The Strategic Development Plan was developed by the Task Force operating within the Government Office from July 2014 to November 2015. The materials created by the Task Force on which the development plan was based are available at [http://etervis2025.sm.ee/](http://etervis2025.sm.ee/).

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Introduction

Drafting of the eHealth strategy is part of the activity plan of the Government of the Republic 2014–2015\(^1\). On July 3rd, 2014, the Government of the Republic decided to set up a eHealth task force\(^2\), to develop a strategic development plan for Estonian eHealth until 2020, including the development vision of eHealth until year 2025. The Task Force operated under the Government Office, with participation of the Ministry of Social Affairs, the Ministry of Economic Affairs and Communications and the Ministry of Finance, with the relevant state institutions of the area of government. The Task Force also included representatives of Estonian Health Insurance Fund, Estonian Medical Association, Estonian Hospitals Association, Estonian Association of Information Technology and Telecommunications, Estonian Family Doctors Association, NGO Estonian Chamber of Disabled People, Technomedicum of Tallinn University of Technology, Faculty of Medicine of the University of Tartu, and Estonian Service Industry Association. Experts of various fields were also included in preparation of the strategy. The work of the Task Force was coordinated by Ain Aaviksoo and organised by the Strategy Unit of the Government Office.

The present document is the result of the work of the Task Force and has been approved at a cabinet meeting of the Government of the Republic on December 3rd, 2015.

The Estonian eHealth vision until year 2025 describes the desirable future state of health care and related areas (labour market, welfare) and the information society achievable by skilful application of the means of eHealth. The vision has been deliberately drafted for a longer period than the strategic development plan, in order to consider the major development trends both abroad and within Estonia. The achievement of the vision is supported by a 5-year strategic development plan and a detailed application plan updated annually.

Estonian eHealth Strategic Development Plan 2020 (hereinafter: Strategy) focuses on particular eHealth specific choices and activities the realisation of which is feasible during the next five years. The Strategy is based on the assumption that the creation of eHealth, i.e. IT-means and possibilities for health care, is a prerequisite for the achievement of the substantial goals of the health area but does not guarantee the achievement thereof by itself. On the other hand, the implementation of the Strategy and the activities thereunder are based on the general service development and financing principles applied in the state, according to which all IT investments must be based on the substantial, i.e. the so-called business objectives of the area, and the optimum possibilities for the achievement thereof, including the necessary ancillary activities for successful implementation of e-applications\(^3\). The strategy is updated at

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1. [https://www.riigiteataja.ee/aktilisa/3290/4201/4007/VV_180k_lisa.pdf](https://www.riigiteataja.ee/aktilisa/3290/4201/4007/VV_180k_lisa.pdf)
2. Materials of the Task Force are available at [www.etervis2025.sm.ee](http://www.etervis2025.sm.ee)
least once in three years, based on the health policy developments and the results of application of the Strategy.

Implementation of the Strategy is lead by the Ministry of Social Affairs, in cooperation with the Ministry of Education and Research and the Ministry of Economic Affairs and Communications and other partners in the public sector (e.g. subsidiaries of the Ministry of Social Affairs, Estonian eHealth Foundation and Estonian Health Insurance Fund), health care providers (e.g. providers of general and medical care, professional organisations in health area), research and development institutions (e.g. universities, higher educational establishments teaching health care, National Institute for Health), private companies and representative organisations of the private sector, and patients, i.e. the population on a wider scale.

**Application plan of the Estonian eHealth strategy 2016-2019** is an activity plan for implementation of the goals of the strategy, including the people appointed to carry out the activities. The plan is updated according to the planning of the state budget, annually. It shall be completed in March 2016.

The application of the eHealth Strategy takes place based on focus areas, grouping various existing e-services and planned activities around the central strategic goals based on the health policy. The Strategy and the application plan form an obligatory basis of financing of all budgetary ICT investments in the health area, and also an important guideline for eHealth initiatives in the private sector aiming at national influence, as well as for research and development activities based on the data analysis of eHealth and the health area (including big data).
List of abbreviations and acronyms

EMPIS – the main procedural system of information of the Unemployment Insurance Fund for implementation of the Labour Market Services and Benefits Act.

ETSA – Estonian eHealth Foundation

FV – focus area

HK – Estonian Health Insurance Fund

ITI – document management development information system of the Labour Inspectorate

MISP-2 – mini-information system -portal making it possible to use the X-tee services open for institution

PPP – public-private-partnership

RA – Ministry of Finance

SKA – Social Insurance Board

SKAIS – information system supporting the work processes of the public services of the Social Insurance Board, including the work of the state pension insurance register

SKAIS2 – project for modernisation of the public services of social protection, with a purpose of optimising the work processes of the Social Insurance Board while providing state pensions, allowances, compensations and various services (rehabilitation, special care, victim support), building a new information system supporting those, and creation of new means and channels of public services.

SoM – Ministry of Social Affairs

STACC – Software Technology and Applications Competence Centre

STAR – data register of social services and allowances – central data library / information system created for organisation of social work carried out by principle of case management.

TA – Health Board

TAI – National Institute for Health

TETRIS – information system of the Estonian Unemployment Insurance Fund for evaluation of capacity for work and payment of work ability allowance

TIS – national health information system

TTKS – Health Services Organisation Act

TTO – health care service provider
eHealth vision 2025

eHealth vision for year 2025 describes the desirable future state of offering of health care services in Estonia at the era of information society. The present vision focuses on the health of people and the health services offered, including the labour market and welfare services related thereto. Thus, the vision associates eHealth also with other areas related to it, in order to ensure their alignment.

VISION:

By 2025, a well coordinated network of eHealth solutions at different levels and health care services based on those have been created, with the following results:

HEALTH DATA

- Health data collected from people are always of high quality.
- Based on the data, it is possible to obtain a comprehensive overview of everything related to a person’s health: on a time scale starting from the information about genetics, indicators describing the state of health, peculiarities of health behaviour until environmental information (i.e. information from within us, about us and about our environment).
- Usage of the data is always transparent and controlled.
- The data are actively used from the primary application for solution of a health case until subsequent reuse, including in research and development and additional services provided by companies.

HEALTH SERVICES

- Health services are always human-centred and relevant.
- Health services are usable regardless of the location of the consumers and their abilities to use ICT.
- The services of different levels and service providers are smoothly interconnected: every health issue of a person is handled comprehensively; only data (not the person) is circulated among specialists.
- The effectiveness of health services is personalized and better measurable, while constant feedback to the specialist and visibility to the person is ensured: both for a single stage and the whole episode or disease.

HEALTH SYSTEM
- Possibilities for disease prevention and active management of people’s own health have significantly increased: e.g. people see a specialist only in the event of a serious need or a more complicated issue, as services to take care of oneself as well as to obtain specialist advice are ensured close to home.

- Source information for development of health policy is significantly more comprehensive and accessible, and it is possible to make better-grounded and quicker decisions in regard to optimum use of resources at all levels.

- eHealth solutions have become a big help for a specialist: data and support for evidence-based decisions are available and immediately accessible to a specialist everywhere; entry of data is simple and smooth.

- Constant innovation is applied at all levels: testing and implementation of new solutions in order to improve the effectiveness of the services and the efficiency of the system.

When implementing the system, the resource of the health care, labour market and social welfare systems are used much more efficiently (e.g. e-services must reduce inefficiently spent time and unnecessary procedures) and the satisfaction of the people using the services increases.

The eHealth vision 2025 shall be implemented, relying on the strategy for five years and a four-year application plan updated every year according to the process of the state budgeting strategy.

Figure 1: the main development documents of management of the area of Estonian eHealth and their time span.
eHealth development goals 2020

“Better information – more health!”

The eHealth Strategic Development Plan 2020 (hereinafter: Strategy) is a part of the Public Health Development Plan 2009–2020. The Strategy focuses particularly on the choices and activities related to e-services, in order to achieve the situation in the area of health described in eHealth vision 2025. The Strategy supports all the general and area-based goals of the Public Health Development Plan, being directly related to the sub-goal 5 “All people have access to high-quality healthcare services by optimum use of resources” and activity 5.4.11 from the application plan of 2015 “Application of the principles and innovative solutions of E-State, increasing the efficiency of the cooperation and information exchange of service providers.”.

The eHealth strategy directly supports also the implementation of the vision and development plan of Estonian information society 2020 and the approach of smart specialisation in supporting the growth of the Estonian economy. Thus, eHealth aggregates the services of development of e-solutions aimed at health in the areas of health, welfare and labour market, considering the relevant general development directions and principles of e-state, and the development possibilities of entrepreneurship, research and development in the area.

eHealth strategy includes all the technological and organisational components related to health data or the provision of remote services through e-channels. It is called the eHealth system and it includes the state information library Health Information System (TIS) and other IT devices and applications processing health information (including the information systems of health care providers, the equipment in possession of people, smart devices, etc.).

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4 https://www.sm.ee/et/tervis
5 http://infoyhiskond.eesti.ee/eesti-infoyhissonna-arengukava-2020/infouhiskonna-arengukava-2020-loppversioon
6 aligned use of information and communication technology and digital health and medical information for purposes related to a person’s health, labour market, welfare and public health (“Wider application of telemedicine in health care”. PRAXIS 2014)
The strategic development goals of eHealth based on the vision are divided into five focus areas based on the policy goals related to the public health and the so-called basic trends including the changes in society. Every focus area aggregates the measures that are logically interconnected and support the achievement of substantial influence into a complete programme. The measures, in turn, aggregate the activities necessary to achieve those specific goals.

In order to implement the eHealth strategy, it is necessary to develop the base competencies and innovation of health services supported by the possibilities of technology in the following five focus areas:

1. **High-quality health information and an infrastructure of health data.** Data acquisition is of high quality and data acquisition is efficient from the place of creation until the availability to different users.

2. **Focus on persons and personal medicine.** Improved possibilities of people to participate in active management of their state of health; by person-based health and gene data analysis and digital decision support it is possible to offer better targeted services to people; R&D activities and entrepreneurship in the health area have expanded.

3. **Comprehensive case management and cooperation of organisations.** The provision of sustainable comprehensive health services is possible through all the stages of the health services (from prevention to rehabilitation), as the provider(s) of health care services and the persons themselves have comprehensive information about the state of health and the action plan of different parties; health services are smoothly integrated with the social and labour market services.

4. **Effectiveness of health services and capacity for analysis.** It is possible to measure and analyse the effectiveness of the services at all levels of the health system in order to make planning and management decisions.

5. **Development of remote services.** The use of remote services and the health services based on those (remote health care and remote care) makes is possible to achieve a better cost-effectiveness of the health system and accessibility of the services; R&D activities and entrepreneurship in the area of health have expanded.
Principles of development of health care e-services

In order to achieve the strategic goals of eHealth, the below data acquisition and e-services development principles are of conceptual importance. Those principles are followed consistently in all the focus areas and development activities.

1. **Open use of data.** Every person has a right to use the health data stored about them, and by active expression of will a) give access in machine-readable format to an organisation of their choice, a provider of health or data analysis service; or b) restrict the use of health information stored about them on the same grounds. In any case a person must give a relevant informed consent to providing or restricting access to the data.

2. **Privacy of persons and protection of personal data** must be ensured also in the event of wide cross-usage of health information. Thus, among other things, opportunities are created for people to see at every moment who and for which purpose is using the health information about them. The surveillance mechanisms and technological means necessary must be constantly updated. Safe sharing of information and adherence to the protection of personal data are values that are and shall remain in focus during the achievement of the eHealth strategy.

3. **Single entry and reuse of data.** Data are entered into the eHealth system once — afterwards the existing source data are used, if possible. Informed collection and reuse of data for different purposes in the prevention and treatment process must significantly increase in order to ensure earlier intervention, more efficient health service and optimum use of resources for all the parties.

4. **Data quality and interoperability.** The health data collected must be of high quality, relying on the agreed data standards, classifications, lists and other requirements established to data quality, in order to ensure the interoperability of information systems. In development of applications, particular attention is paid to the user experience in entering and storing data, in order to ensure the achievement of a better-quality source database.

5. **Data are organised as health cases.** The composition of the important health information collected during the provision of health service and by the person concerned, as well as the metadata associated therewith are defined as a health case based on their nature, not on payment for the service (e.g. a visit to the department of emergency care, response to a referral, result of an examination, beginning a diet, confirmation of cancer diagnosis, etc.). Definition of a health case is the basis for establishment of functional standards for e-services and the standards of important data composition.

6. **Machine-readable reuse and interoperability of data.** Data are successfully reusable if they can be shared in machine-readable format, i.e. they can be automatically processed by information
systems. The share of machine-readable data must be increased in order to enable efficient reuse of data and ensure interoperability.

7. **Quality and effectiveness of services.** The e-services developed shall create new value, thereby improving the quality of health services and helping to improve the quality of life of people, ensure more years of healthy life, save time and money.

8. **Training and education.** In preparation and implementation of all the measures and projects, the necessary training and education component (increasing the capacity of the human resources) must also be considered, in order to ensure the actual functioning of the technical, organisational and legal environment both in the short and long perspective.

9. **Innovation.** The development of eHealth supports the creation, testing and wide implementation of innovative solutions, also by supporting relevant R&D and entrepreneurship, if possible. Also, the already created and successfully used (e.g. elsewhere in the world) solutions are implemented if it facilitates more cost-effective and quicker achievement of the goals.
Focus area 1 - High-quality health information and data infrastructure

Area goal 1: Data acquisition is of high quality and data acquisition is efficient from the place of creation until the availability to different users.

The first focus area aggregates eHealth activities which focus on development of the eHealth system from the creation and display of high-quality source data (manual entry and machine-created) at the location where those are created until reuse thereof later on. In order to do that, a well-integrated infrastructure and ecosystem are developed for convenient use of health information of various origins. That means, among other things, that data acquisition in the health system is organised based on agreed data standards and functionalities at the location where the source data are created, and it is supported by an efficient framework of data processing with relevant national applications. The goal is to achieve the accessibility of standardised digital data to all the parties with the help of an information system.

The lack of high-quality data and insufficient reuse of data has negative influence on the achievement of all the result goals of the health system (and in particular those of the eHealth system). Currently, the use of the health information distributed between the parties in the eHealth system is largely insufficient, as not all the databases and information systems are capable of exchanging data at the right time and in the right format. There are also faults (data quality, technical errors of the system) in the eHealth system already created, both in regard to the creation of data acquisition process data and data display (duplicate entry of data in different information systems, inconvenient use of information systems, difference in the requirements of the parties collecting data and the consequent administrative load to TTOs and register keepers who partly still enter information from a paper document – e.g. register of causes of death). The list of problems also includes a long and resource-consuming data standard creation (including implementation), as there are no national conventions in regard to terms and lists. The Health Information System (TIS) mainly collects data but people cannot share them. The use of health information in R&D is not flexible enough, it is incomplete and thus applied to the minimum extent.

The goal is to achieve saving of resources from reuse of data (time spent by health care professionals and the people using the services, repeated or inefficient operations) and increased effectiveness (improved quality of treatment, increased quality of life). This means a situation where the needs of primary acquisition and use of data (e.g. the current treatment process of a particular patient) are in balance with the secondary use of the same data (e.g. handling of a person with a chronic disease by the next service provider, or considering the needs of clinical research). This means that the creation of data
in the health system has been organised in a convenient way for the user at the place where the data are created, in order to achieve high data quality and effective handling of the data both in the interest of the health of the patient and for the purposes of statistics, R&D and innovation (including population-based analyses) and for various health-political purposes.

In order to fulfil the above goals, high quality of source data and the capabilities of secondary use of data are of critical importance. An information system not corresponding to the expectations of users or non-optimized data acquisition and collection of low-quality data may influence all the goals for which the data are collected. Also, those may hinder the achievement of the goals for which the patient has given their consent and which also includes secondary use of data. The focus area also includes increasing of the competence of health care professionals to process data (skills and knowledge) in order to collect and enter high-quality health information.

In order to achieve the goals of the focus area, the following measures are applied:

**Measure 1.1 High-quality health database: data acquisition and data quality**

The goal of the measure is ensuring high quality of health information which is the basis for making more timely, accurate and cost-effective treatment decisions during the secondary use thereof, as well as development of new innovative e-services.

There is no clear concept of health data quality in Estonia, which would facilitate efficient management of the creation of high-quality information used in health care. The development of the national terms and lists (standards and classifiers) takes place during the implementation of national eHealth projects by the Estonian eHealth Foundation (ETSA), and agreement and implementation of changes in the data compositions is the most time-consuming part of the projects. The standards established have been published in the ETSA publishing centre but application thereof in the information systems of health care service providers is time- and resource-consuming, which in turn prolongs the implementation of solutions. At present, the standards of health care database and lists are changed in non-systematic way in medical documents, according to various eHealth projects. Therefore, an increasing data quality obligation and development emphasis is on the source data information systems and human resources.

Another weakness is the quality of data collected earlier. There are problems with incorrect completion of data fields\(^7\), delayed submission of data or failure to submit data, and the lack of standard of free text and filling of free text fields.

\(^7\) see the analyses of STACC, TAI or ETSA
In order to achieve the strategic goal, special attention must also be paid to the unification of the secondary use of data between various institutions (including SoM/TIS, registers, Health Insurance Fund, TAI, Health Board), which would help to avoid duplicate data, create prerequisites for cross-usage of data in order to satisfy the needs of different users and following of the data in the time line.

In regard to the existing developments, the process of ensuring data quality in the eHealth system requires additional clarity. The current problems include failure to fix the errors discovered (including the lack of means for that) and inability of the service providers to ensure data quality at the place where the data are created. Reviewing/establishment of the requirements for data acquisition and data quality, appointment of a person responsible for ensuring data quality, correction of the errors discovered and planning means for that are ways to create reusable data in the health system better than previously. In order to ensure the possibility to reuse data both in the health system and outside of it, the eHealth strategy pays more attention to increased efficiency of data standard creation, application and data management.

Special attention must also be paid to the in-service training of the people carrying out data acquisition, and including the data quality, management and processing into the training and study programmes of health professionals. High-quality and correct data are achieved in the long run only through qualified employees and service providers who understand the need and importance of standardisation of health data and the possibilities of secondary data processing in improvement of health services and promotion of health outside the provision of health care services.

The data collection and storage principles of the renewed eHealth system are the following:

1. Selected (pre-determined) – it is not equally important to collect or store all the data.
2. Targeted – the composition of the data collected and stored is determined based on the purpose of usage.
3. Person-based – to be able to look for persons and link them based on characteristics.
4. Standardised and suitably structured – applies generally to all the data collected, so that the similar characteristics of different persons could be automatically analysed.
5. Unified – organised identically by all the service providers, which requires the establishment of functional and data standards at national level as a part of the quality requirements for service provision in order to achieve coverage of 100%.
6. High-quality – automatically checked at the location and moment of entry and additionally during subsequent reuse.
7. Pre-analysed – the data and the metadata related to those are organised as health cases containing clinical information processing, in order to ensure the semantic meaning of the data.
8. Customizable – the health data can be organised into a digital health record of a person, and display in ways customized to the needs of the users (family physician’s, home nurse’s or neurologist’s profile, etc.).
9. With feedback – the data providers (medical institution, doctor, nurse, the person) get regular analytical feedback about their activities.
10. International – the development of functional and data standards in order to ensure cross-border interoperability takes place by international cooperation.

In order to achieve the goals of the measure, we implement the following activities:

1.1.1 Development and implementation of uniform data acquisition and data quality requirements, increasing the capability to check data quality

- The requirements currently established to data acquisition, data quality and functioning of the system are analysed. Proposals are drafted to improve following of the requirements established to data acquisition, data quality indicators and functioning of the system at the place of creation of the source data. As a result of reviewing and establishing of requirements, data quality is improved and handling of the data becomes more effective from the place of creation thereof until the satisfaction of the needs of various user groups.

- The data requirements and methods of data acquisition of institutions specialising in data processing (reporting, surveillance, statistics) \((\text{SoM, HK, ETSA, TAI, TA, RA, SKA})\) from TTOs is analysed with a purpose to reduce unreasonable gathering of duplicate information. As a result, loss of resources from the current duplicating of work assignments and getting data ready for processing is eliminated.

- Development of data quality control capability at the location where the data are created is supported, resulting in fewer mistakes in the entered information.

- Processes are created to support the timely submission of all data by data providers (according to TTKS) in accordance with agreed standards and classifiers, including the development of a data quality control system (appointment of the responsible people and assignment of clear roles in the data quality control process; development of the TIS validation module) and a so-called aggregator (unifies the data from different sources and supplies those with metadata). As a result, the amount of low-quality data (both technically and content-wise) is reduced.

- The provision of high-quality health service and the payment terms for that are associated with high-quality data acquisition (fulfilment of functional and data standard requirements).

1.1.2 Development of the terms and lists of the health area and standard development

- A systematic development and administration process of the documentation requirements of terms, lists and clinical activity is developed and implemented (with specific requirements to the format and processes in order to agree upon data compositions and classifiers) in cooperation with professional organisations (including representatives of enterprises) and TTOs, in order to ensure smoother development of standards and implementation thereof in the information systems of TTOs.

- A standard development process necessary for the development of eHealth is implemented, following the principle of open standards, in accordance with the
systematic development and administration process of the documentation requirements of terms, lists and clinical activity, to ensure quick implementation of standards in the information systems of TTOs.

- Application of the principle of machine-readability is implemented to the greatest possible extent in development of data standards used in health care.

- A training system necessary for the application of the development and administration process of the documentation requirements of terms, lists and clinical activity and the creation of technical standards is developed and implemented, helping to ensure the awareness of users of standard development and changes in standards.

- Means for standard creation (including a standard administration platform) are adopted, supporting the work process of standard creation and facilitating the simplification of the implementation of changes in data standards at the location where the source data are created.

1.1.3. Validation of the e-services and applications used by service providers

- Functional requirements for reasonable use of eHealth are developed and applied (as a prerequisite for operation as a health care service provider), the application of which helps to create new services, reduce the amount of low-quality data and increase the reuse of data.

- Validation needs, requirements, extent, risks and expenses are analysed and evaluated. As a result of the activity, risks associated with the inclusion of third parties into the eHealth system are mapped out. Based on the above, it is possible to develop the validation principles, work procedures and the necessary legal space suitable for Estonia for adding third parties into the eHealth system. As a result of the activity, third parties can join the eHealth system quickly and flexibly, meeting all the requirements, and the share of e-services provided to people will increase. The aim should be to create in Estonia the most competitive system in EU for allowing new e-services and applications into the market.

Measure 1.2 Uniform and distributed infrastructure of health data

The goal of the measure is to achieve the quickest and most flexible capability for development of e-services, which is achieved by the development of a health information system, moving from document-based distribution of information to data-based principles of distribution, including the development of analytical databases for special purposes (data warehouses, registers).

A large part of the person-based data in the Estonian health care system:

a) is sent electronically to the Health Insurance Fund into the database of treatment data;
b) is put on paper in order to send them to various registers (birth register, death register, cancer register, etc.);
c) is transformed into impersonal and aggregated data for completing electronic TAI health care statistics reports;
d) is sent to the TIS based on persons.

Thereby, a remarkable amount of source data (both clinical and administrative) has been entered into the information systems of health care institutions, but the structure of the information systems prevents them from being automatically selected or transferred to databases. Independent service providers are not capable of building a synchronised and harmonised data transfer system. In the future, the current state registers and other databases will be developed in cooperation with the developments of the health information system, facilitating secondary use of databases that used to have one narrow purpose for co- and cross-analysis in a flexible manner.

The current problems that will be also solved within the strategy include development of health registers and databases in a more transparent, targeted way and based on the development priorities and elimination of the current paper-based register notices and duplicated data entry. The development of registers and databases requires a clear time schedule and vision, as well as development of selection criteria of developments. It is important to achieve clarity which data exists where, in order to make data queries in accordance with the questions and goals arising during the collection of statistics, R&D and the development of innovative health services. The future activities should be aimed at the creation of technical capabilities, which would make it possible to handle different databases (including registers, databases, surveys, studies, biobanks) as a uniform ecosystem of health information in aggregated and person-based ways, but following the principles of personal data protection. Databases and registers are parts of the national health information system.

In order to achieve the goals of the measure, we implement the following activities:

1.2.1 Development of a renewed architecture and software solutions of the health information system

- Capabilities are developed for secondary use of information relying on data-based sharing instead of the current document-based distribution of information.
- A possibility is created for using information exchange between various parties based on push services.
- A technical capability is created for connecting various databases (including registers, databases, surveys, studies, biobanks) and handling them in aggregated manner based on person, including the development of cross-use capabilities of the data in the databases and development of a patient consent platform for different applications (including research).
- A platform for asking patients’ consent for different applications (including research) is developed.
- Management of health information in the central health information system (TIS) is optimized, the quality and security thereof is enhanced.
• Submission of health information by user interfaces or external information systems is made more efficient and flexible (including the possibility to combine the information of TIS with information from other sources).

• Wider interoperability of the end user’s equipment is ensured (e.g. mobile equipment or large displays, equipment and transmitters collecting health information) in cooperation with the private sector and by promoting solutions independent of the platform.

1.2.2 Creation of an analytical data warehouse based on the distributed data of eHealth

• A national analytical data warehouse for health information is developed for the management of the national health policy, as well as for creating disease- and intervention-based systematised databases (current registers).

• Mutual data exchange supporting analytical and monitoring capabilities is developed between various parties (Ministry of Social Affairs with the subsidiaries of the area, Health Insurance Fund, Unemployment Insurance Fund).

• The national databases based on the data collected during the provision of health care services (including the statistics module of TIS, MIR, the cancer register, death register, birth register) are organised based on the logic of a modern analytical data warehouse, including the use of information with the help of machine-readable analysis software. (Minimum result: there is no duplicate entry, submission of data into all registers by TTO takes place electronically through TIS interfacing, and the information therein can be shared, used and linked in machine-readable format).

Measure 1.3 Efficient user applications for ensuring data acquisition and data quality

The goal of the measure is to develop the user interfaces of the information systems of TTOs, in order to support high-quality data acquisition and facilitate simple and quick usability of data, increasing time efficiency and reuse of data, and reducing the number of errors.

TTOs are responsible for developing their user interfaces, and the submission and usability of the information from the health information system depends on the supplier of the application used by each service provider. As a result, four hospital information systems are used in Estonia (eHealth Suite, Ester/Aptus, PERH information system, Liisa) and four information systems for family physicians (5D-MED, Watson, Arstiportaal +, Perearst2) – the users are completely satisfied with none of those but each have some components that are better than those of the others. However, the size of the health care IT market in Estonia is insufficient for developing many end user applications.

For the patients, the state has developed a patient portal (Patsiendiportaal), while each hospital has also developed their own patient portal. At the beginning of 2015, by the initiative of the private sector and in cooperation with the Estonian Family Doctors Association, an application was created for increasing the efficiency of communication between family physicians and patients but the piloting has not been
started yet. At the same time, user applications for patients/inhabitants for daily use e.g. in smart phones or tablets or smart TVs at home are developed by individual, mainly micro companies on project basis or by start-ups, which cannot bring on a change in the service quality. To sum up: the market is segmented and so far the state has not interfered in the development of end-user applications to stimulate a leap of quality.

Service providers (primarily doctors and nurses) need a possibility to use various technological solutions, regardless of location, to ensure the entry of information in real time, as quickly as possible and in as automated manner as possible. When collecting and entering data, it is important to use different means that value working time, and integrate the resulting database automatically into a coherent whole. (E.g. directly from an analyser, entered by persons themselves, entered by a doctor/nurse, from monitoring devices, automatic text suggestion, call identification, etc.)

In order to achieve the goals of the measure, we implement the following activities:

1.3.1 Development of end-user desktop applications and prototypes

- Central coordination of the development of an information system with modern functionality for family physicians, primarily to support a leap in the development of capabilities for treatment of people with chronic illnesses and active health management.
- Supporting of the development of desktop applications for eHealth service providers (including hospitals, providers of outpatient specialised medical care and nursing care) and welfare service providers, with a purpose to ensure higher-quality data acquisition and convenient use of data processing on desktop.
- Supporting quick implementation of the software solutions licensed by cooperation between the health care service providers and the state.
- Increasing the efficiency of e-emergency medical care as a state-provided health care service by the support of e-services (including mobile applications).

1.3.2 Development of national procedural systems of information

- Development of national procedural systems of information supporting the operation of state-administered institutions (including Health Board, State Agency of Medicines) (including the creation of new ones and renewal of the existing ones, in order to eliminate obstacles in development of the e-services of the institutions in the domain of the Ministry of Social Affairs and more efficient fulfilment of state tasks).

1.3.3. Development of new data acquisition possibilities

- Possibilities are created for quicker entry of treatment data by TTOs and increasing the semantic data quality of free text fields, including the development of centrally provided predictive text service.
- Development of smart solutions simplifying the work of health care service providers is supported.
- Implementation of voice recognition in Estonian is supported, which speeds up the process of entering treatment data.
Measure 1.4 Database meeting the needs of R&D activities

The goal of the measure is to support the availability of a database meeting the needs of R&D activities, and thus increase the volume, quality and usability of the R&D activities based on health information for management of the health policy.

In comparison to the Nordic countries, health information is used and analysed very little and non-systematically in Estonia. The existence of disease- and intervention-based systematised databases is critical for the development of R&D work in health area and export of eHealth services.

A part of the data collected for the treatment or health management of a person is also usable for R&D work. However, some of the source data necessary for research and substantial analyses are currently not collected by health care institutions. Both the data collected today and the missing data must be mapped out according to the purposes of use. Thereby, a part of the person-based health information is very universal and can be used for so-to-say unlimited number of questions. Others, however, are of limited usability in the context of the particular register.

In the future, eHealth is offering a good platform for supporting statistics and R&D, prerequisites of which are clearly formulated R&D needs. The convenience of input (same user interface, adding of data collected by a person), optimum need and subsequent actual use of the data for R&D work are considered when collecting various data from daily treatment work. The legal framework must support the combined handling of data and the use of personal information.

We make additions to the existing data compositions in various registers and databases, considering the needs of R&D work, professions and medical institutions (common part in data composition and movement logic is greater than differences). Thus, it is possible to achieve standardised solutions, the existence of the information necessary for R&D work and improved access to health information for R&D work.

In order to achieve the goals of the measure, we implement the following activities:

1.4.1 Definition and development of the data compositions necessary for research across professions.

- Establishment of the development principles of registers and databases resulting in a methodology according to which data fields in registers are filled for the purposes of R&D work.
- A systematised list of databases is agreed for which it is reasonable, necessary and possible to start collecting data in the perspective of five and ten years.
- Purposes of use are formulated for each database, based on which the descriptions of data compositions and data acquisition protocols are drafted. As a result of the activity, a transparent input is created for research, facilitating effective conducting of research.

1.4.2 Creation of technical possibilities for collecting data for R&D.
• When collecting additional data different from the daily clinical practice for the purpose of R&D (also for the national disease-based registers), national standards are also developed for those data and user interfaces are developed for digital collection and other processing of information.

Measure 1.5 Application of open data platform

The purpose of the measure is to create possibilities for a person to administer the authorisation of use and sharing of their own data outside the place where the data are created, including research by third parties, for commercial services, provision of cross-border services, etc.

The open data platform is based on a principle according to which the owner of the data about a person is the person, whether the processor is a public or private institution. A person must have a right to obtain all the information the processing party has about them in electronic, machine-readable format, and all the parties of the health system must have an obligation to accept electronic information in machine-readable format. That facilitates secondary use of the data, so that the person can personally or through an authorised user use the data about them also outside the place where the data were created and the purpose of collection thereof.

Based on the principle of flexible and smooth use of health information, until now in Estonia data have been collected into an information system (health information system) without the aware consent of a person but with a possibility to opt out.

A platform of open data must follow two principles:

1. upon the aware consent of a person, it must be technically possible to use a person’s health information everywhere outside the place where the information was created. A person has a right to obtain information pertaining to them from every service provider in machine-readable format.

2. Within the eHealth system (including the information systems of health care service providers and the national health information system), the current opt-out principle shall be continually followed when processing the data of people (i.e. data are collected by default for all health services according to the legal grounds, and based on the legislation it is assumed that a person agrees to the processing of their health information when using the service). Outside the eHealth system, the opt-in principle is applied (i.e. aware consent of a person is necessary in order to process information.

In order to achieve the goals of the measure, we implement the following activities:

1.5.1 Preparations of the Health Information System (TIS) for the application of the open data platform
• Possibilities are created for connecting the data collected by a patient with the treatment data (in the current TIS) for using both by the provision of a health service and in association with e-services chosen by the person.

• A possibility (including central work organisation and a technical solution) is created for administration of the data collected by a person and the treatment data: for use outside the place where the data have been created, including research, provision of commercial services by third parties, etc.

1.5.2. Supporting of the development of cross-border health information exchange

Possibilities for cross-border data exchange are created in order to ensure the provision of health care service also across borders, regardless of the geographic location outside Estonia.

• The joint activities of eHealth in the EU are supported, and if necessary, activities supporting the right of EU citizens to obtain their health information in machine-processable format and publish those for use by other parties according to their authorisation are initiated and managed.

• Legislation at the EU level is supported in order to clearly establish the right and opportunity of each citizen to obtain digital access to their health information and allow safe sharing thereof in order to use various e-services, while ensuring reasonable protective measures to ensure people’s safety, privacy, etc.

• EU legislation aims at simplifying and unifying the market rules of eHealth: to apply a common organisation of certification (including the need for single registration/certification in EU), a quality label, if necessary, and better coordination of evaluation of health technologies. As a result, there are more data to exchange and services to use those for.

• Based on the application plan of the strategy, the standards of the EU level, the classifiers, terminology and instructions are analysed, in order to detect shortcomings and needs for development for enabling cross-border digital processing and sharing of health information and cross-border provision of health services. Accordingly, the eHealth initiatives planned at the EU level and the existing ones, pilot projects and R&D financing possibilities are screened, and the need and extent of participating in those is decided. Standardisation, etc. activities take place in cooperation with the private sector, using private experts for representing Estonia, if necessary.

• Pilot projects and joint solutions are considered and started bilaterally with other countries, if it is reasonable due to extensive communication and data exchange (e.g. with Finland).

• The development of machine translation solutions at the European level is supported with the purpose of cross-border data exchange and use.

Measure 1.6 Organisation of legal space
The purpose of the measure is to ensure the development of the legal space and correspondence thereof to the developments and application of the content and the development of the organisation of eHealth.

The use of health information for R&D purposes is a growing trend including possibilities for improvement of public health. There are more and more health data from various sources. It is important to determine the rules for collecting information and the quality requirements, requirements to data collectors and the rules for data use and access in research work. Also the rules for using the data in the opposite way – application of the results of research for promotion of health. Access to health information by various parties in various stages of health, welfare and employment systems both in the public and private sector is also not clearly determined.

In order to achieve the goals of the measure, we implement the following activities:

1.6.1. Secondary use of health information in health care and outside it

- A logical and efficient code of processing health data that protects the privacy of data subjects (people) is developed for Estonia, and active participation in the development of the relevant legal space and ethical practices is ensured.

- Uniform principles are developed and, if applicable, the legal space is organised for secondary (i.e. from the health information system or the place of storage of the source data by the TTO) use of health data **upon the provision of health care services** after the storage of primary data, also for making prevention, diagnostics and treatment decisions.

- Uniform principles are developed and, if applicable, the legal space is organised for secondary (i.e. from the health information system or the place of storage of the source data by the TTO) use of health data **upon the provision of public services**, also for assignment of compensations (allowances, driving license, weapons permit, etc.) or obligations (military service) related to the state of health.

- Uniform principles are developed and, if applicable, the legal space is organised for secondary (i.e. from the health information system or the place of storage of the source data by the TTO) use of health data **for scientific purposes**; access to the data used for scientific purposes is improved, which facilitates the creation of a larger number of studies and creates prerequisites for use of the results of research in health care.

- Uniform principles are developed and, if applicable, the legal space is organised for secondary (i.e. from the health information system or the place of storage of the source data by the TTO) use of health data **for development of entrepreneurship**; upon the consent of people, access rights of companies for the development of new products and services are improved, which in turn facilitates quicker innovation and more efficient development of e-services.

1.6.2. Use of health information collected by persons in health care and outside it

- Principles are developed and, if applicable, the legal space is organised for secondary use of health information collected by people themselves through commercial service.
• Active participation in the development of the relevant legal space and ethical practices is ensured at international level.

1.6.3. Organisation of the legal space – quality requirements to the parties processing health information, accessibility and availability

• Requirements to the parties processing data are established and a suitable legal-technological system is created (an IT application with a legal framework and a contract administration mechanism), making the health data accessible between the TTOs and for companies and people themselves in machine-processable format, so that the privacy and security thereof is ensured (e.g. availability of health information to pharmacists, cloud service providers and other service providers).

Measure 1.7 Development of digital data use and information processing capability

The goal of the measure is to increase the effectiveness and efficiency of data processing in health care, ensuring digital data use and the basic and in-service training of health care professionals.

On the one hand, in realisation of all the measures and projects, the necessary training and education component (increasing the capacity of the human resources) must also be considered, in order to ensure the actual functioning of the technical, organisational and legal environment both in the short and long perspective. On the other hand, development of targeted basic competencies is important, considering the super fast development of technology after the training of the health care personnel currently employed.

In order to achieve the goals of the measure, we implement the following activities:

1.6.1 Training and educational programmes for working health care professionals

• Preparation and organisation of training programmes and courses and creation of interactive learning tools for health care professionals of different levels, in order to ensure a receptive and efficient environment upon the implementation of the new tools developed within the eHealth strategy and for the implementation of new e-services.
• As a basis for training, a competency model of e-skills of health care professionals (including levels) and the means for testing are developed and subsequently updated.
• Application and development of serious games and smart applications

1.6.2 Integration of digital capabilities into the basic training of health care professionals
- Adding the eHealth area development component into the training of health care professionals, considering the competency model of e-skills of health care professionals as a part of the integrated training, in order to ensure high digital competency of future health care professionals in their area. Also, creation of interactive study and testing tools.
- Application and development of serious games and smart applications
Focus area 2 – Focus on persons and personal medicine

Area goal 2. Improved possibilities of people to participate in active management of their state of health; by person-based health and gene data analysis and digital decision support it is possible to offer better targeted services to people; R&D activities and entrepreneurship in the health area have expanded.

The second focus area aggregates eHealth activities that facilitate the provision and organisation of health services according to the needs of every individual person and thus more extensive implementation of preventive, predictive and inclusive approach in health care.

There are several problems with the implementation of personal medicine focusing on persons, starting from a significant increase in the amount of health data and the related insufficient user skills and finishing with the availability of evidence-based information materials supporting personal healthy behaviour. In the event of large data volumes it is possible to analyse them at the level of average indicators, but personalisation to the level of an individual has not been developed. There is no technical capability for combined handling of health and gene data in daily clinical practice. There are no (substantive and technical) solutions for supporting personal health management, and the participation of people in their own health management is low.

A goal is to start considering individual peculiarities more than before, and offer better targeted health services, thus ensuring a better treatment result and considerably empowering people and their family members to take care of their health. A challenge to eHealth is the increase in the volume of data used for the provision of health service (health, gene and other molecular information will be substantially added to the treatment data), and thus the use of the data analysis methods (quantitative analysis of probability relations) and means of decision-making support. A goal is to support health care professionals and people in administration of large data volumes and a movement towards the prediction and management of every individual patient in application of treatment guidelines adapted to an average patient.

A goal is to support people in taking a significantly larger responsibility for their own health, which means greater awareness of one’s health and management of risks related thereto, and increased participation in making choices/decisions about health services. By using IT tools, it is possible to make information more accessible and understandable for people, provide possibilities for adjusting behaviour based on personal feedback and support for decision-making similarly to health care professionals.

Considering that greater personalisation and application of the principles of individual responsibility and focus on persons are among the development goals of modern health systems around the world, the technological innovation in the area of eHealth and changing of the processes in all the health system
have a great economic potential. Thus, it is very important to integrate also the R&D activities and initiative of companies into the implementation of activities.

At the level of the health system, the goal is personalisation – including the capability to apply the modelling of health risks and services in planning of services at the level of smaller groups of population with similar characteristics, in order to facilitate better targeted service provision more in alignment with people’s preferences. Risk-based grouping creates possibilities for planning of services and better measurement of the performance at different levels (e.g. for a service provider to manage their service; for the state/government for direction of the health policy), and facilitates the adaptation of activities, resources and agreements (e.g. for financing of a service) to narrower risk-based groups.

In order to achieve the goals of the focus area, the following measures are applied:

Measure 2.1. Development of personalised and user-focused e-services.

The goal of the measure is to develop personalised and user-focused e-services, in order to ensure a more active role of people in managing their own health. At the moment, the information system only provides people an opportunity (through the Patient Portal) to view the documents and prescriptions loaded into the database and submit applications; a possibility to view the treatment invoices submitted to the Health Insurance Fund is under development. Digital reception has a different solution for each health care institution.

As the first national e-service involving the patient, the eHealth certificate facilitates the combination of the previous health information with the health declaration describing the state of health of a person into a structured summary that the person can view and that the doctor can use to provide an evaluation to their state of health in regard to driving.

Various health service providers (e.g. hospitals, general medical practices, laboratory service providers) also provide possibilities to people for viewing the information stored about them.

In a personalised health system that focuses on persons it is important that a person changes from a passive data viewer into an active manager of their health, using the e-services adapted to their individual characteristics and preferences. It means that a part of various preventive, treatment etc. services, a stage of those must be solved digitally: e.g. preliminary notification, input of information by patient, communication of results, interaction, registration to visits, self-monitoring, asking of a secondary opinion, etc. On the other hand, it is important to develop the possibilities for secure administration of the health state information originating from various sources: e.g. providing authorisation for secondary use of data to various parties both in Estonia and abroad, including the health care service providers, providers of medical or health apps and for research; also to integrate the (health) information collected by people themselves outside the provision of health services with the so-called medical information.
In order to achieve the goals of the measure, we implement the following activities:

2.1.1 Development of a service-based patient portal

- Functionalities and services are developed to facilitate active participation of a patient in the prevention or treatment process, including the development of self-service component for health care services and other e-services (e.g. pre- and post-visit communication; digital reception, collecting feedback). The applications designed for patients are closely integrated with the e-services used by health care professionals.
- Individualised provision and display of health information and notifications to patients is developed (e.g. exchange of information before and after the visit to a doctor, information about quitting smoking, recommendations for packages of rehabilitation exercises, etc.).
- Patient applications are developed and integrated to provide instructions about prevention and follow-up/self-treatment, including the applications of patient pathways, development of technical capacity for the integration of independent (private sector) applications and the relevant developments/interfaces of the Patient Portal (e.g. enabling individual instructions based on the health file).
- The use of the various functionalities of the Patient Portal on different platforms (including mobile equipment, TV) is optimised in cooperation with partners from the private sector.

2.1.2 Development of person-focused data management and data use monitoring service

- A service is developed for active communication between secondary data users (research facilities, companies developing business services) and individuals in order to allow the use of their data (based on the general consents given by persons) and the active consent management service for the people.
- A service for inclusion into clinical etc. research and expressing a relevant wish shall be developed.
- A possibility shall be provided to monitor the use of personal health information.

2.1.3 Facilitating the implementation of individual applications supporting the adaptation of behaviour

- Facilitating the implementation of applications (mobile apps, etc.) supporting the adaptation of behaviour based on personal feedback and decision-supporting applications designed for general users.
Measure 2.2 Development of decision-supporting solutions

The goal of the measure is to improve the decision-making quality in clinical practice and health promotion and increase the efficiency of the decision-making process, actively applying the decision-supporting applications based on digital data processing in the eHealth information systems.

Decision-supporters are IT applications helping doctors, other health care professionals and individuals make clinical or health decisions by connecting the automatically aggregated health information about a person with evidence-based knowledge. The algorithms of decision-supporters consist of evidence-based knowledge that is compared to the health information of individuals and that provide different decision-making options based on that. The development of decision-supporters must ensure their correspondence to the principle of evidence-based medicine, including the treatment instructions, and the possibility of flexible consideration of the results of research constantly updated over time.

The data volume used in the process of treatment and diagnosis is increasing, and in many cases systematic handling thereof without the aggregation and preliminary analysis of data is virtually impossible for health care professionals. Given the constantly increasing amount of health data and various treatment suggestions, also people are in a situation where they need reliable support for decision-making.

Aggregated health information about a person facilitates person-based case handling supported by preliminary evidence- and research-based risk evaluation. Structured and automatically pre-analysed provision of aggregated health information considers the best practices of usability of IT systems. In the event of successful implementation of the measure, the effectiveness of preventive activities will increase, the speed of decision-making and the quality of the treatment process (including the prevention of treatment errors) will presumably improve, and a possibility is created to optimise the working time of health care professionals, increase the time spent on patients and increasing the cost-effectiveness of the health care system (reducing the number of unnecessary visits, studies and procedures).

In order to achieve the goals of the measure, we implement the following activities:

2.2.1 Implementation of national services of clinical decision-making support

- Decision-making support applications for the evaluation of interaction between medicinal products are implemented.
- Also, internationally approved decision-making support applications for supporting clinical handling (e.g. a central service with a possibility of local adaptation for the end user, which is interfaced with international, constantly updated databases and support systems).

2.2.2 Development and application of decision-making supporters in personal medicine

- Digital decision-making support applications based on the analysis of individual health and genetic information are developed and implemented in daily clinical practice (by family physicians and
medical specialists); the decision-making support applications must facilitate the combination of the databases of TTOs and the TIS data with central decision-making support service.

- Capabilities and prerequisites are created for the development of health care services based on the principles of clinically reasonable personal medicine and the implementation of the decision-making support possibilities based on that.

### 2.2.3. Development and implementation of decision-making support intended for patients/individuals

- Digital decision-making support applications for use by people themselves are developed and/or implemented (for application e.g. in the Patient Portal or individual devices), which enable people to actively participate: a) in the decision-making process of health service (with a health care professional); in management of their own health behaviour (and other risks) based on automatic feedback; c) in management of post-hospitalization self-treatment and secondary prevention.

- Increasing of the awareness and improvement of the skills regarding the decision-making support applications created, in cooperation with the general information society and the activities of increasing people’s awareness of e-services are supported.

### Measure 2.3 Creation of conditions for association / integrated handling of gene and health information

The goal of the measure is to increase the effectiveness of treatment and diagnostics and increase the capacity of R&D activities and the development of entrepreneurship at an international level, using the health, treatment and gene information in an integrated manner.

Currently, the health data of a person are separated from their comprehensive gene information and are not associated. Therefore, it is not possible to handle them in integrated manner in daily clinical practice or provide more precisely targeted health services.

Genetic tests are carried out in clinical practice first of all for diagnostic purposes, e.g. before birth, on new-born babies and children in order to detect genetic diseases. It is the area of medical geneticists who specialise in the prevention or diagnosis of rare diseases with very severe consequences. In the event of such diseases mainly related to the defect one gene or a whole chromosome, the focus is on a narrow known genetic component and an already developed pathology.

Wider application of personal medicine requires the analysis of more complicated associations between many genes and various health and disease information, for which the main goal is to predict the possible development of a disease and the consequences thereof in the future, considering the joint effect of the genetic and environmental factors, behaviour and medical intervention. As a rule, those associations are complicated and require extensive data analysis, increased awareness and supporting IT tools which help to process the information and present it in a usable manner.

Personal medicine is currently in a phase of rapid development, and thus a large part of the activity is related to R&D and innovation. On the other hand, such research activity based on big data requires
active connection with the information created in a clinical environment and quick feedback about the associations discovered about the genetic factors and the manifested diseases.

In comparison to the rest of the world, the situation in Estonia is unique, as we have a 15-year experience in collecting and analysing gene samples, and a secure infrastructure has been built for the association of data from various origins. This creates possibilities for simultaneous and mutually enhancing development in daily clinical medicine, health-related R&D and the development of entrepreneurship. Thereby, a critical factor is coordinated joint activity of different competences and organisations supported by the relevant infrastructure of eHealth.

Biological samples of 52,000 people (a sample of 5% of the Estonian grown-up population), of which genotyped gene data of about 23,000 people and sequenced gene data about 2000 people are located in the Genome Centre of the University of Tartu, where they have also been connected with health and treatment data from various sources for the purpose of research. Those data cannot be applied for daily clinical use, also the potential of use is limited with 52,000 gene donors collected until now.

In individual hospitals and universities, some research groups have collected various biological samples and carried out research with gene data related to particular diseases or health conditions. Since 2001, the National Centre for Translational Medicine operates at the Faculty of Medicine of the University of Tartu. Among other activities, it specialises also in molecular pathology and physiological genomics.

There are two technology development centres – Software Technology and Applications Competence Centre (STACC) and Competence Centre on Health Technologies – which also specialise in development of personal medicine to develop entrepreneurship in the area of software and biotechnology.

For integrated handling of gene and health information in development of personal medicine, it is important to create a comprehensive all-Estonian information technology infrastructure for integration of all previous initiatives and organisations, which each party independently could not afford. In 2015, the Ministry of Social Affairs with partners conducted a pre-survey of the pilot project of personal medicine⁸, based on which an application plan has been drafted for coordinated activities of three ministries (Ministry of Social Affairs, Ministry of Economic Affairs and Communications), including the development of eHealth systems.

By implementation of the measure, conditions are created for association of gene data with health information in provision of precision medicine services and facilitation of R&D and innovation in personal medicine.

_In order to achieve the goals of the measure, we implement the following activities:_

2.3.1 **Development of personal medicine data warehouse and the associated analytical e-services with TIS**

- A pseudonymised gene and health data processing platform is developed to facilitate the development R&D and entrepreneurship.

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⁸ [https://www.sm.ee/et/personaalmeditsiin](https://www.sm.ee/et/personaalmeditsiin)
2.3.2 Expansion of the data composition with a personalised gene database and the reference database of associations between gene and health data

- A possibility is created for integration of personalised genotype data with personalised health data in the TIS.
- A reference database is created at the TIS about the associations of clinically validated gene and health data as a basis for centralized decision-making support service in personal medicine.

Measure 2.4 Empowerment of people by technology

The goal of the measure is to increase the awareness of people and their family members about their health, and create possibilities for active management of their health condition and participation in the treatment process. We presume that with the support of technology and upon the addition of services, a person will change from a passive observer of health information into a collector and follower of their own additional health information and an active manager of their health.

A large (even major) part of care for the health of people with chronic diseases falls on the persons connected with them. This is an invisible resource, similarly to voluntary firemen and assistant police officers, which must be integrated into service provision as much as possible, and the possibilities of e-services must be used for increased convenience in fulfilment of the role.

In order to achieve the goals of the measure, we implement the following activities:

2.4.1 Development of smart solutions and web-based serious games aimed at people

- Smart apps are developed in cooperation with the private sector.
- Self-care and development solutions aimed at the empowerment of people and supporting the medical service (and integrated in the services) are developed.
- Web-based serious games for the people and the persons connected with them are developed.
- Increasing of the awareness and improvement of the skills regarding the applications created, in cooperation with the general information society and the activities of increasing people’s awareness of e-services are supported.

2.4.2 Development of solutions aimed at involvement of the community

- Applications integrating various parties around the service of one person are developed (e.g. home care, care for close relatives, primary level, nursing care, specialised medical care).
- Innovative prototypes are developed.
Focus area 3 – Comprehensive case management and cooperation between organisations

Area goal 3. The provision of sustainable comprehensive health services is possible through all the stages of the health services (from prevention to rehabilitation), as the provider(s) of health care services and the persons themselves have comprehensive information about their state of health and the action plan of different parties.

The third focus area aggregates eHealth activities focusing on the support of the health system and development of an uninterrupted comprehensive set of health services and case management, relying on cooperation between service providers starting from prevention and finishing with e.g. the medical specialists of top centres and the welfare system or psychologists and diet counsellors both within the country and across borders. The accessibility of the relevant information and quick feedback on the results helps to ensure that the responsibility is maintained at the right level, which differentiates integration from simple consolidation, and makes it possible to offer patient-focused health care and consistency of treatment by cooperation between various service providers.

The current problems include insufficient availability of comprehensive health information and movement thereof between health service providers, insufficient support to following treatment instructions and coordination of treatment.

The use of the possibilities of eHealth for the association of prevention, treatment, rehabilitation and welfare processes between different service providers has been started but true integration where the data of a person’s health and medical background form a uniform health and disease file and it is clear at any moment of time who must handle the person is yet to be developed.

A recent study of the World Bank\(^9\) clearly pointed at the problems with consistent primary-level patient handling and following of the principles of integrated treatment. The means of IT have not been sufficiently used in application of uniform standards of patient handling; relying on the role division at different levels (including family physicians and medical specialists) may significantly facilitate that.

Integration between several e-services of the health, employment and welfare area (including SKAIS2) in order to increase the effectiveness of data use has not been completed.

For the purposes of development of the national information systems, a wider need of information of other state institutions for thorough evaluation of a need for cross-handling of data and avoiding

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duplicate input and handling of data has not been mapped out. The movement of health information outside the health sector is unclear.

eHealth must immediately facilitate more efficient coordination of treatment in the health care system and e.g. after hospital case, creating improved exchange of information between the hospital, the first level and welfare. Also, IT-solutions must be found for smoother connection of the roles and obligations of the health and social sector in patient handling.

The goal is complete (from the beginning till the solution) collection and use of health information between various service providers in order to provide synchronised and uninterrupted service under the responsibility of all the service providers related to the case. Through such a focus, the efficiency of health and welfare services increases, the attention is focused on proactive exchange of information and communication between service providers.

In order to achieve the goals of the focus area, the following measures are applied:

**Measure 3.1 More efficient integration of health services by support of data exchange**

The goal of the measure is to connect different health services into a whole by improvement of information exchange, in order to achieve more efficient use of health care resources, reduce unreasonable time consumption and increase the satisfaction of people with the health care system.

The application of the measure will significantly improve the provision of uninterrupted support and services of the health care system in coordinated cooperation of various service providers. The possibilities of eHealth related to the solution of the current problems (including deviations from the consistency of treatment, unnecessary visits to medical specialists, duplicate analyses and studies, uncoordinated treatments) are yet to be developed.

The eHealth services to be developed must aim at complete case management, so that different service providers would be actively informed of the “location” of a patient/person in the system, and the activities of service providers would be well coordinated for the purposes of treatment/solution. This requires clear determination of who must carry out which activities; every party has an overview of both the individual handling plans organised by different service providers and the description of the whole episode at a more general level.

All the parties related to a treatment and/or care case (including the person) have access to the aggregated information. It can also be used for the provision of health and care advice and treatment recommendations in a virtual environment. In selected (more complicated) cases, different service providers use a common health and disease file across service providers.

Also, targeted development of possibilities for patients to actively participate and assume responsibility for their health is developed, both in the prevention phase and upon independent following of the recommendations of health care professionals and other specialists at home.
In order to achieve the goals of the measure, we implement the following activities:

3.1.1. Development of the service of digital referrals and digital reception

- A possibility is developed for digital organisation of patient logistics in all places of use (including high-quality formulation of a specialist’s decision for referral of a person, finding a suitable consultant and booking a time for visit, delivering a high-quality consultation response to the referring specialist and the patient).

3.1.2. Development of supporting capacity for coordination of patient handling

- E-applications are created for organisation of patient handling and logistics between different service providers, e.g. for coordination of screening studies (cancer screening register), coordination of the treatment of patients with chronic diseases after a treatment episode by a medical specialist or a visit to emergency care to transfer the responsibility to family physicians, etc.

3.1.3 Development of e-services supporting integrated treatment / patient management

- The use of integrated treatment instructions (common for family physicians and medical specialists) is developed and implemented as a central TIS (patient pathways) e-service (input for local and central decision-making support applications) – as a part thereof, a central repository for treatment and prevention instructions and patient instructions is created.

- The use of integrated nursing instructions as a central e-service (input for local and central decision-making support applications) is developed and implemented.

3.1.4. Development of the cooperation possibilities of a common virtual team between various service providers

- A so-called virtual team e-service is developed, i.e. a cross-sectoral virtual environment of different specialists for case-focused patient management (e.g. a pilot project as a virtual team application for handling the problems of children’s mental health).

Measure 3.2 More efficient integration of health, labour and welfare services by support of data exchange.

The goal of the measure is to reduce inefficiency due to insufficient exchange of information caused by the lack of coordination of the welfare and labour (including occupational health) services, and improve the service experience. Implementation of the measure helps to achieve more efficient use of the resources, reduce unreasonable spending of time and increase people’s satisfaction in the area of health, welfare and employment, creating possibilities for reuse of health information for the provision of benefits and services supporting the quality of life and work.

Currently, information is distributed through the services of institutions and x-tee (Ministry of Social Affairs STAR, Social Insurance Board SKAIS, Unemployment Insurance Fund EMPIS/TETRIS, Labour Inspectorate ITI, Health Insurance Fund MISP-2, etc.). The cross-usage possibilities of data are being
developed, the services are not united and integrated, and the transfer and comprehensive monitoring of cases is not possible. It is not possible to transfer the responsibility from the health system into the social system and monitor the development of a case, or counselling between various systems.

Also, exchange of information between the specialists providing the occupational health service and other health services is insufficient, and therefore the accordance of the work conditions to the state of employees’ health are not always ensured. Ineffective exchange of information between doctors, employees and employers prevents targeted monitoring of the state of health, and failure to report work-related diseases and accidents at work promotes lack of reporting accidents at work and work-related diseases, which applies excessive load to the health system.

The measure focuses on developments facilitating the movement of selected health information in the information systems of the health, employment and social area (with a person’s informed consent), in order to ensure reuse of once collected and created data. The aim of this is to increase the satisfaction of people with the services provided, and improvement of the service performance in all three areas.

*In order to achieve the goals of the measure, we implement the following activities:*

**3.2.1. Improvement of information exchange in the area of health and welfare**

- A possibility is created for connecting health and disability information from the SKAIS2 developments, in order to increase cross-use of data and facilitate resource-efficient and better-quality social welfare service.

- E-services will be developed and implemented for flexible provision of health and welfare services in integrated manner by various service providers, ensuring smooth exchange of information and coordination of patient handling and logistics, with the movement of responsibility.

- A so-called virtual team e-service is developed and implemented, i.e. a cross-sectoral virtual environment of various specialists for case-focused patient management (e.g. a pilot project for integration of nursing care and welfare service in order to ensure shorter hospitalization of people and a better health and welfare service at home).

**3.2.2. Improvement of information exchange in the area of health and employment**

- A possibility is created for using health information for the provision of services, allowances and benefits to people with reduced capacity for work (including evaluation of partial capacity for work and payment for compensations in the event of accidents at work and occupational diseases), thus increasing cross-use of data and facilitating a more resource-efficient and better-quality service to support the capacity for work.

- Information exchange services based on the health information systematised in the TIS and summaries and evaluations created outside the provision of a health service (e.g. evaluation of capacity for work and disability, certificates of incapacity for work, health inspection of call-up selectees, etc.) for occupational health and other health service providers are developed, in order to facilitate early intervention in prevention of health damage to employees.

- A more efficient exchange of information is created between the doctor and the Labour Inspectorate for better communication of work-related diseases and accidents at work.
• Information exchange between the TTO, the employee and the employer is developed for increasing the efficiency of organisation of occupational health, including the creation of e-services based on the aggregated health information of employees in order to support the prevention of damage to the employees’ health in the working environment.

Measure 3.3 More efficient cross-sectional reuse of health information

The goal of the measure is to increase the areas of use of the existing health information, reduce bureaucracy in the health sector and the share of documents on paper, and optimise work processes. In addition to the need to reduce the share of paper-based and repeatedly entered health information, the strategy considers also the interest and need of other organisations outside the health and welfare system in using health information for the improvement or automation of their services. The activities of the measure must support a vision of the future where health-related and health service-related decisions (certificates, recommendations, referrals, etc.) are created and approved digitally based on the information from different sources. Documents are created on paper only under special circumstances. The functionality developed must facilitate data queries and convenient handling of information both for quick issuing of documents and making of service decisions.

In order to achieve the goals of the measure, we implement the following activities:

3.3.1. Expansion of the areas of application of eHealth certificate and development of new automated services

• New opportunities for using the eHealth certificate are realised with a purpose to have all the decisions and documents based on health information in digital format.

• A roadmap is created, and the default (i.e. automated) e-services (certificates, recommendations, referrals, decisions, etc.) are developed and implemented, making it possible to use the existing health data without intervention of a health care professional.

3.3.2. Facilitating the reuse of health data outside the health care system

Principles are developed for reuse of health data outside the health system (both public and private sector), considering the privacy and convenience of people, and the relevant e-services are developed and implemented in cooperation with the service providers of the public and private sector.
Focus area 4 – Development of effectiveness of health services and capacity for analysis.

Area goal 4: It is possible to measure and analyse the effectiveness of the services at all levels of the health system in order to make planning and management decisions.

The fourth focus area aggregates the eHealth activities that create a possibility to plan and provide services, focusing more on quality and result goals (i.e. measurable value) that the health services should offer (value-based care) instead of increasing the volume (i.e. source indicators).

Currently, a common problem is the insufficient quantitative and systematic quality measurement/evaluation both at the level of the state and the service provider, insufficient estimation/management, lack of focus on the achievement of cost-efficiency at the level of quality-based system and insufficient feedback to patients in regard to the effectiveness of treatment, and generally insufficient inclusion of patients into quality evaluation (insufficient and non-systematic opportunities to provide feedback about the provision of health service).

In practice, the implementation of good information management with the support of eHealth is important, relying on the national quality policy for the area of health. The measures of the present focus area must create efficient possibilities and tools for quality-based handling (measurement and analysis) as a part of daily work procedures. Thereby, it is assumed that the organisation of the so-called basic hygiene of eHealth in the existing data collection systems is handled under the first focus area of the strategy, including the collection of high-quality source data, source services of data exchange and registers.

As a separate measure, the present focus area includes the development of new possibilities related to the use of digital data based on the development needs of health care.

The purpose is to ensure the monitoring capacity of the result of the activities, i.e. the outcome, at all levels – from the particular health care professional and the institution providing the service to long-term planning of the system in the context of the service portfolio of the Health Insurance Fund or the national health care policy. It is also necessary to achieve measurement of the effectiveness (quality) of the individual (intermediate) stages of the health service and the ultimate goal, with a purpose to focus the planning and management decisions on the increasing of value by the services.
Measure 4.1 Monitoring capacity of the performance of the health system

The goal of the measure is to apply the means of eHealth for systematic development of the performance of health services, improve the quality of treatment and cost-efficiency at the level of the health system, and create more motivation in the health care providers at all levels, as well as support integration and cooperation through common long-term performance goals. To sum up, application of the measure has a direct remote influence on the health and well-being of the population.

Until now, various population-based survival figures and patient satisfaction surveys have been used in Estonia for the measurement of system-level performance. The effectiveness of health care services is measured and conformity of treatment process to the standard is evaluated mainly by the Health Insurance Fund by conducting clinical audits, developing the quality system of family physicians (with payment of bonuses) and providing annual feedback to the hospitals of the Hospital Master Plan of Estonia, describing the different aspects of the operation of the hospital and the change compared to the previous year.

Also, in 2014, a department called Ravikvaliteediindikaatorite Nõukoda (Council of Treatment Quality Indicators) was formed. It will create a complete system for regular evaluation of the quality of health care service and publishing of the relevant information in cooperation with clinicians. An expert committee of health care service quality at the Ministry of Social Affairs gives evaluations to the quality of health care services based on the applications of persons (patients) who have contacted the committee, but it does not carry out systematic analyses of the information received by the committee or creation of feedback or study opportunities based on that. There is no systematic and consistent quantitative measurement of the complete health system in Estonia, though development in that direction is perceivable.

The purpose of the measure is to speed up the achievement of the desired capacity, so that it would be possible to analyse the performance of the services and interventions at the national level in every stage of the service/intervention. It means that among other things it is possible to analyse the performance of the service when a person moves between different service providers. For that, systematic collection and capacity for analysis of treatment results and treatment quality indicators should be ensured through the eHealth system. Among other things, the systems developed should enable prediction of the effectiveness of services upon planning the services in short and medium-length perspective (what-if and predictive modelling analyses), in order to support rational planning decisions.

For improved involvement of patients and increased trust of the health care system by the society, it is important to develop possibilities to publish performance indicators in a suitable format. Within the
strategy, attention is paid also to the current limited involvement of patients in the measurement of quality (insufficient and non-systematic opportunities to provide feedback about the provision of health care services), creating possibilities for providing feedback and ensuring that the information reaches the necessary level of decision-making.

In order to achieve the goals of the measure, we implement the following activities:

4.1.1. Organisation and development of central register-based e-services

- Principles for development of disease- and intervention-based registers are created, relying on the goal to develop information systems providing e-services from static databases. As a result of the activity, a capability is created to bring the IT development projects of the Ministry of Social Affairs into conformity with the terms established to development projects in the national IT policy.

- E-services for different user groups (national policy makers, scientists, service providers) are developed in order to use the data in the registers, which increases the opportunity for targeted management of health care policy and investments.

4.1.2. Development of the data analysis capacity

- Technical capacity for data analysis is created and the existing analysis capacity is increased in order to apply/predict quality-based management measures and analyse the application of new treatment methods and solutions, including the development and implementation of a benchmarking system in the eHealth system.

- R&D projects for development of new methods in the analysis of the health system is supported, using the analysis of big data.

- Development and implementation of new software products for data analysis is supported.

4.1.3. Publishing of the results of service performance analysis

- Service performance indicators are published in aggregated manner, considering that people must be able to obtain information about the quality/performance of services / service providers presented in an understandable way.

- Possibilities of inclusive participation in measurement of treatment quality are created for people.

- Capabilities for calculation of the cost-efficiency of services at the state level are developed.
Measure 4.2 Monitoring capacity of the effectiveness of health services at the level of service provider

The goal of the measure is to create possibilities for systematic monitoring/analysis of the effectiveness of services and interventions by the service providers at every stage of the service/intervention in order to improve the effectiveness of the services — by improving the treatment quality and increasing the effectiveness. The implementation of the measure has an immediate effect on the health and well-being of the population.

Measurement and analysis of the results at the level of health care service providers (and individual health care professionals) in Estonia is currently carried out inconsistently. The main universal activity applied by most of hospitals and medical practices is patient satisfaction survey. Some hospitals practise quality development in the framework of ISO accreditation, whereas such practices are more common in certain individual professions (e.g. laboratory medicine). In 2014, TÜ Kliinikum passed successfully the accreditation of the Organisation of European Cancer Institutes, which is one of the most important results. Also, each year the Estonian Health Insurance Fund gives feedback to the hospitals belonging to the Hospital Master Plan of Estonia about the twenty indicators developed under the PATH project. Family physicians have a national collegial evaluation system based on the Handbook of Quality Development for Family Practices developed by the Estonian Family Doctors Association. For the purposes of evaluation of treatment results, some R&D projects have been carried out in Estonia.

At the moment, there are no good examples in Estonia about the use of indicators (quality, efficiency) or tools for analysis of the performance of health services in management of service development. Until now, the goals of implementation of business intelligence software have been financial accounting and drafting of routine, extensive annual statistics reports on medical activity.

It is possible to achieve the goals of the measure, uniting the possibilities of a central data warehouse with the information systems of service providers, and developing special applications for analysing the quality and performance of end users (doctors, nurses, administrators). Also, it is important to develop and apply the collection of information/data about the performance from sources other than the service provider, considering the follow-up activities of the service by the patient and delayed manifestation of results. The systems developed should make it possible upon planning the services to predict the performance of the service planned at the level of the service provider in short and medium-length perspective (what-if and predictive modelling analyses).

In order to achieve the goals of the measure, we implement the following activities:

4.2.1. Development of analysis capabilities for TTOs

- Agreed standards and indicators of the performance of health services (quality, efficiency) are implemented as central e-services based on the collected data as feedback.
• Prototypes for integrated application of the e-services based on the TIS data warehouse in the information systems of the TTOs are developed for benchmarking of the performance of their services.

• Prototypes are developed for business analysis desktop applications in the information systems of TTOs (including the capacity of what-if and predictive modelling analysis).

4.2.2. Collection of data about the performance of eHealth services from people

• Applications for collection of feedback regarding the quality of life after the provision of health service(s) are developed and implemented.

• Applications for following the administration procedures of medicines and guidance are developed and implemented.

• E-services and applications making it possible for people to provide feedback to the service provider about the performance of a health activity are developed and implemented.

• Application (self-)measurement of reliable health information by people by mobile devices is developed and implemented.

Focus area 5 – Development of remote services

Area goal 5. Remote services and the health services based on those (remote health care and remote care) make it possible to achieve better cost-effectiveness of the health system and accessibility of the services; R&D activities and entrepreneurship in the area of health have expanded.

The fifth focus area aggregates the health system development activities related to eHealth from the perspective of remote services: active development of health services based on remote administration to balance out the inevitable reduction in the number of qualified employees in the health and welfare sector, problems with the accessibility of health care service and the increased expenses of institutional service provision. In the event of a service based on remote administration (i.e. remote service), the person and the service provider are not physically in one location (i.e. the definition of the service does not require the determination of the physical location of the service provider), but the prerequisites include real-time communication, connection with a professional and the supporting technology. Remote services include tele-medical care, tele-care and mobile services (m-services).

A problem is the lack of a central development plan of remote services in the health area; the operation and financing models of the health services using remote administration and an eHealth infrastructure supporting the provision of remote services have not been regulated or developed. The implementation of e-consultation for selected professions has been started; video consultations take place in selected
cases and we have examples of well-functioning solutions in the area of tele-radiology and -pathology at the service providers. Also, it has been attempted to implement several telemedicine projects.\textsuperscript{10}

Technical solutions of remote services have been available already for some time but the integration thereof into the work process is not common. This is the case also due to vague responsibility and the lack of integrated approach starting from the standards / quality indicators, organisational vagueness of service provision and incomplete regulation of data use. It is important to organise the legal space and introduce the new legal space to the market parties, in order to ensure the basis for increased secure and integrated implementation of remote services in solving various health concerns of a person.

However, development of remote services is an area requiring a clear vision: what is developed by the state, which services are created in cooperation between the public and private sector and the need for which services remains fully for people to decide as commercial services.

The goal is to implement remote services as a natural part of the health area and the services related thereto, in order to improve the availability and effectiveness of health services, reducing the costs on labour, service users and the society as a whole. It is important to use the possibilities of remote services in order to achieve greater efficiency and a better performance at all levels of the health area – primary level, specialised medical care, nursing and care, prevention – and the areas related to health. The primary focus in the development of remote services is on the improvement of the primary-level service and supporting of the integration of the health and welfare services in order to reduce the large share of current hospital treatment, and increase the use of home treatment and care possibilities.

We apply the following measures for the development of remote services:

**Measure 5.1 Development of the eHealth infrastructure supporting remote services and the prerequisites for the implementation thereof**

The goal of the measure is to increase the efficiency and flexibility of the health system and its focus on user, creating possibilities for effective application of useful remote services as a part of the health service.

Remote services require the completeness of the eHealth system, adaptation of the legal space, and the creation of a necessary infrastructure and a solution of IT infrastructure. The current experience is limited to single pilot projects between the providers of health service and people, or upon the communication between health services with remote services. Those initiatives require expansion (including e-consultations). The eHealth infrastructure developed or supported upon the

\textsuperscript{10} See e.g. a study of PRAXIS [http://www.praxis.ee/tood/telemeditsiini-lalaldasem-rakendamine-eestis/](http://www.praxis.ee/tood/telemeditsiini-lalaldasem-rakendamine-eestis/)
implementation of the eHealth strategy must support the provision of remote services, including the creation of possibilities for expansion of pilot projects.

The measure focuses on the development of sustainable possibilities of secure e-consultation and remote monitoring service in three main directions:

1. Person ↔ service provider in prevention activities, active, care and follow-up treatment and the provision of labour market or welfare service;
2. Service provider ↔ service provider for consultation of a current or earlier case;
3. Person ↔ machine-expert system for checking one’s condition, getting voluntary feedback or obtaining service (e.g. a treatment machine).

In order to achieve the goals of the measure, we implement the following activities:

5.1.1 Development of an eHealth infrastructure supporting remote services between health service providers

- Conditions are created or ensured for wider use of asynchronous and synchronous e-consultations and video consultations, equally with physical services.
- Information easily used by the health service provider (pre-analysed summaries of health information to facilitate the provision of remote services) is aggregated and a virtual communication environment is created which enables cross-sectional or case-focused communication of different parties.

5.1.2. Development of an eHealth infrastructure supporting remote services between health service providers and people

- Conditions are created or ensured for implementation of asynchronous and synchronous remote monitoring services and e-visits/consultations and video consultations, equally with physical services.
- A central solution supported by the health information system is developed, which enables interfacing of the data collected under the remote service with other health data, thereby creating a prerequisite for using the data collected by a person or a “machine”.
- Possibilities are created in the health information system for participation of data analysis service providers in sharing of health and disease data.
- A feedback environment is created for the health service providers and citizens, creation of a treatment instruction for realisation of the provision of feedback.

5.1.3. Development of new possibilities to collect information about the state of health of people, including from healthy people and measured by people themselves.
• Possibilities are created to collect and analyse information outside the provision of health and welfare service and regardless of the location of the data (e.g. smart applications used by the persons themselves, accomplishments at sports clubs or running tracks, various sensor data, etc.) and use it for the purposes of managing personal health and public health.

• Possibilities are created for submission of the data collected by persons themselves to third parties for use and analysis of the data. A large amount of information collected by persons themselves through remote monitoring increases the need to aggregate the data in a pre-analysed format, so that already pre-analysed information would reach the desktop of a doctor.

5.1.4. Policy-making of remote services

• A plan for development of remote services is created, including the specification of a development process how to stimulate pilot projects and develop validated and widely used health services from those.

• Constant evaluation of monitoring and application possibilities of innovative remote services for realisation of the business need of the Estonian health area (e.g. annual summaries of new developments and the application requirements and opportunities thereof in Estonia and abroad).

• A legal space is created to enable and define remote services, governing the validation of the solutions offered and ensuring the legitimacy of e-consultation / remote monitoring or other decision-making based on digital data, and realisation of responsibility for service provision and the result of the service by remote administration. Also, an opportunity is created for persons to share and manage their own data. Advertising and cross-border operation of such services are also reviewed.

• Increasing of the awareness and improvement of the skills of the users of remote services, in cooperation with the general information society and the activities of increasing people’s awareness of e-services are supported.

Measure 5.2 Development and application of remote services

The goal of the measure is to develop and apply remote services for prevention, provision of primary-level and specialised medical care and integrated with care services, supporting innovative development of the service chain and thus increase the efficiency, while people assume a greater responsibility for the management of their own health and using health services outside a standard medical institution.

First focus is in development of remote services for the primary level, in order to solve problems related to equal availability of general medical care. We presume that with the support of remote services, the availability of health services should improve, if the new service type enables the solution of a part of patients’ problems in less time and by more flexible use of health care professionals’ time.
Implementation of remote services requires that service providers offer different technological possibilities and means to people (local computer, tablet, smart phone, smart TV), using the possibility to support prevention, treatment and/or welfare services via different remote administration solutions in all events when it is more efficient or effective as a whole than the service or service component provided physically. The primary focus is on supporting the integration of the health care and social welfare service, in order to reduce the share of unnecessary hospital care and by expanding the possibilities of home treatment with the support of remote monitoring, as well as supporting of home nursing-care service by the means of eHealth. Special attention is paid to the possibilities of application of innovative remote medicine (e.g. which objective findings can be evaluated via remote medicine applications).

The following services are distinguished upon the development of remote services (as in the whole strategy):

1. services developed by the state (the national development plan);
2. services desired by TTOs (supported initiatives);
3. services that people want (private market).

In order to achieve the goals of the measure, we implement the following activities:

5.2.1 Development and application of remote services in prevention

- Remote services (including m-services) are developed and implemented in order to prevent diseases, maintaining focus on healthy lifestyle, diet, movement and ensuring access to the relevant information. The goal of the measure is to expand the influence of the disease-prevention activities on the target groups, creating new possibilities for the target groups to take responsibility for their health in the digitalising world.

5.2.2. Development and implementation of remote services in the provision of general and specialised medical care

- The possibilities of remote services are applied on a wider scale to support the timely availability of the health care service at the primary level: including support of the new telemedicine service and especially at the primary level, service standards are developed, the legal space is adapted and the procedure for adding the price list of the Health Insurance Fund is agreed.

- The e-consultation service is expanded to a large number of professions.

- The work processes of family physicians, specialised medical care and nursing care are optimised upon the addition of e-services / remote services.

5.2.3. Development of remote services in rehabilitation and monitoring of people with chronic diseases, integrated with home care services
The development and implementation of remote monitoring services is supported, in order to enable the patients with chronic diseases test their necessary vital indicators and submit those to service providers.

Measure 5.3 Facilitating entrepreneurship for the development of remote services

The goal of the measure is targeted development of entrepreneurship in the health area, promoting cooperation between companies developing remote services and TTOs, and thus create additional value in the health system.

The measure focuses on the opportunities to increase awareness of the business need of the health system and the possibilities of entrepreneurship to address that. A challenge of Estonia as a small country is to find ways to motivate companies to develop products for the small Estonian market. The current financing models do not enable the inclusion of the funds from the private sector, cooperation models of the public and private sector (PPP models) need to be developed. According to the eHealth strategy, in the future there will be an active market for the development of remote services and good cooperation between the technology/development companies and service providers.

In order to achieve the goals of the measure, we implement the following activities:

5.3.1 Creation of the principles of the cooperation model / financing model of the public and private sector

- Responsibility for ensuring the necessary e-services in the health area between the public and private sector is determined.
- Principles are developed for evaluation of the evidence-based nature and cost-efficiency of innovative e-services/products and the underlying technologies, which is a prerequisite for the extensive implementation thereof in the health care system (including inclusion into the service price list of the Health Insurance Fund). The cost-efficiency criterion includes the price, the evidence-based nature includes also the possibility for national certification of the solution used.

5.3.2 Increasing awareness and supporting need-based innovation

- Round tables, trainings and competitions are organised for the parties of the eHealth ecosystem, in order to ensure the awareness of the cluster uniting the health care and welfare service providers, R&D partners, entrepreneurs and enterprises of the health area of the cooperation possibilities and generation of new ideas.
- For need-based innovation of new value-creating products and services, competitions based on pre-defined needs are organised. Innovation vouchers or product development grants are
provided to promote cooperation between sectors, including the involvement of practising doctors and nurses in the innovation process.

- The support process of implementing innovation is promoted as a whole to promote the birth of new companies – the creation of the so-called incubation programmes is considered to create and market new products and services in the area of eHealth, in cooperation with the measures of entrepreneurship.

- Test environments (*living labs*) are developed for validation and fine-tuning of services and products.
Implementation of the strategy

Organisation

For the implementation of the strategy, an efficient organisation is applied with a task to ensure the achievement of the desired strategic eHealth goals by multi-level and inclusive management model and roles with clear responsibility.

Figure 1. Organisation for implementation of the eHealth strategy

*eHealth strategy council*

A permanent strategy council is formed at the Ministry of Social Affairs, partly as a successor of the Task Force. Its task is to ensure the conformity of development and management of eHealth services with the other national goals (including various strategies guiding the work of various areas of the scope of the Ministry of Social Affairs, as well as the information society and R&D). The head of the strategy council is the Deputy Secretary General on E-services Development and Innovation, the assistant head is Deputy Secretary General on Health. It is important to define responsibility at a strategic level in order to balance the needs of various interest groups.

The eHealth strategy council is responsible for:

- the consistency of the eHealth strategy with the achievement of the goals of the Public Health Development Plan 2020;
- synchronisation of the activities of the system of e-services and developments and various parties of the health area (users, customers, partners);
• considering the interests of various parties of the health area (users, customers, partners);
• efficient connection of the development and administration of the eHealth system with R&D and development of entrepreneurship (including ensuring the conditions necessary for the development of eHealth and realisation of the potential of the eHealth system outside the immediate provision of health services);
• development of and reporting on updating of the eHealth strategy and application plans.

The head of the eHealth strategy council is the Secretary General of the Ministry of Social Affairs and it should include representatives from:

1. Ministry of Education and Research
2. Ministry of Economic Affairs and Communications
3. Government Office
4. Estonian Health Insurance Fund
5. Estonian Hospitals Association
6. Estonian Family Doctors Association
7. Estonian Medical Association
8. Estonian Service Industry Association
9. Estonian Connected Health cluster
10. Tallinn University of Technology
11. University of Tartu
12. Estonian Chamber of Disabled People
13. Think Tank PRAXIS

Ministry of Social Affairs (management of service development)

The Ministry of Social Affairs is responsible for the implementation of the eHealth strategy and the achievement of the agreed strategic goals. The Deputy Secretary General on Health is in charge of the substantive goals, i.e. those related to the effectiveness of the health policy and health services, and the Deputy Secretary General on E-services Development and Innovation is in charge of the efficient functioning of the supporting e-services.

In order to implement every e-service developed, the desired result is defined and a person responsible for the functioning and results of the service is determined — the owner of the service\(^\text{11}\).

1. Service owners in the health area and steering groups of e-services

\(^{11}\) “Analysis and proposals for determination of the owners of public services (conception)”; Ministry of Economic Affairs and Communications; approved at the VV cabinet meeting on June 30th, 2015
The units in the health area of the Ministry of Social Affairs (and the leading specialists working there) or the institutions working in the scope of the Ministry or the Estonian Health Insurance Fund providing public services. It is important to define responsibility through the complete content of a public service. Service owners are in charge of all the steering groups related to the management and development of e-services. Steering groups are the highest decision-making authorities of the project, following the achievement of the results, the budget and the deadlines. Their members must ensure all the decisions necessary for successful realisation of the service.

The service owners are responsible for:
- the consistency of the e-services with the health care policy, the needs of customers and users;
- the funding;
- the final result of the service (through the steering group);
- the mandate of the project group members participating in the customer’s-portfolio manager’s development;
- involvement of partners.

2. **Product Owners i.e. portfolio managers of eHealth services**

There are specialists working in the development unit of e-services at the Ministry of Social Affairs (area of e-service development and innovation) or in the health area and the scope of the Ministry or in the Estonian Health Insurance Fund who are in charge of developments and organise the management and development of the related products and e-services. Definition of responsibility for a service provided through an e-service as a digital channel in the interests and by the request of the Service Owner is important. Product Owners are also project managers who technically manage the development projects in the scope of the mandate and for the purpose received from the Service Owner.

Product Owners are responsible for:
- the efficient coordination of the development process of particular e-services and fulfilment of agreed development tasks, i.e. the management of a development project;
- realisation of the expectations of the Service Owner (deadline, result, budget);
- ensuring the necessary capacity for implementation and efficient use of the eHealth services (competence and skills of users; service development know-how and methods).

**IT application units**

The IT development of the eHealth services and the management of the applications takes place at two individual units (Estonian eHealth Foundation and the ICT Department of the Ministry of Social Affairs). The Estonian eHealth Foundation manages the IT development and administers the applications related to the health information system, and the ICT Department of the Ministry of Social Affairs fulfills the
same role for the applications of the Ministry itself and the institutions in the scope of the Ministry (Health Board, State Agency of Medicines, and National Institute for Health).\textsuperscript{12} The immediate partners and formulators of orders of both application units are Product Owners.\textsuperscript{13} It is important to define responsibility for the purposes of IT development and the IT component administration of e-services according to the order of the Product Owner.

IT application units are responsible for:
- efficient realisation of IT development projects (if necessary, in cooperation with external development partners);
- efficient coordination of work groups necessary for development (actively involving the competence of the Product Owner and Service Owner, if necessary);
- high-quality functioning of the IT component of the e-services at the service level agreement (SLA) agreed with the Product Owner, i.e. the administration of e-services;
- ensuring the administration of the necessary infrastructure (hardware and software) and the technical standards;
- the IT capabilities and know-how necessary for the technical development of the eHealth system.

Technical work groups

In addition to the specialists employed by the SoM or the IT application units full-time, experts with various competence (health experts, reference panel of the population, work groups of the legal space / ethics and architecture) are involved on a permanent basis to facilitate efficient application of the input necessary in the development projects.

1. Health care experts and expert groups

Experts from various medical areas are permanently involved in the work of the e-services development unit of the SoM. The goal is to ensure the suitability of the eHealth services for medical purposes but also the successful user experience for health care professionals as one of the main user groups. It is important to define the responsibility for drafting functional and medical standard requirements related to a competent input. Health care experts work individually as independent consultants. Product and Service Owners ensure formal approvals by professional organisations.

Health care experts and expert groups are responsible for:
- high-quality expert advice in the development of the processes and standards of e-services according to the best medical knowledge in the world and the needs of the Estonian users;
- active participation in the development of eHealth services in order to achieve improved availability, increased efficiency and better performance thereof by support of e-services;

\textsuperscript{12} The Estonian Health Insurance Fund develops and manages also important eHealth services, e.g. the digital prescription service.

\textsuperscript{13} The eHealth Strategy Task Force has recommended to carry out an analysis to determine the possibilities for enhancing the cooperation of the development unit of e-services of the SoM (deadline March 2016).
high-quality expert advice in the development of reliable possibilities for the secondary use of health information in R&D and for commercial purposes to develop new products and services.

2. **Reference panel of the population**

A reference panel of the population consisting of patients of different age and target groups and healthy people is formed at the development unit of e-services of the SoM on a permanent basis. The purpose of such a reference panel is efficient involvement of patients in the development of e-services at an early prototyping (service design) phase. It is important to define the responsibility by receiving input for the achievement of good user experience and for designing the new service processes supported by e-services.

The reference panel of the population is responsible for:
- active participation in the development of the health services in order to achieve improved focus on patient and user and greater user convenience by support of e-services;
- active participation in early testing of new e-services.

3. **The working group of ethics and legal space**

The working group of ethics and legal space is formed at the SoM on a permanent basis, expanding the role of the current ethics council of the Health Information System. The task of the group is to ensure efficient protection of personal data when processing the continually increasing amount of more and more complex health data. The responsibility of the working group has been defined based on the goal to ensure the consistency of management and development of eHealth services with the principles of protection of personal data with the help of the role of an independent consultant and arbitrator.

The working group of ethics and legal space is responsible for:
- the development of the principles of protection of the privacy of an individual and the independent monitoring/analysis of the application thereof;
- the development of the regulation and means for the right to use and process own data and the possibilities to delegate the right;
- independent monitoring/analysis of the development and application of the principles for using health information in association with public good (provision of public services) and R&D and for commercial purposes.

4. **The working group of architecture**

The working group of architecture is formed at the IT application unit (eHealth Foundation or the ICT Department of the SoM) on a permanent basis. It shall ensure the effective functioning of the eHealth system (and e-services) according to the best known practice of the information and communication technology and in accordance with the needs of other parties of the health system and the
developments of the Estonian information society in all the country. It is important to define the responsibility related to the use of the best know-how upon the IT realisation of e-services.

The working group of architecture is responsible for:

- active participation in agreeing on the necessary infrastructure (hardware and software) and the technical standards necessary for the effective functioning of the eHealth system (i.e. the health information system and other central databases of the health area and the information systems of TTOs) between various parties in order to ensure the consistency of the system;
- high-quality expert advice in the development of the processes and standards of e-services according to the best ICT knowledge in the world and the needs of the Estonian users;
- active participation in the realisation of the development projects of the health information system (in cooperation with external development partners, if necessary);
- active participation in the development of the IT capacity and know-how necessary for the technical development of the eHealth system in cooperation with development partners (including brainstorming of developers, hackathons, etc.).

Health service providers

Health service providers (TTOs) are the largest processors of health information, and all the source data related to treatment activities are created in the information systems administered and developed by them. According to the new eHealth system conception, TTOs keep continually developing their own information systems but it is coordinated more efficiently with the national information system developers and other TTOs. Also, the information processing requirements and standards necessary for the provision of high-quality health care service are established, and the TTOs shall be responsible for following those.

Health care service providers are responsible for:

- following the information processing requirements and standards necessary for high-quality health care service provision in their information systems;
- interfacing with the national eHealth services.

Partner-ministries (HTM, MKM)

By implementing the eHealth strategy, on the one hand a significantly improved capacity is created for R&D and entrepreneurship and economic development based on the processing of health information. On the other hand, within the smart specialisation policy there is remarkable consistency between the R&D and entrepreneurship measures related to the health area and the eHealth strategy in regard to the health care policy and ICT activities, in order to avoid unsustainable expenses. Also, the eHealth services form an important part of the development of the information society. By the eHealth strategy developed at the government level, it has been planned to coordinate the sectoral investments and policies related to the ICT of the Ministry of Education and Research and the Ministry of Economic
Affairs and Communications with the Ministry of Social Affairs, and to consider the relevant part of the eHealth strategy in the implementation thereof.

Roles of partner ministries:

- The Ministry of Economic Affairs and Communications coordinates the financing and political decisions related to the development of the capacity of development and use of the e-services influencing the health area with the Ministry of Social Affairs.
- The Ministry of Education and Research coordinates the decisions influencing the use of health information (including gene and other molecular data, treatment data, data about public health, etc.) in R&D and the infrastructure investment and other political decisions related thereto with the Ministry of Social Affairs.
- The Ministry of Social Affairs is responsible for ensuring consistency with the achievement of the goals of the development plan of the information society upon the implementation of the eHealth strategy, as well as the creation of improved capacity for R&D and the development of entrepreneurship and economy based on the processing of health information upon the development of the eHealth system.

International cooperation

At the international level, the interest of Estonia in implementation of the eHealth strategic development plan is:

- to ensure that cross-border data exchange is actually functioning within the EU or at least between the main origin or destination countries for patient movement – that also the cross-border strategy aims at comprehensive case management and availability of services, also promoted export of health services (service of foreign patients);
- to be actively present in all the groups and initiatives with potentially significant influence at the EU level – we must be informed and be able to influence the course of events to defend our principles and solutions, for enhancing cross-border service interests, to identify and intermediate possibilities for cooperation and business opportunities;
- to ensure the functioning of a uniform market of eHealth solutions – it means a uniform, simple, clear set of rules for the creation, use and distribution of eHealth solutions, which would ensure interoperability and protection of patients. Thus the companies have a greater incentive for innovation and a “home market”, which also brings more solutions into the Estonian market (both domestic and foreign);
- to be informed of the front-line of eHealth in the whole world – to know the newest solutions and emerging ideas in the development of technology and services and have contacts in order to apply good new possibilities as an early applier for achievement of the goals.

However, the limited nature of the eHealth mandate at the level of the EU and the inevitable need for prioritisation of resources within Estonia must be considered, i.e. it is not possible to do everything, especially simultaneously. The efforts made and resources contributed for the promotion of the above
interests must thus be proportional to the potential of the gain. The criteria for the latter are: direct nature of the gain, extent of the influence, duration of the influence, amount of own effort. If necessary, we must be ready to contribute increasingly to valuable and effective foreign initiatives if they help to achieve the strategic goals of eHealth.

The organisation of international eHealth cooperation is the task of the SoM. In order to ensure the necessary domestic coordination and exchange of information, an unofficial network is created of people who meet periodically, constantly communicate virtually and involve also parties from the private sector (e.g. joint organisations of companies, Estonian Hospitals Association). The network also includes organisers of the foreign communication of e-Estonia, in order to ensure good exchange and synchronisation of information by distribution of e-state solutions and cross-border cooperation initiatives also on a wider scale and mutually.

For the organisation of international cooperation and supporting of entrepreneurship, the SoM with its subsidiaries and partners also introduces the Estonian eHealth solutions internationally. Among other things, high-quality and informative introductory materials (including web content) are constantly published in English about the Estonian eHealth system and solutions.

**Funding**

The eHealth strategy is implemented by various parties, considering that besides the national databases and information systems, the eHealth system includes also other equipment and applications by which health data are processed and health services are provided through e-channels. Thus, also the funding sources are versatile.

For successful application of the strategy, it is important that different funding sources are coordinated based on the role and responsibility of each party.

**Funding sources**

From the state budget through the SoM, the general coordination of the whole strategy and the national eHealth services, the infrastructure necessary for the administration thereof and the IT costs of the institutions in the scope of the SoM are funded.

The SoM may also pay direct allowances to particular health care service providers to motivate quicker implementation of the services prioritised by the state.

Outside its immediate scope, the SoM (including the information systems of TTOs) does not undertake the role of software owner but can participate in development projects in the role of a so-called prudent
contracting entity. That applies e.g. in an event when the market parties are too segmented to ensure high-quality competition in the provision of software in Estonian (e.g. family physicians).

Also the SoM may participate in an early (so-called pre-commercial) stage in development of user application prototypes e.g. through innovative procurements. The goal should be the development of innovative solutions with partners and end users from the private sector, and quick realisation of the developed prototypes in all the software used. The intellectual property of the end products remains to the private sector.

Through the **Estonian Health Insurance Fund** (from the health insurance budget) the expenses of the TTOs for the provision of eHealth services (including for the purchase and management of licensed software and hardware necessary for the provision of services, to the amount of the royalties of the national eHealth services, which is necessary for the provision of the services, e.g. archiving of documents in the health information system or the Photo Bank) are covered by amounts (prices of services listed among health care services) paid for the services provided by TTOs.

In the future, the ICT component of the health care service prices will be associated with the quality requirements established to the provision of health care services at a national level, to facilitate the realisation of particular developments necessary for the state in the information systems of health care service providers.

**In addition to the above, funding means based on result-based risk division are developed** – how to actively stimulate innovative quality and the creation and early implementation of evidence-based e-services supporting cost-efficiency by the TTOs. A goal of the measure is to stimulate entrepreneurship in the area of health care IT in Estonia, promoting product development by cooperation of ICT companies, scientists and TTOs in order to increase the quality and cost-efficiency of health care.

**Health care service providers from their own budget** finance all the expenses for supporting their service processes by eHealth from the funds earned from the Estonian Health Insurance Fund or other sources (e.g. own contribution of patients or sale of the service to other market parties, own funds). This may include the acquisition and administration of hardware and software, software development, as well as the fees for using the state eHealth.

The investments of health care service providers are supported from the state budgets via the measures governed by the SoM and the Ministry of Economic Affairs and Communications.

The ICT investment decisions of TTOs are guided at the national level mainly by health care political decisions. For example, upon the establishment of quality standards to the provision of health care services (including digital data acquisition and data exchange) or the establishment of quality-related result goals to the provision of health care service. The realisation of particular developments necessary
for the state in the information systems of health care providers is stimulated both by national targeted allowances and the agreements of the Health Insurance Fund (e.g. by connecting the ICT component included in the service price with the development of the necessary e-service capability).

As new measures, TTOs are supported by various national measures in the fulfilment of the role of a so-called prudent contracting entity (e.g. family physicians) or the development of user application prototypes at an early stage of product development (see the subsection of the SoM above).

The European Union Structural Funds and other foreign financing investments are first of all aimed at making a so-called leap of development in the health area in connection with prevention and treatment services, but also to create better opportunities for the development of R&D and entrepreneurship in the health area and inclusion of foreign investments.

For that, various measures governed by the Ministry of Economic Affairs and Communications, SoM and the Ministry of Education and Research are used.

All structural funds and other foreign funding investments must be consistent with the eHealth Strategic Development Plan until year 2020, regardless of the recipient of the allowance. For that, HTM and MKM coordinate and approve the planning and application of their measures with the SoM. Also, the partner ministries involve the representatives of the SoM in making financing and policy decisions related to the development and use of the e-services influencing the health area or the use of health information (including gene and molecular data, treatment data, data on public health, etc.), in order to ensure the feasibility and strategic influence of using public funds.

From international projects, first of all better integration of the Estonian eHealth services with the eHealth services of other European countries is funded, as well as the development of the possibilities for more active use of e-services in Europe as a part of the e-society. Also, international funding is used for the development of the eHealth competency in Estonia both in the private sector and in R&D institutions, as well as in the public sector.

Various cooperation models with the private sector are used for quicker spreading of innovation related to e-services in the health care system, as well as for the development of the Estonian business and economic potential in the areas of health care, informatics, etc.

For that, PPP models, risk division models, innovation procurements, promotion of foreign investments, etc. are used.

The market of e-services for end consumers is also an important development engine for successful application of the eHealth strategy. Based on the strategy, the state can promote
Funding objects

For successful application of the eHealth strategy it is important to ensure flexible financing of various components at a sufficient level.

In addition to hardware investments and administration and the purchase of development work and the administration of complete information systems, it is necessary to support the acquisition and integration of licensed final products with the Estonia-specific systems in order to keep up with the rapid development in the world. That is necessary both at the state level and by TTOs.

It is also necessary to engage in the service development (service design) of the health area, training and informing of users and the general public.

In order to use the natural potential of autonomous TTOs, as well as technology companies, it is necessary to invest in the creation of stimuli through reasonable standardisation, and into supporting the implementation thereof. In standard development active cooperation is necessary both with the European Union and at a global level (first of all the USA), in order to ensure the quick implementation of innovation and the reputation of Estonia as an active target country among potential partner companies.

Special attention must be paid to the development of eHealth in the necessary direction and scope and as a part of international cooperation networks by active stimulation of the developments related to entrepreneurship or R&D. Thus, it is necessary to combine skilfully local resources and foreign investments and allowances.
## Terms used in the eHealth strategy

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Source data</strong></td>
<td>Raw data created by the primary source. (e.g. data entered by a doctor during the provision of a health care service, data entered by persons themselves, data generated by an automated analyser, etc.)</td>
</tr>
<tr>
<td><strong>Data warehouse (=data storage)</strong></td>
<td>Data warehouse (=data storage) – a set of methods, technologies and practices for using data, with a purpose to make better decisions and offer better services, maintaining the privacy of the data subjects and creating possibilities for data analysis.</td>
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<tr>
<td><strong>Database</strong></td>
<td>A database is a set of organised data processed in an information system</td>
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<tr>
<td><strong>Data acquisition</strong></td>
<td>Collection of data and saving thereof for machine processing; the data acquisition rate / data acquisition report into the central system of the health information system means the efficiency of transfer of documents.</td>
</tr>
<tr>
<td><strong>Data quality</strong></td>
<td>An agreed framework of quality requirements must apply to health information and the collection thereof. Data are of high quality if they are complete, valid, accurate, timely, unique and compatible. The system by which the data are processed must be easy, flexible, acceptable for users, representative, timely and include high-quality data.</td>
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<tr>
<td><strong>Open data platform</strong></td>
<td>It must be technically possible to use the health information of a person everywhere outside the place where the data are created if a person has given an informed consent for that, and include the data from all the sources that have been acknowledged as technically suitable for which the person has provided their consent. That is supported by a relevant technical solution – by issuing data only in the desired extent and to the desired data recipient.</td>
</tr>
<tr>
<td><strong>E-consultation</strong></td>
<td>Consultation of a health care professional from distance, using digital health information and data exchange channels.</td>
</tr>
<tr>
<td><strong>Criteria for reasonable use of eHealth</strong></td>
<td>Functional requirements established to health care service providers for storage, processing and exchange of data created in the course of operation with other parties. The purpose of the criteria is to improve the quality, efficiency and safety of service provision; involve people and their immediate family, improve the coordination of service and support the fulfilment of the goals of the health policy and maintain the security of patients and protection of personal data.</td>
</tr>
<tr>
<td><strong>eHealth system</strong></td>
<td>The eHealth system consists of national databases (including the database Health Information System, state registers, national database Prescription Centre, etc.), the systems necessary for the administration thereof (including the hardware and software) and</td>
</tr>
</tbody>
</table>
Submitted to the government cabinet on November 27th, 2015

<table>
<thead>
<tr>
<th><strong>eHealth infrastructure</strong></th>
<th>Technical applications etc. components and parties supporting the functionality of the eHealth systems, databases, services and other applications.</th>
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<tbody>
<tr>
<td><strong>eHealth service end user</strong></td>
<td>Health care service providers; health service providers; health care of health service users – depending on the particular service.</td>
</tr>
<tr>
<td><strong>eHealth service provider</strong></td>
<td>Owners or administrators of information systems and applications included in the ecosystem of eHealth. External service providers who have a right and opportunity to use a person’s health data and provide information based on those.</td>
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<tr>
<td><strong>eHealth push service</strong></td>
<td>Automatic notifications of patient movement between various service providers in the health care system</td>
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<tr>
<td><strong>Disease data / treatment data</strong></td>
<td>Data related to the diseases of a person and the treatment thereof</td>
</tr>
<tr>
<td><strong>Disease file</strong></td>
<td>A document with certain format and content including the data of one case or medical episode of a patient about the data collected during in- or outpatient treatment and that can be documented either digitally or on paper.</td>
</tr>
<tr>
<td><strong>Information system</strong></td>
<td>An information system consists of the means for collecting and maintaining, processing and issuing information. Main parts of an information system: - database (register, database); - processing regulations (programmes); hardware or technical means. “Information system” is a technical, not a legal term. A database is always an information system but an information system is not always a database from the legal perspective. Information systems include e.g. the web pages of institutions, Excel tables, inventories on punched cards, presentation slides, etc. Several databases can technically form one information system.</td>
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<tr>
<td><strong>Remote monitoring</strong></td>
<td>Remote or tele-monitoring is a telemedicine service with a purpose of surveillance of the health state of patients from a distance by technical equipment. The data are collected either automatically by a personal health monitoring device or the patient registers and sends their own health information.</td>
</tr>
<tr>
<td><strong>Remote care (=telecare)</strong></td>
<td>Telecare is an area specialising in the provision of social services, using information and communication technologies and digital data. Remote care is first of all used to support the daily activities of the people who need help (e.g. elderly or disabled people) and ensure quick reaction to a need for help, if necessary.</td>
</tr>
<tr>
<td><strong>Remote medicine (=telemedicine)</strong></td>
<td>Provision of health care services by means of information and communication equipment in situations where the health care specialist or patient or two health care specialists communicating with each other are in different locations.</td>
</tr>
</tbody>
</table>
| **Remote service** | A general term to describe remote medicine, remote care and various services based on a mobile platform. In the event of a
remote service), the person and the service provider or two service providers working together within the service are not physically in one location (i.e. the definition of the service does not require the determination of the physical location of the service provider), but the prerequisites include real-time communication, connection with a professional and the supporting technology.

<p>| Interoperability | The capacity of different systems and devices to exchange information and interpret the shared information. In health care, interoperability means communication between various information systems and software solutions, data exchange and the capacity to use that information. Interpretation of data exchange between information systems is ensured at the level of data field. |
| Machinereadable integrated treatment etc. instructions | Combination of treatment instructions at the primary-level and specialist medical care and sharing thereof in a format processed/processable by computer to the desktop of a doctor. |
| Decision-making support for doctors and nurses (clinical and decision-making support) | IT application helping doctors and other health care professionals make clinical decisions, associating the automatically collected health data of a person (including gene data) with evidence-based knowledge. |
| Decision-making support for people/patients | An IT application helping people evaluate their state of health, a need for health services and provide further guidelines for deciding the next steps, associating the (automatically) collected health data of a person with evidence-based knowledge. |
| Personal medicine | Prevention, diagnostics and treatment of diseases based on the probability of individual risks and recommendations of decision-making support identified by calculated analysis based on individual geno- and phenotype. The purpose of applying personal medicine is more extensive implementation of preventive, predictive and inclusive approach in health care. |
| Register | A database where information is added and updated systematically and according to plan. |
| Standards | Sets of values, rules and instructions developed to achieve an optimum, consistent and reproducible result. Standards are established and approved by international or national standardisation institutions and available to the general public. |
| Synchronous and asynchronous telemedicine | Synchronous - real-time telemedicine where information is passed on a continuous basis with a small or unnoticeable delay; asynchronous analysis of information collected by studies and acting upon that takes place with a delay, later, not real-time. |
| Comprehensive case management | Comprehensive solution of each medical case / health issue based on the cooperation between service providers and clear responsibility. |
| Health data | The data describing a person’s state of health and their use of health care services, including the health-related data associated with a disease (e.g. study results and treatment plan) or not associated with a disease (including e.g. vaccinations, health certificates, self-measurements). |</p>
<table>
<thead>
<tr>
<th><strong>Infrastructure of health data</strong></th>
<th>An infrastructure for integrated handling of various databases (including registers, datasets, surveys and research, biobanks).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health account</strong></td>
<td>A person-based dataset, which in addition to the disease data collected currently by health care service providers:</td>
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<tr>
<td></td>
<td>▪ includes the clinical interpretation of gene studies (and gene information, if necessary, the environmental factors,</td>
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<tr>
<td></td>
<td>▪ enables a citizen to add information about their health behaviour, eating habits, stress level, movement habits,</td>
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<td></td>
<td>▪ sleeping habits, training and spending of free time;</td>
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<tr>
<td></td>
<td>▪ facilitates the reception of various health data measured by medical or training devices (e.g. morning heart rate, heart rate after time n, blood pressure, blood sugar, oxygen consumption, etc.);</td>
</tr>
<tr>
<td><strong>Health Information System</strong></td>
<td>A database belonging to the state information system founded according to the Health Services Organisation Act where data related to the health area are processed for the conclusion and fulfilment of agreements for the provision of health care service, ensuring the quality of health care services and patient rights and protection of public health, including the keeping of registers of the state of health, collecting health statistics and health care management.</td>
</tr>
<tr>
<td><strong>Health file</strong></td>
<td>A set of all the episodes (or health events) of a person that are related or unrelated to a medical case (including e.g. vaccinations, health certificates, self-measurements). The purpose of the current health information system has been the collection of a disease file based data in order to enable better treatment of patients. The collection and use of extended information (i.e. the health file data) would serve the purpose of a long healthy life. The health file data conceptually also include some of the disease file data but they include much more – a health file would gather all the disease files, medical records and the documents not related to disease.</td>
</tr>
<tr>
<td><strong>Health event</strong></td>
<td>A change in the health of a person associated with the use of health care services (e.g. a visit to doctor, an emergency medical care visit, a study, vaccination) and about which health data are submitted to the health file.</td>
</tr>
<tr>
<td><strong>Health system</strong></td>
<td>A system for the provision of health services consisting of the systems of health care and public health. The primary task of the health care system is provision of medical services (e.g. in hospital, at primary level and in nursing care) and the primary task of the second public health system is organisation of health promotion and prevention. The health system consists of various elements like service provision (services and intervention for both individuals and the population), labour force, health information, medical products and technology, financing and leading and governance.</td>
</tr>
<tr>
<td><strong>Health service</strong></td>
<td>A service related to a person’s health which may be associated with welfare and/or labour market services.</td>
</tr>
<tr>
<td><strong>Health care service</strong></td>
<td>The activity of a health care professional for the prevention,</td>
</tr>
</tbody>
</table>
diagnosis and treatment of a disease, injury or poisoning with a purpose to ease the discomfort of a person, prevent the deterioration of their state of health or aggravation of a disease and restore their health. The minister responsible for the sector establishes a list of health care services. Those include outpatient and inpatient health care service, stationary treatment and pharmacy service.