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Privacy and Data Security Challenges in the Hungarian Health Sector at the Beginning of the 21st Century

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Abstract

Nowadays information is one of the most important parts of our world, therefore its protection is necessary and indispensable. This protection is especially important if life or health data are concerned. This paper describes the protection of healthcare data in three main sections. The first part refines the concept of privacy and data protection. This section describes the concept of e-health systems and the planned Hungarian Electronic Health Care Service Space. In the second part the question of data security is discussed from the aspects of the latest information developments. The first two subsections of the third part takes a wider approach. The changes will only be successful if the data protection regulations comply with the European Union General Data Protection Regulations and data protection becomes more widespread in Hungary among the developers, operators and users. The third section points out that data protection and data security have not only strict legal and technical limits but the overall medical (demographic, epidemiological), economical and social points of view is also important.

Keywords: data security, privacy, health, information technology, e-health, trends, Electronic Medical Service Space (EESzT)

Introduction

This study focuses on two issues. The first is a discussion of the situation of healthcare data protection in Hungary these days. Based on the first one, the second issue elaborates on what information technology-related challenges await healthcare in the nearest future, and what consequences these challenges may entail in regard to data protection. The overview also aims to draw the attention to a few development trends that have a good chance of producing an impact on healthcare in the short and long run.

Summary

On the one hand, *data protection* (F. Ható, 2005; Nemetz–Vajda, 1991) includes the right to protect personal data, on the other hand, however, the regulations also need to ensure that information about public affairs remains public. A good basis for understanding the origins and evolution of the fundamental principles is provided by the generational classification (Jóri, 2009) which argues that the General Data Protection Regulation (GDPR) adopted by the European Union in 2016 (95/46/EC; GDPR, 2016) is the third generation of the directives and regulations that form the framework of the EU and Hungarian legislation. The members states of the European Union are obliged to implement the regulation from 25th May 2018, which requires a number of interpretative rules and implementing regulations at member state level.

Hungary has completed a number of preparatory steps towards modernizing healthcare. The Electronic Medical Service Space (EESzT), which links the tiers of the supply system and the background institutions, was developed as part of this effort. Currently, the system is in its pilot phase with the involvement of several institutions. But from the fall of 2017, it is mandatory for every healthcare service provider funded from the state budget to use the EESZT (Tarcza et al., 2016). In this context, one of the greatest challenges that e-health system is facing is the adoption and enforcement of legislation that complies with the data protection directives and the GDPR in the member states, which is an important task for Hungary too.

Development of information system similar to the EESZT can be divided into phases in time (Detrekői–Szabó, 2002). The key areas of work in the registration phase are data collection, data processing (creation, management, deletion), sorting and search, organization, etc. In the analysis phase, analysis procedures built on the stored data are developed in order to address complex issues. The third phase is when the system has reached a point in its development where it is capable of simulating effects of future events, thereby facilitating the impact assessment of strategic decisions. Regarding the development phases, it is an important observation that the average time needed to complete the individual phases is 3 to 5 years, but none of the phases can be skipped.

The concept of *data security* (F. Ható, 2005) covers the technical, organizational and algorithmic solutions that are suitable for achieving compliance with legal and non-legal requirements (customs, best practices) for data processing.

Forecasting future conditions requires a profound understanding of the past and the present. Today the Internet is in the era of web 2.0 (O'Reilly, 2009), but we are about to enter the age of semantic web applications (Tóth, 2010).[1] These days we are already witnessing the technical progress that upgrades the objects of the human environment with devices enabling electronic connectivity, which are capable of communicating with each other and with other networks (Internet of Things) (daCosta, 2014; Simon, 2014). Computers becoming increasingly powerful, along with a further increase in processing power will continue to refine the level of detail offered in virtual worlds, enhancing their similarity to the real world.

[1] See also: www.sramanamitra.com/2007/02/14/web-30-4c-p-vs/; www.exkss.com/devel/huHU/onto/showtopic?topicName=Szemantikus%20web.

A possible categorization of the development efforts in healthcare distinguishes the areas of wearable tools, biosensors; extended reality; 3D printing; robotics; micro and nanotechnology; personalized medicine; gene technology; artificial intelligence, and machine learning (Meskó, 2014).

The above development activities can be summarized as follows:

- there are already a lot of health related examinations that used to be limited to laboratories but now can be carried out at home;
- 24-hour monitoring of patients, extended storage and evaluation of data, and alerting if necessary is on the way to becoming a common practice (it is possible that the visible symptoms of a given medical occurrence have not yet manifested themselves, but measurable parameters already foreshadow their imminent onset);
- patients may store the results of measurements taken with instruments, or forward them immediately to their therapists;
- devices are not only capable of performing measurements, but they can also carry out certain automated interventions;
- it is a general trend that items we use every day are upgraded with additional electronic digital functionality;
- an important area of application of these devices is helping injured, disadvantaged and/or elderly people;
- devices of Augmented Reality (AR) can bring the benefits of digital technology to many areas of our daily lives;
- 3D printing of artificial limbs and protheses is already possible today;
- there are ongoing experiments to replace human organs and tissues with 3D technology;
- *tissue engineering* has been introduced as a new bio-engineering discipline;
- researchers experiment with shape-shifting structures similar to those found in nature;
- robotics can bypass physical limitations of human beings;
- replacing and controlling injured limbs produce increasingly sophisticated solutions;
- these days focus in healthcare, nursing and social care is shifting towards solutions offered by robot technology;
- micro and nanotechnological applications are playing an increasingly important role in many areas of our lives;
- combination of communication technologies with these materials technologies will be certainly one of the trend-setting areas of the future;
- achievements of infocommunication technology, the underlying network support, and machine intelligence already have an impact on our immediate neighbourhood;
- in healthcare computer applications supporting prevention, diagnostics, healing and rehabilitation have been introduced;
- artificial intelligence proved to be more efficient in many areas than humans.

These new devices and infocommunication applications must comply with the requirements of operation as well as the data security requirements of operability, reliability, availability, accessibility, integrity, authenticity, irrefutability, and confidentiality (Folláth et al., 2010).

The devices and applications are often based on the latest achievements in research and development. Development is a competition, those who respond faster and offer the

less expensive solutions will earn greater profits. Data security often seems to be an expensive and unnecessarily resource-intensive component of a project. In the recent years data security considerations were omitted from development plans in many cases. As regards projects relevant to healthcare, an even more stricter approach is required, and professionals and developers are already aware of this fact, and maybe users have also realized it. Data protection seems to be "waking up" from its slumber: the third-generation General Data Protection Regulation (GDPR, 2016) of the European Union already addresses the issues of built-in data protection (*Privacy by design* – Data protection oriented attitude should infuse development, starting from the design phase). Actual implementation of built-in data protection will surely slow down technical development and make it more costly, but without applying the principle, solutions with patched-on security additions will be much more vulnerable.

Society moving (or dragged) into the future

In order to present a more comprehensive view, the subject of data protection and data security should be placed in a broader context of relationships. In addition to legal and technical boundaries, there are overarching healthcare (demographic, epidemiological) and social considerations that must be highlighted in regard to data protection and data security in healthcare (Iván, 2002).

When addressing development efforts, system roll-outs, and operation, decision makers will have to take the following into account:

- the population of our country is aging;
- the population is shrinking;
- the number of marriages is in decline, a considerable percentage of the marriages end up in divorce, the number of families is decreasing, more and more people live in much looser family relationships or alone;
- isolation of the individuals with its symptoms and implications leaves its mark on our society;
- the number of children is decreasing;
- differences appear between regions within Hungary;
- our country has to withstand external pressures owing to migration;
- conflicts (ethnic, religious, economic, etc.) between the minority and majority tiers of the society are rising.

Usually, as people in a generation/age group grow older,

- the proportion of women increases;
- male mortality rises compared to the mortality of women (which also leads to an increase in the number of people living alone);
- the number of women suffering from chronic diseases is increasing;
- the degree of the individual's vulnerability to deprivation is increasing (family relationships are shrinking, the supporting network of the family is becoming weaker, there is a measurable decline in maintaining contact with the outside world, etc.);
- widening gaps appear between classes and groups in the society;

- in regard to health and quality of life, the deviation of chances is increasing (increasing differences) and the risk of certain diseases rises, following a natural trend.

The support system should be prepared for the following:

- qualified (medical and healthcare) workforce will be subject to a strong pressure due to migration (salaries, European and American "brain drain");
- some of the most advanced equipment and procedures cannot be financed due to the limitations of the current social security practices;
- medical practitioners age along with the society;
- healthcare workers also age like the rest of the society;
- due to educational, financial or other reasons, a part of the society is still excluded from the services of the digital age.

Summary

In data protection, the Hungarian regulations adhere in part to the data protection trends of the European Union. In many cases the General Data Protection Regulation that is to be implemented compulsorily before 2018 leaves working out the details to the member states. In this regard, legislation in Hungary should involve reviewing and synchronizing the existing laws, directives, regulations and sectoral instructions. Once this process is complete, the lowest tier of regulations may rework the currently applicable set of rules. Implementing the principles laid down in the GDPR in a suitable manner (e.g. data portability, transparency, etc.) may contribute to accomplishing the key information technology related objectives of public administration and healthcare policy.

In regard to data security, we can state that there are fundamental deficiencies in almost all of the examples that we examined. The technological transition (EESZT) that the Hungarian healthcare IT aims to accomplish – which essentially means leveraging the opportunities afforded by the advanced information technology networks – should be open to integrating new elements offering an appropriate level of security in the field of healthcare professions, but also on the patient's end. Infocommunication devices owned by users can be regarded as a significant resource, which, if leveraged after achieving a suitable security level, could lead to economic savings. The transition in this case could be successful if there is also a change in regard to the level of data security. On the one hand, this means using the proper devices, and on the other hand, enforcing operating and data security principles locally.

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