (1), 1-2 (Feb. 2005), <http://www.mhi.co.jp/tech/pdf/e421/e421040.pdf> .
17. M. Ward, (29.03.2006), Smart Homes Offer a Helping Hand, *BBC News Online*, May 19, 2004; <http://news.bbc.co.uk/2/hi/technology/3715927.stm>.
18. J-F. Blanchette and D. Johnson, Data Retention and the Panoptic Society: The Social Benefits of Forgetfulness *The Information Society* **18**, 33-45 (2002).
19. C. George and P. Duquenoy, Online Medical Consultations: Are We Heading in the Right Direction? In: *Ethicomp 2005, Looking Back to the Future, Linköping University, Linköping, Sweden, September 2005* (Ethicomp, Linköping, Sweden, 2005), pp. 12-15.
20. C. Castelfranchi, The Role of Trust and Deception in Virtual Societies, in: *Proceedings of the 34th Hawaii International Conference on System Sciences, 2001* (IEEE, Piscataway, NJ, 2001).