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Entrepreneurial Discovery Workshop Report III

Topic 2: BIOMEDICINE, BIOPHARMACEUTICALS, BIOINFORMATICS



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EDP workshop overview

On June 20, 2019, the Ministry of Education, Culture and Research, with the support of the Joint Research Center of the European Commission and in partnership with the Information Society Development Institute, organized the second entrepreneurial discovery process (EDP) workshop in Biomedicine, Biopharmaceuticals, Bioinformatics (Biomed) priority domain.

The event was attended by 48 people, representatives of public authorities, universities, research institutes, private sector and civil society, distributed as follows:

Working group	Biomedicine	Biopharmaceuticals	Bioinformatics
Nr. de reprezentanți	<i>Facilitator:</i> <i>dr. Sergiu Porcescu</i>	<i>Facilitators:</i> <i>prof. Mihail Todiraș,</i> <i>prof. Olga Tagadiuc</i>	<i>Facilitator:</i> <i>prof. Ghenadie Curocichin</i>
Business	5	5	3
Academia	6	7	6
Civil society	3	3	2
Public authorities	3	3	2
Total:	17	18	13

The main purpose of the EDP workshop was to carry out the SWOT analysis and to formulate the vision for the future development of the priority domain, including per identified subdomains.

As part of the mapping the economic, scientific and innovation potential and identification of the preliminary areas for smart specialization, 3 Biomed subdomains were identified, which have potential for smart specialization. These niches were first discussed during the EDP event organised in December 2018. The identified subdomains have been validated during the EDP workshop:

- *Biomedicine*
- *Biopharmaceuticals*
- *Bioinformatics*

The EDP workshop agenda included an introductory plenary session, where representatives of relevant public authorities (Aliona Onofrei from the Ministry of Education, Culture and Research, Gheorghe Gorceag from the Ministry of Health, Labor and Social Protection, prof. Ghenadie Curocichin from State Medical and Pharmaceutical University “Nicolae Testemitanu” and corr.mem. Svetlana Cojocar from the Academy of Sciences of Moldova) highlighted the importance of the entrepreneurial discovery process for the Biomed sector. The Head of the Science Department of the SMPU “Nicolae Testemitanu”, prof. Ghenadie Curocichin, made a brief presentation of the agenda and methodology.

The presentations delivered by the members of the national smart specialisation technical group (dr. Sergiu Porcesu - National Contact Point for the Joint Research Center of the EC, prof. Ghenadie Curocichin, SMPU “Nicolae Testemitanu”) focused on several relevant topics. These included smart specialization in the Republic Moldova, identified priority areas, entrepreneurial discovery process, examples of good practices / success stories. Prof. Curocichin presented a report on the results of the first iteration of the EDP workshop in Biomed.

The presentations were followed by 2 participatory exercises, moderated by facilitators:

- performing SWOT analysis of the identified subdomains and the priority domain as a whole,
- developing visions for the identified subdomains and then a common vision for the future of the ICT priority domain as a whole.

Current status of the Healthcare sector

The weight of the health sector varies from 8% to 15% in the economic structure of the regions of the Republic of Moldova, being ranked on average, the fourth, after agriculture, industry and trade.¹ At the same time, it is well known that, “the health care sector is not, as commonly portrayed, an expensive cost, but is an important economic engine, which contributes to the economic growth of a country and creates many high-quality jobs”.² As Dr. Zsuzsanna Jakab, WHO Regional Director for Europe, said: “Health investment is the smartest investment – it pays off.”³

The mapping exercise, carried out by SIRIS Academic in the Republic of Moldova, has emphasised a potential for technological transfer in the field of Health, with several subdomains identified, such as Biomedicine and Biopharmaceuticals, where “Health, biomedicine and pharmaceuticals are a balanced priority with a similar contribution from publications and patents. Four of the topics are patent-intensive, focusing on pharmaceutical products and processes, postoperative medical treatments, surgery, prosthetics and hospital equipment. Three of the topics are publication-intensive, focusing on health policy and quality, biotechnology and pathology. One topic mixes publications and patents almost perfectly, focusing on pathology and medical treatments.”⁴ The Health domain has shown a fairly balanced profile of involving both the research and medical practice sectors, a fact which allows for a faster transfer of research results into daily practice.

Based on the results of the above mentioned studies, the health, biomedicine and pharmaceuticals subdomains have the potential for creating competitive advantages. At the same time, it is obvious that the insufficient development of the bioinformatics and IT in health will serve as a substantial obstacle in the development of these subdomains.

It should be mentioned that on March 6, 2019, the Republic of Moldova became a full member of the International Center for Genetic Engineering and Biotechnology (ICGEB). This membership gives the entities from the Republic of Moldova access to the results of advanced research in the field of molecular biology and biotechnologies, offers the perspective of deepening the relevant knowledge and applying the latest techniques in biomedicine, production of phytopharmaceuticals and biosimilars, offering competitive advantage to the mentioned subdomains. The membership of the Republic of Moldova in ICGEB will benefit the country through an enhanced transfer of technologies and expertise in the field of genetic engineering and biotechnologies to the domestic pharmaceutical industry, ensuring the internal market with pharmaceutical substances and increasing their export.

Based on all of the above, the subdomains of Biomedicine, Biopharmaceuticals and Bioinformatics have been identified as having the potential of forming competitive advantages at regional level.

Healthcare sector in the Republic of Moldova is traditional, based on classical, disease-centered approaches. The structure of morbidity and mortality in the Republic of Moldova is specific to developing countries, with a high prevalence of noncommunicable (or chronic) diseases (NCDs), which consume huge amounts of resources for diagnosis and clinical treatment of patients, due to their long-lasting nature.

The health status of the country's population has experienced some improvements over the past two decades. Life expectancy increased from 63/ 70 years for men/ women in 1996 to over 68/ 76 years in 2016, while the infant mortality rate decreased from 21 cases per 1,000 live births to 9,3 cases per

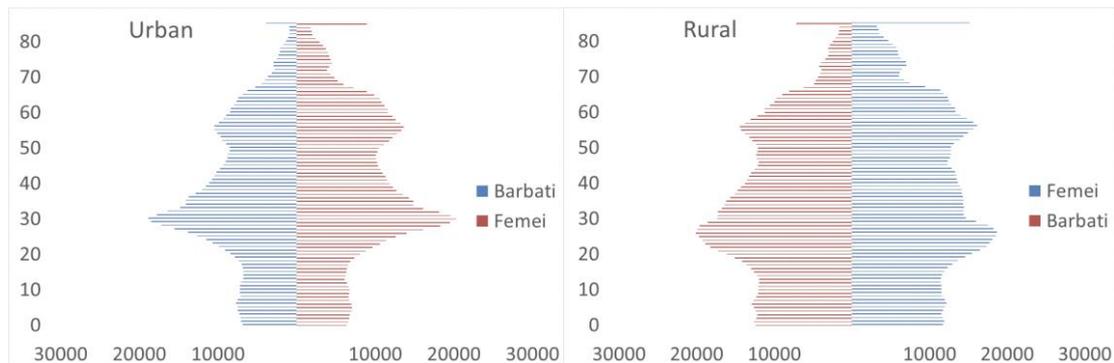
¹Hugo Hollanders. Mapping for smart specialisation in transition countries: Moldova. The economic, innovative and scientific potential in Moldova. Summary of the report "Mapping of economic, innovative and scientific potential in the Republic of Moldova" prepared by, 2017. (https://s3platform.jrc.ec.europa.eu/documents/20182/234901/JRC_mapping-summary+leaflet-Moldova_Oct3.pdf/2f7c3eeb-3324-46db-a08b-e23a3ea87085)

² WHO Regional office for Europe. Economic and social impacts and benefits of health systems. Tammy Boyce and Chris Brown (Eds.). (http://www.euro.who.int/__data/assets/pdf_file/0006/395718/Economic-Social-Impact-Health-FINAL.pdf)

³ Jakab Z. Report on the work of the WHO Regional Office for Europe. Address by Dr Zsuzsanna Jakab, WHO Regional Director for Europe at the 68th session of the WHO Regional Committee for Europe. Copenhagen: WHO Regional Office for Europe; 2018 (<http://www.euro.who.int/en/about-us/governance/regional-committee-for-europe/68th-session/speeches-and-presentations/Day-1-Monday-17-September-2018/opening-address-by-dr-zsuzsanna-jakab,-who-regional-director-for-europe-at-the-68th-session-of-the-who-regional-committee-for-europe>).

⁴ Characterisation of preliminary priority areas for smart specialisation in Moldova. Network analysis for the identification of key stakeholders for preliminary priority areas for smart specialisation in Moldova. SIRIS Academic, 2018. (<http://unicloud/wp-content/uploads/2019/01/Characterisation-of-preliminary-priority-areas-for-smart-specialisation-in-Moldova.pdf>)

1000 births. Both indicators are quite good for the group of countries, with similar income levels to Moldova, these values also rank Moldova under regional standards, especially in terms of infant mortality and men's life expectancy.



Graph 1. Population dynamics in urban and rural areas

Source: Expert Group and United Nations Population Fund, "Demography Matters: What is the Impact of Population Dynamics on the Moldovan Economy?", Chisinau, 2017.

General morbidity and mortality profile of the population is mostly defined by noncommunicable diseases (especially cardiovascular, oncological and digestive diseases). As shown in 2015, noncommunicable diseases accounted for 83% of total years of incapacity, communicable diseases - 11% and incapacity due to accidents - only 6%.

Smoking and heavy drinking – being 2 of the key factors associated with noncommunicable diseases - have a high incidence in the Republic of Moldova. Estimates show that 45% of men are smokers, compared to 35% on average, 44% in Bulgaria, 39% in Romania and 34% in Hungary. According to the World Health Organization's latest estimates in 2014, a volume of alcoholic beverages equivalent to 10 liters of pure alcohol per capita was consumed in Moldova, slightly above the historical average of 9.5 l between 2000 and 2013. This consumption level is well above the global average of 6.3 l / capita, but reflects a culture of abuse typical of the region - Bulgaria consumes about 12 l / capita, Romania - 9.6 l / capita and Hungary - 10.9 l / capita.

Noncommunicable diseases are mostly influenced by lifestyle and diet choices, by general stress levels, smoking and alcohol abuse and demographic profile. Therefore, taking into account the considerable tendency of population aging and the prevalence of smoking and heavy drinking, it can be expected that by 2030, noncommunicable diseases will be even more frequent than at present, the incapacity caused by noncommunicable diseases will reach 87% out of the total. From the perspective of policy options, this trend calls for the development of horizontal policy solutions, capable of providing general services, rather than vertical solutions focused on the treatment of one or another specific disease.⁵

For example: mortality from cardiovascular diseases during the recent years stays at the level of 57 per 100.000 population. Similarly, the costs of treatment and recovery of patients with NCDs represent a major burden for the national economy. The increase in prevalence of NCDs is underlined by the population aging and the emigration of youth.

The prevention, diagnosis and clinical treatment of patients with NCDs require the application of innovative, accessible and cost-effective solutions. At the same time, the Republic of Moldova has a significant scientific-innovative potential, with traditions and local scientific medical schools, a network of RDI institutions, as well as a numerous medical-scientific diaspora.

⁵ SND Moldova 2030. <https://cancelaria.gov.md/ro/advanced-page-type/snd-moldova-2030>

SWOT analysis of the Healthcare sector

Strengths

- There are relevant institutions for the training of highly qualified staff
- Adequate specific R&D infrastructure (institutes, scientific laboratories)
- There is a network of medical institutions and diagnostic laboratories (public and private)
- National Medical Insurance Company (NMIC) has long been established, national protocols are in place
- Pharmaceutical enterprises are open for cooperation
- Availability of classic substances (raw materials, plants, microbes), technology transfer
- Production, bioequivalence legislation in place
- Consumer demand for high-quality treatments
- National coverage with broadband internet and the necessary infrastructure has been established (relevant infrastructure for bioinformatics and e-health development; technologies and equipment for processing big volumes of data)
- State University of Medicine and Pharmacy (SUMP) is the education supplier for the medical staff; education is based on the best international practices
- IT and molecular biology professionals available at the national level
- Active international collaboration (trainings, conferences, articles); international research and technology transfer projects; access to international databases / membership (possibility to store data in international databases, e.g. EURISCO, cooperation with FAO)

Weaknesses

- Shortage of medical staff
- Absence of a population's genetic profile
- Inadequate product safety and quality (medical equipment, medicines, food)
- Lacking cross-sectoral collaboration
- Scarce funding of medical services
- Staff not qualified to implement new technologies
- Inadequate funding of the sector: research is not at the top of government priorities; research management is lacking and inter-sectoral and interdisciplinary collaboration is poor
- Electronic patient record is not implemented, incomplete legislation, lack of legal framework for management of medical data; lack of a personalized medical database at the national level
- Small pool of specialists in bioinformatics, inadequate training of medical professionals in the use of genetic data in daily practice and in the health system as a whole; lack of specialized continuous education centers; low level of genomic data acceptance, physicians are not trained in using genomic data
- The absence of a national biobank based on population data, accompanied by registries of the patients disease, lack of data collections and single centralized data collection center; data is not stored, as opposed to national collections
- Lack of modern biotechnologies
- Lack of GLP (Good Laboratory Practice) accredited laboratories (equipment, facilities, staff, regulations);
- Inadequate collaboration between sectors and laboratories

Opportunities

- Opportunities to participate in international programs and projects
- Availability of IT solutions
- Increased accessibility to screening and education programs
- Opening up of European funds to bioinformatics and e-health; focus on bioinformatics and e-health of the European R&D funding programs
- Increased cost-effectiveness of medical services and patient adherence to treatment
- Predicting the effects of drugs, focusing projects due to genomic knowledge

- Republic of Moldova is a member of ICGEB - International Centre for Genetic Engineering and Biotechnology
- Transition to evidence-based policies
- Optimized bioavailability of existing pharmaceuticals
- Collaborating with farmers who grow herbs (in terms of genotyping, plant study)

Threats

- Economic, political instability in the country
- Demographic problems
- Staff not qualified to implement new technologies
- Departure of specialists in the field, insufficient financing; brain drain
- Lack of adequate schemes to ensure the sustainability of infrastructures
- Rapid change of technology
- Insufficient acceptance of the population
- Lack of researchers and qualified staff in the sector and due to excessive migration of specialized personnel
- Lack of personnel motivation policies
- Loss of opportunities to access funds from national and international programs
- Lack of investors' credibility
- Lack of Biopharmaceuticals development strategy

The main development factors identified for the 3 subdomains, resulting from the participatory group exercise, are summarised in Table 1.

Table 1. Main development factors per subdomain

Biomedicine	Biopharmaceuticals	Bioinformatics and e-health
<ul style="list-style-type: none"> • There are relevant institutions for the training of highly qualified staff in the Biomed field. • Adequate specific R&D infrastructure (institutes, scientific laboratories) • There is a network medical institutions and diagnostic laboratories (public and private). • National Medical Insurance Company (NMIC) has long been established, national protocols are in place. • Shortage of medical staff. • Absence of a population's genetic profile. • Inadequate product safety and quality (medical equipment, medicines, food). • Lacking cross-sectoral collaboration. • Scarce funding of medical services. • Opportunities to participate in international programs and projects; • Availability of IT solutions • Increased accessibility to screening and education programs • Economic, political instability in the country; • Demographic problems; • Staff not qualified to implement new technologies 	<ul style="list-style-type: none"> • Pharmaceutical enterprises are open for cooperation • Availability of classic substances (raw materials, plants, microbes), technology transfer • Production, bioequivalence legislation in place. • Consumer demand • Lack of modern technologies • Lack of GLP accredited laboratories (equipment, facilities, staff, regulations); • Inadequate collaboration between sectors and laboratories • Optimized bioavailability of existing pharmaceuticals • Collaborating with farmers who grow herbs (in terms of genotyping, plant study) • Lack of researchers and qualified staff in the sector and due to excessive migration of specialized personnel • Lack of personnel motivation policies • Loss of opportunities to access funds from national and international programs • Lack of investors' credibility • Lack of Biopharmaceuticals development strategy 	<ul style="list-style-type: none"> • Inadequate funding of the sector: research is not at the top of government priorities; research management is lacking and inter-sectorial and interdisciplinary collaboration is poor; • Electronic patient record is not implemented, incomplete legislation, lack of legal framework for management of medical data; lack of a personalized medical database at the national level; • Small pool of specialists in bioinformatics, inadequate training of medical professionals in the use of genetic data in daily practice and in the health system as a whole; lack of specialized continuous education centers; low level of genomic data acceptance, physicians are not trained in using genomic data; • The absence of a national biobank based on population data, accompanied by registries of the patients disease, lack of data collections and single centralized data collection center; data is not stored, as opposed to national collections; • Opening up of European funds to bioinformatics and e-health; focus on bioinformatics and e-health of the European R&D funding programs; • Increased cost-effectiveness of medical

		<p>services and patient adherence to treatment;</p> <ul style="list-style-type: none">• Predicting the effects of drugs, focusing projects due to genomic knowledge• Republic of Moldova is a member of ICGEB - International Centre for Genetic Engineering and Biotechnology• The transition to evidence-based policies• Migration of staff, insufficient funding; brain drain;• Lack of adequate schemes to ensure the sustainability of infrastructures;• Rapid change of technology;
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Vision for the Healthcare sector

By 2029, the healthcare system in the Republic of Moldova will be based on the principles of 4P medicine (Preventive, Participatory, Personalized, Predictive), transitioning to the 6P vision (+ Public & Psycho-cognitive) in order to guarantee the universal access of the population to qualitative healthcare services and high-tech.

The main objectives to achieve this vision

- Developing the legal framework to underpin the current vision
- Digitising the healthcare system – setting up a unique, integrated information system, interconnected with the social insurance system.
- Training highly qualified employees, capable of practicing 4P medicine and implementing these principles in daily practice.
- Personalizing medical care and implementing precision medicine by means of population genetic mapping, use of Big Data and individual data, results of local biotechnology development and high quality medicines.
- Promoting the culture of health among the population.
- Implementing broadly the principles of "Health Technology Assessment", based on an integrated information system, connected to the patient's data enabling informed decision-making and evidence-based decisions throughout the healthcare system.
- Cross-sectoral and international collaboration.

Conclusions

During the EDP workshops, the participants were open to continue the discussions in order to identify the smart specialization niches in the Republic of Moldova. There were also eager to have these discussions manifest as calls for proposals for collaborative projects, requiring the involvement of representatives from the academia, business and civil society.

Recommendations

- Although the results of the sectorial groups have been presented at the concluding panel of the EDP workshop, more joint meetings are necessary to identify the precise niches for the development of specific projects.
- Joint cross-sectoral meetings are needed to identify niches for specific interdisciplinary projects.
- Following the first phases of EDP, we consider it useful to involve the National Agency for Research and Development in the process, so it can adjust the project funding priorities and / or launch separate calls for the funding of the projects identified as a result of EDPs.
- Due to the fact that EDP is a multi-iteration process, it is important to identify dedicated national funds to support these efforts (potentially - a national project).

The following table summarises the sectorial goals and objectives per subdomains, resulted from the participatory exercise.

Table 2. Sectorial goals and objectives in Healthcare sector

1. What is the present situation of the priority subdomain?		
<i>Biomedicine</i>	<i>Biopharmaceuticals</i>	<i>Bioinformatics and e-health</i>
<ul style="list-style-type: none"> • Classical approaches based on disease/patient, classical implementation of evidence-based medicine • There is a network of medical institutions and diagnostic laboratories (public and private) • There are relevant institutions for the training of highly qualified staff • Adequate specific R&D infrastructure (institutes, scientific laboratories) • National Medical Insurance Company (NMIC) has long been established, as a funder of medical services 	<ul style="list-style-type: none"> • Very low level of IT application in the healthcare system • National coverage with broadband internet • Relevant infrastructure for bioinformatics and e-health development; technologies and equipment for processing big volumes of data • Inadequate infrastructure for the development of bioinformatics • IT and molecular biology professionals available at the national level • Relevant international collaboration • Access to international databases 	<ul style="list-style-type: none"> • Insufficient domestic products on the pharmaceutical market • Domestic pharmaceutical companies open for cooperation • Availability of classic substances (raw materials, plants, microbes), but the technology transfer is lacking • Production, bioequivalence legislation in place
2. What are the key challenges?		
<i>Biomedicine</i>	<i>Biopharmaceuticals</i>	<i>Bioinformatics and e-health</i>
<ul style="list-style-type: none"> • Shortage of medical staff • Absence of a population's genetic profile • Inadequate product safety and quality (medical equipment, medicines, food) • Lacking cross-sectoral collaboration • Insufficient involvement of medical services consumers in decision making 	<ul style="list-style-type: none"> • Poorly funded medical services; • Weak cross-sectoral and interdisciplinary collaboration • Electronic patient record is not implemented, lack of a personalized medical database at the national level, absence of a national biobank based on population data, accompanied by registries of the patients disease • Lack of legal framework for management of medical data; • Small pool of specialists in bioinformatics, inadequate training of medical professionals in the use of genetic data in daily practice • Physicians are not trained in using genomic data 	<ul style="list-style-type: none"> • Modern biotechnologies are not being used • Lack of GLP (Good Laboratory Practice) accredited laboratories (equipment, facilities, staff, regulations); • Inadequate collaboration between sectors and laboratories

3. What are the sectorial goals of the subdomain?		
<i>Biomedicine</i>	<i>Biopharmaceuticals</i>	<i>Bioinformatics and e-health</i>
The medicine is based on 4P principles (Preventive, Participatory, Personalized, Predictive), focused on maintaining the health of the population. The medical sector of the Republic of Moldova is part of the integrated European healthcare system.	Bioinformatics and e-health sector provides real time information, supporting personalized clinical decision making (prevention, treatment, prognosis) based on patient's personal data (genomic, metabolomic, behavioral, etc.), as well as robust evidence-based information for decision-making. The healthcare system is interoperable both at national and European levels.	Biopharmaceuticals sector is based on modern production technologies, along the entire pharmaceutical value chain, at the level of GLP, GPP, GCP, is based in internationally accredited laboratories and is part of the international pharmaceutical value chain.
4. What are the main objectives to achieve sectorial goals?		
<i>Biomedicine</i>	<i>Biopharmaceuticals</i>	<i>Bioinformatics and e-health</i>
<ul style="list-style-type: none"> • Developing legal framework for the implementation of the 4P paradigm • Educating highly qualified human resources, able to practice 4P medicine and implement these principles in daily practice • Promoting the culture of health among the population 	<ul style="list-style-type: none"> • Digitising the national healthcare system – developing a unique, information system, integrated with the social assistance system • Genetic mapping of the population and the use of Big Data and individual data in medical practice • Promoting personalized medicine and e-medicine among physicians and population 	Developing domestic biotechnology and establishing high-value pharmaceutical value chains.
5. Which key stakeholders should be involved to achieve the sectorial goals?		
<i>Biomedicine</i>	<i>Biopharmaceuticals</i>	<i>Bioinformatics and e-health</i>
<ul style="list-style-type: none"> • Healthcare services consumers (patients) • Medical community (republican hospitals, territorial medical associations, regional health centers) • IT community (Technical University of Moldova, Academy of Sciences of Moldova, IT companies) • Academia (State Medical and Pharmaceutical University „Nicolae Testemițanu”, medical colleges, Institute of Oncology, Institute of Cardiology, Institute of Genetics and Plant Physiology) • Private sector (local pharmaceutical companies, residents of the Republic of Moldova, private hospitals, IT companies) • NGOs and civil society (Association of Diabetes Patients, Association of patients with hearing impairments, Stop Autism Association, Home Care Association, Hospice Angelus Moldova etc.) • Government (relevant parliamentary committees, Ministry of Health, Labour and Social Protection, Ministry of Education, Culture and Research, Ministry of Economy and Infrastructure, Ministry of Finance, Medicines and Medical Devices Agency, National Center for Personal Data Protection) • External partners (World Bank, JRC, ICGEB, WHO, USAID etc.) 		

VISION for the priority domain HEALTHCARE

1. What is the present situation of the priority domain?

Healthcare sector in the Republic of Moldova is traditional, based on classical, disease-centered approaches. The approaches in the healthcare sector are based on the implementation of EBM (Evidence-based medicine), reflected in National Clinical Protocols, which is an outdated principle, with no clear focus on prophylaxis, prediction and personalization. The structure of morbidity and mortality in the Republic of Moldova is specific to developing countries, with a high prevalence of noncommunicable (or chronic) diseases (NCDs), which consume huge amounts of resources for diagnosis and clinical treatment of patients, as well as unfavourable demographic situation. Sector efforts at implementing IT, are aimed at development of an integrated information system. At the same time, National Medical Insurance Company takes measures aimed at increasing the effectiveness of expenses by applying a services procurement system.

2. What are the key challenges?

- Lack of a legal framework underpinning the development of personalized medicine services, e-health, m-health
- Absence of an integrated healthcare information system
- Lack of genomic information aimed at personalising the prophylaxis, treatment, prognosis of the evolution of existing diseases
- Insufficiency of qualified staff able to practice personalized medicine
- Lacking participation / interest of the population in health problems
- There is no practice of robust evidence-nased decision making at the level of healthcare system and individually at the patient level
- Insufficient adoption and adaptation of relevant good practices from other countries

3. What should the priority domain be like in 2029 in order to stay competitive, innovative and answer the societal challenges (VISION)?

By 2029, the healthcare system of the Republic of Moldova will be based on the principles of 4P medicine (Preventive, Participatory, Personalized, Predictive), transitioning to the 6P vision (+ Public, + Psycho-c ognitive) in order to ensure the universal access of the population to qualitative healthcare services and high-tech.

4. What are the main objectives to achieve this vision?

- Develop the legislative framework for implementing the vision in question
- Digitalization of the health system - creation of a unique, integrated information system, including with the social assistance system.
- Preparation of highly qualified human resources, able to practice 4P medicine and ensure the true implementation of these principles in daily practice
- Personalization of medical care and implementation of precision medicine through population genetic mapping and the use of Big Data and individual data, the results of the development of indigenous biotechnology and high quality medicines
- Promoting the culture of health for the population

- Broad implementation of the principles of "Health Technology Assessment", based on the integrated information system, connected to the patient's data in order to make informed, evidence-based decisions throughout the healthcare system
- Cross-sectoral and international collaboration

5. Which key stakeholders should be involved to achieve this vision?

- Healthcare services consumers
- Medical community
- IT community
- Academia
- Private sector
- NGOs and civil society
- Government (central/ local)
- External partners