

# E-HEALTH CARE IN HUNGARY WITH THE HELP OF ICT TOOLS

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**ABSTRACT:** *In addition to the smartphone applications, some specialized administrative bodies of the public administration have additional opportunities to facilitate the activities of the authorities. One of the important technical and development tools of the 21st century, is the big variety of drones, which were originally developed for military purposes. The another most important info-communication tools (hereinafter: ICT) are the smarth-phones. Undoubtedly, these equipments can be apostrophized as probably the most popular technical tools, based on the fact that in addition to their ever-expanding uses, they also provide excellent help for leisure activities and outdoor photo/video documentation. In addition, we can find their application in more and more fields of our Hungarian public administration system. In recent years, the use of smartphones and applications on them, has been successfully introduced in more and more administrative areas, which makes the work of the authorities more efficient and faster, which in many cases can lead to the saving of human lives too. After (!) the Corona virus pandemic, I have no doubt about, that the health care, and the e-solutions, developements helped a lot till nowadays, and it will be just more important in the next years as well. I will highlighted some of the good practices that I consider to be most important and may give some positive expressions to implement them in other fields.*

**KEYWORDS:** *health-care, application, modernisation, special administrative field, info-communication.*

**JEL Code:** K23

## 1. INTRODUCTION

The development of healthcare is one of the most important interests of society as a whole and one of the sectoral areas of greatest interest. In the life of a modern state, the service provider must be as efficient as possible and of the highest quality. This is especially true for the health sector, where citizens' health and possibly their lives are at stake. That is why the current Hungarian government must also do everything to be able to provide the most modern equipment for healthcare institutions (ÁRVA,2016).

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Digital health and care cover the tools and services that use information and communication technologies to improve prevention, diagnosis, treatment, monitoring of health-related issues and as well as monitor and manage the interaction of health and lifestyle, such as artificial intelligence, blockchain, the interconnection of devices (IoT) or the 5G network. Innovative digital healthcare and care can improve the quality of care and access to care, as well as increase the overall efficiency of the healthcare sector or reduce administrative burdens. The topic is extremely difficult, as new projects, participants, or initiatives that "change everything" appear every day. In the following, I would like to briefly present the Hungarian developments.

### **1.1. Developments in Hungary**

Nowadays, we can say that in addition to the acquisition of devices for domestic medicine, there is also a need for the technical and technological development of health administration. Thanks to the EU subsidies, improvements have also been made in this area in the past period. Among these, the new, Unified Healthcare Electronic Space (hereinafter: EESZT) stands out. As part of the solution introduced on November 1, 2017, it is possible to record the data on medical services, prescriptions, referrals, laboratory tests and other findings in a national online network. The most important purpose and practical benefit of this is that, through the system, this information becomes available to all doctors and pharmacists treating the given client/patient. We can see this as a new digital – and perhaps even more important – unified information source, to which approximately 10,000 healthcare providers have joined.<sup>1</sup> The goal of the program is that by now all institutions and persons providing services in the field of health care will be connected to the Unified Health Care Space.<sup>2</sup>

It is important to emphasize that this health information can only be seen by the patient's general practitioner and treating doctor in the system, so - as a general rule - we do not have to worry about our sensitive health data falling into the hands of unauthorized persons. The system includes the following important service elements.

- eHealth history; - eRecipe; - eReferral; - Digital Image Transmission; - eProfile; - Trunk publication; - Use of Health Service Space for health care providers.<sup>3</sup>

The eHealth History essentially enables the central storage and retrieval of medical documents generated in connection with individual care events. This may be important when a later disease appears or before surgical intervention. It should be added that within this function, the case history will only store the care documentation, additional documents created during the care will be preserved and stored in other units of the EESZT.

Clients are assisted by the Resident Portal, where everyone can find a list of their care events (in the event catalogue) and view their e-disease history documents created during their care (by clicking on the case history menu item).

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<sup>1</sup> This is how we consider the general practitioner, the pharmacy, as well as state clinics and hospitals. Private doctors, private hospitals, dentists and ambulances are scheduled to be connected to the system in November 2018.

<sup>2</sup> According to the statement made by minister commissioner Gergely BARTUS on Kossuth Rádió Napközben program on April 24, 2018.

<sup>3</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/agazati-portal-es-modulok> (last viewing: 2023.04.20.)

The e-recipe is one of the new system's most well-known and perhaps most used modules. Essentially, we already receive an e-prescription, even if it is traditionally printed on paper since the doctor who writes the prescription can also see in the system whether the patient has taken the medication after the prescription has been issued. Accordingly, pharmacies also have the right to see what medicines were previously prescribed to the given patient.<sup>4</sup>

To connect to the EESZT, a web service interface may also be necessary in the case of information systems on the prescriber side (general practitioner, specialist practice, hospital, etc.) and pharmacy information systems. As an additional function, it can be mentioned that a web application is also available for doctors, with which they can view the patient's medication.

The available functions that the system provides to the attending physician are the following services:<sup>5</sup>

- writing medicine prescriptions;
- writing a recurring prescription (ordering a three-month quantity of medication);
- yourself, or withdrawal (logical deletion) of drug prescriptions prescribed by the substituted doctor;
- querying the summary list of drug prescriptions based on Social Security Number;
- querying certain drug prescriptions.

One of the fundamental aspects of the introduction of the e-health system is that we do not cause a break in the currently existing processes, thereby not making the lives of patients more difficult (ASBÓTH-FAZEKAS-KONCZ, 2020). Thus, it will be possible to order paper-based prescriptions in the future, and handwritten prescriptions (hereinafter: prescriptions) will also remain valid. At the same time, the system creates an opportunity to use modern solutions by providing paper-based prescriptions with Social Security numbers - which, when redeemed at the pharmacy, are entered into the EESZT and searchable in the same way as prescriptions originally ordered electronically - a completely paperless procedure is possible too.

The essence of eReferral is to modernize and simplify the previously introduced rules<sup>6</sup>. The eReferral module of the EESZT creates the previously missing data transmission channel between the IT system of the doctor issuing the referral and the doctor performing the examination, thus ensuring the reliable and safe transmission of patients' health data, which is the basic objective of all public administration IT development. During care, the information provided by the referring physician (e.g. preliminary examinations, findings, or current complaints) must be clear to the examining physician. To this end, transmission using electronic means can eliminate the difficulties and risks associated with previous paper-based referrals.<sup>7</sup>

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<sup>4</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/e-recept> (last viewing: 2023.04.14.)

<sup>5</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/e-recept> (last viewing: 2023.04.12.)

<sup>6</sup> The essence of this is that it is possible for anyone to use a significant part of the health services based on a doctor's referral. Until now, during the referral, the initiating physicians could only prepare the referral on paper and record the history, possible requests, and findings related to the requested care. In recent years, health care providers have had to accurately record more and more data on these papers, so the IT systems of specialist clinics and hospitals are already prepared to handle the content of referrals electronically.

<sup>7</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/beutaló> (last viewing: 2023.03.14.)

A significant advantage of eReferral is that it created an opportunity for the referring physician to prepare the patient's referrals in a standardized way - even by creating their templates - during which the rules of the referral are checked, and it may be important that the patient's other needs can be taken into account when preparing the referral, their content and time. The referrals sent by the referring doctor are stored in the EESZT and become available to all doctors with authorization and specialist knowledge of the care institution they wish to use. As a result, care can be planned even before the patient arrives, and patient data related to the referral is available in a reliable form and content when the patient logs in. This will result in the attending physician being able to start his diagnostic and therapeutic activities faster and more thoroughly. The fact of the use of the referral is also recorded in the e-referral module, and the referring physician and the patient can receive a notification via the EESZT about the completion of the findings of the services used based on the referral if they so request. During the operation of the system, it is also possible for not only doctors, but also patients to view their referrals through the public portal, and - due to the synchronization of the system with the client portal - it is possible to request notification to our client portal storage about the completion of new referrals(SZABÓ,2020).

It is important that because of extraordinary situations (e.g. emergency referrals on the night shift, when it is not possible to record data), the current paper referral option will still be maintained.

Within the framework of the Digital Image Transmission function, it is possible to transmit images created and stored by devices of various manufacturers to other healthcare institutions and service providers<sup>8</sup>. Thanks to the rapid development of technology, digital imaging is also appearing in specialist areas where recordings were often not recorded before (e.g. histology, gastroenterology, ECG, EEG). At the same time, digital technology creates the opportunity to quickly and safely transmit digital images between different institutions by applying the standards accepted so far and by exploiting the possibilities of the Internet, thereby increasing the efficiency and safety of patient care. In essence, this can mean cost-effective copying and forwarding, moving images without moving them from their original location(SZABÓ,2020).

The EESZT offers three different functions to achieve the above goals. First of all, the sharing of the digital image material for healthcare providers joining the EESZT, during which the participants record the list of images created by them in a central database, which can be viewed and downloaded by other providers if necessary.

The second function of the system is a digital image-sending technology, which is a special e-mail system developed for image transmission, without significant size limitations. Its primary areas of application arise when images quickly forwarded that have not yet been shared in the central system (e.g. forwarded by the patient after primary examinations have been completed).

The third function is remote consultation, which also requires online expertise, through which the attending physician can request professional help from other medical colleagues

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<sup>8</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/digitalis-keptovabbitasi-es-tavkonzilium> last viewing: 2023.04.20.)

in complicated cases<sup>9</sup>. I consider that this also clearly increases the efficiency and quality of patient care, complying with and complying with data protection rules to protect patient data.

As a module, eProfil is designed to ensure that the most characteristic health summary data for patients, their health profile, can be accurately and continuously recorded. The information stored here – in contrast to several modules of the EESZT – is not data on patients' health events, but a health summary (reports) specific to the patient. Entries must meet two main requirements in terms of content:<sup>10</sup>

- A health event, illness, medical intervention, etc. that occurred during the patient's life. it must be recorded, which affects your health condition for a long time, as well as the tests and treatments that may become necessary.

- It must contain all health (and health care) information for the necessary duration that may be important during health care.

The cases of viewing posts can also be divided into two main categories:

- During emergency care, the most important health information should be available quickly and in a summary.

- During other care, the information that influences the care should be available in a uniform form.

It can be stated that the data managed in the eProfile typically do not, or rarely, change and are characteristic of the patient's health status in the long term. This includes data on allergies, drug sensitivities, implants, chronic diseases, participation in care, established diseases, changes, and current medication. Registration in the eProfile can be done by the attending physician and general practitioner, but at the same time, due to the right of self-determination of the person provided, this can also be prohibited. Here you can distinguish between a complete ban on your eProfile - so neither data can be entered nor queried -, the submission of new data is prohibited (in this case, previously entered data can still be queried), or the default (as a reset function), according to which both submission and query are allowed.

The main publication, as a module, "ensures, as a single service, the publication for the matching systems of the institutions responsible for the code tables, code bases and registers used by several actors, as well as accessibility for the actors who use them, separating the roles and processes of the data owner and the user. The module handles public, public-purpose and technical master data."<sup>11</sup> As a result, the employees of the various healthcare institutions can see the source of the data and documents included in the system.

The use of the EESZT for healthcare providers as a module presents the connection process in detail. Within this framework, the system provides the necessary forms, which must be attached through the system. The assembled system sends the confirmation after the documents have been posted, and then the technical implementation of the connection to the system begins(SZABÓ.2020).

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<sup>9</sup> As a personal opinion, I would like to note that the role of this remote council is greatly appreciated in today's severe "doctor shortage".

<sup>10</sup> Source: Forrás: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/e-profil> (last viewing: 2023.03.20.)

<sup>11</sup> Source: <https://e-egeszsegugy.gov.hu/web/eeszt-informacios-portal/torzspublikacio> (last viewing: 2023.03.21)

## 2.SMART SOLUTIONS OR THE ROLE OF MOBILE APPLICATIONS IN HEALTHCARE

Among the healthcare developments, mobile applications, which are gaining in popularity based on download data and user feedback<sup>12</sup>, deserve special mention, of which I would like to present the most important ones.

### 2.1. Életmentő App (Lifesaving App)

The application's services<sup>13</sup> provide the opportunity to enter important data (e.g.: known illness, treatment, drug sensitivity, etc.) in advance so that they are displayed at the same time as the emergency call at the rescue controllers at the press of a button. The rescuers will not only see the location (exact geographical position) of the person in trouble but also the battery level of the phone, which can be useful information in case the device is drained. In many cases, the quick arrival of the ambulances also depends on whether it is possible to know the exact geographical location of the patient. With the help of the application, the user can immediately contact the rescue controllers of the National Ambulance Service. Simultaneously, the application sends a message to the rescue control centre with the user's data, including his location. The positioning function also shows us our position measured by GPS, the nearest defibrillator, hospital, clinic or pharmacy. The application indicates what you are looking for and can quickly navigate us there. Another important function is the lifesaving guide. Providing first aid until the ambulance arrives increases the patient's chances of survival and recovery. The ÉletMentő application provides help and supports with its interactive guide, which looks at the most important steps by topic so that life-saving can begin professionally(SZABÓ,2020).

### 2.2. Szív City (Hearth City)

The application was created for a similar purpose, i.e. to help save lives. Szív City is a virtual community whose volunteer members are ready to save public victims of circulatory arrest (sudden cardiac arrest). By downloading the Szív City app and registering, they agree that if someone near them has a heart attack, they will rush to the scene when the National Ambulance Service is alerted, and start reviving them before the ambulance arrives.<sup>14</sup>

I don't think the COVID epidemic needs to be introduced to many people. In March 2020, it almost burst into our lives like a stroke of fate. We didn't know what was happening, only that there was trouble and that a pandemic was sweeping the world. The first months were very difficult, as most of the states were not prepared for everything. Suddenly, it was necessary to quickly switch to online education, carry out numerous administrative tasks and comply with quite a few restrictive measures, such as continuous disinfection and the use of masks. Fortunately, we have since learned that the vaccines that have been developed are a kind of solution to this pandemic. However, the mobile applications created during the epidemic also provided great help for this, which serve the interests of both the authorities (health, law enforcement, etc.) and the population in the field of information, contact research and administration. Applications related to this

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<sup>12</sup> Source: <https://minap.hu/cikk/nepszeru-mentos-applikacio> (last viewing: 2023.03.02.)

<sup>13</sup> Source: <https://www.mentok.hu/ha-baj-van/eletmento-app/funkciok/> (last viewing: 2023.03.10.)

<sup>14</sup> Source: <http://szivcity.hu/> (last viewing: 2023.03.15.)

covid-19 epidemic include the *Virusradar* and the *Home Quarantine application*(SZABÓ,2020).

### **2.3. Virusradar**

This is a mobile application developed based on the best international examples for protection against the coronavirus. With the help of the application, contact with proven infected people can be investigated by measuring the distance of mobile devices using Bluetooth. VírusRadar made the work of epidemiologists easier in contact tracing. The app communicates with other users via Bluetooth and exchanges encrypted, anonymized data about the distance of nearby devices if they have been within a dangerous distance in the last 14 days. If a user becomes infected, the user may share the app's data with epidemiologists. Professionals can ask the infected person using the information to share the data, thereby notifying people who were in close contact with the infected person.

### **2.4. Home Quarantine**

This application made it easier for people to request this type of control method when they were quarantined. In this way, making the work of others easier, in this case, the work of the police did not have to pay their respects to the person currently in quarantine, but with the help of the application, when he downloaded and registered himself, he was able to use a photo every single day to prove that he had complied with all regulations he does not leave the house and takes the quarantine rules seriously. In doing so, the persons under control must complete the following steps for the authorities. Start the application and log in. After that, you need to tap on the "Start Remote Control" button. Then the application will start the camera, during which you have to look into the front camera of the phone and follow the instructions on the screen, then wait until the message "Remote control successful" appears on the phone screen. When taking the photo, it is also important to make sure that only the person under control appears in the photo, and that no other person is visible in the photo(SZABO,2020).

### **2.5. EESZT App**

The previously mentioned *EESZT* system was able to expand with a new important element after the outbreak of the coronavirus epidemic. The developed *EESZT mobile application*, which is an important new element enables the use of a downloadable electronic vaccination certificate. With the application, we got relief in that if we have already received the vaccination, we do not have to wait to receive our protection certificate in the form of a card, but if this application is downloaded, they can easily and quickly check our protection/vaccination with the help of a QR code in places where entry is only possible with a protection card. Such as the interior of cinemas, theatres and restaurants. So if the person has already received his vaccination, he can download the application and not have to wait days or even weeks for the little card to be sent out because the application is connected to the EESZT IT system used by vaccinators, so they are already registered there(SZABÓ,2022).

### **2.6. AIPDerm**

The *AIPDerm* application can represent a new level of digitization and modern solutions. During the AIPDerm teledermatology service, we scan our suspected skin disease with the help of our smartphone camera. If we have a dermatological problem, we simply take a photo and upload the picture of it to the AIPDerm application via smartphone or computer. Here, in addition to uploading our data and high-quality photos, it is also

necessary to enter the experienced symptoms. Artificial intelligence (AI) supports the doctor in dermatological examination, which can be used remotely or even from home. Based on the mobile phone photos and the patient's message, the MI combs through its huge database, containing around two million photos, in seconds. The machine recognizes 700 diseases, which is 95 per cent of skin problems, and according to AIP Labs, it has no equal in the world. The machine thus selects the three or five diseases it considers most likely<sup>15</sup>. After that, the attending physician determines the final diagnosis and treatment with the help of Artificial Intelligence, can prescribe the use of over-the-counter medicinal products or a prescription, and in the case of a serious illness, recommends that you visit a specialist in person. The prescription can be redeemed at any pharmacy through the EESZT. Finally, a monitoring system helps to follow the patient's recovery and prevent future illnesses.<sup>16</sup>

### 3.USABILITY OF DRONES IN 21ST-CENTURY HEALTHCARE

In my opinion, in addition to smartphone applications, some specialized administrative bodies of the Hungarian public administration have additional opportunities to facilitate the activities of the authorities with other excellent tools. The XXI. One of the important technical and development tools of the 20th century is the range of drones originally developed for military-technical purposes<sup>17</sup>. Drones can undoubtedly be considered one of the most popular technical devices, based on the fact that, in addition to their ever-widening range of uses, they also provide excellent assistance for leisure activities and outdoor photo/video documentation.

I am aware that there are dangers in the use of drones, which I do not want to go into in detail in this study, because the article deals with the modernization of healthcare. In the course of my research, I considered drones as a tool, the use of which in certain administrative areas can greatly contribute to making the work of the given authority more efficient and effective. In addition to the mentioned mobile application, the use of drones may be another important element of healthcare administration in the future.

The project that Alec Momont first developed<sup>18</sup>, as a prototype of the first aid drone, could be used for a rather special, but at the same time useful for society as a whole. The essence of this is that the drone is equipped with a defibrillator, which can be deployed in areas that cannot be reached in minutes with other vehicles.

The developed device has quite serious features, as it has a load capacity of approximately four kilograms and can cover an area of twelve square kilometres with approx. it reaches in one minute, thereby increasing the patient's chances of survival to an unprecedented extent compared to the traditional, much slower means of delivery. The question arises here, how should the device be used, how can it save lives? Due to the

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<sup>15</sup> Source: [https://hvg.hu/360/202306\\_\\_tavgyogyitas\\_idosfelugyelet\\_\\_borrakszures\\_\\_noverhivo\\_aplafonon\\_\\_orvosi\\_gepesites](https://hvg.hu/360/202306__tavgyogyitas_idosfelugyelet__borrakszures__noverhivo_aplafonon__orvosi_gepesites) (last viewing: 2023.04.02.)

<sup>16</sup> Source: [www.aipderm.hu](http://www.aipderm.hu) (last viewing: 2023.04.03.)

<sup>17</sup> Unmanned Aerial Vehicle, UAV, or Remotely Piloted (Aerial) Vehicle, RPV, or drone (the meaning of the English word drone testicle (beehive)), which in the beginning is an aircraft primarily used for military tasks, which has some kind of self-control or remote control (most often a combination of the two), so there is no need for a pilot on board.

<sup>18</sup> Source: [https://index.hu/tech/2014/10/30/eletet\\_menthet\\_a\\_defibrillator\\_dron/](https://index.hu/tech/2014/10/30/eletet_menthet_a_defibrillator_dron/) (last viewing: 2023.03.05.)



development of technology, it is also possible to carry out lifesaving in real-time, remotely, following the instructions given by a specialist. Documented life-saving successes are also associated with the technology. A case in the USA is worth mentioning, during which local disaster management and fire department staff rescued two young people caught in a flood. With the help of a drone managed by the fire department, it was possible to survey the terrain, then use the device to drop rope and life jackets, and finally carry out a successful rescue.<sup>19</sup>

Thanks to the results of a Swiss experiment (which lasted from March 2017 to October 2017), to process laboratory samples faster, drones are also used to transport not-too-heavy samples between different healthcare institutions<sup>20</sup>. Their delivery does not require too much strength and energy, but speed is necessary, in many cases, lives can depend on how quickly a result arrives. This is also why we can consider the medical use of drones as a rather innovative solution, which can be used to avoid the loss of time caused by urban traffic and especially traffic jams. In addition to samples, it is of course also possible to deliver blood, medicines or other materials related to health care over long distances.<sup>21</sup>

For those who live in a less urbanized area, getting to a doctor or medicine can be difficult. This is also why the continuous development and testing of drones in this area is important, as their use can improve the quality and efficiency of healthcare services, as well as their perception by society, realizing the objectives of the concept of the Good State.

Disaster management staff have already deployed drones in Hungary as well. The Baranya County Special Rescuers tried to find a man missing in a mine with the help of a drone. In addition to the manpower search, they used the possibilities offered by the drone and scanned the area of the reeds of the lake from a height of a few meters from the shore, which was monitored by the disaster prevention staff standing on the shore through a screen.<sup>22</sup>

#### 4. CLOSING THOUGHTS

The appearance of the coronavirus and the effects of the pandemic made humanity and the governments of the countries realize that more emphasis should be placed on the development of digital solutions in the field of healthcare as well. In my opinion, it can already be stated that the big winners of the change will be, on the one hand, the technology companies implementing the developments, along with the citizens. According to my point

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<sup>19</sup> Source: <https://www.origo.hu/techbazis/20150703-dronokkal-mentettek-eletet-tuzoltok-dron-kopter-aradas.html> (last viewing: 2023.03.11.)

<sup>20</sup> Source: [http://hvg.hu/tudomany/20170331\\_korhazi\\_dron\\_egeszsegugyi\\_szallitas\\_laborminta\\_gyors\\_szallitasa\\_svajc\\_lugano](http://hvg.hu/tudomany/20170331_korhazi_dron_egeszsegugyi_szallitas_laborminta_gyors_szallitasa_svajc_lugano) (last viewing: 2023.03.21.)

<sup>21</sup> A drone has transported chilled human blood more than 250 kilometers across the hot Arizona desert – setting a record for transporting biological samples by remotely operated vehicle. The blood was still in good condition after the three-hour transport, which means that the role of drones in rural medicine can even be life-saving. Source: <http://www.origo.hu/gazdasag/20170921-dronnal-szallitottak-emberi-vermintat-sikeresen.html> (last viewing: 2023.03.21)

<sup>22</sup> Source: [https://hvg.hu/itthon/20150413\\_Dronnal\\_keresnek\\_egy\\_eltunt\\_embert\\_Barany](https://hvg.hu/itthon/20150413_Dronnal_keresnek_egy_eltunt_embert_Barany) (last viewing: 2023.02.18.)

of view, the majority of users and patients are currently showing openness and willingness to accept new digital services and devices, as they perceive their improvement in quality of life, prevention and greater security about their health. Of course, doubts can be raised regarding the protection of personal data, especially when using mobile applications, which developers and implementing governments must be able to adequately ensure. If this succeeds, the governments, including Hungary, can take new steps in the process of building a well-functioning, efficient, transparent, modern, service-providing state, which is the greatest expectation of citizens and clients.

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