TARTU BIOTECHNOLOGY PARK
integrated expertise

“Digitalisation in Healthcare: Growing the future”

Emerging Technology White Paper

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Table of Contents

Introduction

When Covid-19 hit the world, medics working in pretty much every healthcare system wished they were just a little bit more…Estonian.

While doctors found themselves adapting to a whole new way of giving consultations within weeks, and pharmacists were searching for a way to prevent vulnerable people queuing outside their stores to pick up their weekly medications, in Estonia, it was business as (sort-of) normal.

Estonia's health service has been digital for 12 years. More than 99% of the data generated by hospitals and doctors is digitised. Citizens can access their own medical records via a super-secure online portal and choose who gets to look at those records. That means finding out whether or not you've had a jab for yellow fever is a few clicks away, as is discovering just how many millilitres of a particular drug you were given when you had your tonsils taken out.

Many health services also happen online — from video consultations to e-prescriptions. And things that can be enormously complicated elsewhere, like registering a death and notifying all the relevant parties, are seriously simple; in Estonia, once death is registered online, notifications are automatically sent to that person's workplace, the tax office and the population registry.

PART 1 Digitalisation in Healthcare

Visionary Seminar: Visions that may shape the future!

On this premise, the project CELIS brings the visionary seminar to share and guide through all the stages of digitalisation and offer an ecosystem, both in-person and online, to learn from the industry leaders. The hybrid seminar had a focus on the potential and possibilities within the subject "Digitalisation in Life Sciences" – initiating digital transformation and change management in the health sector, trying to foresee the next 5-10 years of development in the field.

The visionary seminar was divided into two sessions, first presenting different healthcare sector innovations, proven to be successful from Estonia and the second part consisted of innovative presentations about the future of Healthcare.

Let's see what are those things that the world can learn from visionaries to become more digitally advanced in healthcare.

Strong cyber security and trust are the foundations of a digital health enabled society

Dr Ain Aaviksoo, who is the Chief Medical Officer of Guardtime Health, MD from the University of Tartu and MPH from Harvard University, talked about the superior approach to public challenges of digitising healthcare. According to him, the secure exchange of data is the most important thing that needs to be kept in mind.

If we start from a situation, when all our data is digital because it is created digitally in the first place and put that data to use in a way that we can prove the time integrity or the provenance of that data in the future, a country can build such a solution, where nearly everything is possible digitally.

Dr Ain also shared that since healthcare is happening in many places at the same time, simultaneously, so there needs to be a way to make the single version of the truth/data available to everyone. Hence the universal conceptual model of healthcare solutions being built should be based on data security, data privacy, and very importantly have the integrity of processes. Cybersecurity compliance audit and reconciliation, trusted third parties, are just old and clumsy ways that are built on the analog and of paper world. Whereas in the digital world, where things happen instantaneously, very flexibly, we need to have a technology that supports just this process integrity in its own way.

The very practical example that he shared was that we see a lot of traction now in healthcare is that instead of building huge data lakes, which has been the quest maybe for last 10 years, people

are now turning to build a reliable platform that can utilise these data lakes and analyse and harness the power of data to convey a meaningful outcome. To build such a platform, first, you secure the data in the original location in a way to maintain its integrity so that you can trust in future that the information is reliable. And then using multi-party computation, automate the auditing of that. So that if now this aggregate is used to track those deals, and the results, the single version of the truth is shown to all the stakeholders

Lastly, sharing his dream, Dr Ain shared some of the possible areas where there is scope for innovation. Some of them being, more real-time healthcare in future, value-based payment systems, there would be personalized decision making driven by the data, there is real evidence used all the time, health services are business invisible and are an integral part, and frictionless governance across borders.

At the time of writing this report, WHO has announced an international partnership to build a trusted COVID-19 Vaccination Certification Infrastructure along with the Estonian Prime Minister[1]. It seems that the vision shared by Dr Ain is already being realised by him in addressing the need of the hour, i.e. the global vaccination drive and the evidence of the same!

Biobanks will enable the next era of innovation in healthcare!

Prof Tõnu Esko shared his lessons from Estonian Biobank and threw more light on the rise of precision medicine. He is the Vice Director of Development and head of Estonian Biobank Innovation Center at Institute of Genomics, University of Tartu, where he holds Professor Human Genomics position genomics. Tõnu Esko is also a Research Scientist at the Broad Institute of Harvard and MIT, Cambridge, USA and visiting researcher at the Children's Hospital Boston and Harvard Medical School, Boston, USA.

He gave us an introduction about how genetics and big data when combined with genetic factors could really lead to new and effective medicine and treatments.

Tõnu started by highlighting the importance of both genetic and lifestyle risk factors in the risk of developing certain diseases. Emphasizing that it's important to know one's genetic background to be able to modify the lifestyle because the more genetic risk one has for a certain disease, the less flexibility one has in his lifestyle choices.

The 21st-century citizen-centred state and service-oriented society require information systems to function as an integrated whole to support citizens and organisations. There must be interoperability between different organisations and information systems. In other words, they must be able to work together, and data needs to be requested from the citizen only once.

[1] https://guardtime.com/blog/who-digital-covid-19-vaccination-infrastructure

The Estonian Biobank (EBB) is a population-based biobank of the Estonian Genome Center at the University of Tartu (EGCUT. Its cohort size is currently close to 200,000 participants ("gene donors" ≥ 18 years of age), which closely reflects the age, sex and geographical distribution of the Estonian population.

Estonians represent 83%, Russians 14%, and other nationalities 3% of all participants.

Genomic GWAS analyses have been performed on all gene donors, and RNA samples from 2,100 individuals are available for gene expression studies, along with 45 biomarkers from serum and plasma.

https://www.eithealth-scandinavia.eu/biobanks/the-estonian-biobank/

The unique thing about the Estonian biobank is that it's the first biobank that had its own biobanking law, to support nationwide research projects. It doesn't just regulate how the data is used, and what are the rights and obligations for the database custodians, but more importantly, it gives the participants a lot of rights and protections against discrimination and misuse of their genetic information.

When people join the biobank, they sign a broadly informed consent. In this proof, broad informed consent, they give the rights to the biobank to contact them, to invite them to be part of further research studies, and also to actually connect with this extra information infrastructure to retrieve health information like all the hospitals, health records, registries, prescription databases, all that is related to the individual and it also gives the participants the right to know.

Estonia, indeed is one of the forerunners, getting such a big part of the population genetically profiled. Not just profiled but also to open that data for research, for clinical work, for the benefit of the participants.

According to Tõnu Esko, the future of medicine is definitely genetic medicine and it makes sense to keep an eye on different developments or come up with tools and services to make good use of genetics in providing better care for the patients.

Five main parameters to see if your country is ready for personalised medicine:

- Availability of e-health, EMR and other e-infrastructure
- Availability of advanced Genome analysis technology
- Availability of scientific and medical expertise
- Identification of genomic variations with effects on human health and behaviour
- People's interest in the adoption of personalised healthcare

Being open advances society

2020 is the most surprising year in quite a lot of aspects. And as we know, we are all confronted with a crisis, all people around the globe are opening up doors and breaking down walls for global collaboration. This helps in opening up data to create models that allow us to predict more specific concepts.

During the first covid crisis, within only eight weeks, Europe was able to collect a group of over 100,000 people that worked in 42 countries, that created over 25 million of pieces of open source development medical supplies by using digital manufacturing capacities, makerspaces, 3d printing, injection molding, all kinds of technologies were in use that was never seen before. In fact, the U.S. Food and Drug Administration (FDA) also came up and approved some of these designs that the community created and they were liberated for clinical use, all in less than two months.

Bart de Witte, one of Europe's leading and awarded experts on the digital transformation of healthcare, and one of the most progressive forward thinkers focused on finding alternative European strategies for the current postmodern world to create a more desirable future with greater social benefits, shared some points, Do's and Don'ts, to take into consideration while building resilient digital healthcare ecosystems:

- The biggest hack is to give everybody access to health care. There should be open source AI in healthcare because if we open-source AI, we get a lot of companies like the libraries on GitHub that can start using and adopting. And we don't get monopolized or colonized by big tech companies that are entering the market.
- Lowering down the barriers to getting access to the technology would create more business, hence experience economy would be the next phase of economical value creation in healthcare.

- When one develops a digital future in healthcare, one should ask himself, what workflow should it follow? Should it follow Moore's or Eroom's law for the digital age?
- In digital healthcare, one should compete on experience and not compete on IP.
- Information asymmetries will always lead to inequality. When we think about AI, we create asymmetries, asymmetries between larger organizations, private organizations and individuals. In Europe, they had asymmetries between the medical substances that you need to produce drugs because they were all produced in another country, hence removing asymmetries and building resilience and sovereignty as an answer is really important.
- When we think about algorithms and business models, there is one single company that decides in Europe. But in healthcare, Europe has billions of EU funding on research to try to avoid this and recreate its search engine for Europe. And then they started investing in research alone is not the thing, it is the business model. It is the platform, it is the network effect. So there is much more than just having IP.
- The value system should be based on inclusivity, humanity should be the beneficiary and not the shareholders
- The AI model being built should be based on the fundamental rights, like the right of integrity of a person, that means it should take into consideration things like informed consent, privacy prohibition etc.

Don'ts

End up in a monopoly of medical knowledge and creating symmetries. This can be avoided by stopping seeing data as a commodity, as the new oil, or gold. The data in healthcare is something that is extracted out of an individual's body and belongs to a society or belongs to the individual, there is no legal definition on who owns data, there is a gray zone in there.

Creating AI of the people, by the people and for the people

Hippo AI vision is an NGO, a humanitarian nonprofit that wants to accelerate the open development of AI. They believe that AI should be accessible to the general public, free of economical interest. And want to serve humanity, regardless of race, religion, gender, sexual orientation, creed, or political affiliation for any disease.

The foundation collects donations to build global Data Commons for AI, publish the data under an Open Knowledge license, that at the end, accelerates medical discoveries that are available to all.

They partner with one single patient with a specific disease, this patient becomes the face and donates name and the data and the face for advocating for the campaign. All the patients that are suffering from the same disease, can donate money or health data. And then they create these global data sets that are available to all under the license and hence,

- Creating data and AI commons like AI is a common good.
- Avoid information asymmetries,
- Protect human rights,
- Solve the United Nations Sustainable Development Goals
- Create a movement driven by people, patients that want to democratize AI.
- Create a public awareness
- Accelerate data donation, and
- Accelerate collaboration

Expanding the potential of digitalization going from e-health to *in-silico*

Dr Liesbet Geris, who is Colleen-Francqui Research Professor in Biomechanics and Computational Tissue Engineering at the University of Liège and Leuven in Belgium, also is currently the executive director of the Virtual Physiological Human Institute

A European initiative, the Virtual Physiological Human (VPH), is focused on a methodological and technological framework that enables collaborative investigation of the human body as a single complex system. The collective framework makes it possible to share resources and observations formed by institutions and organizations, creating disparate but integrated computer models of the mechanical, physical and biochemical functions of a living human body.

Dr. Leisbet Geris told that Virtual Physiological Human leads to a better healthcare system which aims to produce the following benefits:

- personalized care solutions
- reduced need for experiments on animals
- more holistic approaches to medicine
- preventative approaches to the treatment of disease
- The use of in silico (by computer simulation) modelling and testing of drugs could also reduce the need for experiments on animals.

VPH is a framework which aims to be descriptive, integrative and predictive.

The framework is formed by large collections of anatomical, physiological, and pathological data stored in digital format, typically by predictive simulations developed from these collections and by services intended to support researchers in the creation and maintenance of these models, as well as in the creation of end-user technologies to be used in the clinical practice.

The VPH model aims to integrate physiological processes across different length and time scales (multi-scale modelling). These models make possible the combination of patient-specific data with

population-based representations. The objective is to develop a systemic approach which avoids a reductionist approach and seeks not to subdivide biological systems in any particular way by dimensional scale (body, organ, tissue, cells, molecules), by scientific discipline (biology, physiology, biophysics, biochemistry, molecular biology, bioengineering) or anatomical sub-system (cardiovascular, musculoskeletal, gastrointestinal, etc.).

Personalized care solutions are a key aim of the VPH, with new modelling environments for predictive, individualized healthcare to result in better patient safety and drug efficacy. It could also result in healthcare improvement through a greater understanding of pathophysiological processes. The use of biomedical data from a patient to simulate potential treatments and outcomes could prevent the patient from experiencing unnecessary or ineffective treatments.

Summary by the moderator

Hope

The moderator, Mr Sachin Gaur, showed a common theme across the four speakers which were data in the healthcare domain. While Ain emphasized the aspects linked with data security and protection to improve reliability, Tõnu emphasised on precision which comes from biobanking or 'omics' data. Bart talked about keeping the access to that data equitable so that there is equity of larger society in this AI-led healthcare movement. Liesbet aced it up by showing how the data models can enable faster turnaround time in clinical trials, simulation of complex therapies and procedures and making healthcare safer and more sustainable. She summed it up by saying that the most important 'omics' is economics!

He further highlighted some points accentuated by the current covid crisis, which demands the world to prepare a large scale digital enabled role out of covid vaccine, taking inspiration from nature ('dogs detecting covid patients' and success of small startup bluedot in predicting covid-19 outbreak) and how new pandemic tracking approaches need to be developed for building resilience before the next pandemic strikes.

Barriers

Experts from large countries often dismiss the Estonian version or any other futuristic society as a nice, controlled environment. What we can definitely draw as a lesson from a technology-led future that technology, while is a key building block for bringing this more equitable, accessible and safe future but it is not sufficient. Where most societies lack is the political will for changing the status quo, which in turn comes from the societal readiness of adopting and asking for the change.

We often miss out on these important human factors to bring change. Mere looking at the future from a technology lens could be a wish list but not reality. Bringing societal stakeholders together, a bottom-up movement that empowers users is the real driver of change in societies like Estonia! This is the most difficult part to replicate compared to a technology led digital solution.

Conclusion

Digital in healthcare is the biggest opportunity which is further accelerated by COVID-19; it increases the access, whether it is rural or urban, the access remains the same. In the past few years, the world has seen tremendous innovation in digital health technologies, including the electronic health record, virtual visits, mobile health, wearable technology, digital therapeutics, artificial intelligence and machine learning. The increased availability of these technologies offers opportunities for improving access, outcomes, adherence and research.

Digital Health is a precursor to preventative healthcare. It is a proactive approach to healthcare and promotes long term sustainability. As monitoring of health data using digital health provides a framework to predict health episodes in advance. hence, It focuses on preventing or detecting health issues before they evolve into major medical problems. Transforming healthcare with digital as the key pillar will enable a more sustainable future for Europe and other societies.

PART 2 Estonian e-Health Ecosystem

Major players supporting the field or working on the field of digitalisation in healthcare

Health Clusters

Connected Health Cluster, founded by the Science Park Tehnopol, is a country-wide partnership between health-related stakeholders in Estonia, who are committed to accelerating the adoption of connected health solutions, on an international scale and on commercial terms[2].

Science Park Tehnopol is a research and business campus helping to develop startups and SMEs more quickly. Tehnopol Startup Incubator helps technology-based startups to develop their business and get investments.[3]

Tartu Health Cluster, founded by Tartu Biotechnology Park, is for life science and biotechnology companies and other stakeholders on Tartu City, Southern-Estonian and Estonian level, alleviating the Estonian biotechnology sector bottlenecks by connecting local industry with potential partners abroad through their network, helping local companies thrive through providing access to conferences, trade fairs and exhibitions and providing joint marketing for Estonian companies in events and webinars[4].

Tartu Biotechnology Park provides physical infrastructure as well as business development and consultancy services to companies and R&D institutions in the fields of biotechnology, medicine and veterinary medicine[5].

Medicine Estonia Cluster joins medical institutions interested in export of medicine by attracting patients from abroad.[6]

Health Founders is a vertical health technology accelerator in the Baltics. Helping exceptional founders develop breakthrough ideas into sustainable business models.[7]

[2] https://www.connectedhealth.ee/,accessed 24.08.2020
[3] https://www.tehnopol.ee/en/startup-incubator/, accessed 24.08.2020
[4] https://biopark.ee/tartu-biotechnology-cluster?lang=en,accessed 24.08.2020
[5] https://biopark.ee/?lang=en,accessed 24.08.2020
[6] https://biopark.ee/?lang=en,accessed 24.08.2020
[7] https://healthfounders.ee/, accessed 14.09.2020

Roles of governmental institutions in digitalisation of Estonian healthcare

The Ministry of Social Affairs plans the health care policy and organises its implementation. The objective of the Ministry of Social Affairs, together with relevant institutions, is to ensure the following through health policy:

- the availability, quality, and safety of healthcare;
- the awareness of and satisfaction with health services among residents.[8]

TEHIK (Centre for Health and Welfare Information Systems) is a competence centre of information and communication technologies in healthcare, social protection and social work fields[9].

Information System Authority enables and secures all the e-solutions[10].

Research/Academia

Estonia has altogether 26 educational institutions offering higher education.

The leading university with a highest reputation offering master and degree programmes focused on healthcare is the **University of Tartu**. Several masters programmes are provided by **Tartu Health Care College** and **Tallinn Health Care College**. Various courses related to digitalisation of healthcare are provided by some other universities like **Tallinn University** and **Tallinn University of Technology**.

Next to the universities several research institutions are established. **University of Tartu Institute of Genomics** gathers - Estonian Biocentre, Estonian Genome Centre and Core Facility. The University of Tartu, Institute of Genomics Core Facility is dedicated to providing genotyping and sequencing services to researchers, clinicians and others with the state-of-the-art technology of Illumina.

Estonian Biobank is a population-based biobank of the Estonian Genome Center at the University of Tartu. The cohort size is currently 200.000 gene donors (20% of ≥18 years of age population), which closely reflects the age, sex and geographical distribution of the Estonian population.[11]

Also, the **Institute of Clinical Medicine** is created at the University of Tartu.

[8] https://www.sm.ee/en/e-health, accessed 26.08.2020
[9] https://www.tehik.ee/, accessed 26.08.2020
[10] https://www.ria.ee/sites/default/files/content-editors/ria_aastaraamat_2020_48lk_eng.pdf,accessed 24.08.2020

[11] https://ccht.ee/home/, accessed 27.08.2020

The main task of the institute is to conduct teaching, research and development activities in its disciplines and related disciplines. Most of the clinical subjects of the Medicine programme are taught at the Institute of Clinical Medicine. The institute is the main coordinator of the residency (postgraduate specialist medical) training, the clinical medicine doctoral (PhD) studies and the doctors' continuing education at the University of Tartu and in Estonia. Most of the academic staff are clinicians, who hold different positions at the Tartu University Hospital.[12]

Research and development units are found in all biggest hospitals in Estonia.

The Tartu University Hospital is the main clinical research institution in the country.

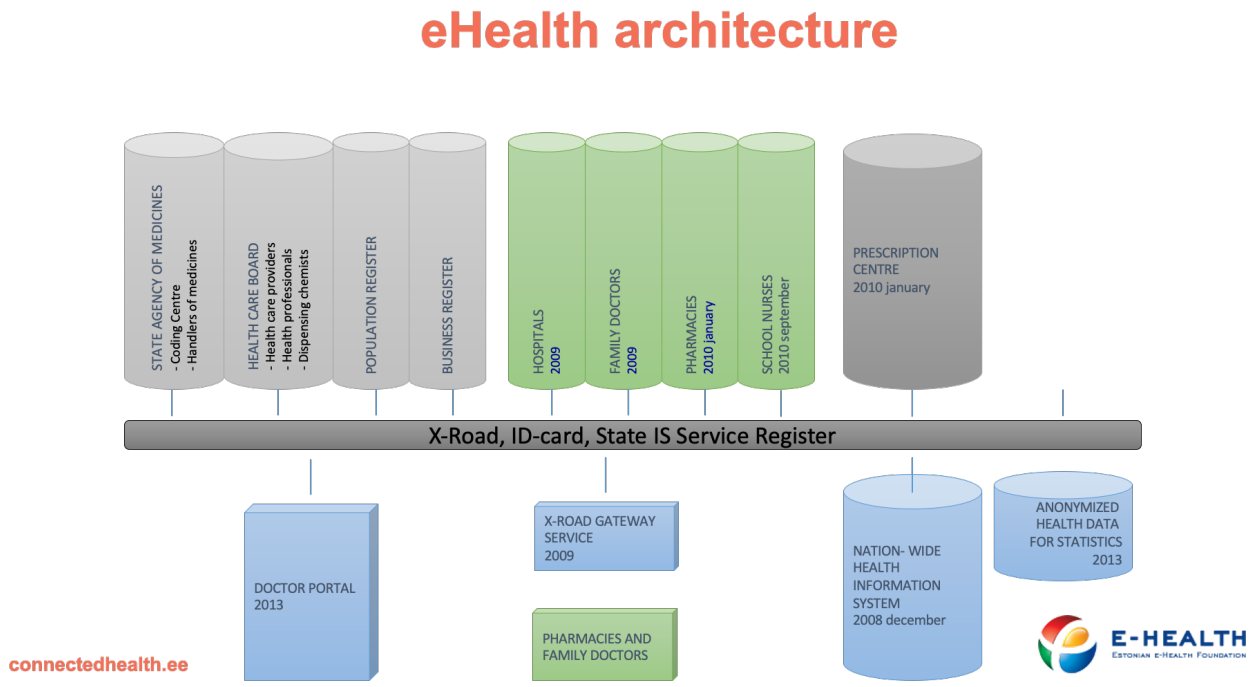
The North Estonia Medical Centre is another top healthcare provider in the country. Research and Development department gives opportunity to organise science, training, and development activities[13].

[12] https://kliinilinemeditsiin.ut.ee/en, accessed 12.09.2020
[13] https://www.regionaalhaigla.ee/et/teadus-ja-arendustegevus, accessed 27.08.2020

X-road - Estonian e-solution environment

X-Road® software-based solution X-tee is the backbone of e-Estonia. It allows the nation's various public and private sector e-service information systems to link up and function in harmony.

Estonia's e-solution environment includes a full range of services for the general public, and since each service has its own information system, they all use X-tee. To ensure secure transfers, all outgoing data is digitally signed and encrypted, and all incoming data is authenticated and logged.



It connects different information systems that may include a variety of services. It has developed into a tool that can also write to multiple information systems, transmit large data sets and perform searches across

several information systems simultaneously. X-Road® software based Estonian environment X-tee was designed so it can be scaled up as new e-services and new platforms come online.

Today, it is implemented in Finland, Kyrgyzstan, Faroe Islands, Iceland, Japan, and other countries. Similar technology that is based on the Estonian interoperability experiences has also been implemented in Ukraine and Namibia.

Two X-Road® ecosystems can be also joined together, federated as a one-to-one relationship between two ecosystems. Members of the federated ecosystems can publish and consume services

with each other as if they were members of the same ecosystem. Federation enables easy and secure cross-border data exchange between these ecosystems. [14]

Estonia and Finland are the first two nations in Europe to develop a joint data exchange platform based on Estonia's X-Road in 2018, which allows databases in both countries to interface, assist with cross-border services, and make e-services accessible to Estonian and Finnish citizens.[15] According to Estonian Ministry of Social affairs there are changes planned to involve more private enterprises to development of healthcare.

[14] https://e-estonia.com/solutions/interoperability-services/x-road/, accessed 14.09.2020
[15] https://e-estonia.com/x-road-between-finland-and-estonia/, accessed 24.08.2020

Summary from Estonian Health Experts opinions

Estonian e-health system is among leading countries globally with a number of advanced e-health applications like e-prescription, e-consultation, e-health records in hospitals and digital health history of patients. Estonia has 4 major health databases on which are based different services - Estonian nation-wide Health Information System, Estonian Health Insurance Fund's database, Estonian Bank of Healthcare Images and Estonian Genome Bank. Estonian Genome Bank has restricted access through individual request by the participants, but the other three are accessible by health professionals. The government is in the process to develop a platform for managing informed consent by data subjects that can digitally give consent on their health to secondary data users incl. private companies.

Nevertheless, there are some challenges in Estonian healthcare digitalisation that experts pointed out.

Data Usage and Management

Data is kept in different databases and the interactions between those databases is not always sufficient and reliable. There is a lot of information gathered in the healthcare sector, but this information needs further analysis in the next periods to make the most use of them.

Digitalisation needs investments and optimizing the costs is a common driver of using innovative technology. Although there are financial measures that enable innovation, the high technological solutions remain often too expensive.

Innovational technological possibilities are not known widely, so the decision makers don't know what the most recent technological possibilities are.

Small Market

Estonia is rather small, so we always need to see how we can go abroad with different solutions that we create. However, due to the dynamic environment Estonia is suitable for piloting and co-creation.

Public and Private Sector Cooperation in Digitisation of Healthcare

The government is working on development of an infrastructure for cooperation projects- like sandboxes e.g., so that enterprises could come and test their products on data from various datasets (genomic, health, clinical) in Estonia.

Recent Developments

COVID – 19 has speed up innovation and different solutions that enable social distancing. In the beginning of the Corona crisis the Estonian Health Insurance Fund reacted in days and started promptly to remunerat teleconsultations.[16] This measure prevented that regular treatment would have been paused and kept away the infection in risk groups and medical personnel. It was possible as the plan to use virtual consultation, but due to the crisis, the application was used earlier and more actively than planned. Teleconsultations were very well received by patients and medical professionals and ⅔ of all doctor's appointments were done remotely.

Another example is the "HOIA" app for anonymous detecting contacts between mobile phones and informing people who have been in close contact with coronavirus carriers. There are also an increasing number of applications to optimise health and social care costs.

Some examples. An app for Sclerosis Multiplex patients for home surveillance of movement and other parameters enabling to analyse the condition of the patient and react on time to the changes,[17] or an indoor GPS patient monitoring system for an Estonian rehabilitation center to evaluate the effectiveness and impact of rehabilitation.

Telemedicine improves the healthcare of patients living in the remote areas. With the applications it is possible to reduce the impact of lack of medical personnel in remote areas - possible to use doctors to get a second opinion from another doctor and for a patient to visit a specialist of some specific field.

Road Ahead

The market growth will probably follow the overall development in the world. Expectedly, the growth will be bigger when the state is able to set up a cooperation framework for development of new products and services.

In the next 5 years, using the health and genomic data will be available to create new services and products for the private sector. Estonia has a valuable asset as a long-term digital health data, but we are not making much out of it now. There is the potential that we can create new services and products based on health data that is available and other digital data that Estonia is rather good at.

Genomic data will be used in practice for prevention and health promotion incl. cancer risks, in clinical practice and in personal prescription of medications.

Wider use of patient home surveillance devices for providing healthcare from distance and less hospitalisation - using sensors and measurement devices combined with the apps that collect and

[16] https://www.haigekassa.ee/partnerile/raviasutusele/kaugvastuvotud, accepted 16.09.2020
[17] https://www.astrakliinik.ee/sclerosis-multiplex/kodumonitooring-muutub-sclerosis-multiplexiga-inimeste-jalgimisel-uha-tahtsamaks/, accessed 27.08.2020

monitor the information, enabling the personalised medicine from distance. Monitoring of cancer risks are more visible for people so they could take actions to prevent it.

Expert opinions were shared by the following experts:

1. Katrin Kaarna - Institute of Clinical Medicine, University of Tartu, Tartu University Hospital, Project of National Centre for Translational and Clinical Research
2. Andres Salumets - The Competence Centre on Health Technologies, CCHT
3. Carmen Siitsman - ELIKO Tehnoloogia Arenduskeskus OÜ
4. Kalle Killar - Estonian Ministry of Social Affairs
5. Kitty Kubo - Estonian Health Insurance Fund

(read more from Report on Joint Marketing Opportunities - https://drive.google.com/file/d/17PZL1ybh27QE4TtzNJvd8fV6zutCD4G2/view)

Useful links – Report on Joint Marketing Opportunities

https://drive.google.com/file/d/17PZL1ybh27QE4TtzNJvd8fV6zutCD4G2/view

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