

# FUTURE OF DIGITAL HEALTH SYSTEMS

**REPORT ON THE WHO SYMPOSIUM ON THE  
FUTURE OF DIGITAL HEALTH SYSTEMS IN THE  
EUROPEAN REGION**

Copenhagen, Denmark, 6–8 February 2019



**World Health  
Organization**

REGIONAL OFFICE FOR **Europe**







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**DAY THREE**

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## ACRONYMS AND ABBREVIATIONS

<b>CEO</b>	chief executive officer
<b>eHealth</b>	electronic health
<b>EU</b>	European Union
<b>GP</b>	general practitioner
<b>ID</b>	identification
<b>mHealth</b>	mobile health
<b>NHS</b>	National Health Service (United Kingdom)
<b>OECD</b>	Organisation for Economic Co-operation and Development
<b>SDG</b>	Sustainable Development Goal
<b>TB</b>	tuberculosis
<b>UNESCO</b>	United Nations Educational, Scientific and Cultural Organization
<b>UNICEF</b>	United Nations Children’s Fund
<b>WHO</b>	World Health Organization

## **NOTE TO THE READER**

This report summarizes content from the WHO Symposium on the Future of Digital Health Systems, held in February 2019 at UN City in Copenhagen, Denmark. This report does not represent a literal account of the presentations or discussions delivered during this event but aims to summarize the content in the most meaningful way for continued guidance on the digitalization of health systems in the European Region. Projects, reports and data referred to in this report are not to be taken as endorsement or validation by WHO, but as content delivered by expert speakers and participants during the symposium. The summaries of presentations and of points made in discussions are presented as the opinions expressed; no judgement is implied as to their veracity or otherwise. This report condenses discussions according to the day and session and does not necessarily represent a true reflection of chronological order. The summaries of the discussions and group work address the themes emerging from wide-ranging discussions among all speakers and do not necessarily imply consensus.

## **CONSENT FOR PHOTOGRAPHS AND PRESENTATION MATERIAL**

Photographs depicting people and material from presentations included in this report are used with consent from individuals. Consent was obtained when participants registered for the Symposium.

## **ACKNOWLEDGEMENTS**

The authors of this report are: Mark Nunn, lead rapporteur, London, United Kingdom; and Carrie Peterson and Clayton Hamilton, Division of Health Systems and Public Health, WHO Regional Office for Europe.

The Symposium team would like to acknowledge the work of the rapporteurs, who collected notes and conclusions from the meeting's parallel sessions. This report would not be possible without their generous effort.

Text editing by David Breuer

Design by Linda Alpern, graphic designer for both the Symposium and this report



## EXECUTIVE SUMMARY

The WHO Symposium on the Future of Digital Health Systems in the European Region took place at the WHO Regional Office for Europe at UN City in Copenhagen, Denmark on 6–8 February 2019.

The aim of this Symposium was to develop priorities for public health action to accelerate the adoption of digital health in countries and to help to develop a European roadmap for the digitalization of national health systems by sharing country experiences and exploring how digital health and emerging innovations are used to strengthen national health systems.

Sessions were designed to highlight digital health activities being carried out by countries in the WHO European Region and to discuss how digital technologies can empower individuals, support health workers and contribute to meeting key national health policy objectives. Other topics examined actions needed to accelerate digital health adoption; the role of digital health in advancing health sector reform and providing innovative mechanisms to deliver health services; methods for measuring progress in the uptake of digital health; and how to incorporate emerging technologies in strengthening health systems. Examples were shared of how digital health can contribute to the achievement of Health 2020, universal health coverage and the United Nations 2030 Agenda for Sustainable Development.

In parallel, a series of workshops for representatives of Member States used a facilitation method known as LEGO® Serious Play® to foster open discussion on common problems of relevance to national digital health environments. Participants had the opportunity not only to gain insight into their own vision for digital health but also to understand the visions of their fellow Member States and common principles for furthering the development of digital health in the Region.

More than 360 participants and 90 speakers from 50 countries participated in the 2019 WHO Symposium on the Future of Digital Health Systems in the European Region. Wide-ranging discussions in more than 30 sessions addressed the nature, impact, ethics and strategies of digital health at levels from the technical to the philosophical, highlighting important themes and conclusions along the way.

At the highest level, the conclusions gained from discussions and presentations during the symposium are embodied in the following three key messages.

1. Digitalization is challenging our understanding of how and where health care can be delivered and is driving a transition to predictive and preventive models of care.
2. Digitalization of health systems is not simply a notion of continuing what we are doing now, more rapidly and more efficiently but is:
  - » putting the individual at the centre of their own health and well-being;
  - » addressing how the rights and consent of the individual can be respected and acted upon; and
  - » harnessing the value of data for health.
3. Digital health is centrally important to achieving universal health coverage with more efficient and effective modes of providing quality and equitable access to health for all. However, innovating towards a safe future enabled by digital health requires concretely linking investments for digital health to achieving public health objectives.

These messages were supported through several ideas and points of discussion that speakers and participants from the audience emphasized repeatedly.

**Framing digital health in the context of achieving universal health coverage is important to ensure safe and inclusive health services of the future.**

There was broad agreement that digital health is a key factor in reforming public health and health systems; improving the reach, impact and efficiency of health services; and delivering patient-centred services, in which individuals are engaged as active partners in their care. However, leveraging the full potential of digital health in a way that ensures that services are safe, trusted and accessible to all populations requires governments to anchor their national digital health programmes in the guiding principle of universal health coverage.

**The barriers to progress in digital health are often human, not technological.**

Common hurdles voiced by countries include allocating money, integrating data, using common open standards and ensuring that the workforce is ready to embrace change. In this context, fear of job losses in the health sector is largely unfounded – although digitalization may eliminate the need for certain specializations and change the nature of others. Here, health and data literacy are key: helping professionals and individuals to understand what constitute data for health, their relevance to health system reform and population health and how and why to react to them.

**The digitalization of health systems has an important governance component that requires urgent attention.**

Credibility and public trust are essential to the success of digital health. New standards and regulatory approaches are needed to ensure security and transparency so that individuals understand and are confident in the use of their data. Building this trust requires the political will to take responsibility and lead and to ensure that wrongful uses of technology are prevented.

**Linking digital investment to public health and health promotion and disease prevention goals requires strategic approaches and organizational changes based on identified needs.**

Without such approaches, the digitalization of health systems risks introducing new or increasing existing health inequalities – creating divides where resources are not aligned with social needs and where the benefits do not reach the most vulnerable people.

**Governments may lose the political struggle around controlling technology and data for health.**

They must work together through open and transparent mechanisms with academia, health organizations and industry to effect appropriate changes that preserve the safety, privacy, health and well-being of populations.

**The private sector is hunting the billions of dollars to be spent in the health-care business and is not always motivated by equity, solidarity and social justice.**

If public entities are not adequately prepared to embrace and govern emerging technologies and the data revolution, in a very short time – just a few years – the window of opportunity will have passed. Public–private partnerships offer one way to harmonize motives for the public good, and Sustainable Development Goal 17 provides unique momentum to facilitate the creation of such partnerships. The momentum of big political interventions and agreements must also be further exploited. Dialogue is crucially important – especially around this engagement with the private sector and how to structure collaboration and commercial models.



**Interoperability is (still) essential to realize the full potential of digital health systems.**

Without shared strategic and political understanding of what interoperability means, there is no way to create shared digital ecosystems that enable the potential of digital health to be realized. Standards and formats are widespread, but they must be agreed upon, implemented and governed consistently.

**Governments are centrally responsible for accelerating progress in safe and inclusive national adoption of digital health.**

Partnerships are key, but without government leaders, progress towards equity in digitally enabled health systems will be impossible.

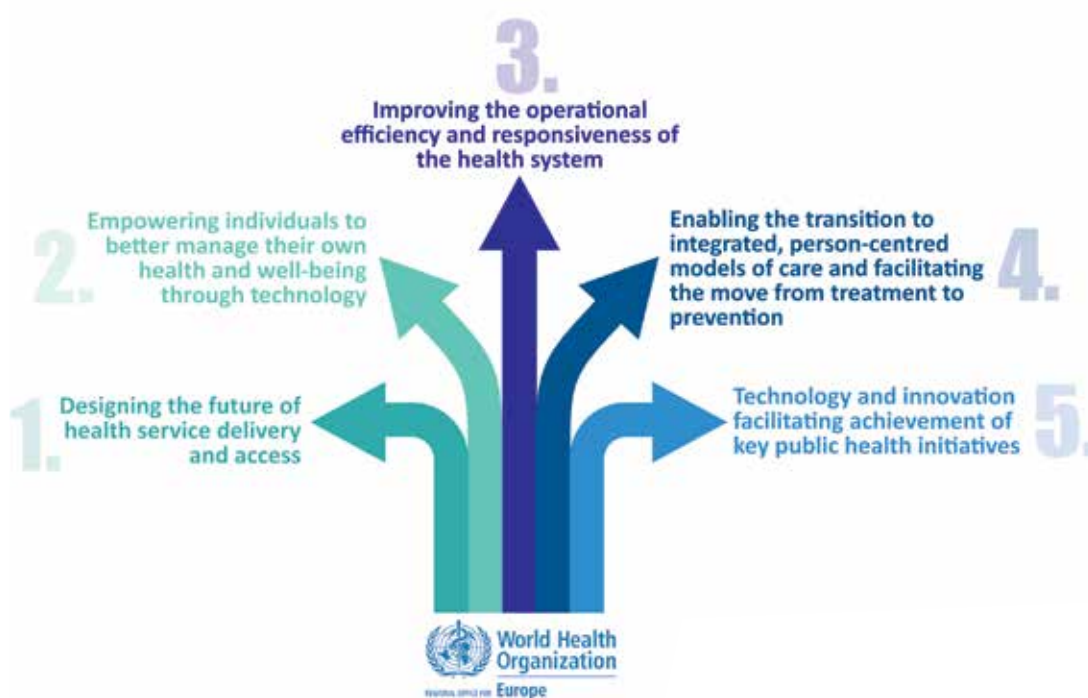
## BACKGROUND

The adoption of digital technologies in health is widely recognized as crucial to well-functioning health systems and in empowering individuals as part of a transition to integrated, person-centred care.

Digital health also plays a significant role in achieving public health priorities put forth by the European health policy framework, Health 2020, which was endorsed by the WHO Regional Committee for Europe in 2012; and in achieving the health-related Sustainable Development Goals (SDGs). In May 2018, during the Seventy-first World Health Assembly, WHO Member States adopted resolution WHA71.7 (1), which emphasized the role of digital health in strengthening health systems and “as a means of promoting equitable, affordable and universal access to health for all”.

To enhance public health action for digital health in the WHO European Region, the WHO Regional Director for Europe, Dr Zsuzsanna Jakab, established the *digitalization of health systems initiative*, delivered under the strategic guidance of the Director of the Division of Health Systems and Public Health, Dr Hans Kluge. The aim of this initiative is to provide countries with a fast-track, integrated approach to accelerate digital health adoption for strengthening health systems and enhancing public health capacity and to reinforce the role of innovation in achieving national health policy objectives and key public health challenges.

This initiative has five overarching focus areas for facilitating the application of digital health in countries:



Digitalization of Health Systems Initiative of the WHO Regional Office for Europe

Underpinning the delivery of these focus areas are the core European health system values of equity, solidarity and universalism. These must be preserved as health services in countries become increasingly digitalized.

A first meeting on the digitalization of health systems initiative took place in Budapest, Hungary on 21 June 2018, with support from Semmelweis University and the European Health Management Association. During this meeting, countries identified six themes for introducing innovations into health systems and public health, for which increased support from WHO and its partners is sought (2):

- » establishing and maintaining core infrastructure for digital health services;
- » better understanding through data;
- » mobilizing external funding;
- » better understanding of and engaging with resistance to technology-based change;
- » establishing foundations for key future trends; and
- » tailoring digital health to population groups.

Countries' commitment to the agenda for innovating health systems was further confirmed during the WHO meeting on Health Systems for Prosperity and Solidarity: Leaving No One Behind, which took place in Tallinn, Estonia in June 2018 (3) and again in the context of supporting primary health care as enshrined within the Declaration of Astana during the Global Conference on Primary Health Care, Astana, Kazakhstan, in October 2018 (4).

### **Aim and objectives of the Symposium**

The aim of this Symposium was to develop priorities for public health action to support the adoption of digital health in countries and to help develop a European roadmap for the digitalization of national health systems.

To achieve this, the Symposium shared country experiences, explored how digital health and emerging innovations are used to strengthen national health systems and examined WHO's role in supporting countries to achieve success in digital health. The sessions identified key activities in digital health being carried out by countries in the WHO European Region and discussed how digital technologies can empower individuals and health-care workers and contribute to meeting key national health policy objectives.

### **The Symposium was structured around five thematic streams considered most relevant to achieving the aims:**

- » governance and leadership for the future of digital health;
- » next-generation digital health systems;
- » national successes in digital health;
- » working together to create health services of the future; and
- » ask me anything.

Within these streams, sessions examined the concrete actions needed to accelerate the digitalization of national health systems; the role of digital health in advancing health sector reform and providing innovative mechanisms to deliver health services; methods for measuring progress in digitalizing national health systems; and how to adopt emerging technologies in health.

In parallel, a series of workshops for representatives of Member States used a facilitation method known as LEGO® Serious Play® to foster open discussion on common problems of relevance to national digital health environments. Participants had the opportunity not only to gain insight into their own vision for digital health but also to understand the visions of their fellow Member States and common principles for furthering the development of digital health in the Region.

To illustrate tangible examples of health systems and services that have been successfully digitalized, two exhibits were held during the symposium. The PatientVille exhibit, provided by Healthcare DENMARK, offered a unique opportunity for participants to see first-hand how integrated care supported by digital health and data can be implemented. PatientVille provided a living simulation showing how digital health supports coherence in treatment for individuals with chronic conditions as they move through the health system. The exhibit included a demonstration of the different environments in which digital health services are delivered and illustrated their use in the prehospital sector (ambulance), the hospital, the municipality, the general practice and the individual's own home. This unique simulation of a digital health journey was offered in both English and Russian.



PatientVille future hospital booth ©WHO/Kamilla Krøier



PatientVille emergency patient care booth ©WHO



PatientVille patient empowerment booth ©WHO/Kamilla Krøier

The second exhibit showcased how the public sector is leveraging the potential of cutting-edge virtual reality technology through exciting collaborations. The exhibit gave participants the opportunity to try virtual reality services and to learn from public-sector representatives, who played a role in initiating and incorporating this technology into innovative practice. The goal of the exhibit was to stimulate a deeper understanding of the possibilities that virtual reality can offer in the public sector. Participants experienced how six hospitals in the Nordic countries use a programme designed specifically for hospital situations to distract children from procedural pain so they can lie calmly while a physician or nurse takes a blood sample or administers an intravenous injection. The demonstration was kindly supported by the Paediatric Pain Management Unit at Rigshospitalet (the main general hospital in Copenhagen, Denmark). The exhibit also showcased an innovative example of how virtual reality is used in psychology as a therapeutic tool for social anxiety, with the kind support of the Psychiatric Research Unit of the Mental Health Centre, Copenhagen.

The Symposium website, containing video of the keynote sessions, speaker profiles, the full agenda and several fact sheets, along with other resources, is available at the following link: <https://eHealthresearch.no/WHOisdigital>



Virtual reality exhibit ©WHO/Kamilla Krøier



Virtual reality exhibit ©WHO/Kamilla Krøier



## SUMMARY OF DAY ONE

### OPENING PLENARY

The Symposium was opened by Dr Hans Kluge, Director, Division of Health Systems and Public Health, WHO Regional Office for Europe. He hailed participation at this inaugural event by representatives from over 50 countries and emphasized Europe's social obligation to leave no one behind in the digitalization of health systems. This was followed by the opening address of Dr Zsuzsanna Jakab, WHO Regional Director for Europe, and Ellen Trane Nørby, Minister for Health, Denmark. Carrie Peterson, Division of Health Systems and Public Health, WHO Regional Office for Europe, facilitated the opening plenary.



Hans Kluge ©WHO/Kamilla Krøier



Zsuzsanna Jakab ©WHO/Kamilla Krøier

### Reflections from the opening plenary

- » Political leadership is key in embracing the change brought about by the digitalization of health systems. Governments must anticipate and shape these changes and allocate sufficient resources for the governance of both technology and data.
- » It is important for governments to ensure that regulators are fully aware of what they need to achieve in the unique context of the health space: for example, political discussions must also cover clearly what is not the purpose of collecting health data.
- » For countries to move forward, clear routes are needed with strategies, regulations, norms and standards and clear visions on issues such as data protection. Protecting individuals' rights, and the safety of their data and records, is paramount.
- » Although non-state actors contribute to shaping the digital agenda, governments are responsible for keeping the public trust.
- » Professional education and training programmes are an essential part of preparing the health workforce for digitalization.
- » Further platforms such as this symposium are important in aligning all these approaches and bringing the relevant stakeholders together.



## THE FUTURE OF DIGITAL HEALTH SYSTEMS

Digitalization has become an instrumental factor in modernizing European health systems and unlocking the value of data that underpins their operation. The potential efficiency that digitalization offers is key in working towards universal health coverage by providing safe, timely and affordable access to health services for all. Digital approaches can facilitate training, surveillance, health security and service delivery to underserved populations. Most importantly, they can empower communities and individuals to improve their own health and well-being in new and innovative ways.

“Technology can appear impersonal, but it has a unique ability to support and bind human beings as families and societies,” says Ellen Trane Nørby, Minister for Health, Denmark. In such countries as **Denmark**, digitalization is already changing people’s lives, from personal everyday interactions with technology to the opportunities presented by genomics for personalized medicine. Digital approaches can support preventive, predictive and personal care – but only if accompanied by political responsibility, leadership and the willingness to embrace opportunities and prevent unsuitable uses of technology.



Ellen Trane Nørby, Minister for Health, Denmark ©WHO/Kamilla Krøier

Data-driven technologies can improve diagnostics and generate insights that benefit all of society. Big data can harness the power of the large data sets being produced to provide new insights to health-care workers and individuals – using apps and devices to improve how people live their lives and ensuring that the right information is available at the right time for the right individual. For this to succeed, credibility and public trust are essential. Digitalization must be supported by security and standards to underpin that public trust; without this, the full potential of digital health can never be realized. Successful digitalization requires a strong political focus on regulation and governance.

Barriers to realizing the full potential of digital services are often related to allocating money, integrating data and ensuring that the workforce is equipped to embrace change. Public strategy should consider the fact that companies, as well as governments, have opportunities to exert control over the agenda for progress: countries in the European Region and elsewhere are already transitioning to digital

health, but they need strategic approaches that take ownership of the digitalization agenda and link digital investments to key public health, health promotion and disease prevention goals. Without this guiding focus, the digitalization of health systems will not be aligned with social needs and risks creating a digital divide in which the benefits do not reach the most vulnerable people.

WHO's 13th Global Programme of Work has committed to targets under the 2030 Agenda for Sustainable Development. This will guide WHO's action and engagement over the next five years and is to be supported by a commitment to digitalization at every level of the health system, particularly in primary health care settings. It is now time to accelerate this process in Europe.

*"It's time to move beyond an understanding of the promise of digital health and accelerate the process of implementation."*

## KEYNOTE: INSPIRED TO SUCCESS!

As a child, adventurer Aron Anderson was diagnosed with sarcoma (a form of cancer) in his lower back. After a year of unsuccessful chemotherapy and radiotherapy treatments and medication, at the age of nine years, he required surgical treatment. It saved his life but severed many of the nerves leading to his legs, and as a result, left him unable to walk. He emphasized how thankful he is to have been "a customer of **Sweden's** health-care system". Throughout this difficult period, he underwent 12 operations, spent countless nights in hospital and received all his other necessary treatments, wheelchairs and equipment at a total out-of-pocket cost of about €1000.

Although the health-care system cured his cancer, it could not, however, make him feel healthy. Despite representing Sweden at the 2008 Paralympic Games, he felt constantly unwell throughout his early twenties. Wanting to be healthy and energetic and not just cancer-free, he embarked on a quest to examine his own health, reading dozens of books on health and diet, and only eventually reaching useful conclusions about what might work for him after long, hard, dedicated work and a process of trial and error.



Aron Anderson ©WHO/Kamilla Krøier

Today, however, the possibilities for this kind of journey of discovery are very different: health services and data can be personalized. For example, Aron Anderson used commercially available DNA tests to provide further insight into his health and uses a brainwave-measuring headband to help him meditate, in combination with a ring containing sensors to track his movement, pulse and heart rate variability. This information empowers him to manage his own health in a time and manner of his choosing. A multitude of books are no longer needed to gain this level of insight. Instead, assisted by technology, Aron could obtain data from his own body and adjust his lifestyle accordingly.

Although the journey to better health may have become easier for the individual, making the most of these resources – not only curing disease or infirmity but also enabling people to attain physical, mental and social well-being and fulfil their potential – requires strategy, commitment and teamwork. This comes not just from potential users of technology but also from those who work to make its benefits available to all. Aron Anderson ended by thanking the Symposium participants for their commitment to that noble cause.



Hans Kluge and Aron Anderson at PatientVille patient empowerment ©WHO

## PANEL DISCUSSION: THE DIGITALIZATION OF NATIONAL HEALTH SYSTEMS – ACCELERATING ACTION IN ACHIEVING UNIVERSAL HEALTH COVERAGE AND THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

### Panellists

- » Zsuzsanna Jakab, WHO Regional Director for Europe
- » Olzhas Abishev, Vice-Minister of Healthcare, Kazakhstan
- » Chris Fearne, Deputy Prime Minister and Minister for Health, Malta
- » Ellen Trane Nørby, Minister for Health, Denmark
- » Mark Pearson, Deputy Director, Employment, Labour and Social Affairs, Organisation for Economic Co-operation and Development (OECD)
- » Moderator: Ilona Kickbusch, Adjunct Professor, Graduate Institute of International and Development Studies, Geneva and Director, Global Health Centre, Geneva, Switzerland

## Issues addressed in the session

Digital health plays a significant role in achieving the key public health priorities put forth by the European health policy framework, Health 2020 (5) and the 2030 Agenda for Sustainable Development (6), by strengthening the capacity of countries to achieve better, more equitable, sustainable health and well-being for all throughout the life-course.

Universal health coverage (Sustainable Development Goals target 3.8 (7)) encompasses principles of equity and social justice arising from the Health for All movement of the 1970s (8) and enshrined in the 1978 Declaration of Alma-Ata on Primary Health Care (9). A renewed commitment to the Declaration was made on its 40th anniversary at the Global Conference on Primary Health Care in Astana, Kazakhstan, in 2018 (4).

Digital health is a powerful enabler for achieving universal health coverage through its ability to:

- » extend the scope, transparency and accessibility of health services and health information;
- » widen the population base capable of accessing the available health services, including marginalized and underserved populations;
- » improve public health surveillance;
- » facilitate training of the health workforce; and
- » offer innovation and create efficiency gains in operating health systems and providing health care.

Ultimately, however, investments in digital health compete for precious health system resources. Piecemeal investment approaches and shifting political landscapes are notorious in leading to costly information technology failures and lost opportunities for health system reform. To maximize the impact of digital health to accelerate the achievement of universal health coverage, countries require a more consistent and standardized approach to adopting and scaling up technologies in health. This necessitates improving the understanding of how these technologies are managed – in terms of both their governance and financial sustainability – and establishing trust among the public and health-care professionals in their use.



Opening panellists ©WHO/Kamilla Krøier

## Summary of the discussion

At present, a great deal of technology comes from other sectors and is modified for the health system. Systemic change is required so that health professionals actively guide these processes of technological development in health. Convincing health-care professionals to embrace these changes is a challenge. In contrast to some other sectors of the economy, the health sector is a late adopter of digital technologies. Much of what will happen in the coming years can be forecast by looking at – for example – the finance sector, where machines have taken over routine computational aspects of work, but humans still perform contextual analysis. Technology has not eliminated jobs in the sector, but it has changed them; more roles are being created, but certain types of jobs are vanishing. The same is likely to happen in health, so thought needs to be given to the tasks that humans can and should do in providing the health care of the future.

*“Change is not deterministic: the fact that a technology exists does not mean it will be adopted, and the health workforce is not changed by what is done with technology but by how the sector is reorganized to accommodate it.”*

In equipping the health workforce to embrace the coming transformation, specific emphasis needs to be placed on aspects of communication and interpersonal skills development. Education and professional training are important, and education in digital matters will be an essential part of modern curricula for medical development. It is crucial to ensure that people who understand the health sector lead the advancement and implementation of technologies so that solutions are successful in meeting the needs for which they were created.

To make the full use of such technologies as ePrescription in the European Region, they must be scaled up past the local or national level and include cross-border capability. Although this technically exists in some parts of the Region, it does not yet function smoothly, mainly due to difficulties accessing records from other countries, differences in legislation and lack of standards being applied. Cross-border systems in health should exchange information, be patient-centred and secure (here, blockchain technology can offer some solutions). This has not yet been achieved, and uneven access poses equity issues. Further regulation of the management of personal data across borders is also needed.

Big data can be used to increase the focus and accuracy of product development research, making, for example, pharmaceutical development less reliant on trial and error, reducing research costs and development lead times and reducing the price of medication. As a huge evidence resource, it can also help ensure that policy is genuinely evidence informed. Digital health cannot be technology-led. It has to be addressed by applying supporting policies, as with any other area of health. Change should be embraced, but political leadership is key.

**Malta** has developed a web-based system allowing digital access to patient information known as MyHealth. Currently about 20% of the population uses it, but the greatest challenge is encouraging doctors to accept it as part of their routine clinical practice. **Denmark** offers one example of how change can be managed. There have been years of economic and political investment in building digitally integrated systems, guided by a succession of well-articulated, longer-term strategies. Challenges are faced head on, ethics are discussed and credibility is emphasized. Patient data are not shared with insurance companies and employers, and equal access is safeguarded. **Kazakhstan**

is another example, having redesigned its primary health care around the goal of achieving universal health coverage through digital health, building a fully digital ecosystem in which individuals need only show their identification to obtain all their medical records. A national electronic health record was launched in Kazakhstan in January 2019, which can be accessed from any smartphone.

The context for the digitalization of health systems is shaped by the governance environment, for which there are many, differing national models that have proven successful. As we think about digital health and how to govern it, consider external influences from outside the health sector, in which different forces compete to influence health, how it empowers individuals and how the preservation of human rights can be ensured.

## GENERATION SDG – YOUTH REFLECTION ON THE FUTURE OF DIGITAL HEALTH AND WELL-BEING

Tanya Herfurth (founding board member, Young Leaders for Health) introduced her organization, which focuses on learning, advocacy and innovation to foster and empower leadership in public and global health.



Tanya Herfurth ©WHO/Kamilla Krøier

Young Leaders for Health holds a social entrepreneurship challenge on electronic health (eHealth) (10), inviting the development of new electronic tools for the most pressing public health challenges. The previous challenge was on noncommunicable diseases in urban populations, and the 2019 challenge is on noncommunicable diseases and air quality.

Tanya described the youth perspective of today's society as being characterized by ambiguity, volatility and uncertainty and emphasized that the issues that challenge society cannot be solved by one discipline alone. Digital solutions for health need many experts. Digitalization is happening and holds two main opportunities. The first is continually strengthening health systems through an ongoing cycle of learning and innovation and can only be fully achieved if digital health systems are interoperable. Interoperability

is therefore a public good, something on which governments should lead and for which they should control the products. The second opportunity is for genuinely patient-centred health systems. The social entrepreneurship challenge tries to contribute to these transformations.

The overarching issues in enhancing the future development of digital health systems are security and trust. Trust is in the hands of the elected, while non-state actors are everywhere and contribute to shaping the digital agenda through their actions. Governments are responsible for keeping the public trust.

## PARALLEL SESSIONS

### 1.1. LEADERS OF THE FUTURE – POLITICAL, ECONOMIC AND ETHICAL GOVERNANCE FOR DIGITAL HEALTH SYSTEMS

#### Issues addressed in the session

Demographic change and population ageing, changing profiles and burden of disease, increasing costs of health care, issues with health workforce sustainability, growing patient demands – these drivers are challenging the European values of equity, access and universalism on which health systems and public health services are founded. They are placing a range of new demands on national health systems and on the decision-makers who are entrusted to ensure their continued and sustainable operation.

European leaders sought to answer the questions:

- » What are some of the key success factors in governing national programmes for the digitalization of health systems and health service delivery?
- » What will it take to be a successful leader of the digital future in what is often a highly complex and politicized landscape in health?

#### Presenters

- » Lars-Torsten Larsson, Chief Medical Officer, National Board of Health and Welfare, Sweden
- » Ofir Marer, Head of Regulations, Digital Health, Ministry of Health, Israel
- » Claudia Pagliari, Director of Global eHealth, University of Edinburgh, United Kingdom
- » Moderator: Ihor Perehinets, Programme Manager, Health Systems Governance, Division of Health Systems and Public Health, WHO Regional Office for Europe



Session 1.1 presenters ©WHO/Kamilla Krøier



### Reflections from the discussion

- » Key success factors for effective governance of national health digitalization strategies are connected people; connected strategies; evidence-informed decision making; constructive cynicism; shared decision-making; and accountability.
- » Organizational change is required to reform health system delivery but faces challenges from the need to build core infrastructure; people's resistance to technology-based change; and the intricacies of tailoring digital health to different population groups.
- » Governments should not act alone but should work together with academia, health organizations and industry to effect change, based on evidence and a process that is continually evaluated and modified.
- » Digital solutions in health should be adapted to needs, and the needs of the individual should drive reformed care delivery.
- » The future is not only about the latest and greatest technologies available – more economical and readily accessible solutions must also be considered.
- » Honesty with the public is crucial: data-driven research can be positive, but it must be transparent. Ethics matter, and standards must be enforced.

### Summary of the presentations

The current use of digital services in **Sweden** is unevenly distributed by geography and age, posing some degree of equity imbalance. To address this, Sweden has developed a 2025 vision to be the “best in the world at using the opportunities offered by digitisation and eHealth to make it easier for people to achieve good and equal health and welfare, and to develop and strengthen their own resources for increased independence and participation in the life of society.” Their national economic objective, supported by case study evidence, is that digital tools will save money, time and resources, and their approach is based around trust, respect, security and credibility. It is an example of long-term commitment to governance and acknowledgment that strong governance is required to meet various implementation challenges, including the need for integrated solutions; addressing the needs of health-care professionals; tailoring to individuals' needs, addressing fears of technology and keeping expectations realistic; and addressing ethical aspects of consent.

**Israel's** national efforts in digital health innovation are also shaped by strong governance, and the government has committed to investing US \$922 million in the field over the next five years, establishing national regulations for digital health and information technology, making the most of an advanced health system and capitalizing on their potential as a “start-up country”. Digital health is a growth engine in Israel, supported by an innovation culture that sees information as a strength. Strong governance is needed to achieve the appropriate balance between protecting the privacy and interests of the public while advancing and transforming health care. Israel's governance model ensures that government does not act alone but works together with academia, health organizations and industry to effect change and ensures that the roadmap for success is continually evaluated and modified. Israel faces challenges similar to those in Sweden, including privacy concerns; issues around regulation and standards, infrastructure and manpower; and organizational restructuring. In addressing digital health challenges, solutions in Israel are strategically focused on encouraging research and development; supporting and strengthening health and research infrastructure; addressing the specific needs of different population groups, and regulatory improvement and reform.

Effective governance requires an open but critical mindset. Strategies in digital health must be based on what has been proven to work and integrate evaluation throughout the innovation life cycle to continue advancing in directions that support achieving health policy goals. There is some risk that newer technologies and treatments will increase health expenditure and widen equity gaps. As such, it should be acknowledged that certain digital solutions may not be appropriate or feasible for adoption in every national health system. Governments and leaders of the future should, in addition, develop mechanisms to hold industry accountable for demonstrating the efficacy of digital innovations in health – ensuring that industry proves that technology can do what it says it can do and prevent using public money to buy promises. Further inclusion of academia in governing digital solutions in health will ensure that policy-makers keep national goals realistic and grounded in evidence.

The stakes for good governance are high, and the public sector faces great challenges in regulating this rapidly evolving field. The private sector is actively working to shape the digital health agenda, and public uptake of private services and technologies is already widespread: for example, beyond health-care institutions, consumers around the world are spending millions of dollars on “digital wellness technology”. Much of the public is providing data and helping develop digital health as a field, but it is primarily private companies that are benefitting, both financially and through the richness of data the public willingly provides. Public data should not be sold to companies, and public services should maintain their industry independence. Ethics are vital, and clear ethical frameworks should be developed and enforced in both the private and public sectors. For this reason alone, governments must assure that they maintain a leadership role in continuing to shape the digital health space.

## **1.2. DEVELOPING AN INTEROPERABLE DIGITAL HEALTH ECOSYSTEM FOR THE FUTURE**

### **Issues addressed in the session**

There are notable challenges in developing interoperable national digital health systems and service architectures that connect across subnational boundaries and link the various levels of the health system together. Having access to the necessary technology and having a stable telecommunication infrastructure are both crucial, as are governance, policy, legislation and a comprehensive standards framework.

### **Presenters**

- » Ramesh Krishnamurthy, Senior Adviser, Department of Information, Evidence and Research, WHO
- » Arlete Monteiro, Information Technology Director, Ministry of Health Shared Services, Portugal
- » Moderator: Rune Pedersen, Department Manager, Patient Pathways, Norwegian Centre for E-health Research



Session 1.2 presenters and moderator ©WHO/Kamilla Krøier

### Reflections from the discussion

- » Establishing effective interoperability in national digital health systems requires governance and oversight of technical and non-technical factors between and within information systems. This includes public ownership of the national interoperability agenda, legal mandates, multisectoral engagement, appropriate use of information and communication technology, stakeholder alignment strategies and adequate and skilled human capacity.
- » Interoperability encompasses harmonizing data flows within the health system and harmonizing the workflow (processes) themselves.

### Summary of the presentations

Digital health comprises a vast landscape of technologies, conceptualized around a vision of standardized systems for better health-care delivery and outcomes, using systems supported by robotics, telemetry and telemedicine that measure everything and connect and interpret data. Interoperability between and within information systems is key to the seamless integration of health data. In the public health domain, interoperability typically encompasses the exchange of indicator-based records, individual or patient records, registries, diagnostic and image records and geospatial data.

National health information systems, within which many of these data are created and exist, comprise a set of complex subsystems that include census and survey data, civil registration and vital statistics systems, data collection and processing systems (forms, methods and warehouses) and resource tracking systems supported by sector-wide policy, resources and processes. There are many producers and consumers of health information system data, including ministries responsible for health, finance, education and labour, local governments, the private health sector, insurance providers and development partners.

Establishing and ensuring that these types of data (and others) are interoperable involves standardization – a shared set of ideas about the structure and exchange of data that implies addressing

and harmonizing a range of technical and non-technical factors, including governance and oversight, legal mandates, multisectoral engagement, appropriate use of information and communication technology, stakeholder alignment strategies and adequate and skilled human capacity.

Examples of standards relevant to health data include:

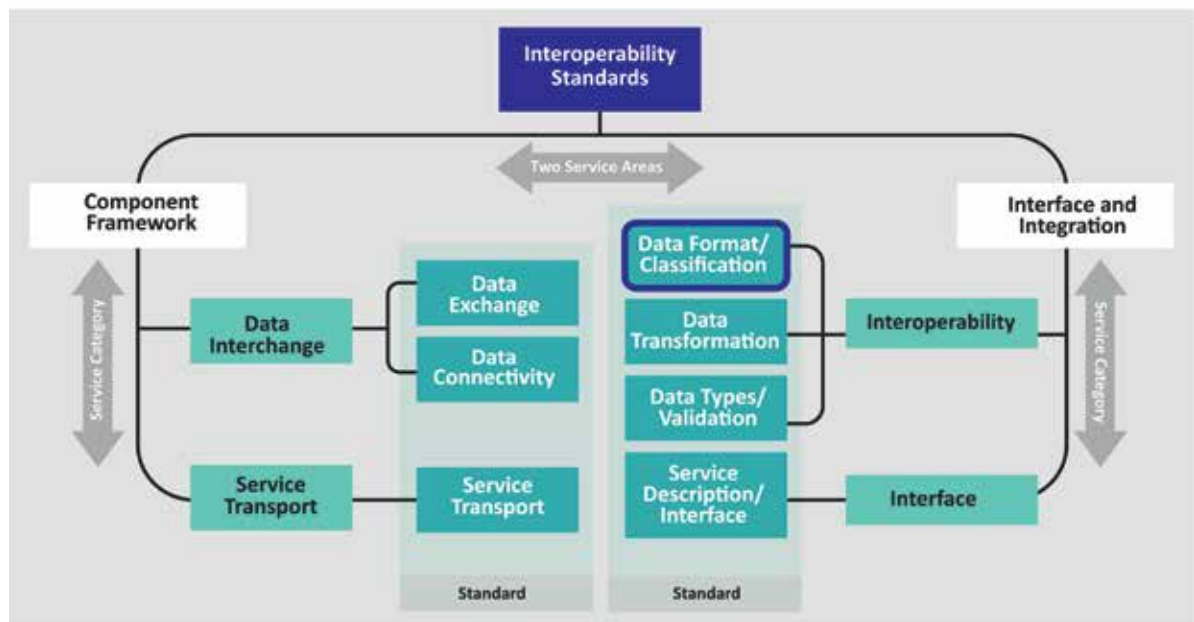
- » data standards: disease classification, drug classification, clinical procedure terms, units of measurements, etc.;
- » information content standards: vocabularies, data types, document structure, etc.;
- » information exchange standards: laboratory orders and results, patient admissions, discharges and transfers from inpatient facilities, etc.;
- » entity and personal identifiers standards: patient identifier, provider identifier, employer identification number, country identifier, health insurance issuer identifier, etc.;
- » privacy and security standards: anonymization and pseudonymization standards, security standards, confidentiality standards, consent standards, data audit trails, etc.; and
- » functional standards and business requirements, which are increasingly required as well.

Areas within the health information system that need standardization applied include facility registries, provider registries, health workforce registries, national insurance schemes registries, national citizen unique identification schemes (patient and person unique identification schemes), essential drugs and commodities registries, coding of high-priority diseases, laboratory values, terminologies and device-to-device interoperability.

**Portugal** is one example of national change towards a paradigm of digital health. The country currently operates 60 information and communication technology systems of different levels of maturity. The goal is to change the paradigm of health-care delivery placing the citizen at the centre of care. This transition is supported by the national electronic health record, which is designed to persist throughout people's lives, making information from multiple health institutions available for individuals to interact with it in different ways at different times in their lives. To meet this need, the Shared Services Division of the Ministry of Health develops national systems using easy-to-implement standards. Information is also directly available to individuals through a portable "wallet for health" containing or providing prescription data, medication alerts and more.

Interoperable health systems are complex, going far beyond hospitals and organized health care. National governance, multisectoral engagement and stakeholder alignment strategies are all necessary to close current gaps. This requires the right frameworks and architecture and standards for data and security. From a regional perspective, work across borders can complicate this and bring up additional policy and legal barriers but is nevertheless an area of vital importance to tackle in ensuring that a European Region-wide framework for health data interoperability one day becomes reality.

## ARCHITECTURE AND STANDARDS



Slide on architecture and standards from Ramesh Krishnamurthy

### 1.3. THE NORTHERN EUROPEAN SUCCESS STORY IN DIGITAL HEALTH

#### Issues addressed in the session

Countries in northern Europe are frequently recognized as world leaders in designing and adopting digital services supporting government, health and social care. With some of the world's highest rates of digital service adoption, ubiquitous access to high-speed Internet and advanced digital skills and education (11), these societies are creating new modes of health service delivery and new opportunities to engage citizens in managing their health and well-being.

Key representatives from ministries responsible for health in various countries in northern Europe provided their perspectives on the tangible and intangible factors that have contributed to their national digital health success, including strategic approaches to implementing integrated, people-centred health services and the directions being taken in creating sustainable and equitable health systems of the future.

#### Presenters

- » Nanna Skovgaard, Head of Division, Health Digitalization and Innovation, Ministry of Health, Denmark
- » Priit Tohver, Advisor, Digital Services Innovation, Ministry of Social Affairs, Estonia
- » Sari Palojoki, Senior Adviser, Ministry of Social Affairs and Health, Finland
- » Moderator: Line Linstad, Coordinator, WHO Collaborating Centre for Digital Health and Telemedicine, Norwegian Centre for E-health Research

#### Reflections from the discussion

- » Digitalizing the health system is the most effective way to ensure the sustainability of health services.
- » Individuals must be included as active partners in health and not passive recipients of services.

- » Having a clear, national digital health strategy is a key success factor and, once it is in place, the ministry and all digital health stakeholders must support it.
- » Health systems must be based on open standards, avoiding vendor lockdown.
- » Care data and health research data are two separate types of data and should not be mixed, but they must be synchronized.

### Summary of the presentations

**Denmark's** Digital Health Strategy 2018–22 (subtitled “A coherent and trustworthy health network for all”) is based on principles of universal coverage and free and equal access to health care, funded by general taxes, with a high degree of decentralization. Denmark's system is highly digital, with electronic health records at hospitals, the offices of general practitioners (GPs) and in municipal facilities for care for older people, rehabilitation, etc. All referrals and laboratory results are also digital. The Shared Medication Record is a database used between hospitals, GPs, municipalities and pharmacies, and individuals can access their data through the national health information portal, Sundhed.dk. For individuals, coherence is the major problem: in a 2015 survey conducted by *Trygfonden* and *Mandag Morgen*, 66% responded that there is insufficient coherence between hospitals, GPs and municipalities in the health system. In the same survey, respondents cite better coherence as the most important key feature of an improved health system. To address this, a common sector strategy has been devised, with 27 discrete activities across five focus areas:

- » the individual as an active partner – such as through patient reported outcome data;
- » knowledge on time – the right data should be available about the individual whenever it is needed, through coordinated care with integrated information technology systems;
- » prevention – earlier, more targeted treatment;
- » trustworthy and secure data – the right data at the right time, in the right hands, based on cooperation around cybersecurity and information security and a risk-based approach to the security level of digital solutions; and
- » progress and common building blocks – developing an ecosystem of shared services and components, with one national infrastructure shared between hospitals, GPs and municipalities (but not one information technology system).



Priit Tohver ©WHO/Kamilla Krøier

**Finland** has a national eSocial and eHealth strategy 2020 (“Information to support well-being and service renewal”) with an eHealth services timeline. Capacity-building is a priority, and Finland’s medical students have digital literacy courses integrated into their education. An electronic prescription and pharmaceutical database through which health-care services and pharmacies access prescribing and dispensing information has been mandatory since 2017. A patient data repository has also been operational, with some content mandatory, since 2011, and more content is being made mandatory over time. A data repository for social care services is also being developed. An online service for citizens, My Kanta Pages, enables viewing of prescription information and medical records, management of consents and wills (living wills, organ donation choices, etc.), requests for prescription renewals, and – for parents – managing the information of children younger than 10 years. A personal health record storage system is also being developed that will store wellness information provided by citizens from self-care or home care systems of social and health-care providers, organizations and/or companies, and personal devices or apps. Citizens will enter information on a voluntary basis, manage it themselves and be able to provide it to care providers and/or other certified services for analysis or other purposes. Use of the ecosystem is encouraging so far; mandatory elements aside, all public health-care providers and all large and medium-sized private providers are connected to the Kanta repository. My Kanta is now one of Finland’s top three Internet brands.

**Estonia’s** approach strongly emphasizes the importance of trust, based on three main building blocks:

- » technology: transparent technical solutions built from previously tested components well-known to users;
- » principles: for example, individuals are in charge of their data; data can only be shared with individual consent; and all data access is logged; and
- » culture: digital literacy is a part of the general curriculum for all citizens, in school and for the general population, achieved through the work of Look@world (Vaata Maaailma), a project-based organization that focuses on promoting the safe use of computers and the Internet, thereby supporting education, science and culture in Estonia and enhancing the national quality of life.

Ninety-eight per cent of Estonia’s residents have personal electronic identifiers. Technical solutions are in place to ensure that individual data are not used without consent and that misuse, should it occur, is appropriately addressed. Digital literacy has been part of general education in Estonia for many years, though it is not currently part of the curriculum for medical students. However, as Estonia’s population generally has a high level of digital literacy, clinicians tend not to question the need for digitalization but rather propose solutions for improving existing systems.

## 2.1. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN HEALTH SYSTEMS AND HEALTH SERVICE DELIVERY

### Issues addressed in the session

Artificial intelligence is computer systems capable of solving problems that normally require human intelligence. Interest in this has risen enormously because of significant advances in effectiveness and use. The health sector, one of the most important sectors for societies and economies worldwide, is especially interesting for artificial intelligence applications, given the ongoing digitalization of all types of health information. Artificial intelligence can support medical decision-making at reduced costs, everywhere. However, the complexity of artificial intelligence algorithms creates difficulty in

distinguishing good artificial intelligence–based solutions and in understanding their strengths and weaknesses, which are crucial for clarifying responsibilities and for building trust (12).

### Presenters

- » Indra Joshi, Digital Health and Artificial Intelligence Clinical Lead, NHS England
- » Ramesh Krishnamurthy, Senior Adviser, Department of Information, Evidence and Research, WHO
- » Kazem Rahimi, Deputy Director, George Institute for Global Health
- » Moderator: Stein Olav Skrivseth, Director, Norwegian Centre for E-health Research

### Reflections from the discussion

- » Three principles on the use of artificial intelligence in health have emerged from the work of NHS England.
  - Developing standards and regulation to support the use of artificial intelligence in the health system is essential and requires changing how regulations are devised and applied.
  - Embrace the art of the possible, taking time and effort to dispel myths and actively work to demonstrate practical applications of artificial intelligence in health.
  - Leave no one behind on this journey: ensure an inclusive approach to artificial intelligence in health that incorporates input from health-care professionals, patients and the public. Transparency and communication around initiatives and case studies is crucial.
- » Certain preconditions are necessary for success: trust must be built and maintained, and standards created to underpin digital assurance so that populations can trust artificial intelligence–based tools operating in the health domain.
- » Accessibility and equity are key, and often overlooked, concerns affecting the adoption of artificial intelligence in health. Artificial intelligence must be implemented in a way that provides equitable benefits to all population groups in our societies.
- » Evidence-informed standards and a strong ethical framework must guide the development of artificial intelligence tools used in health.
- » Intersectoral engagement is vital in establishing national environments for digital health.
- » WHO has outlined five necessary elements supporting the safe and inclusive implementation of artificial intelligence at the country level:
  - policy frameworks and regulatory mechanisms;
  - artificial intelligence–specialized human resources capacity;
  - artificial intelligence architecture and computing infrastructure;
  - artificial intelligence–specific applications and algorithms; and
  - funding for research and development in artificial intelligence for health.





Stein Olav Skrøvseth ©WHO/Kamilla Krøier

### Summary of the presentations

Health care already has many different manifestations of artificial intelligence, but there is relatively little scientific evidence of what works and significant debate about what counts as evidence. Some studies show that, in most artificial intelligence companies examined, even those considered to be highly profitable, virtually no evidence is being applied to the product development process. The artificial intelligence market may be well positioned to sell products but is unfamiliar with how health evidence is traditionally gathered and evaluated and is seldom aware of the complexity inherent in providing health care.

DeepMedicine, a programme at the University of Oxford in the **United Kingdom**, is one initiative investigating the opportunities that artificial intelligence technology can offer health. Advantages include more powerful and efficient data processing, automation, and “discovery through reduced complexity”. From the viewpoint of health service goals, many current artificial intelligence tools fall into the category of patient triage and automated diagnostic algorithms – generally, automating labour-intensive tasks to free up the time of health professionals, accelerating processes and decreasing the burden on health-care systems. Other applications may be possible in mental health, which is traditionally difficult to examine because data sets have no endpoints. Back-end systems are also ripe for artificial intelligence adoption, such as with blood transport, where a company might predict where blood will be needed, and machines and robotics can be used to help facilitate logistics.

Currently, the popular discourse surrounding the use of artificial intelligence in health care is frequently oriented towards it being a potential “threat to professional recognition, jobs and the other incentives for which professionals enter the industry”. There are, however, several examples of artificial intelligence being used successfully to augment the skills of health-care professionals – the paradigm of human *and* machine rather than human *versus* machine. It is important to focus on identifying artificial intelligence conducive problems in health, and this is currently not always the case.

Health expenditure is steadily increasing, leading to questions being raised as to the value of technology's contribution to health and why reducing costs is so difficult. However, overall cost is a function of unit price and volume, so although a new tool may be cheaper and reduce unit costs, increased utilization means that volumes increase, and subsequently, overall costs increase. In this context, when applied to health, artificial intelligence may offer something different in the future – for example, complete service substitution or the empowerment of individuals to manage certain aspects of their own health and health care.

National Health Service (NHS) **England** is using artificial intelligence as one of a suite of tools to empower people to participate in their health and care using digital services that meet needs, emphasize prevention and offer a personalized experience. National principles are required – and have been drawn up – for the field as it develops, along with a code of conduct for data-driven technology. Regulation is needed but is difficult to impose: many different categories of work and activity require regulation, and effective approaches require changes in how regulations are devised and applied.

With regard to the use of artificial intelligence in advancing national health-related Sustainable Development Goals and targets, scalability and appropriate mandates and governance mechanisms are vital for it to be effective. At present, there is much talk of the fourth industrial revolution and data as the “new oil economy”, but the pace of change is faster than the applicable legislation, and much disruptive technology is already active in the marketplace. Digital consumer products that are readily available today contain many embedded technologies that are not fully disclosed, and there is a danger that artificial intelligence will be used in similarly surreptitious ways in health if it is not adequately governed.

*“For digitalization to be effective, it must not only transform health and care but also change how people think about it, making health systems digital by desire.”*

The landscape of health is changing, investment is shifting and more tools will penetrate health care over the next few years. The primary focus must be on solving appropriate problems at the country level. An assessment of readiness for adopting artificial intelligence in health is based on three key principles: national preparedness; country engagement; and alignment of stakeholders. WHO is in the process of developing a conceptual framework for core capacity development and categorizing country preparedness for artificial intelligence and is encouraging countries to think about certain potential workstreams:

- » artificial intelligence for primary health care and service delivery;
- » outbreaks, emergency response and risk reduction;
- » health promotion, disease prevention and health education; and
- » artificial intelligence health policy and funding.

## 2.2. DIGITAL HEALTH: REDUCING OR EXACERBATING HEALTH INEQUALITIES?

### Issues addressed in the session

A 2014 report by the European Union (EU) eHealth Stakeholder Group examining the potential relationship between health inequalities and digital health highlights: “The ultimate risk is that the flaws of the traditional health system will be reflected and potentially even aggravated online. This

would deepen the rift between socioeconomic groups, in particular between the well-to-do and educated and those who, for whatever reason, experience difficulty navigating information and communication technology-enabled environments and consequently have less information and fewer quality services at their disposal” (13). A 2013 article by Kosinska and Marschang (14) also raises the key question of “how to turn eHealth into an enabler as part of sustainable and inclusive health systems that can alleviate existing health inequalities without being in competition with other health-care needs.”

In this panel discussion, public health leaders provided their perspectives on the contributing role of digital health in reducing or exacerbating health inequalities. They highlighted technical, social and policy-based issues of relevance and proposed ways of working together to ensure that the digitalization of health systems does not inadvertently create new or exacerbate existing inequalities, leading to an unwanted digital divide in health.

### **Panellists**

- » Vesna Miranovic, Director General, Ministry of Health, Montenegro
- » Cristian-Vasile Grasu, Secretary of State, Ministry of Health, Romania
- » Natasha Azzopardi-Muscat, President, European Public Health Association
- » Moderator: Sascha Marschang, Director of Operations and Membership, European Public Health Alliance



Panellists and moderator ©WHO/Kamilla Krøier

## Reflections from the discussion

- » For digital technologies to be incorporated effectively and equitably within population health, they must be driven by the needs of people and not by the technologies themselves.
- » Common digital architecture, standardization and interoperability are needed across subnational regions and the broader WHO European Region. A lack of standardization between systems makes gathering data impossible, and these data are needed to address inequities.
- » Inequality in digital health is an under-researched field and needs addressing. Further research and discussion are needed on the role of technology in reducing, reproducing or exacerbating inequalities in health.

## Details of the discussion

**Romania** has one of the smallest health budgets in Europe, and correspondingly, a unique perspective on digital health. A total of 120 000 people live in remote locations, with limited access to good-quality primary care. National health services must evolve to meet the needs of individuals in a more equitable and sustainable way. As such, four counties in Romania are piloting telemedicine projects in an effort to close this access gap. The main challenge is a lack of standardization between systems, which creates difficulty in gathering data to measure health development, perform analysis, carry out research, improve quality and guide policy decisions.

**Montenegro's** Electronic Appointment Scheduling Project was designed to correct equity issues in an old system that was not fit for purpose. Previously, citizens, irrespective of where they reside, were required to be physically present in the capital (Podgorica) to obtain appointments at the start of each month, with only the one opportunity per month to do so. The new system was based on a legal obligation to provide individuals with an initial specialist appointment within a 30-day period and enable them to schedule visits to their chosen family doctor using a mobile phone app. The goals of the project were to show respect for individuals' time; to improve access to doctors and specialists; to create a standard list of procedure durations; to introduce standards for the duration of health check-ups; and to measure doctors' efficiency during working hours. Challenges and feedback included resistance from doctors, who felt that central scheduling made the system too transparent; patient no-shows; a lack of available appointments to match the demand; and physicians unnecessarily spending additional time with patients. These were balanced by benefits, including a far more equitable booking system; the availability of a tool for planning and for detecting organizational problems; and an enhanced ability to detect staffing shortfalls.

Digital and personalized health technologies can empower consumers to quantify health behaviour, measure risk factors that can then be reduced and help prevent and fight noncommunicable diseases. Nevertheless, there is a risk of widening inequities, since early adopters tend to be affluent, more motivated, more health conscious and more highly educated. Hence, they possess the necessary technological literacy to operate digital devices and the numeracy and linguistic capabilities required to process information and then act to change behaviour. However, digital technology can still positively influence health equity and strengthen upward and downward accountability. For example, digital technologies can be used to facilitate cross-referencing of characteristics such as age, sex, race and ethnicity against socioeconomic variables (education, income and insurance or employment status) and geographical location (urban, rural and small islands) and local infrastructure and can therefore provide insight into existing inequities, giving policy-makers better opportunities to address them.

Standardized systems are required, however, to gather the data that would enable inequity to be addressed. Common digital architecture, standardization and interoperability are needed across subnational regions within and between countries of the WHO European Region. Good evaluations of the potential impact of digital technology on population health outcomes and health equity are also lacking. Several questions in this area still need to be answered, including around the implications of using various measurements of social inequality; how far existing studies can illuminate potential relationships between innovative health technology and social inequalities in health; and the pathways through which innovative health technologies reduce, reproduce or exacerbate social inequalities in health.

## 2.3. DELIVERING INTEGRATED CARE EMPOWERED BY DIGITAL TECHNOLOGIES

### Issues addressed in the session

Integrated care is an organizing principle for care delivery with the aim of achieving improved patient care by improving the coordination of the services provided. Integration encompasses the combined set of methods, processes and models that seek to bring this about. Integrated care seeks to address fragmentation in patient services and to enable better coordinated and more continuous care, frequently for an ageing population with increasing incidence of chronic disease (15).

This session examined the role of digital technologies in enabling integrated care and looked at enablers and barriers to their implementation, including examples of where integrated care is applied, how care teams and individuals utilize technology within integrated care environments and the impact for the operation of the broader health system.

### Presenters

- » Gro Karine Rosvold Berntsen, Chief Researcher, Patient Pathways, Norwegian Centre for E-health Research
- » Nick Guldmond, Professor of Integrated Care & Technology, Erasmus School of Health Policy & Management and I.M. Sechenov First Moscow State Medical University
- » Antoni Dedeu, Director of Programmes, International Foundation for Integrated Care
- » Moderator: Rune Pedersen, Department Manager, Patient Pathways, Norwegian Centre for E-health Research

### Reflections from the discussion

- » Organizational improvements should be given priority in the process of digitalizing national health systems, aiming for greater connectedness between actors and sectors.
- » Integrated care and digitalization are closely related, but patient pathways need to be defined to identify where digitalization is necessary. Individuals should be involved in continual dialogue to define the goals and priorities for their treatment.
- » Governance of data is required to successfully implement integrated care approaches.



Antoni Dedeu ©WHO/Kamilla Krøier

## Summary of the presentations

Adapting care systems for the future requires emphasizing the organizational aspects of change and development. A paradigm shift is occurring towards greater connections between health care, social care and communities and engaging different stakeholders at different levels. The logic of integrated care is that it can increase coordination of care, improve efficiency and quality for each task, address and respect individual preferences and enable the right resources to be available at the right times and in the right places. It can contribute to meeting the triple goal in health and care systems: improving the user's care experience; improving the health of people and populations; and improving the cost-effectiveness of care systems.

Achieving this requires a high level of coordination. In planning integrated care, it is important to have digital platforms and ecosystems that define each provider's role and that include the necessary digital tools to carry out these roles. In this context, new technologies bring great potential, but they require governance, oversight and careful organization to fulfil that potential within intrinsically complicated health systems.

Several European Region countries have services and resources for integrated care in place but still face a myriad of technical and operational challenges in connecting and exchanging information between and within complex systems. In particular, greater connectedness is needed between fragmented parts of health and social care.

Some models and strategies exist to reap the benefits of integrated care and challenge how health-care organizations are connected. **Norway** is providing integrated care to support the needs of

individuals with complex diagnoses and comorbidities. Based on research in northern Norway, this group requires goal-oriented, cyclical treatment processes that account for about two thirds of the national care budget (16). In integrated care, one person has one care plan. This approach serves to identify relevant resources and piece together diagnosis-specific plans in response to an individual's specific needs. These plans need to be concrete, specifying who does what and when, supported by a data governance mechanism that defines appropriate access. Each individual must be involved in a continual dialogue to define the goals and priorities for their treatment. A digital platform ecosystem approach defines each provider's role, including digital tools for planning, communication, workflow organization, providing and analysing sensor and health-care data and creating monitoring tools.

The International Foundation for Integrated Care views integrated care as a fundamental design principle for health systems resulting in benefit to communities, individuals or service users through the culmination of specific processes, methods and tools. By definition, integrated care encompasses the vision of care being patient-centred and population-oriented. To achieve this, information solutions are essential to serve population health management, condition management in primary care, coordination across providers for seamless care and self-management. Many of the key elements of integrated care are digital: for example, among the key lessons for service delivery are effective information and communication technology systems to enable care professionals to easily communicate with each other and allowing people to interact effectively with care providers in a way that supports shared decision-making. Common components for success include eHealth and data strategies (system-level integration), integrated electronic health and care records (organizational-level integration), centralized information referral and intake (service-level integration) and single or shared health records (clinical and professional integration).

The EU's SCIROCCO Maturity Model for Integrated Care (17) provides a standardized means of assessing the maturity level of integrated care and digital solutions in regions and countries. A key domain is information and eHealth services, which enable activities essential for integrated care: sharing of health and care information; the use of care plans across diverse care teams; continual collaboration, measuring and managing outcomes; and enabling people to take a more active role in their care.

## AFTERNOON PLENARY

### HEALTH SYSTEMS OF THE FUTURE – MOVING FROM TREATMENT TO PREVENTION

#### Issues addressed in the session

The emergence of preventive solutions in health care is giving rise to a new public health debate. These solutions are usually classified as being either proactive or predictive in nature. Proactive care solutions stratify at-risk individuals based on known algorithms and ensure that preventive action is taken to intervene well before the onset of symptoms, let alone illness. Predictive care solutions leverage cutting-edge technologies and sophisticated machine learning data algorithms to not only stratify risk but even predict risk and intervene even further upstream (18).

These predictive technologies often rely on genetic testing to help determine susceptibility to disease years or decades before the disease might manifest itself. These technologies can also be used after

diagnosis to prevent worsening of the person's condition and to guide treatment to avoid adverse events. Technological developments are furthering this concept; the increased collection of personal health and lifestyle data, the advent of big data and improved analytics can generate better insights earlier. This will enable issues to be anticipated with unprecedented precision, pinpointing behaviour to avoid and actions to take before risk factors even arise (19). With falling costs associated with preventive solutions, their widespread use may become viable, and yet the value of applying these approaches in European Region health systems and the public health benefits remain uncertain.

### **Panellists**

- » Stein Olav Skrøvseth, Director, Norwegian Centre for E-health Research
- » Ed Kelley, Director, Service Delivery and Safety, WHO
- » Kalle Killar, Deputy Secretary General, E-services Development and Innovation, Ministry of Social Affairs, Estonia
- » Patty Kostkova, Associate Professor and Centre Director, University College London
- » Moderator: Ilona Kickbusch, Adjunct Professor, Graduate Institute of International and Development Studies, Geneva and Director, Global Health Centre, Geneva, Switzerland

### **Reflections from the discussion**

- » Health systems can be viewed as having three pillars:
  - (1) high-quality primary health care and public health services supported by
  - (2) multiple sectors serving
  - (3) engaged, empowered communities. Digital health has a key role in creating bridges between these three pillars.
- » To achieve disease prevention through technology, it is key to have digital awareness and skills in the population.
- » Coordination across sectors and within the health-care sector is necessary to accelerate progress in adopting digital health, and trust, awareness and acceptance are key to success.
- » Governance for digital health is crucial: strategies are required to ensure that citizens' rights are safeguarded, that digitalization does not cause or increase inequity and that benefits for the good of the public are not overshadowed by private sector interests.
- » The widespread assumption that digital solutions will reduce health-care costs should be carefully questioned. Expectations also increase as digital services become available.
- » Subregional platforms are required to enable countries to learn from each other.
- » Considering digital health as the convergence of the digital and genomic revolutions with health, health care, living and society positions it in the centre of a much larger transformation of whole systems and ways of living. It must not just apply technology to problems but also change the mindset to look at society's larger issues.





Panellists and moderator ©WHO/Kamilla Krøier

### Summary of the presentations

The Declaration of Astana during the Global Conference on Primary Health Care in 2018 abstracted health systems functions within three pillars: (1) high quality of primary health care and public health services supported by 2) multiple sectors serving 3) engaged, empowered communities. Digital technologies have an important role to play in creating bridges between these pillars, but health systems and funding frameworks are not keeping pace with technological developments.

*“Moving from treatment to prevention of disease with technology requires high-quality data along with learning health-care systems that use it to produce knowledge and apply it to service provision.”*

If, however, we do not ensure that public authorities govern the change being brought about by digitalization in health, there is the serious risk that other actors who are driven by commercial motives that may not align to public health objectives may assume leadership roles. Public leadership and citizens’ trust must therefore be (re)gained and maintained to capitalize on innovation and public health benefits.

In working towards disease prevention aided by technology, it is key to have digital skills and awareness within the population. This does not come easy: in the example of **Estonia** – a country well advanced in adopting digital health – an enormous investment has been made to develop methods for lifelong learning of digital skills, training older adults and addressing the digital capability of people with disabilities.

To get better feedback on their lifestyle and to receive better services from the health-care system, more than 10% of Estonians have already given their genomic information to the state (and this

number continues to increase). People-centred approaches are the key to translating digital success into better access to care, and co-participatory design is a basic tenet in creating digital services in Estonia.

The private sector is often the innovator and the instigator of change in the health sector, but for this dynamic to align with public health interests, the issue of trust must be addressed and the right governance frameworks created.

**Finland** has the fair data economy approach that addresses different aspects of data management, starting from consent and ending with acceptance of companies involved in delivering health services. International organizations have an important role to play in establishing the wider framework.

Coordination across sectors and within the health-care sector is crucial. Trust, awareness and acceptance are key to success, but generating trust in abstract systems can be difficult. Research in this field must adhere to principles and be transparent, reproducible and replicable, but this can be problematic, especially in the machine learning and artificial intelligence communities, in which work is often neither transparent nor replicable because it is too complicated and complex.

There are many questions around governance and management of technology and data, including how to use, manage and generalize data within the health-care system; how to manage health data owned by private companies; and how to manage the entry into the health space of new digital actors initially unfamiliar with the health landscape. Although there continue to be broad scale concerns surrounding the privacy and security of health-care data, individuals are freely distributing data to big companies, presenting paradoxes with which many remain uncomfortable.

Appropriate partnerships and regulations are required to ensure people's security and rights. Currently, not all the actions taken in response to unprecedented quantities of data information are defined, and more data should therefore only be demanded if it is known what to do with them. The correct balance must be struck between letting all the flowers bloom and steering development, and we do not yet know what or where that balance is. In the European Region at least, health care is mostly public, the public has most of the data and many governments are restrictive about letting private companies access them, yet major governance challenges remain. These include the principle that "no decision about me should be made without me" – but how can this be accommodated in broader, national systems, and where and how does the individual fit in? A further wave of challenges comes with the difficulties of coordinating and providing for individuals with chronic diseases.

There is great public interest in people improving their own lives using technology, but there are big deficiencies on the public health side of this field, including systems to regulate data ownership and sharing. Meanwhile, companies in the health space lack the necessary governance structures. As part of efforts to address this, WHO has encouraged greater collaboration with the private sector. Other collaborations will come, but this work must be framed within long-term development plans and defined goals driven by outcome and impact.

Looking at global disease prevention, there is huge potential in early warning systems that capitalize on personal data – including from wearables – for preventing pandemics and other uses. The challenge is to engage people in projects to predict and prevent diseases from occurring. This change will influence epidemiology and the understanding of what evidence is. Epidemiology should embrace real-time data sets. Millions of terabytes of data come from various devices on weather, fitness, traffic

and everything else that can be combined to allow real-time answers and responses to population-level events, benefitting epidemiology with analysis by openly tested artificial intelligence algorithms.

If digital health can be considered as the convergence of the digital and genomic revolutions with health, health care, living and society, putting it at the centre of a much larger transformation of our whole systems and ways of living, then it must not just be the application of technology to problems but also a change of mindset to encompass society's larger issues. For this to work, systems need data to work with and the capability to extract knowledge from them, and health-care organizations must be ready to receive that knowledge and adapt to it, overseen by adequate strategic and governance frameworks. To facilitate this, platforms are required so that countries can learn from each other.

## KEYNOTE: DIGITALLY TRANSFORMED HEALTH SYSTEMS: INNOVATION IN PRACTICE

Ran Balicer, Director of Health Policy Planning, Clalit Health Services and Founding Director of Clalit Research Institute in Israel, asked participants: *If we could predict the future, what would health care look like?*

He described a future scenario in which a doctor may have the ability to accurately predict the onset of a life-threatening health condition, such as a heart attack, and take an appropriate course of action to prevent it. Dialysis was cited as a good example of a current condition that should be mitigated in this way: once individuals are symptomatic, it is too late; people need to be identified before symptoms appear. Aided by artificial intelligence and predictive modelling, health-care professionals will be able to assess retrospective data sets to look into the future and prevent individuals from developing chronic conditions.

Radiology is another field undergoing significant transformation. There are not enough physicians to process the level of computed tomography and magnetic resonance imaging scans being produced today, and this can be automated. These processes, however, are not simply about automating the role of physicians – in fact, machines can do some things that people cannot, such as picking up signs of calcification that human eyes miss. The goal is to use artificial intelligence to expose these insights so that individuals can enjoy the benefits. From this perspective, population health becomes predictive, proactive and preventive.

Implementing such approaches requires at least five years of retrospective data. Clalit Health Services, **Israel's** main health-care provider, uses cradle-to-grave data on 4.5 million people as the basis for developing the necessary algorithms. Using data in this way enables the collective wisdom of millions of physicians and patients to be used to create mechanisms that show the individual impact of certain types of treatment and hence tailor that treatment accordingly.

Ran Balicer demonstrated a mobile health (mHealth) app developed by Clalit that allows users to see the “what if” scenarios of potential improvements or declines in their health and well-being as a result of changing (or not changing) their behaviour. It presents a counterfactual simulator that draws on big data to allow individuals to choose one or more health goals to pursue and then helps in achieving them. Such innovation in providing evidence-informed information in an easy-to-understand form can be a major factor in enabling populations to better manage their own health. The app is now live for Clalit's 4.5 million members.



Ran Balicer ©WHO/Kamilla Krøier



Slide on counterfactual simulator from Ran Balicer

Ran Balicer further emphasized that “algorithms are not impartial judges: they are opinions embedded in code”. Many decision points are typically embedded in code as are many problematic issues related to inherent fairness, bias and so on. Many factors must be considered when choosing whether to trust a model in a given situation. Individual preferences and opinions can also be embedded into the algorithm to improve care quality by tailoring it to people’s needs and desires. Statistical methods have been created to overcome biases, and platforms and events for sharing, such as this Symposium, are also important.


The collision between social values and the financial realities of escalating costs is inevitable. New solution providers who have little regard for social equity are quickly moving into the health domain, and “they will eat the industry alive” – after which social actors will have to stand in line to buy their solutions, with no other alternatives, just as has happened in other industries.

Addressing whether digital health can reduce costs and improve equity, Ran Balicer argued that there are two types of these innovations: novel therapeutics (personal medicine, biomedication, gene therapy, etc.) and novel digital practices (digital therapies, mobile-based telehealth, artificial intelligence–based decision support, etc.). The hope is to find leapfrogging opportunities in practices as opposed to therapeutics, because this provides unique opportunities to make equitable, universal health care sustainable and affordable. Doing more with less is a great promise, almost too good to be true, but it is truly our only hope in health: we cannot continue with current mechanisms for providing care for people with multiple illnesses. Our choice is to evolve or die. This is an uncomfortable choice, because health-care systems are complex and often resistant to change. There are many good reasons to be conservative, and people usually focus on the risks of moving forward; but the risk of maintaining the status quo must also be considered. Failing to move forward, failing to change and failing to adapt and to progress are not risk-free but are a different type of risk.

*“The often-cited fear of job losses brought about by digitalization is misled. The question is not whether humans or technologies do a better job in deducing inferences; it is about augmenting a failing health-care system with enhanced abilities that make it sustainable.”*


Doctors will not be replaced by algorithms, but health systems that do not use artificial intelligence will be replaced by those that do. “There are teams [in global companies] hunting the US\$ 6 billion in the health-care business, and they don’t care about equity, solidarity and social values like we do.” If the public sector is not strongly advocating these core health system values at every opportunity and we are not providing appropriate responses to industry, then in just a few years, we will not have any choices left.

**Doctors will NOT  
be replaced by algorithms**



**However -**

**Health systems that do not  
use AI, WILL be replaced  
by those who do**



Slide on innovation in practice from Ran Balicer



# SUMMARY OF DAY TWO

## MORNING PLENARY

Day two started with a recap of the opening day's central discussions by Dr Hans Kluge, Division of Health Systems and Public Health, WHO Regional Office for Europe. He emphasized that the Sustainable Development Goals provide unique momentum to accelerate and broaden partnerships that could help drive digitalization. Dr Kluge summarized the previous day's discussions as follows:

Digital health can revolutionize public health and health systems, improve the reach, impact and efficiency of health care and deliver real patient-centred services, in which individuals are active partners in their care. In addition, digital health will be centrally important in achieving universal health coverage by offering access to health for all without the risk of financial ruin. This moment is an immense shift from reactive care to prevention and early detection of disease, using massive data sets to shape public health interventions. Nevertheless, linking digital investment to public health and health promotion and prevention goals requires strategic approaches and organizational changes based on identified needs. Without such strategy, digital health could increase inequity, creating divides where resources are not aligned with social needs and only affluent people benefit. There is a danger that governments will lose the political struggle around control of technology and data. They must work together with academia, health organizations and industry to effect the right changes.

The barriers to adopting digital health are often human and not technological: allocating money, integrating data, using common open standards and ensuring that the workforce is ready to embrace change. Fear of job losses in the health sector is largely unfounded – although digitalization may remove the need for certain specializations and change the nature of others. Algorithms will not replace doctors, but health systems that use technology will replace those that do not.

Digitalization of health systems has an important governance component that requires urgent attention. Right now, the private sector is hunting the billions of dollars to be spent in the health-care business. They are not motivated by equity, solidarity and social justice. If public entities are not adequately prepared to embrace and govern emerging technologies and the data revolution, in a very short time – just a few years – the window of opportunity will have passed.

Credibility and public trust are essential. New standards and regulatory approaches are needed to ensure security and transparency so that individuals are confident in the use of their data. If this is missed, the potential of digital health cannot be fully realized. Building this trust requires the political will to take responsibility and lead and to ensure that wrongful uses of technology are prevented.



Hans Kluge ©WHO/Kamilla Krøier

## Presenters

- » Clemens Auer, Special Envoy for Health, Federal Ministry for Labour, Social Affairs, Health and Consumer Protection, Austria
- » Maritta Perälä-Heape, Professor of Practice in Data-enabled Care and Innovation Ecosystems and Director, Centre for Health and Technology, University of Oulu, Finland
- » Morten Elbæk Petersen, CEO, Sundhed.dk (Danish National eHealth Portal)
- » Facilitator: Nick Fahy, Senior Researcher, Nuffield Department of Primary Care Health Sciences, University of Oxford, United Kingdom

## Reflections from the discussion

- » Individuals should be at the centre of their own health data and helped to understand its value and empowered to benefit from that understanding.
- » Active policy dialogue is needed for data-led care to be successful. The European Region requires a joint strategic action plan for person-centred, data-led health and care, with recommendations at the European Region and country levels, promoting enabling factors and building blocks for data-led innovations and deployment.
- » Similarly, the European Region needs a Region-wide interoperability framework for digital health. A headline structure for such a framework would address legal regulation; collaborative planning and implementation; agreed semantics, codes and mapping systems; technical standards, formats and protocols; and clear orientations for all stakeholders.
- » Countries in the European Region clearly need to invest in a new generation of interoperable information technology infrastructure at the health-care provider level.



## THE “NEW DEAL” OF HEALTH DATA IN DATA-DRIVEN PERSON-CENTRED CARE

### Summary of the presentations

Coming paradigm changes in health care will require new data flow models to deal with huge numbers of online services and platforms generating even greater quantities of data. This brings a range of challenges, mainly around data access, quality and quantity. A recent EU data survey and public consultation indicated that EU citizens may be willing to share their personal health data if it is done in a private, secure way.

In this changing context, a “new deal” approach to data requires that people have the tools and means to control their own data. This necessitates technological infrastructure, examination of service design, and services to help citizens understand what the data means and how to react to it. The OuluHealth ecosystem in **Finland**, a public–private partnership of more than 600 health and life science companies that comprises one of the leading digital health innovation ecosystems in the Region, is conducting related research that is now setting standards for digital health in the Region. Another example of the “new deal” approach is the MyData principles and the MyData Declaration (20). Progress requires a balance between data protection and exploitation. For this, conceptual clarity is still needed in numerous spheres, including, but not limited to, data governance, the big data knowledge economy, citizen-generated data, online platforms and the implementation of the EU General Data Protection Regulation in EU countries. New collaborative structures are working to achieve this clarity, including a Digihealth Knowledge Hub at the University of Oulu that is attempting to create strategic partnerships in the EU to increase expertise in health data management and data modelling for preventive medicine and to share best practices and knowledge with peer groups around the world.



#### MYDATA PRINCIPLES

- to make sure individuals are in a position to know and control their personal data, but also to gain personal knowledge from them and to claim their share of their benefits.
- Mydata Declaration aim at restoring balance and moving towards a human-centric vision of personal data and digital society whose foundations are:
  - Trust and confidence, that rest on balanced and fair relationships between people, as well as between people and organisations;
  - Self-determination, that is achieved, not only by legal protection, but also by proactive actions to share the power of data with individuals;
  - Maximising the collective benefits of personal data, by fairly sharing them between organisations, individuals and society.

22.8.2019
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Slide on MyData principles from Maritta Perälä-Heape

## WHAT IS NEEDED TO CREATE AN ECOSYSTEM FOR DIGITAL HEALTH? INTEROPERABILITY FRAMEWORK AND PUBLIC INVESTMENT

Health-care providers should be motivated to exchange health data first because provision is about continuity of care and second to fill databases and registries that can help build research, artificial intelligence and other tools to improve the future of digital health systems. There is a clear, strong public interest in doing this to achieve a higher quality of health care.

Public health is largely about policy and good governance, and much could be done in terms of consultation, research and implementation to enhance this. At present, ecosystems for digital health are fragmented systems of individuals, providers, homes, registries, institutes, etc. Every participant – including patients and professionals – generates data, they all need an electronic ID and they all use different information technology infrastructure. It is possible to be optimistic, but there are many hurdles: some parts of the health sector are not properly connected – either within themselves or to other parts of the health sector – and many countries have large information technology infrastructures in their health systems that are not capable of exchanging data successfully. Interoperability is the magic word, and a common strategic and political understanding of what it means is required to create shared ecosystems. In creating this shared understanding, there is a crucial need to listen to doctors and other professionals: generally, their voices are not heard in policy discussions, but they have to manage the care processes. Their input is needed because of the complexity, dependence and difficulty of providing care.



Clemens Auer ©WHO

Since sharing health data is in the public interest, creating such an interoperability framework for digital health is a public obligation. A headline structure for such a framework would address clear legal, organizational, semantic and technical policy areas. An interoperability framework should include:

- » sound legal regulations covering electronic ID, roles, data protection, patient autonomy, liability, etc.;
- » structures for collaborative planning and implementation in the overall health system, defining use cases, processes, needs and priorities;
- » agreement on semantics, codes and mapping systems;
- » agreement on proven effective technical standards, formats and protocols;
- » agreement on the further development of standards and formats for new use cases; and
- » clear orientations for all stakeholders.

The European Commission has devised an eHealth European Interoperability Framework (21) that provides a set of standards and formats: these should now be agreed on politically. Political will, public interest and public investment are required – especially because there is a clear need in the Region to invest in a new generation of interoperable information technology infrastructure at the health-care provider level. Public understanding of what creates interoperability must be linked with future investment in the health-care infrastructure. Despite the complex nature of the task, the underlying principles are simple.

- » Talk to each other and break the silos.
- » Create a public understanding of interoperability and the need to create the necessary frameworks.
- » Invest in the new generation of interoperable infrastructure.

## **THE DANISH NATIONAL EHEALTH PORTAL – A EUROPEAN FRONTRUNNER**

One example of a mature vision of digital health is Sundhed.dk, the Danish National eHealth Portal, a European frontrunner that generates great international interest. It is a critical tool to help GPs keep individuals healthy and is a major part of national health strategy supported at all political levels. In **Denmark**, public ownership goes hand in hand with a high level of public trust, and the portal – usable across multiple digital platforms – has 2.3 million unique users per month at present, with traffic increasing. It functions as a gateway to patient data not accessible on local systems (for example, by allowing GPs to access hospital data). These data are integrated from more than 120 separate sources rather than stored on Sundhed.dk servers, so there is no duplication involved. From the user viewpoint, a closed space holds personal clinical data, while an open space functions as a unique source of information such as health handbooks and free health programmes to help manage chronic disease, navigate childbirth and make positive behaviour changes such as quitting smoking. A My Health overview function supports interactivity between physicians and individuals.

Sundhed.dk aims to be “a safe harbour in an often chaotic eHealth market”. With this system, patients are satisfied and operational costs are controlled. There is no guarantee that buying digital structures will save money, but Sundhed.dk has shown that eHealth is an effective facilitator towards that objective.

# The Danish health care sector - and digital public service & e-government



## The Health care sector

- Universal coverage
- Free and equal access
- Cross sectorial
- GP as “gatekeeper”

## High ICT-maturity

- Long tradition of health registries and databases
- Unique personal identifier
- Digital signature & secure login to public services (NemID)

WHO Symposium – Future of digital health systems 7th February 2019

[sundhed.dk](http://sundhed.dk)

Slide on Denmark’s health-care sector from Sundhed.dk



Symposium participants ©WHO

## PARALLEL SESSIONS

### 3.1. ELECTRONIC PRESCRIPTION – A COMMON DENOMINATOR FOR DIGITAL HEALTH ADOPTION IN EUROPE

#### Issues addressed in the session

National electronic prescription (ePrescription) systems are one of the most prevalent digital health services in countries in the European Region. WHO's third global survey on eHealth, conducted in 2015 (22), revealed that, of the 27 countries that reported having a national electronic health record system, 19 (70%) were linked to a pharmacy information system such as ePrescription. Other evidence indicates that at least one third of all EU countries have fully functioning ePrescription systems.

#### Presenters

- » Maria Bäcklund Hassel, International Coordinator, Swedish eHealth Agency
- » Pilar López Calahorra, Manager, Pharmaceutical Services, Catalan Health Service, Spain
- » Kitty Kubo, Innovation Lead, Estonian Health Insurance Fund
- » Moderator: Monika Johansen, Department Manager, Future Health Record, Norwegian Centre for E-health Research

#### Reflections from the discussion

- » ePrescription should not be viewed as a one-time technology implementation but as a model undergoing continual adaptation and evolution.
- » The innovation cycle is iterative: problems in early phase implementation are normal and should be expected when projects go live.
- » Key success factors for ePrescription include high public demand, political will and support and a range of technical and implementation-specific factors.

#### Summary of the presentations

Electronic prescription was introduced in **Sweden** in the 1980s at a time when the government had a monopoly on pharmacies. In 2008–2009, the market was deregulated. The Swedish eHealth Agency was established around the same time and is now responsible for all ePrescription repositories supporting 1400 pharmacies across the country. ePrescriptions in Sweden have been a success because of several factors: a culture of cooperation; the existence of standards and formal interoperability; a devoted project group with oversight; good planning and step-by-step, structured implementation; and competition between county councils. The effect has been to achieve a 99% digital prescription rate; increased quality; improved patient safety; increased services to citizens; time and cost savings; and better oversight of the system, since pharmacies must report all sales to the eHealth Agency. This Agency is now also responsible for producing national medicine statistics. Digital services have been developed to complement the system, including a national medicines list; the My Prescribing follow-up tool for prescribers and managers; and the My Prescriptions tool for citizens. Soon, paper prescribing will be abolished to achieve 100% digital coverage.

eHälsomyndigheten

## Why was it a success?

- Cooperation between stakeholders
- Standards and format interoperability
- Devoted project group
- Planning
- Step by step and structured implementation
- Competition between county councils

Slide on the success of digital health adoption in Sweden from Maria Bäcklund Hassel

Implementing the ePrescription service in Catalonia, **Spain** was also the result of a long process, made more complex by the fact that it was created in a public universal health system with multiple providers. The region of Catalonia covers 7.5 million people, 61 hospitals, about 850 health-care centres (for primary health care and social and mental health) and 3200 pharmacies. A total of 98% of prescriptions in Catalonia are now digital. Adopting ePrescription in Catalonia has aided in several improvements across the health system, including integrated health management, online electronic prescription and dispensing, safety and rational drug use, improved coordination between health-care professionals, enhanced accessibility to health-care and pharmaceutical services and creation of a single medication plan. ePrescription has therefore been instrumental in catalysing a transition from an individual paper prescription to integrated pharmaceutical care. The continual improvement and evolution of ePrescription in Catalonia has maintained a focus on quality (including safety and sustainability tools) and improving the interfaces between the stakeholders in the health system.

The creation of a single medication plan (*pia de medicació*) that provides a simple, consolidated overview of an individual's prescribed medication has proven to be particularly successful. Here, medications are grouped for ease of understanding according to the length and type of treatment (chronic or long-term treatments, treatments to be taken if needed, acute or short-term treatments, etc.) and includes essential information and instructions about how to take each medication. This information is easily accessible on the Internet.

Key development projects for the future include further development of the safety and sustainability module (improving clinical safety and promoting sustainable prescriptions), an integrated medication plan (harmonizing medication and treatment between parts of the health system); interoperability (across subnational regions and between EU countries); and mobility solutions (treatment adherence, prescriptions from mobile devices and linkage to the MyHealth platform).

The take-home message of this work is that electronic prescription is not a one-time technology project but also a model of health and pharmaceutical management that is continually adapting and evolving and that seeks excellence through integrated health care focused on the individual. In early 2019, for the first time ever, EU citizens could use prescriptions from other countries, through a cross-border agreement between **Estonia** and **Finland**. Prescriptions may now be the best electronic service

in Estonia, and 100% of prescriptions in the country are digital, but it was not always this way: “people now say they can’t imagine life without it, [but] the first two weeks of the service were terrible. It was almost shut down.” The government was patient at the start, understanding that the innovation cycle is iterative: not everything can be predicted beforehand, and some issues are only revealed when projects go live. Problems in early-phase implementation are normal.



Kitty Kubo ©WHO

In **Estonia**, about two thirds of people know they can view their prescription information in an online portal, and about one quarter of the population has used it. For doctors, it provides efficiency and time management benefits (transparency and precision in ensuring the correct level of reimbursement, assessing and resolving drug–drug interactions, prescription renewals without the need for face-to-face visits, the possibility to assess adherence to therapy, detection of medicine over- or misuse and access to an individual’s full medicine history). The benefits of the system for the state include the availability of good-quality statistics, improved surveillance options and an efficient tool for policy analysis and changes. Factors contributing to the success of ePrescription in Estonia include high public demand for an electronic service, political support, having registries with high-quality data and in-house information technology competencies. Future plans for the system include adding reminders and notifications; renewals; and pharmacogenomics, as part of a more general move towards personalized medicine. More conceptually, it might also include examining and rethinking the concept of “prescription” – for example, being able to prescribe exercise, or museum visits or social interaction in more sophisticated, less pharmacocentric responses to mental health problems and other issues.

### **3.2. MOBILE HEALTH – USE CASES ENABLING INDIVIDUALS AND HEALTH-CARE PROFESSIONALS TO ACCESS SAFER, MORE CONNECTED HEALTH CARE**

#### **Issues addressed in the session**

The use of mobile technologies in health (mHealth) is profoundly affecting how health services and health behaviour change initiatives are being delivered, health information is accessed and health is being monitored and managed. This session broadly examined examples of how mHealth is being

actively used to strengthen national health systems, support health-care professionals and facilitate health service delivery in low- and high-resource settings in countries in the Region. It examined the current factors impeding wide mHealth adoption in the Region and the steps countries can take to address these.

### Presenters

- » Anna Frellsen, CEO, Maternity Foundation
- » Sameer Pujari, WHO Be He@lthy, Be Mobile initiative
- » Josué Sallent, Director, Fundació TIC Salut Social, Spain
- » Moderator: Gunn Hilde Rotvold, Senior Adviser, Patient Pathways, Norwegian Centre for E-health Research

### Reflections from the discussion

- » Effective mHealth solutions are not necessarily about investing in advanced facilities but about supporting health workers and individuals where they need it most.
- » A multisectoral approach encourages stakeholder involvement and effective partnerships and helps ensure that programmes are embedded within local services and sustainable.

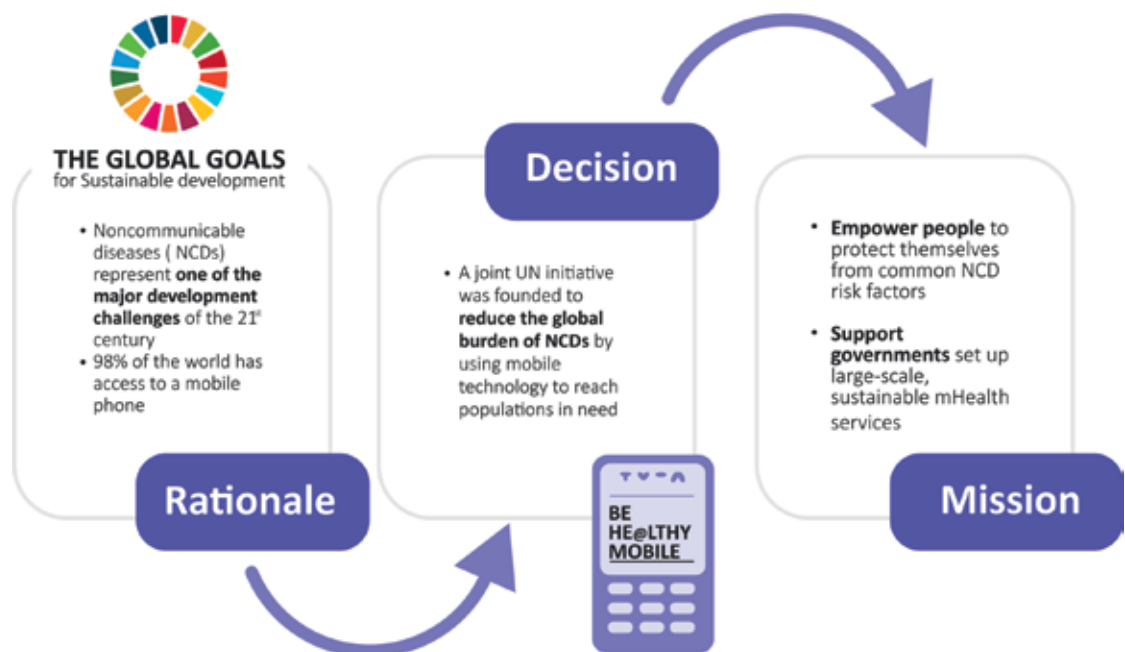
### Summary of the presentations

The Maternity Foundation's Safe Delivery App programme (23) was created as a solution to address maternal and child mortality, 99% of which occurs in low- and middle-income countries, and around 90% of which is preventable with basic interventions. Currently a woman dies during childbirth every second minute, and a newborn dies every 10 seconds. The solution is therefore not about investing in advanced facilities, equipment or doctors but about giving priority to the availability of skilled birth attendants trained in handling basic childbirth emergencies. Saving mothers and newborns from dying requires building skills among health workers (especially in remote areas) who must handle childbirths alone and supporting them in their work. One of the Foundation's solutions is the Safe Delivery App, which condenses and visualizes global guidelines to provide skilled birth attendants instant access to evidence-informed, localized and up-to-date clinical guidelines on basic emergency obstetric and neonatal care. The app is a basic emergency training tool and job aid and is also used in preservice and in-service training and study and for training simulations. It is available in global versions in various languages, with nine adapted national versions so far. The Safe Delivery App has been well received and widely downloaded and has won several awards, and numerous scale-up projects are currently underway.

The Be He@lthy, Be Mobile initiative implements digital health programmes addressing noncommunicable diseases. It is a joint venture of WHO and the International Telecommunication Union that was set up in 2013 to address the challenge of noncommunicable diseases by advancing the scaling up of related mHealth services in countries. It provides evidence-informed content and technical support to governments that want to develop their own mHealth programmes for their citizens, with the overall mission of improving global health by scaling up digital health solutions. Its objectives are to create effective mHealth services for noncommunicable diseases that work at scale; to help governments design and integrate these services into existing health systems; and to promote multisectoral partnerships.



## A UN RESPONSE: Be He@lthy, Be Mobile



Slide on Be He@lthy, Be Mobile from Sameer Pujari

The four core pillars of Be He@lthy, Be Mobile are (1) country implementation of mHealth programmes; (2) toolkits that serve as guiding documents for country implementation; (3) innovation; and (4) partnerships. Over the past five years, tremendous progress has been made. Be He@lthy, Be Mobile works with 11 countries of different regions and income levels, tackling issues as diverse as raising awareness on cervical cancer and helping people quit using tobacco. As of June 2018, programmes had been launched in **Costa Rica, Egypt, India, the Philippines, Senegal, Tunisia** and **Zambia** and were in the preparatory phase in **Burkina Faso** and **Sudan**. The initiative is also working with two high-income countries – **Norway** and the **United Kingdom** – to learn more about what it takes to scale digital projects in different contexts. Be He@lthy, Be Mobile’s innovation comes from its emphasis on scale. It is the first United Nations initiative to use population-wide mHealth prevention services at scale and is the largest scaled mHealth initiative for noncommunicable diseases in the world. It is unique in having developed a multisectoral approach to ensure that programmes are sustainable and encourages partnerships between stakeholders across the mHealth ecosystem: ministries of health, ministries of information and communication, academia and local nongovernmental organizations. Through the International Telecommunication Union, Be He@lthy, Be Mobile receives support from a network of other groups connected to digital health, including multilateral organizations and private-sector bodies with expertise in pharmaceuticals, behaviour change, technology, insurance or wellness. Connecting all these different groups ensures that programmes receive the necessary support from the right agencies and are embedded within local services.

In **Spain**, Catalonia’s strategy for delivering digital health is led by the Salut Social Foundation, a public agency within Catalonia’s Ministry of Health mandated to facilitate the transformation of health and social assistance models through information and communication technology. Catalonia’s health care follows a multi-provider model integrated into a single public network designed to enhance the autonomous management of each provider. Providers are free to select their information systems, but interoperability among systems must be guaranteed.

In this context, Catalonia's digital health strategy aims to identify and aggregate all health data generated inside and outside hospitals and to exploit them with big data systems and analysis to support clinical decision-making and research. The strategy intends to use data from apps, wearables, medical devices, the mHealth data cloud platform and primary and specialized care. The goal is a multichannel approach in the care model and provision of services, such as accreditation and homologation of digital components (apps, wearables and medical devices); prescription of digital components by health-care professionals; integration of data generated by citizens into electronic health records; and increased cooperation between professionals.

### **3.3. DIGITAL HEALTH TRANSFORMING HEALTH SERVICES DELIVERY IN PURSUING UNIVERSAL HEALTH COVERAGE**

#### **Issues addressed in the session**

Across the WHO European Region, innovative digital solutions have supported health systems in monitoring population health outcomes and adopting new models of people-centred care. This session explored country cases and possible solutions to challenges in practice, and discussion of policy options addressed the following.

- » How can technology be used to organize health services in a more people-centred manner?
- » There is no universal health coverage without primary health care – can technology be used to strengthen primary health care and give access to more people?
- » How can technology enable countries to leapfrog to tackle the changing nature of demand arising from noncommunicable diseases?

#### **Presenters**

- » Toni Dedeu, Director of Programmes, International Foundation for Integrated Care
- » Hrvoje Belani, Head of Analysis, Informatization and Business Process Improvement, Ministry of Health, Croatia
- » Moderators: Melitta Jakab, Senior Health Economist, WHO Barcelona Office for Health Systems Strengthening and Juan Tello, Head, WHO European Centre for Primary Health Care

#### **Reflections from the discussion**

- » Digital health projects and initiatives that deliver functional solutions can be scaled up and replicated, allowing others to leapfrog in their development of national capacity for digital health.
- » Governance models for policy, innovation and implementation include both top-down and bottom-up processes.
- » Governments should define incentives that increase access to health care and reduce the digital divide.
- » The focus of primary care, the patient–doctor relationship, must be given priority and strengthened in the context of digitalizing health systems.

#### **Summary of the presentations**

In working towards the health-related Sustainable Development Goals, there is increased motivation and momentum to address universal health coverage through actions to strengthen primary health

care. Studies indicate that primary health care is a central feature of health systems delivering high-quality care at an affordable cost. Leveraging technology for strengthening primary care is a key contributor in this respect.

Current changes around digitalization involve a huge transformation that offers great opportunities to realize person-centred health care and universal health coverage. Digital health provides tools for new ways of delivering services and for managing population health that enable the use of real-time data to define risk groups and targeted treatment. Digital health can also improve the cost-effectiveness of health systems and the working environments of health-care professionals.

Addressing noncommunicable diseases through the innovative use of digital technologies provides new opportunities for more targeted impact in countries and for sharing information to help leapfrog in their development. Projects and initiatives can lead to reference sites serving as inspirational ecosystems that can deliver creative and functional solutions that can then be scaled up and replicated. For example, the **Croatian** Health Insurance Fund introduced primary care panels for noncommunicable diseases, aiming to strengthen the role of GPs by systematically recording and managing data on individuals with noncommunicable diseases. Both clinical and managerial decision-making were improved and, after three years, 3.8 million adults have been reached. The results include better patient satisfaction, better management of noncommunicable diseases in primary care, fewer secondary complications, and fewer patients who require specialist consultants.

Supported through digital health, the scope and reach of primary health care services can be extended to previously difficult-to-reach population groups. Leveraging digital health in primary health care can optimize services with evidence-informed transformations and align accountability and incentives with new models of care. However, challenges to equity – and therefore to the prospects for universal health coverage – are inherent in these possibilities, including the fact that access to digital tools is reduced in lower socioeconomic groups. In response, governments need to define incentives, including sustainable financing and reimbursement schemes that increase these groups' access to care and that reduce the digital divide. In all of this, it is important to keep sight of the most important focus of primary care: the patient–doctor relationship. Digital tools should augment this relationship.



Session 3.3 moderators and participants ©WHO

## 3.4., 5.4. AND 7.4. MEMBER STATE WORKSHOP ON DEVELOPING A ROADMAP FOR ACCELERATING DIGITAL HEALTH ADOPTION IN EUROPE

### Issues addressed in the workshops

Health decision-makers face an array of challenges when integrating technologies and innovating processes to serve and improve population health. The collaboration needed to meet agreed targets and priorities involves working across professional, organizational and sectoral boundaries, each with distinct cultures, priorities and varying service configurations and governance arrangements, and this is especially challenging. Real-world practices in politics and management often involve multiple factors that influence policy and performance. Despite goodwill and best efforts, uptake and implementation of digital health solutions can fall short of meeting expectations and fail to allow for unforeseen system barriers, performance pressures, political factors and changing contexts.

This workshop, spread out over several sessions throughout the symposium but compiled and reported singly here, used an innovative facilitation method known as LEGO® Serious Play® to foster open discussion among countries. The method uses LEGO® bricks to build models representing, for example, ideas, values, challenges, scenarios or relationships. Participants examined a complex problem that does not have a clear answer (advancing a regional vision for digital health) by focusing on countries' priorities, barriers, enablers and a regional direction for accelerating progress in national digital health adoption. By participating, countries sought insight not only into their own vision for digital health but also into the vision of their fellow countries and common principles for moving forward with the development of digital health in the Region.

### Reflections from the workshops

- » Countries and stakeholders are looking for central leadership and political will to set directions and bring digital health forward.
- » All stakeholders of relevance to the digital health agenda should be included, bringing everyone together to create clear, standardized ways of doing things, with visibility given to all actors.
- » Patients and citizens should be placed at the centre of efforts for digitalization of national health systems.
- » Cooperation at multiple levels (institutional, national and international) will help to advance the European Region digital health agenda.
- » Digital health connections to the rest of the world (beyond the European Region) should be created and/or strengthened.
- » Technical issues and inadequate resources were the most discussed barriers. Collaboration issues, attitudes and approaches to working with digital solutions, unsatisfactory leadership and legal issues were further discussed as hindering participants' work in advancing digital health systems.
- » To mediate or resolve the identified challenges in creating successful national digital health programmes, specific actions are needed in: establishing and maintaining collaborations; developing digital competencies; reducing data and fragmentation; modes of implementation; leadership; and transforming ways of working.

### Summary of the workshops <sup>1</sup>

Participants were given increasingly complex warm-up tasks building models to express different

<sup>1</sup> In this workshop summary, a region refers to a subnational region unless explicitly stated as the WHO European Region or other WHO regions.

motivators and nuisances working with health. These models were explained and examined from different angles. The final task was to build a model that illustrates a key challenge in applying digital health in each participants' own country and then to modify the model to illustrate a response, the nature of the next step and the actions to be taken to address the challenge. The outcomes below are harvested from the work of nearly 30 participants in all the sessions. They present a range of possible responses to the various challenges faced by the more than 20 Member States represented.



LEGO® Serious Play® ©WHO



LEGO® Serious Play® ©WHO

### Challenges to digital health in Europe

The European Region would benefit from simple, transparent systems that create coherence and enable an actionable understanding of complex data. There is a lack of clear direction in digital health across the Region and within countries. This incoherence may be worsened by diverging needs between the regions and regional governments and the federal and central governments. In many countries, funding to enable and secure a national digital health system is insufficient, pressuring subnational authorities to compete for money but not necessarily to cooperate around shared objectives. This furthers inequalities between and within countries, since the levels of resources and money for digital health differ vastly. At the country level, there is often inequality between different hospitals, with different systems and levels of digitalization. There can also be significant differences between the digital capacity of public and private doctors and hospitals, and computer illiteracy among health professionals is a significant barrier. A widespread lack of information technology knowledge is a barrier to effectively digitalize the health system at any level, and many doctors are still working without computers.



LEGO® Serious Play® ©WHO



LEGO® Serious Play® ©WHO

This lack of capacity is exacerbated by a lack of regional standardization, norms and interoperability needed to make the most of the large-scale potential of digital health. Regional and national incompatibilities are an issue, with many regions now having invested in their own discrete software solutions. Information silos are commonplace, with no systematic approaches to deal with them; applications often do not “speak” to each other, and even within countries, shared national systems do not function optimally. Separate regions or even facilities can have their own disparate approaches, undermining coherent national infrastructures and making regional coherence even more challenging.



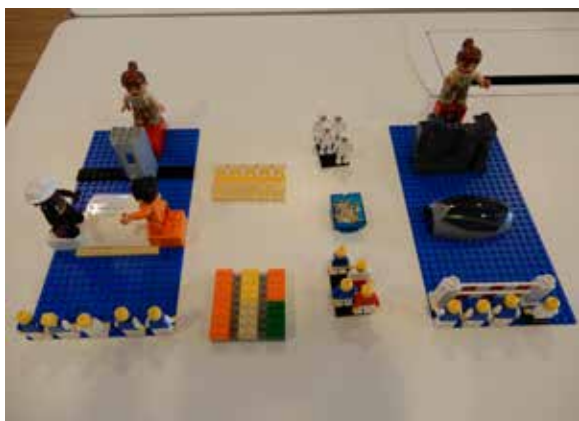
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Traditional health-care systems and ways of working often conflict with new digital health systems, and a lack of resources hampers effective progress with digitalization. Governments are still unsure of how to progress, and overarching strategies are incomplete or absent. Political leaders need to decide which systems to use nationally and who should have access to these systems. Servers must be established and/or secured, health professionals trained and pharmacies integrated, but leadership and political will to advance ideas and push the digital health agenda forward is lacking. Public–private cooperation continues to present difficulty, with widespread uncertainty about how government strategies and policies can incorporate private enterprises.

*“Those who are mandated with the responsibility for digital health can feel lonely – left to balance complex tasks alone, without political backing and with little assistance when facing challenges.”*



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Technical issues affecting the digitalization of health systems (standardized process, national infrastructure, interoperability, data security, reuse of data, ecosystem integration and integration of new technologies and services) and inadequate resources (number of personnel, digitally literate professionals, computers, money and time) were the most discussed barriers. In addition, collaboration issues, attitudes about and methods of work in digital health, unsatisfactory leadership and legal issues, in that order, were further discussed as hindering participants' work in advancing digital health systems.

### **Actions countries might take to address these challenges and move towards a European Region vision for digital health**

*“The solution is more like a parade, all marching to the same tune, and all are going in the same direction, towards the same goal. The government is helping us keep the beat and march on towards the goal.”*

Countries identified actionable solutions such as: better communication and collaboration, both horizontally and vertically; aiming for patients to be active demanders and to benefit from the system; (re)using existing solutions, knowledge and infrastructure; strong central leadership to set priorities and direction; providing guidance on and implementing appropriate standards; and slowly rushing forward to keep pace while ensuring safety and quality.

### **Creating beneficial relationships for digital health**

Participants emphasized the importance of countries – and the European Region as a whole – establishing relationships for digital health with the rest of the world. Methods proposed included:

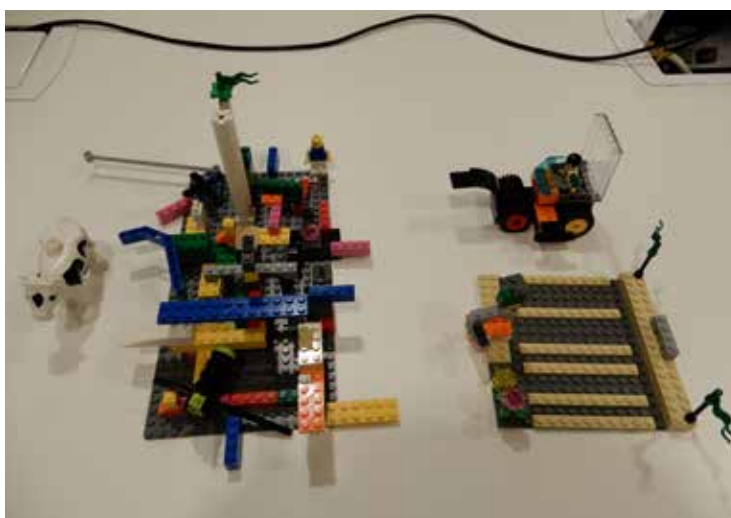
- » establishing networks to enhance regional cooperation and promote interoperability within and across borders;
- » providing mechanisms to enable people and institutions to kick-start cooperation;
- » having workshops for countries to focus on specific technical areas of digital health;
- » establishing permanent places – real, virtual or at periodic gatherings – for stakeholders across the Region to meet and share experiences, skills and lessons; and
- » establishing laboratories for co-creating digital health solutions in a joint effort between all stakeholders to remove walls and enhance cooperation around shared goals.

Countries with more mature digital health environments are encouraged to join WHO, other international organizations and other non-state actors to assist the other countries that require it, supporting work with standards, regulations, capacity-building, etc. WHO should collect and provide examples of best practice on public–private partnerships and develop a generic process model.

Stakeholder involvement needs to be enhanced for the future of digital health systems. This gives visibility to all the actors at the technical, political and societal levels. “We are only one category of stakeholder who has this challenge; [we need] to avoid having only the same people at the same table.” Countries identified cooperation at multiple levels (institutional, national and international, including private organizations and interests) as one step forward.



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### Person-centred approaches

Member State representatives repeatedly emphasized that person-centred approaches were the focus of efforts for digitalization of health services. In advancing a European Region direction forward, the aim is for individuals to be proactive users (active demanders) of the system and to be supported in activities for health promotion. Funding should follow the patient, helping to move health care closer to the individual.

### Data ownership and use

In terms of data ownership and use, it was felt that individuals should own their data and provide consent for its use, rather than the reverse. Granting data access should be in the best interests of the patient, as actionable data and for secondary use of data. In support of this, safe and secure infrastructure for health data exchange is needed both nationally and internationally. The government should protect secure data servers, databases should be connected and regulations should be provided for collecting, providing access to and using data. Safe, secure national and regional infrastructure for exchanging data across the Region is badly needed.



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**Tackling regionalization**

At the country level, addressing political issues to reduce the fragmentation and isolation of subnational regions is another step forward that would enable the harmonization of infrastructure and increase interoperability. Creating a network between regions to work together to achieve better results, avoid working separately on the same issues and (re)using resources more efficiently, such as reusing software from more developed regions, are also seen as key next steps. Finally, health professionals need incentives to be part of ministry-led efforts for working towards a central vision of how digital health will address health goals.

**Improving digital and health literacy**

Computer and digital health service training is needed for health professionals, along with digital literacy for health professionals and digital health education for the general population. Health professionals and students should be prepared for the coming changes and trained in the use of technology and software and how they support their work and their patients' health. Advocacy and both health and digital literacy work should be done to sensitize populations to digital health and equip them to exploit it to benefit population health.

**Improving funding for digital health**

Adequate funding needs to be allocated to support national health digitalization initiatives. For the health workforce, computers are needed, as are training materials. For the implementation of national-level initiatives, political commitment and incentives, financial support, qualified staff for digital health teams as well as time, energy and persistence are resources to be given priority. A modular approach to implementation at the country level should include pharmacies, hospitals and public insurance agencies.

**Creating standardized approaches to digitalization of health systems**

Countries identified the need for a clear and standardized way of doing things: "like making a cake, everyone knows the ingredients that go in, but it can look really different." In particular, harmonized approaches to health standards adoption are required, and government leadership for this is key. Once the right data and the right integration are available to support the development of core health services and data exchange, additional functionalities and services can more easily be built around that. The necessary legal frameworks should be put in place or revised, nationally and regionally. Standards, ethical rules and data regulations are required and should be devised or adapted – including standards in sharing and distributing data.

**Effectively setting priorities for activities**

In the digitalization of health systems, priorities need to be set for several simultaneous projects, and balancing and making strategic decisions are often difficult. Digital health professionals need support from governance bodies to avoid being overwhelmed and overburdened. A collective vision can create a digital health team and help them to consider their actions and directions forward. In this respect, complete digitalization of the health system is a constant process and dynamic that may require changes over time. Having one coherent strategy across sectors is needed for everyone to gain a collective understanding of the priorities involved.

### **Managing speed and complexity in the digital transformation in health systems**

Participants expressed a call to make the process of digitalizing health systems more manageable. “Instead of rushing so much, it is better to slowly rush forward in a safe and responsible way.” It was agreed that mobility and agility are needed to jump into this new world and adapt as part of the journey. Where necessary, old health systems should be completely and transparently reformed (“the old system is like a labyrinth”) and not simply have digital processes applied (“getting the skeletons out”).

### **Having knowledgeable leaders for digital health**

For the above to become reality, policies, strategies and concrete action plans need to be created and implemented. Political leadership should clarify which systems should be developed and who should have access, based on solid groundwork led by patients’ needs. For this, a knowledgeable leader is needed to bring digital health forward and set direction, a captain who understands this environment and wants people on board to seize the opportunities offered by digital health and move forward.

### 3.5. THE BEAUTIFUL MARRIAGE: DIGITALIZATION AND PUBLIC HEALTH – TOWARDS SHARED OBJECTIVES IN AN EVOLVING MARRIAGE

*“The promise of digital health will not be achieved if its development is left to market forces alone.”*

*–Dr Zsuzsanna Jakab, WHO Regional Director for Europe*

#### Issues addressed in the session

It has become increasingly clear that universal health coverage cannot be achieved without the support of digital health, which can help provide services to remote populations and underserved communities, facilitate training of the health workforce, provide accurate and timely patient information through electronic health records and so much more. Nevertheless, the promise and potential of digital health cannot be achieved if the development of the technology is guided solely by market forces. How do we ensure that corporate interests and public health objectives go hand in hand?

#### Keynote listeners

- » Bogi Eliassen, Chair of Danish unit, UNESCO Bioethics Committee
- » Natasha Azzopardi Muscat, President, European Public Health Association
- » Moderator: Walter Ricciardi, Professor, Università Cattolica del Sacro Cuore di Roma, Italy

#### Reflections from the discussion

- » The marriage between digital health and public health is in crisis and needs conscious interventions to tackle the current divide between these two communities. A common platform is required to bring them closer together, and WHO, the European Commission and other key international stakeholders should work together to create this platform.
- » The private sector has ownership of the health data they collect. Creating effective relationships with them in working towards the common good may be one approach to enable more open use of this data.
- » Digital literacy in health is needed, including how the risks of using personal data are managed
- » A relatively small team or initiative can create change on a systemic scale, and more focus on the art and science of managing the change brought about by the digitalization of health systems can support this.
- » Technological developments receive a lot of funding; however, funds also need to be allocated for training the public health workforce to effectively utilize new technologies.

#### Summary of the session

The session, co-hosted by the WHO Regional Office for Europe and the European Public Health Association, took a collaborative approach in which participants explored the extent to which digital health and public health communities are working together to co-create a healthy and fair future. They also investigated the extent to which key governance mechanisms that guide the development of digital health are present in countries. The group had three keynote listeners who moved between the groups and listened for crucial insights. The keynote listeners shared their observations at the end of the session. The session participants consisted of four individuals from the digital health community, four from the public health community and five who chose to not self-identify.



Session 3.5 participants ©WHO



Session 3.5 participants ©WHO



Keynote listeners and moderator ©WHO

To gain an aggregated understanding of what the participants had experienced to date, Martin Kraye von Krauss (Senior Adviser, Division of Health Systems and Public Health, WHO Regional Office for Europe) guided the participants in a collective learning exercise in which participants formed groups and responded to four guiding questions.

1. Can you share examples of senior leaders in government that are taking a leadership role in digital health, working to keep public health objectives at the top of the digital health agenda?
2. Do you have examples to share in which a broad range of stakeholders was involved in the development of national digital health strategies? Who convened the process? Which stakeholders were involved? Were any stakeholders neglected?
3. Can you describe the organizations that have been mandated to oversee the implementation of the national digital health strategy in your country and the extent to which both the digital health and the public health communities are involved in these organizations?
4. Can you share examples from practice of some proper processes for policy and decision-making, planning, resource allocation, coordination and monitoring and evaluation of digital health systems?

### **Outcome of discussions**

It is an important responsibility to develop new strategies for public health and digital systems. Digital health experiences a high degree of improvisation and ad hoc initiatives that are not systematically addressed. If the role of public health is not enhanced in the management of change to digital, future scenarios will not be adequately governed or rooted in public health values. Mistakes are bound to be made along the way, and these mistakes also provide opportunities to make or revise strategic decisions. For example, if a strong and highly developed country like Denmark has challenges and issues, other countries will be certain to face challenges too. We need to understand carefully and critically where we can take strategic decisions, such as aggregating data to protect individuals. Cybersecurity is also a crucial part of the digital health system that impacts patient safety. People should be at the centre of digital solution design, and the technology should follow. Emphasize analysis, action and advocacy when creating new systems and platforms for digital health.

The merger of public health and digital health is characterized by paradoxes: sometimes working with conflicting ideas that need reconciling. Market forces driving innovation in digital health are progressing faster than public health and legal systems can respond. If a system in which public health can have a guiding role is not created, another system will take over, and it may not have the same values or act in the interests of the public good.

Upon concluding their observations, the keynote listeners noted several considerations for decision-makers as we move forward:

1. How do we ensure that public health objectives are guiding innovation in digital health?
2. Who [really] owns personal data?
3. How do we improve the capabilities of the health system to meet the demands of the patients?
4. How do we accelerate the health literacy agenda?

## 4.1. MAKING EFFECTIVE USE OF INFORMATION FOR DECISION-MAKING IN HEALTH

### Issues addressed in this session

Effectively gathering and analysing health-system performance data are crucial factors for evidence-informed decision-making in health. However, far too often, health decision-makers at all levels lack tools and approaches to act on existing health data and have no concrete, sector-wide strategy for future health information integration. This leads to perpetuating inefficiency in health systems, which result in avoidable resource waste, a poor evidence base on which to formulate investment decisions and reduced quality of treatment outcomes.

National approaches to health analytics that are revolutionizing how health data are viewed, used and acted on were examined. Examples were shown that demonstrate how this insight creates new value propositions for health information and supports the development of health policies that address the most relevant issues and serve the most vulnerable population groups.

### Presenters

- » Eleonora Harwich, Director of Research and Head of Digital and Tech Innovation, Reform.uk
- » Patrick Black, Senior Health Data Analyst, Research & Development and Health Analytics Division, Department of Health, Ireland
- » Mikalai Ramanau, Clinical Decision Support System Specialist, Department for the Formation of e-Health of the Republic of Belarus
- » Moderator: Fabrizio Carinci, Adjunct Professor of Biostatistics, University of Bologna

### Reflections from the discussion

- » People are central to any data management reform. Leaders should engage with all relevant stakeholders involved in the scope, design, implementation or use of new analytics and technology.
- » Innovative visualization, presenting information in the simplest way possible, is crucial. The importance of using “good stories” to convey what the data say should not be overlooked, and many approaches already exist.
- » Given that the main target is to provide health care to individuals, it is important to be sure that the needs of patients and doctors are adequately captured and reflected.
- » Many commercial models of data sharing are available; however, difficulty persists in defining value and assessing fair commercial models based on the value of a technological innovation.

### Summary of the presentations

It is important for governments to take the lead and understand what type of health technology markets they want to shape. These need to be markets in which engagement with patients and the workforce is not an afterthought but part of the design. Making health-care data work for everyone requires examining the value proposition within the health technology space.

In the health technology ecosystem in the **United Kingdom**, it is possible to know where data is flowing but difficult to work with that knowledge because information is not centralized and not always available online. Which commercial models are being applied to using and managing health data in different situations is also unclear. To help clarify this, Reform.uk created a classification of existing data-sharing agreements, organizing them into five categories that are widely in use:

- » data-sharing agreements;
  - » grant-funded collaborations;
  - » licensing arrangements;
  - » cost recovery agreements (with value assigned to data according to the number of person-hours taken to produce it); and
  - » commercial arrangements (such as hospitals with an equity stake in a private company).
- Most existing partnerships use one of the first four models.

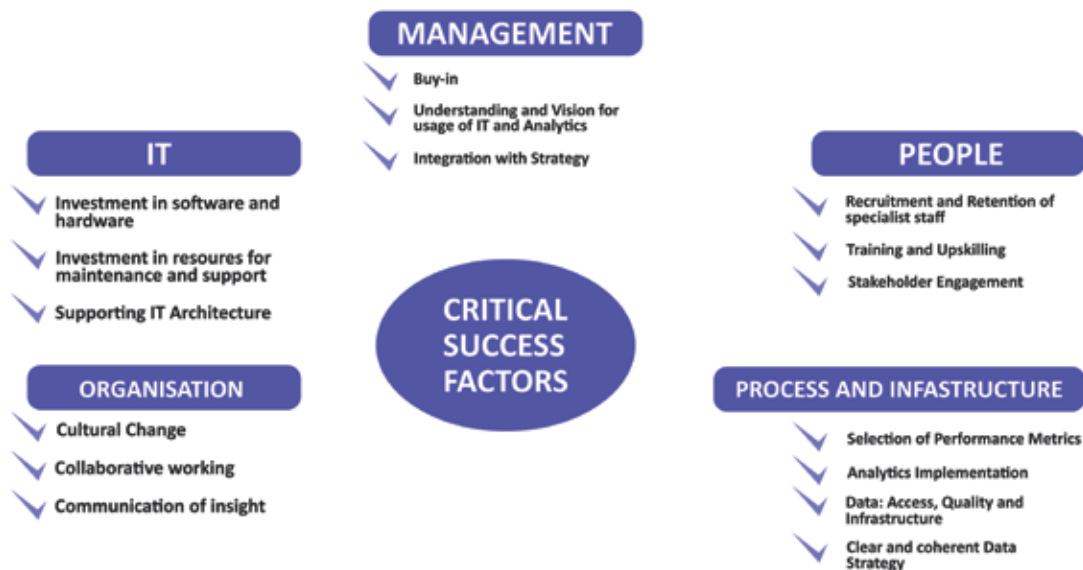
There are many commercial models of data sharing to explore – consortium agreements, equity sharing, profit or revenue sharing, local asset-backed vehicles, etc. Different ones suit different innovations or products better than others, and what is fair locally need not necessarily be fair nationally. For example, a local hospital might have a revenue-sharing agreement that makes money, allowing the hospital to provide better services, but thereby potentially increasing health-care inequality at the country level.

One primary purpose of data sharing is to improve patient outcomes and the efficiency of systems. Data have value in developing commercial models, but this is hard to define. There is no widely shared understanding about what this means, even to different parties engaged in partnerships. This means there is little discussion about what a fair apportioning of value should look like. Reducing information asymmetry and barriers to accessing data is important, but having serious conversations about fair commercial models is difficult because of this confusion about value. If the value of a technological innovation cannot be assessed until it is properly tested, but it cannot be tested without access to data, and it cannot have access until a data-sharing agreement is in place that takes the value of the innovation into account, there are problems. One interesting response to this impasse includes the use of synthetic data (“a fake clone of real data” sufficiently different that it is not personal data but sufficiently similar for the same type of analysis).

In **Ireland**, policy is derived from the examination of macro-level information on the health system and analysis of the performance of a system struggling with increasing expenditure and long waiting lists. The health data landscape is fragmented, so work has been done to find out what technology and processes are available to help bring together a high-level view of the data. The data analytics process has focused on minimizing the data required to convey the right messages optimally. A health analytics solution was procured on the market to bring all existing data sets together into a new architecture (a MySQL database), with software at either end to help make the best use of the data and support the core activities of the Department of Health.

Following procurement, implementation is critical. Getting it wrong can greatly damage credibility – especially when there is already large-scale resistance to technology. Ireland had two prongs to implementation. The first was centralized data management, controlling the collection and processing of data using new software with simple interfaces that enable nontechnical health professionals to manage data in clear and transparent ways and that enable end-users of the data to understand what is being done with it. The second was decentralized access to the data and self-service visualization. Innovative visualization displaying information in the simplest way possible is crucial. The required software is something beyond basic descriptive analytics, which offers some predictive and prescriptive analytical capability. The data management tool gives good central control of data governance. People are central to all of these processes – policy, reform and implementation. The Department of Health, therefore, engaged with many stakeholders in scoping, designing and implementing the analytics and technology.

## THE ROAD TO SUCCESS...



Slide on success factors in Ireland's use of information for decision-making in health from Patrick Black

**Belarus** has addressed national-level data governance to help to achieve the overall health objectives of universal health coverage and high-quality health care, as characterized by accessibility, security, patient satisfaction, high quality and ethical standards, stability of processes and outcomes and efficiency. The main challenges facing the country include substantial obstructive regulation in the health-care sector; a lack of standards for the structure of medical data; the inability to use international base models because of strict legislative regulation; and limited functionality of existing systems. Improving the quality of care requires the availability of clear, accurate data on health indicators for individuals and for populations. This leads to the need to create a system for data collection, assessing indicators and reporting and feedback on care quality. The aim is to build a centralized health data management system that brings tools together in one information space to manage data for everybody from providers to patients, accompanied by decision support systems to help doctors increase the speed and effectiveness of decisions and manage resources more effectively.

At the end of the session, the speakers were asked to give a single word to symbolize the major bottlenecks they had experienced in transforming information into performance.

- » Patrick Black (**Ireland**): "silos": data are siloed everywhere, and extracting them and making them usable are difficult.
- » Mikalai Ramanau (**Belarus**): "challenge": everything is always a challenge for us.
- » Eleonora Harwich (**United Kingdom**): "portability" – including newly generated data from patient-facing apps and private companies doing technological or health product design. There is a need to ensure that all that portable data go back into the system and are not monopolized.



## 4.2. HOW DIGITAL HEALTH CAN REVOLUTIONIZE EVIDENCE-INFORMED HEALTH DECISION-MAKING – THE DECISION-MAKER'S PERSPECTIVE

### Issues addressed in the session

Health analytics and data integration are unlocking the value of data on the performance of health systems for decision-makers at all levels of health systems. New methods of presenting and visualizing data for health, including the data originating from outside routine health information systems, offer exciting new possibilities for monitoring, insight and forecasting. But do we really know what information key health decision-makers are looking for in making evidence-informed decisions on health policy and investment in health systems? Do they have access to the data, tools and skills required to draw knowledge from the ocean of information available to them, or is the real value and insight being lost in a mountain of detail?

This session took a different approach to addressing these questions through an open, interactive and informal dialogue with key decision-makers to better understand how they see and use (or do not use!) the health information made available to them digitally, where there are gaps and how we can build capacity in the Region to take a more predictive and proactive approach to using information for decision-making in health.

### Presenters

- » Miklós Szócska, Vice-Dean, Faculty of Health and Public Services and Director, Health Services Management Training Centre, Semmelweis University, Hungary
- » Charles Alessi, Senior Adviser, Public Health England and Chief Clinical Officer, Healthcare Information and Management Systems Society
- » Ran Balicer, Director, Health Policy Planning, Clalit Health Services and Founding Director, Clalit Research Institute
- » Moderator: Susannah Robinson, WHO

### Reflections from the discussion

- » Methods are needed for measuring progress in digitalizing health care. These should measure progress the same way regardless of the country, to ensure comparability.
- » To get the support of decision-makers, ensure that they are provided with information that is unambiguous and easy to understand. Decision-makers can be influenced by the public and the media, and pressure for evidence-informed decision-making can be created by making evidence – data, analysis and results – easy to understand and open to the public.

### Summary of the presentations

Changes in health care can be painful; it is therefore important to ensure that the advantages of change are communicated well. Measuring progress in the digitalization of health is important, but difficult. The health-care sector has become very good at learning how to achieve good scores on certain indicators while failing to take many other factors into account. It is therefore necessary to ensure that countries use the same methods to ensure comparability. Further, the benefits of digitalization should not only be measured in savings: other factors must also be counted, such as time savings for individuals, reducing health-related absenteeism at work and minimizing care burdens. Non-health data can further provide

useful information about health-care systems. For instance, network analyses conducted on diabetes treatment data in Hungary helped to reveal some dubious pricing practices being used by industry.

*“Radical disruption does not work in health care, so digitalization has to be an incremental, slow-motion revolution.”*

Data should be collected and integrated as widely as possible, since even the simplest data can have great value if collected and used systematically on a large scale. The reuse of health data is of concern to both clinicians and individuals. It is much easier to get support for data reuse projects by framing them in terms that are important to health-care professionals – for instance, “this project will save you 30 minutes daily if the number of patients per day stays constant”. Unnecessary data collection only to create progress indicators should, however, be avoided.

High-level health decision-makers typically think in infographics – positive outcomes must be highlighted as selling points. Getting their support requires that data, results and findings be visualized in a format they understand. However, the nature of politics can often mean that data and evidence do not drive political decisions in health. However, when clear, easy-to-understand information is made available to the public and media, politicians are often compelled to follow public interests and demands.

### **4.3. BUILDING A EUROPEAN FRAMEWORK FOR ETHICS IN DIGITAL HEALTH**

#### **Issues addressed in the session**

The emergence of data-driven and automation technologies in health systems and public health is giving new impetus to the establishment of solid and transparent ethics frameworks to guide and support their safe adoption and use. More discussion and understanding are needed in developing a way forward. At the same time, it is important to recognize that health can readily benefit from the substantial thinking and ethics practices already developed by other sectors as early adopters of these technology approaches.

The role of ethics was highlighted in the development and adoption of future digital solutions in health, to understand best practices for how national ethics governance for health systems can be established to be adequately equipped to tackle the challenges that the future of digital health systems and information sharing will undoubtedly hold.

#### **Presenters**

- » John Oates, Senior Lecturer (Developmental Psychology), Faculty of Wellbeing, Education and Language Studies, Open University, United Kingdom
- » Petra Wilson, Managing Director, Health Connect Partners and Senior Advisor for Healthcare, FTI Consulting
- » Moderator: Anne Torill Nordsletta, Department Manager, Health Data Analytics, Norwegian Centre for E-health Research

**Reflections from the discussion**

- » Researchers require training in ethics, also considering other areas than research, and attuning to the values and attitudes of the public to create and inhabit ethically secure spaces in their work.
- » Written informed consent can exclude some groups of participants from research and knowledge accumulation: the resulting ethical challenge must be addressed.
- » Informed consent should be dynamic, enabling participants to change their position.

**Summary of the presentations**

Ethics are traditionally based on socially constructed mores and therefore have historical and contextual fluidity. They are subject to many tensions, including between absolute and relative standards; democratic versus autocratic morality; and the codes of research ethics versus participants' values and attitudes. The values and attitudes of the public are constantly shifting, and especially for digital health. With few exceptions, every new social science research project presents new ethics issues that detailed guidance and regulations do not cover. How then can we design an effective framework for digital health that takes into account the transient nature of technology and its impact on shifting societal values?

The ethics of research has so far been dominated by objectives arising from the Nuremberg trials: to protect the research participant against possible harm and to ensure that all research is voluntary in terms of written informed consent (24). Although these objectives remain important, in the modern world, they should no longer be the only concern. Today's approaches require a more complex ethical research framework based on the desired research virtues of awareness of risk and benefit; solution-based rationality; altruism; and resoluteness.

A new way of thinking about research ethics can be developed from balanced, structured reasoning about these virtues and how they can become vices if under- or overemphasized. Both too strict or too weak an emphasis on a virtue can lead to unethical conduct. Different virtues are necessary in different research phases – for example, respectfulness when negotiating research; sincerity when creating it; and humility when disseminating the results. Digital health researchers should be trained in ethical argument beyond the ethics of managing participants, to consider benefits and problems in other areas, and to ensure that they are sensitive to current ethical thinking to have the best possible chance of creating and inhabiting ethically secure spaces in their work.

One approach offered that could be of value in taking the next step towards developing an international framework for ethics in digital health is a four-component model encompassing:

- » ethical sensitivity: interpreting the situation and identifying the presence of an ethical issue;
- » ethical reasoning: formulating the morally ideal course of action by identifying the relevant ethical issues and using these principles to consider appropriate actions;
- » ethical motivation: deciding what one actually wishes and intends to do; and
- » ethical implementation: executing and implementing what one intends to do.

Capacity to tailor consent to the realities of modern health care is currently limited. True consent honours the intent to ensure that the participant understands truly what consent is about, but consent procedures are often static, whereas care is dynamic in nature. Concepts of ownership and custodianship are confused and limit the concept of consent. Informed written consent is still a mainstay of health research, but the consent should be presented to participants in a context-

sensitive manner, which enables them to review, revoke and revise their consent as priorities change and research progresses. More sophisticated approaches are possible than what is currently used: just as information flow can be likened to a flow of water that can be turned off, changed in size and turned fully up, so individual consent could also become dynamic to reflect the fact that consenters might change their position as a research project or procedure progresses. Such dynamic consent is already used in numerous projects.

Having appropriate models for consent that are meaningful in digital environments is another area significantly affected by our understanding of modern-day ethics. Current models of consent often fall short of meeting the dynamics of working within digital health environments, but there are emerging models for us to consider.

Under Article 4 of the EU General Data Protection Regulation, the consent of a data subject is defined as being freely defined, specific, informed and unambiguous. However, several additional considerations should be made in applying consent in digital health environments.

- » Informed consent can restrict research to those who have capacity to consent, and it is important to consider the ethics of excluding groups of individuals in developing knowledge. This can leave behind people who are unable to consent because of temporary or permanent cognitive impairment, and this can be ethically problematic for legal custodians and next of kin, who may be reluctant to provide consent on behalf of someone else.
- » An individual should be able to withdraw consent at any specific time. There is complexity in understanding how this would affect the data that are already present in different digital systems and potentially aggregated and shared.
- » Further, lengthy informed consent written in legalese that participants cannot understand and that are often used in digital environments protect researchers and service providers more than the informant and pervert the intent of the consent. Consent is meaningless if people do not understand what they are consenting to.
- » Consent is often static, but care is dynamic. Can this dichotomy be resolved?

Future models of consent need to consider:

- » shared access
- » future use
- » public health use
- » wider research.

Dynamic consent is a new approach to engaging individuals about the use of their personal information for research or care. It is dynamic since it enables interactions over time; it enables people to alter their consent choices in real time as their circumstances change and to have confidence that these changed choices will take effect. It can be implemented in digital health environments through an interactive personalized interface that enables participants to engage as much or as little as they choose and to alter their consent choices in real time.



## Dynamic Consent

### Features of Dynamic Consent

- Placing participants in control
- Using social media technology
- Promoting active participation
- Facilitating communication
- Appealing to public goods

### Benefits of Dynamic consent

- Promoting the delivery of better quality and more cost-effective health care
- Improving quality of research
- Streamlining the consent process
- Removing the need for anonymized data
- Facilitating participant recruitment & retention
- Sustaining public confidence in research

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Slide on dynamic consent from Petra Wilson

## AFTERNOON PLENARY

### PANEL DISCUSSION: PARTNERING FOR THE DIGITALIZATION OF HEALTH SYSTEMS IN EUROPE – EUROPE’S POSITION IN THE GLOBAL DIGITAL HEALTH LANDSCAPE

#### Issues addressed in the panel discussion

The landscape of public and private stakeholders in digital health is rapidly expanding and diversifying into areas that cross over into data science and statistics, pharmacology, biomedicine, genomics, education and other fields. This is coupled with a range of stakeholders specifically focusing on vertical or disease-specific applications of digital health in, for example, mental health and other noncommunicable diseases, migrant health and ambient and assisted living; the need to align partnerships for digital health has never been more pertinent. Digital health also needs to develop closer engagement with patient representative organizations both in countries and internationally for co-creating digital health solutions that are safe and fit for purpose. But how do countries navigate in this crowded and diverse space of partners and their varying interests to accelerate action for the digitalization of national health systems and achieving universal health coverage?

Europe’s position in the global digital health landscape: with digital data and solutions in health becoming increasingly borderless, how do we see the Region’s position in the global digital health landscape changing? Will the Region’s health system values of equity, solidarity and universalism be threatened by the commercial interests of global solution providers or will we manage to adequately safeguard European Region populations to leverage the full potential that global technologies and innovations have to offer?

## Panellists

- » Walter Ricciardi, Professor, Università Cattolica del Sacro Cuore di Roma
- » Usman Khan, Executive Director, European Health Management Association
- » Elias Mossialos, Professor of Health Policy, London School of Economics & Imperial College London and Chair, Department of Health Policy, London School of Economics
- » Michèle Thonnet, eHealth European & International Affairs Executive, General Secretariat, Ministry for Solidarity and Health, France
- » John Crawford, Managing Director, CrawfordWorks Ltd.
- » Céire Costelloe, Director, Global Digital Health Unit, Imperial College London
- » Bente Mikkelsen, Director, Noncommunicable Diseases and Promoting Health through the Life-course, WHO Regional Office for Europe
- » Eduard Salakhov, Deputy Director, Department of International Cooperation and Public Relations, Ministry of Health, Russian Federation
- » Moderator: Nick Fahy, Senior Researcher, Nuffield Department of Primary Care Health Sciences, University of Oxford

## Reflections from the discussion

- » Partnerships will be critical in digitalizing the Region's health systems and in defining its place in the global landscape. The routes may vary, but the principles do not: trust, common understanding, visibility and sustainable visions and targets that persist even if society, politics and information technology change.
- » Future progress in Europe may be enhanced by academic partnerships and the strength of research commitments.
- » One approach to fostering partnerships is to tap into existing networks, using them to test new digital interventions.
- » Political decision-makers need to be convinced that investment in digitalization, including investment in the right research and training, is important.
- » Addressing health-care management challenges needs to start in educational programmes: we must engage more fully to realize our potential.
- » Digital health systems intrinsically involve partnerships, and the digital elements are tools to improve partnerships across entire health systems and societies.



Panellists and moderator ©WHO

### Summary of the discussion

Europe's position in the global health landscape is a fortunate one: the Region enjoys rich resources in terms of the quality of its science, cohesive health-care organizations, commitment to public funding and health services that are mostly free of user charges. In research, there is a strong skill set in academia with expertise with large data sets. As a counterpoint, it was argued that the Region lags behind because it fails to take advantage of its strengths. The **United States** moves with a great, dynamic, entrepreneurial economy, **Australia** and **New Zealand** are writing different stories around public consultation and **Japan** and the **Republic of Korea** are investing. Meanwhile, in the Region, "we make the same mistakes, interacting with vested interests... even very democratic, transparent countries have procurement and interoperability problems". Europe has invested in important things but not the right research and the right training. The key to future progress may be in academic partnerships and the strength of the research commitment across the Region – especially now that commercial interest in digital health and the monetization of health-related data sets is increasing.

Political decision-makers must acknowledge that investment in digitalization and all that comes with it is important. Those in authority need to be trained to think differently: leaders in this type of change do not occur naturally and must be created. An academy could be established in the Region to train the younger generations, who are enthusiastic but inexperienced, to become effective leaders of change.

Partnerships will be critical both in digitalizing the Region's health systems and in defining its place in the global landscape. In health, "we like talking to ourselves", but we need to get out of our immediate realm and talk to individuals, doctors, educators, social caregivers and other relevant stakeholders. When discussing health, the focus is often on various factors that affect it and all the related processes within complicated networks; and since digital health systems are inherently about partnership, we must see the digital element as a tool to improve entire health systems. "Networking is a compulsory tool, and borderlessness is an essential function of the health system ... there is no progress to be made in the modern age without partnerships." One approach to fostering these partnerships might be to tap into existing disease-specific networks, such as those focusing on antimicrobial resistance. Established networks could be good test beds for new digital interventions, given they are already multidisciplinary, with strong patient and public involvement.

National examples of partnership exist – for example, in the **United Kingdom**, Imperial College has been working with the Department of Health to develop evidence standards for a digital health framework and has embedded evaluation methods within the standards. In this way, if a stakeholder wants to introduce new technology and adhere to standards, they have to produce robust evidence of effect. Ultimately, technology should never be at the centre of an intervention but should be a solution for addressing it.

Many existing impediments to progress in digital health have a basis in management. Today's health managers are already dealing with "Health 1.9" challenges such as eliminating variation in outcomes, addressing such issues as hospital-acquired infections, etc. "Health 2.0" is imminent and will undoubtedly be viewed as a radical new space. Although accurately predicting what health care and health systems will look like in the next 10 years is impossible, today's trainee health managers have to be trained for that environment and its opportunities while also being able to deal with Health 1.9 issues. Addressing management issues is a formidable challenge and needs to start in universities and colleges.

*“Health system transformation is not rocket science  
... it is much more complicated!”*

It is possible to question whether today’s health systems can still be considered as national entities, since partnerships are not just national. For example, European Region countries face similar local challenges and work together locally, nationally and across borders. The routes may vary, but the principles do not: trust, common understanding, visibility, sustainable visions and targets that persist even if society, politics and information technology change.

The European Innovation Partnership on Active and Healthy Ageing, which has the goal of giving Europeans an additional two years of healthy life, may be just the type of multidisciplinary partnership required to improve society in the Region. With many national, academic and industry stakeholders involved, it focuses on how to deliver integrated care – a goal that is impossible to achieve without using technology and eHealth. Within this partnership, 12 regions have been interviewed over two years to capture experiences and lessons, and it has become clear that technology cannot be separated from other issues. Regions vary widely in digital maturity, and success in digital health depends on politics, investment, training, skills development, legal changes and more. The most advanced regions and countries started digitalization early, about 20 years ago, and managed to address the local context – removing inhibitors, building consensus and managing the environment. This research was further developed into the EU SCIROCCO Maturity Model for Integrated Care (25), which groups the many activities that need to be managed to deliver integrated care into 12 dimensions, each of which addresses part of the overall effort. By considering each dimension, assessing the current situation and allocating a measure of maturity within that domain, a country or region can develop a radar diagram that reveals areas of strengths and gaps in capability. The Maturity Model has been operationalized in the form of an online self-assessment tool.

**From  
Conceptual  
Model to an  
Online Self-  
Assessment  
Tool for  
Integrated  
Care**



Slide with 12 dimensions in the Maturity Model for Integrated Care from John Crawford



WHO has an important role in exploiting partnership opportunities at the global level and has set up several mechanisms to fulfil this role. These include a global coordination mechanism and numerous new partnerships to examine how industry might form part of the commercial determinants of health. WHO can add value globally by partnering with key organizations and using the momentum of big political interventions and agreements to further the useful practical development of digital health.

## KEYNOTE: WHY DIGITAL HEALTH?

Hal Wolf III, President and CEO, Healthcare Information and Management Systems Society began by describing how most health systems in the world face similar challenges: ageing populations; an increasing burden of chronic disease and comorbidity; geographical displacement of people; challenging funding systems; highly educated, demanding consumers; a lack of actionable information; and growing staff shortages. This last factor penetrates every single system now: there are simply not enough people to sustain the “encounter” paradigm of health care previously used. The global needs-based shortage of health-care workers is estimated to be more than 14 million by 2030 (26). The wider economics are known, and the ratios of working individuals to those not working will change significantly over the coming years. We are on the hump of a curve already, and even the next 2–3 years will see substantial change in this regard. Building more hospitals cannot address the problem; instead, the model must change to cope. This also causes a shift in risk, and the value question becomes more important.

The medical model for public health is moving slowly and carefully towards increased use of personalized information, but consumers are less patient: they are going online for self-diagnosis. This means that not only clinical data can be used to define the disease state of the individual but also all sorts of personal usage data, or “social exhaust,” as well, illustrating a digital landscape that is being tracked and monitored and can provide many insights about health. Data focus is crucial, with one central rule: all data collected must be secure and treated respectfully.

*“Arguments over ownership are difficult and, ultimately, all data will have many owners. Instead, it is important to think about policy and access to data as opposed to ownership.”*

Without digital strategy, realizing the gains of digital health is impossible. The key to strategy is to create connectivity with the individual in the centre. Then it is possible to look at the individual, the families, the payers, the care teams and public health all using the same data, technology and knowledge management that enables them – us – to make decisions together. Oversight of all this enhances the ability of both the clinician and the individual to engage in and understand what they can do to improve outcomes. 100% consensus in digital transformation of health systems is impossible. To implement change, it is important to move the middle 50%. Compromise is essential – innovation only succeeds when diverse stakeholders can be aligned so trade-offs can happen. “The electric light did not come from incremental improvements in candles.”

All change should be about people, process and technology – always all three, and never just technology. It means moving beyond visit-centric medicine to coordinated, person-centred care, and will consist of the “biggest change management you will ever see ... culture eats strategy for lunch,” and large-scale change is always difficult. The current change is not just technical change but also of a shift in culture to accommodate it and exploit it to the fullest, and the risks of what will happen if that cultural shift is ignored or fails is that health organizations will cost more but not function more efficiently or effectively:

## It's Not Just the Innovation

$$OO + NT = COO$$

Old organization + New Technology = Costly Old Organization

Slide on costly old organizations from Hal Wolf

## PARALLEL SESSIONS

### 5.1. CREATING EFFECTIVE POLICY FOR THE DIGITALIZATION OF NATIONAL HEALTH SYSTEMS

#### Issues addressed in the session

WHO's third global survey on eHealth, conducted in 2015, revealed that among participating countries in the European Region, 70% (30 countries) had a national eHealth policy or strategy, 90% of which (27 countries) indicated an explicit reference to objectives or key elements of universal health coverage (22). Nevertheless, despite this relatively high awareness of the need for policy to support national health system digitalization initiatives, the nature of policy interventions supporting digital health varies significantly between countries. This session investigated how policy can address variations in digital implementation scenarios as health services are increasingly delivered outside of traditional care settings; how policies governing data and their use are linked to broader digitalization initiatives in health; and which policy issues countries should be attuned to when addressing the adoption of emerging service-delivery models involving third-party providers outside the health sector.

#### Presenters

- » Bernardo Mariano Junior, Chief Information Officer, Information Management and Technology, WHO
- » Ioana-Maria Gligor, Head of Unit, SANTE.B3-European Reference Networks and Digital Health, Directorate-General for Health and Food Safety, European Commission
- » Sarah Murphy, Assistant Principal, eHealth and Information Policy, Department of Health, Ireland
- » Moderator: Willy Palm, Senior Adviser, European Observatory on Health Systems and Policies

#### Reflections from the discussion

- » Effective policy for the digitalization of national health systems needs capacity and engagement, a coherent programme of work and strong governance and accountability.
- » Key digital health stakeholders should be engaged at an early stage. They should include private sector representatives but exclude lobbyists.
- » Policy to support digital health should be informed by advice from clinical, information and communication technology, training and standards experts. It should ensure that robust governance and accountability structures are in place along with adequate funding streams for what is planned.

- » An integrated technical and business implementation roadmap for digital health should be devised, and capacity to deliver on policy should be enhanced through upskilling and investment. There should be regular reporting and evaluation on progress (including documenting the reasons for delays and problems) to identify lessons and refine policy in an ongoing manner.

### Summary of the presentations

Digital innovations in health can drive progress towards meeting both the Sustainable Development Goals and the WHO “triple billion” targets; but three core principles are needed: (1) good governance; (2) accessibility; and (3) affordability. At the country level, the digital health transformation must be aligned with national needs, be people-centric in nature and be supported by a sufficiently mature technology and operating model to deliver the desired benefits.

WHO has several digital projects supporting this movement, including a newly formed Digital Health Department at WHO headquarters; a range of primary care panels; the Be He@lthy, Be Mobile initiative (27) (see session 3.2); and a digital health atlas (28). “WHO must ensure that the digital health revolution is safe, reliable and leaves no one behind.”



Presenters ©WHO

In the EU, digital health transformation is based on principles of subsidiarity and cooperation and patients’ rights in cross-border health care. To these ends, a directive (29) is in place that (1) clarifies the rights of patients seeking reimbursement for care received in another EU country and (2) provides the necessary legal framework. Health priorities in the EU Digital Single Market Strategy (30) include the following: giving citizens better access to their data everywhere in the EU; using digital services for citizen empowerment and person-centred care; and connecting and sharing health data for research, more rapid diagnosis and better health outcomes. To achieve these goals, the European Commission has identified three main areas for action:

- » ensuring that citizens have secure access to health data that can be shared across borders;
- » ensuring better data to advance research, disease prevention and personalized health and care; and
- » providing digital tools for empowerment and person-centred care.

**Ireland's** eHealth strategy is organized around a few central tenets.

- » The patient is in the centre as an empowered participant.
- » There will be planned structural, financial and service changes.
- » Health service efficiency needs to be realized.
- » eHealth should be considered a driver for wider economic growth and development.

Effective policy to achieve this requires capacity and engagement (through investment, human resources and networking); a coherent programme of work (including legislation, strategy, standards, reporting and evaluation); and strengthened governance and accountability (including establishing an eHealth department and an eHealth committee). Key successes of the Irish eHealth programme so far include publishing an eHealth strategy; establishing eHealth Ireland and the Chief Information Officer for the health service; the phased introduction of the individual health identifier number; electronic health records for maternity and newborn care; the National Integrated Medical Imaging System; further development of a National Medical Laboratory Information System; and an electronic referrals system.

Later in 2019, Ireland will publish a health information policy on using data to promote safe and effective care will begin planned procurement for electronic health records for acute care. In 2022, this will start to be deployed, electronic pharmacy will be implemented and procurement will begin for community electronic health records. From 2024 onwards, a national shared care record will be implemented and integrated care will be being delivered using information and communication technology.

## **5.2. CULTIVATING A DIGITALLY CAPABLE HEALTH WORKFORCE**

### **Issues addressed in the session**

A country's ability to cultivate a digitally capable health workforce is one of the most important enabling factors underpinning national success in digital health. Nevertheless, coordinated mechanisms for addressing the digital skills of the health workforce in the Region are often lacking. How can we best ensure the digital skills of health workers now and in the future? How can digital literacy be meaningfully addressed as a part of medicine and nursing curricula and through the continued professional development of health-care workers? How are emerging digital technologies, such as artificial intelligence, personalized medicine and robotics, likely to influence the required skill set for health-care professionals?

This session examined key factors enabling the health workforce in becoming, and remaining, digitally capable and the steps that countries can take in this respect, as part of accelerating progress in the digitalization of their national health systems.

### **Presenters**

- » Kirstine Sørensen, Global Health Literacy Academy
- » Lars Münter, Head, International Projects Unit, Danish Committee for Health Education
- » Anne Moen, Professor and Director, UiO:eColab, University of Oslo
- » Claudia Pagliari, Director of Global eHealth, University of Edinburgh
- » Moderator: Gabrielle Jacob, Programme Manager, Human Resources for Health, WHO Regional Office for Europe

**Reflections from the discussion**

- » Collaboration and co-production between individuals and health workers can be facilitated by using health informatics but requires building high levels of digital health literacy in both groups.
- » More focus is required on clinical health informatics in professional education programmes at both the pre- and postgraduate levels.
- » Professional education programmes for health-care workers should embrace the potential of digital tools to enable the involvement and engagement of patients. These programmes should be developed in collaboration with professional organizations.
- » The potential of digital tools to offer new strategies, both for learning and for new ways of delivering care, needs to be explored.
- » eHealth tools should be introduced in the context of other clinical problem-solving skills.

**Summary of the presentations**

Digital health-literate citizens are empowered to play more active roles in self-managing their health, resulting in improved disease prevention, adherence to healthier lifestyles and better health outcomes. Nevertheless, excessive exposure to or use of digital interventions can have disadvantages that must be anticipated and avoided. These can include, for instance, stress or depression caused by excessive focus on digital tracking performance indicators; high costs of digital equipment, licences and staff; and increased digital inequity, by which the people most in need may be least likely to access the services to which they are entitled. The digital health literacy of workers and other citizens is an essential element for successfully deploying eHealth. However, at a time of great change in the health workplace, both citizens and professionals often lack the skills they need to find, understand and appraise online health information and then apply this knowledge to make decisions. Equipping the workforce and public with digital health literacy is essential and should be done in collaboration with professional organizations.

Today's digital health landscape is one of telehealth, health informatics, health analytics, public health and more, and yet health workers often lack the training, skills, equipment and support necessary to adapt to this new environment. Fortunately, many opportunities to improve this situation exist. More data about the workforce improve understanding of who they are and what competencies they have, helping to define training and support needs, targeting digital literacy training and improving the visibility of how workflows can be managed in smarter ways to function efficiently, enhance patient safety and use professionals in the most advantageous ways.

Despite the need for digitally literate workforces to optimize the many opportunities offered by digital health, including those arising through structural change in digitalizing health systems and the emergence of new professions to support health services, widespread changes in recruitment and training are not yet occurring.

Funding education programmes for workforce development is difficult, and health informatics is instead being placed into existing curricula without being fully recognized in medical training. Despite motivated medical students asking that this gap be closed, many already consider the curricula to be too dense. This creates a lack of theoretical and practical skills in using digital clinical tools in the health workforce. Learning strategies should be expanded to include digital simulation; visualization; clinical competencies in cross-disciplinary collaboration; massive open online courses to enable

interdisciplinary training; analytics; and medicine-based evidence (complementing evidence-based decisions with clinical knowledge).

Workforces in the Region are generally ill prepared for the changes that come with digitalization. For example, in **Denmark** – a relatively advanced country in digital health – the national digital strategy does not mention the health workforce. The Danish Committee for Health Education faces challenges around digitalization related to a range of issues, including disease prevention, inequality, coordination, information overload, balancing standardization with individuality and the differing strategic requirements of specialization versus holistic care. The future competencies of Denmark's health workforce must include interdisciplinary approaches; training new types of health-care workers with higher levels of digital competencies; the ability to use constantly changing digital tools; and scientific approaches and reflections.

To make change happen, five types of action can be undertaken:

- » highlighting success stories;
- » ensuring ambitious policies and strategies;
- » ensuring the participation of patients and professionals in digitalization so that people become co-creators rather than users;
- » getting the timing right (starting now); and
- » transforming education and training.

On these pillars, digital health workforces can be built that will face uncertain futures with some confidence. Further, citizens can be empowered with such interventions as patient-reported outcome measures, visualization and feedback and by training professionals to pay attention to the needs of caregivers. Future health-care professionals have to become knowledge brokers as well as clinical experts. The goal is to eventually be able to provide care in a collaborative team consisting of the individual, their families and friends, service providers and health providers.

### **5.3. SETTING UP AND SUSTAINING DIGITAL SERVICES TO SUPPORT MENTAL HEALTH**

#### **Issues addressed in the session**

Recent studies of the use of digital technologies for the treatment of mild depression have demonstrated the ability of such approaches to make high-quality treatment more widely available. Policy recommendations from the EU-funded MasterMind project (31) highlight a diverse range of factors influencing the success of implementations of computerized cognitive behavioural therapy and videoconferencing-enabled collaborative care services.

The WHO Mental Health Gap Action Programme (32) was created to provide guidance on scaling up services for mental, nervous system and substance-use disorders, especially in low- and middle-income countries. It asserts that with proper care, psychosocial assistance and medication, tens of millions of people could be treated for depression, schizophrenia and epilepsy, prevented from suicide and supported to lead their lives – even where resources are scarce.

This session examined how digital technologies are already affecting the delivery of services supporting mental health, with a view to understanding the prerequisites for countries to adopt these services at scale.

**Presenters**

- » Daniel Chisholm, Programme Manager, Mental Health and Mental Disorders, WHO Regional Office for Europe
- » Claus Duedal Pedersen, Head of Innovation Unit, Odense University Hospital
- » Annet Kleiboer, Senior Researcher, Faculty of Behavioural and Movement Sciences, Vrije University Amsterdam
- » Marie Folker, Head of Department, Centre for Telepsychiatry, Mental Health Services, Region of Southern Denmark
- » Moderator: Mette Atipei Craggs, Innovation Consultant, Odense University Hospital

**Reflections from the discussion**

- » eMental health services such as computerized cognitive behavioural therapy and videoconferencing for collaborative care and treatment, when implemented and managed correctly, have been shown to reduce severe or very severe symptoms among adults with mild, moderate or severe depression.
- » eHealth solutions can provide better access to evidence-informed mental health interventions, and especially when there was previously no alternative.
- » Patients and health professionals must be involved in design and implementation to overcome common challenges to eMental health services. These include the attitudes of therapists, clients' expectations, funding and reimbursement issues, training of therapists, technical problems and privacy concerns.
- » New technologies introduce new roles and new practices, requiring training. Education and sensitization are key: individuals are the true drivers of use, and if they want to use technology, providers will too.
- » More research on the quality of health apps is needed. Panellists advised not rushing into randomized controlled trials or implementation – but “trying to fail early on”.
- » National and supranational initiatives are required to support the use of eMental health services at scale.

**Summary of the presentations**

Mastermind was an EU-funded international project that was aimed at introducing and scaling-up of two different types of eMental health services – computerized cognitive behavioural therapy and videoconferencing for collaborative care and treatment – among in adult inpatients and outpatients with mild, moderate or severe depression. Although the initial aim of the project was to engage 5230 people in the study, the services proved so popular that 11 573 people expressed an interest and were included. The results showed that, through the use of these tools, more individuals had access to mental health support where there was previously no alternative, and the therapy was evaluated as safe. In addition, although the study observed more people with severe or very severe symptoms than anticipated, the use of the digital services was associated with significant decreases in symptoms and increases in the number of people eventually displaying no symptoms. On average, more than 60% of patients and health-care professionals reported being satisfied with the services (although significant variation was observed between the different project sites). Lessons for implementation that emerged from the project were: engage health professionals; have clear management strategies and reimbursement structures in place; provide sufficient training; ensure that national guidelines exist; and focus on providing information to patients and partners. Most of the participating countries

are now using the technology in daily operation in a variety of contexts – **Denmark** and **Wales** have scaled up regional solutions, **Scotland** has completed national rollout, pilot projects in **Turkey** have been successful and services have been made available in the Basque Country and Catalonia regions of **Spain**.

Digital technologies provide both opportunities and challenges for optimizing psychological treatments for common mental disorders; however, ample evidence now demonstrates the effectiveness of online interventions in supporting individuals living with such disorders, especially when guided. Differing options for implementation were highlighted, including preventive strategy, “when on the waitlist”, first step in a stepped-care model, relapse prevention, add-on to face-to-face therapy and blended treatment. Technological solutions can also use several environments: serious gaming, robotics, Internet and mobile interventions and more. It is often claimed that online treatment can be less costly and more accessible, but implementation remains a challenge since the technologies are available but not often used. Barriers can arise from therapists’ attitudes towards using technological tools, as well as clients’ expectations, finance and reimbursement issues, training shortfalls, technical problems, and concerns around privacy and/or security. Treatment in mental health is still primarily face to face, and most mobile apps available in this space are not clinically validated, but commercially developed and put on the market.

Methodological concerns also need to be addressed, and obtaining a good evidence base is difficult. Randomized controlled trials are criticized as being too slow and costly, and conventional research methods are not always suitable for evaluating digital health interventions. Agile science and iterative processes, along with the use of big data and machine learning, may be the way to build momentum in this area. Adhering to the principles of co-creation can ensure the involvement of all stakeholders. The Centre for Telepsychiatry, a research and development centre within the mental health services of the Region of Southern **Denmark**, promotes the use of telepsychiatry and eMental health services to improve the quality and accessibility of health-care services for people with mental health problems, working towards early intervention and treatment. The Centre provides several supporting tools for mental health professionals, including written manuals, training, clinical practice guidelines and eLearning. It also assesses the quality of mental health apps to determine whether they are effective and safe to use. The aims of this work are to improve access to specialist mental health services, increase flexibility, reduce transport costs, reduce no-shows and support shared decision-making. All mental health services in the Region of Southern Denmark have offered video consultation since 2015, and the number of electronic consultations has increased from 300 per year to 2000 per year, although videoconferencing still only constitutes a small fraction of the total workload.

Recommendations for countries to move forward on designing eMental health services include: having sufficient evidence (not just on effect but also on how to use technology in real-life care pathways), co-developing digital mental health services with patients and providers, integrating mental health technologies into face-to-face services, working collaboratively with professional mental health associations and patient organizations to discuss the benefits and drawbacks of using eMental health services and having national and supranational initiatives in place to support the use of eMental health services at scale – such as clinical practice guidelines for eMental health services.



## 6.1. DESIGNING, GOVERNING AND DELIVERING TELEHEALTH SERVICES WHERE POPULATIONS NEED THEM MOST

### Issues addressed in the session

Telehealth is offering European Region populations new possibilities for accessing health services and monitoring outside traditional care settings. In 2016, Edith Schippers, Minister of Health, Welfare and Sport of the Netherlands, expressed the potential of telehealth and related health technologies to “move health care from the waiting room to the living room”. Well-designed telehealth solutions can improve health-care access and outcomes, especially for treating people with chronic disease and for vulnerable groups. They not only reduce demands on crowded facilities but also save money and strengthen the resilience of the health system.

However, the implementation of telehealth and its integration into existing health services can prove challenging, especially when solutions span administrative or regional boundaries. This session showcased successful examples of telehealth in the Region, highlighting the necessary governance, technology, regulatory, workforce, training and support aspects. It then examined what countries can do to accelerate the implementation of their national telehealth programmes.

### Presenters

- » Kristian Kidholm, Head of Research, Centre for Innovative Medical Technology, Odense University Hospital and University of Southern Denmark
- » Masoud Dara, Coordinator, Communicable Diseases, Division of Health Emergencies & Communicable Diseases, WHO Regional Office for Europe
- » Yunkap Kwankam, Executive Director, International Society for Telemedicine and eHealth
- » Moderator: Jarmo Reponen, Professor of Practice, Healthcare Information Systems, University of Oulu, Finland

### Reflections from the discussion

- » The main conditions for the successful use of telehealth at university hospitals are: management support; the right financial conditions and support; organizational support; and research to underpin the innovation process.
- » University hospitals play a big role in design and delivery – they are in the unique position of possessing research skills, knowing the patients and knowing the technology.
- » Every health policy decision has digital technology implications for the knowledge-based health systems of the 21st century. Any given digital health technology will not be neutral towards the policy: it will either facilitate or impede the achievement of policy goals.
- » Digital health impact analytics should be part of every health system initiative, including telehealth interventions.

### Summary of the presentations

WHO defines telehealth as the use of telecommunication and virtual technology to deliver health care outside of traditional health-care facilities. It is also an important tool in increasing equity of access. Health-care workers save lives, but the health workforce is unevenly distributed and access is unequal, making telehealth systems indispensable when there are issues of covering great distance with

information, advice, support or technical assistance or when challenging interventions and surgery need to be carried out in distant areas and professionals need direct online consultation. Telehealth can also have great educational value: trials have shown that, when telehealth interventions are initially set up, many consultations are carried out initially but that they decrease over time as the remote staff transfer knowledge to the health workers on site.



Masoud Dara ©WHO



Slide on the importance of people in digital health from Yunkap Kwankam

Odense University Hospital in **Denmark** is using several new remote interventions as an alternative to outpatient visits, home monitoring, patient-reported outcomes and digital meetings with translators (teletranslation). The hospital has developed an app called MyPathway, designed as a generic empty app that can be populated with content by any clinical department for any given patient group, enabling these individuals to access information about their health and their treatment pathways at their convenience. In addition to being a repository for information, the app also enables direct communication with departments from anywhere, with individuals receiving replies within four hours. This means they have the potential to familiarize themselves with any aspect of their current or future treatment at their convenience.

Another example of the future of telehealth is a predominantly phone-based system for remote consultations in **Switzerland**. Staffed by only 250 people (70 doctors, 50 telehealth assistants, medical practice assistants and qualified nurses and 60 call centre agents), it handles more than 5000 teleconsultations a day using telephones, the Internet, videoconferencing and telebiomonitoring. Since October 2000, it has carried out more than 5 million teleconsultations, and more than half of the individuals had no further need to visit another doctor or a hospital.

Communicable diseases remain a major problem that digital and telehealth can play an important part in addressing. For example, in the European Region, WHO is working to combat tuberculosis (TB) – the biggest infectious killer in the world, with 10 million new cases every year – with a three-pillar strategy: integrated care; bold policy; and research and development. Digital health can help the TB response in many ways, including inpatient care, programme management and eLearning. Given how crucial prevention and treatment are in TB control, telehealth is especially important in supporting adherence through approaches such as text message support, video-observed therapy and medical event monitoring systems. On the programme management side, areas for possible technological improvements include laboratory information systems, quantification of drugs and connectivity solutions; in surveillance and monitoring, case-based electronic recording and reporting systems are useful.

Other areas in which WHO is working on digital health in the Region include: eLearning, openwho.org (WHO's new, interactive, web-based platform that offers online courses to people preparing to work in epidemics, pandemics and health emergencies or already doing so) includes an online course on antimicrobial stewardship; the European Respiratory Society–WHO TB Consilium, a free web-based multilingual system providing clinical guidance and advice and cross-border follow-up of patients; and in vaccination programmes, in which WHO and UNICEF have a fully digitalized joint reporting process with a consolidated, harmonized data set and analysis and visualization tools. WHO will continue to build the evidence base for this work by documenting and disseminating examples of digital health; continuing research on evidence and impact; supporting countries in scaling up digitalization efforts; and exploring further possibilities to develop tools for the Region.

## **6.2. DEVELOPING EFFECTIVE PUBLIC–PRIVATE PARTNERSHIPS FOR DIGITAL HEALTH**

### **Issues addressed in the session**

WHO's 2015 global eHealth survey revealed that 21 of 47 of the responding European Region countries use public–private partnerships for digital health (joint ventures between public organizations and private-sector companies). This figure rose to 71% in high-income countries and 80% in Nordic countries (22).

With the increasing use of sophisticated digital technologies in health, public–private partnerships are one mechanism for leveraging these innovations and sharing the risk of investment. This session included examples of how public–private partnerships for digitalizing health systems are being established, structured and managed and their potential advantages and disadvantages.

### Presenters

- » Jakob Uffelmann, Director of Innovation, Sundhed.dk (Danish National eHealth Portal)
- » Mona Truelsen, Project Manager for Health, Nordic Innovation
- » Moderator: Anne Torill Nordsletta, Department Manager, Health Data Analytics, Norwegian Centre for E-health Research

### Reflections from the discussion

- » Public–private partnerships offer opportunities to combine a range of strengths important for delivering high-quality digital health services.
- » Many current approaches to partnerships are legal and technical in nature, often siloed and affected by low willingness to test new solutions. Engaging in supplier dialogue, pre-commercial procurement and innovation partnerships are more modern ways to approach partnerships for digital health.
- » Public–private partnerships offer opportunities to combine a range of strengths and experience important to delivering high-quality digital health services.
- » Public–private partnerships should include companies of all sizes – the value of including small companies should not be overlooked.

### Summary of the presentations

Public–private partnerships offer opportunities to combine a range of strengths important for delivering high-quality digital health. Public entities have the ability to offer holistic approaches to health and well-being, knowledge of population health, public health values and broad knowledge of the stakeholders and processes involved. Private entities can contribute specialist systems, the ability to scale up projects, strong economic incentives, implementation experience and job creation. In reality, there are often conflicts between the contrasting motives and models of the two distinct working cultures.

Sundhed.dk, the Danish National eHealth Portal,<sup>2</sup> provides a good case study of how government can leverage a public–private partnership. Attempts to scale up the platform in **Denmark** led to five years of struggling with a locked-in, single vendor platform that was eventually resolved by choosing a novel multi-vendor strategy to build on the strengths of both the public and the private sides of the partnership. Public authorities were driven by strategic imperatives to achieve value for money, control the environment they were creating, agility in development and exploiting the power of implementation and transparency. These imperatives were underpinned by a holistic approach to public health, experience with large budgets and long-term planning and a patient-centred approach. From the private side came experience in implementing specific systems, value and export opportunities, and – once it was possible to engage with multiple vendors – engagement of a range of small and large private entities. A coherent technical platform is hard to obtain even today, but because it has a stable core, Sundhed.dk has proven stronger by being built on complex processes that now integrate several different eHealth systems.

Nordic Innovation is an organization funded by the Nordic Council of Ministers (the official intergovernmental body for cooperation in the Nordic region). Its mission is partnership between public bodies, businesses and entrepreneurs for “Nordic Innovation [to] contribute to making the Nordic region a leading region for sustainable growth, and increase entrepreneurship, innovation and competitiveness for Nordic businesses”. The organization has devised a Nordic Cooperation Programme for Business and Innovation Policy 2018–2021 to improve public services and foster innovation and new opportunities for the private sector in doing so. Status quo approaches to partnerships are generally legal and technical in nature, often siloed and affected by low willingness to test new solutions. An alternative approach is to engage in supplier dialogue, pre-commercial procurement and innovation partnerships. Previous strategies for Nordic welfare have focused on needs-driven innovation, building and strengthening structures for the Nordic test beds to generate evidence for what works; and creating public–private collaborations throughout the value chain in Nordic and external markets.

The three main action areas for this work are (1) branding and storytelling; (2) public advocacy; and (3) Nordic solutions and value chains. Branding work has concentrated on analysing Nordic strongholds and core qualities, storytelling around these and generating white papers on smart digital health, assisted living and sustainable hospitals for advocacy work with embassies, export agencies and companies. Further work on a strategy for health, demography and quality of life 2018–2021 has included a Bridging Nordic Data Initiative that includes a scenario-generating process, work on visualization and interoperability, a hackathon, mapping of legal obstacles and an executive summit; work on prevention and healthy patients; a call for proposals and a challenge prize on a healthy cities theme; and more work on value chain collaboration that has included scaling initiatives on Nordic life science and medical technology.

### **6.3. STRIKING THE RIGHT BALANCE BETWEEN PRIVACY AND SHARING DIGITAL HEALTH DATA**

#### **Issues addressed in the session**

The increasing need for health data from multiple sources to train data-driven health-care tools and enable public health surveillance is driving a debate on how to balance the interests of developers with the privacy and consent of the individuals whose data make up the health system. For example, how do we practically apply data governance and applicable privacy regulation in digital health systems? How do we ensure that the consent preferences of individuals as to how their personal health data are used are respected and applied throughout the health system? How can we strengthen trust in populations for the use of anonymized personal health information for secondary uses, such as developing the health-care tools of the future?

This session addressed the factors that countries are facing in striking the right balance between privacy and sharing digital health data and how we can work together to ensure they are accounted for in health systems of the future.

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<sup>2</sup> See day 2 morning plenary: the Danish National eHealth Portal – a European frontrunner.

## Presenters

- » Monika Lanzenberger, Directorate-General for Communications Networks, Content and Technology, European Commission
- » Kristoffer Kjærgaard Christensen, Head of Section, Cybersecurity, Ministry of Health, Denmark
- » Luke Slawomirski, Health Economist, OECD
- » Moderator: Petra Wilson, Managing Director, Health Connect Partners and Senior Advisor for Healthcare, FTI Consulting

## Reflections from the discussion

- » To create a harmonized, interoperable health data infrastructure, public consultation is required, involving politicians, policy-makers, health-care providers and citizens, to create the necessary preconditions in terms of policy and politics.
- » The most important stakeholder in health data-sharing approaches is the individual.
- » Patients' interests are paramount: data should be governed and controlled by patients and patient-supplied data should be used.
- » The real value of data is when it is used appropriately to inform decisions at all levels of the health system.

## Summary of the presentations

Putting health data to work safely and securely is challenging. The real value of data is when it is used appropriately to inform decisions at all levels of the health system. There is also huge variation across jurisdictions in data governance and technical and operational readiness to put electronic health record data to work. It is possible to be data rich and remain information poor: few countries regularly monitor health-care quality and system performance, and sharing and accessibility of health data for research varies greatly from country to country. The major barriers to electronic sharing of health data in Europe are the heterogeneity of electronic health records; cybersecurity risks; data quality and reliability; a lack of infrastructure; and legal restrictions in countries.

The OECD Council Recommendation on Health Data Governance (33) suggests setting up national health data governance frameworks to enable the use of personal health data to serve the public interest, to promote privacy protection and to encourage international harmonization of health data. The OECD also suggests 12 technical, policy, legal and political measures to maximize benefits and minimize risks in health data governance. Potential risks include those to privacy and societal trust in government and institutions and damage to societal values around privacy and data sharing. Benefits include better access to health care, improved health-care quality and efficiency, improved societal values and scientific discovery and innovation.

Data can be used securely in several fields and applications, including surveillance; research and innovation (for example, the **UK** Biobank provides a system to prevent, diagnose and treat diseases); systems management (for example, the National Institute for Health and Welfare, THL, in **Finland** uses public indicators to improve the quality of hospital care); and improving clinical practice (for example, Clalit Health Services in **Israel** uses analytics to reduce readmissions to hospital among older people). The EU Digital Single Market has three priorities: (1) giving citizens better access to their data everywhere in the EU; (2) using digital services for citizen empowerment and person-centred care; and (3) connecting and sharing health data for research, faster diagnosis and better health outcomes. Based on an open public consultation, more than 90% of respondents (70% were individuals and 30% organizations) agreed that citizens should be able to manage their own health data, and more than 80% of the respondents agreed that sharing health data can improve treatment and prevent

diseases. More than 80% also agreed that citizen feedback to health-care providers and professionals is essential to improve services. The European Commission adopted a recommendation to establish a format for a European electronic health record exchange on 6 February 2019 (34).

Under the EU General Data Protection Regulation, EU citizens have the right to access their personal data. The Directorate-General for Communications Networks, Content and Technology of the European Commission is supporting the digital transformation of health and care in the EU by seeking to unlock the flow of health data across borders, supporting EU countries in their efforts to ensure that citizens can securely access and exchange their health data wherever they are in the EU. The aim is to allow for interoperability and exchange of full records, with access to existing data and adequate infrastructure to, for example, provide real-time information on existing health conditions, allergies and intolerances; to improve overall continuity of care; and to reduce costs (such as by avoiding having to repeat medical tests in different jurisdictions).

In **Denmark**, strong cybersecurity and information security are critical prerequisites for digitalized health care. For citizens to be comfortable that their data is being managed in their best interests, they must be confident that it is secure. Responsible and secure use of health data is based on awareness of risk. To provide this secure foundation and maintain conditions for the public trust needed to make digitalized health care effective, the national strategy for cybersecurity and information security of the Government of Denmark aims to ensure a coherent risk-based approach and to build and enhance Denmark's capacity to predict, prevent, detect and respond to cybersecurity and information security incidents.

Privacy of data must be ensured by, for example, anonymizing or pseudonymizing data and enhancing security architecture. Transparency is also crucially important, not only in how data are used (such as by logging any access to data) but also in the importance given to ensuring privacy, so that public trust is maintained.





# SUMMARY OF DAY THREE

## PARALLEL SESSIONS

### 7.1. BIOMEDICINE, GENOMICS AND THE FUTURE OF PERSONALIZED HEALTH SERVICES

#### Issues addressed in the session

Personalized medicine (also referred to as precision or stratified medicine) is generally taken to address the intersection of genomics, big data and advanced computing to determine specific treatments for an individual. Precision medicine approaches are already being applied in clinical practice in treating people with many types of cancer and rare diseases; however, the public health effects of personalized health services, biomedicine and broader “-omics” approaches in clinical care are still unclear.

#### Presenters

- » Tõnu Esko, Vice Director and Chief Business Development Officer, Estonian Genome Center, Institute of Genomics, University of Tartu
- » Bogi Eliassen, Chair, Danish unit, UNESCO Bioethical Committee
- » Tom Fowler, Deputy Chief Scientist, Genomics England
- » Moderator: Gro Karine Rosvold Berntsen, Chief Researcher, Patient Pathways, Norwegian Centre for E-health Research

#### Reflections from the discussion

- » Countries and sectors will be more successful when they work together to rethink health systems to make the most of personalized approaches and to facilitate the move from reactive care to a life-course approach of continuum-based health care.
- » As genomics becomes more relevant to primary care and an evidence base is built, professionals will embrace it as something that will help their patients, but education and advocacy structures must be established to make that happen.
- » Engagement with genomics and other approaches must be (and be seen as) ethical and transparent. Public engagement is essential, and advocacy must accompany technological progress. People will often choose to embrace the technology if they are informed and actively engaged in the process.
- » New models for consent will be needed to maximize potential gains.
- » National biobanks that collaborate can combine data and enable learning.
- » Ethical and technical infrastructure must be in place to accommodate technology’s potential, and a more refined understanding of the roles and relationships of the public and private sectors in implementing and exploiting new technology must be obtained.

## Summary of the presentations

Disease is influenced by the three critical factors of genetics, age and lifestyle and environment, accumulating as the individual ages. Currently, a small proportion of people account for the largest portion of expenditure in the health system. People present with symptoms late, health systems struggle with comorbidity and end-of-life care is not well provided. If life is extended through medication and treatment alone, the costs will be astronomical; life expectancy may be gained, but the disease burden will probably not be reduced.

Personalized medicine is based on several P's: prediction and prevention; precision diagnostics; personalized interventions; and a more participatory role for patients. Delivering these will improve outcomes and build trust, and over time – if this enables the targeting of treatments known to be effective – should lead to savings. To make the future of health personal and disease-preventive, our health systems need to regard people as individuals and reach them before they become patients. Part of this shift lies outside what is currently considered the health system. Longer and healthier lifespans are affected by wider infrastructure: better housing, food quality, sanitation and clean drinking-water, education, etc. Addressing these requires sectors and countries to work together and think about ecosystems differently. Discussions are needed around the involvement of the private sector in this process and around issues of ethics and responsibility, just as there are with organ and blood donation. Questions of the greater good in this area are complex and will keep us busy for years to come.

Disease-preventive health activities happen outside the clinic, and potential approaches are widely varied: gene mapping and gene editing; lifestyle approaches; working with synthetic data; etc. Ultimately, moving from reactive care to a life-course approach of continuum-based health care means that actions and interventions that may not seem applicable on an incident-based model can be wise decisions for the long-term view. With the right strategic oversight, a bigger picture starts to emerge about disease progression and comorbidity that moves the role of digital health beyond current health-care decision-making to a general process of personalized medicine in which data drives a virtuous circle. For people to use data that has a value for them, it must be curated in some way. In this circle, the care process generates more and better data (including data from personal treatments, tissue sample collection, DNA sequencing and other data collection), generating a cloud of personalized big data that improves care for that particular individual and, after pseudonymization, feeds research that further enhances decision-making, which in turn drives treatments.

Within its own borders, **Estonia** is moving in this direction, tracking the progress of public trust in, and awareness of, digital health, which is increasing over time and thereby increasing the country's already rich potential to fulfil the promise of big data and personalized approaches. The basis to move towards more advanced uses of data and information, including personalized medicine, is strong: 99% of prescriptions are digital; large databases already hold relevant health data; and every citizen has their own personal ID that enables them to link this data. Estonia is ready for fully personalized medicine: eHealth, electronic medical records and other electronic infrastructure are in place; genome analysis technology is available; scientific and medical expertise is in place; genomic variations that affect human health and behaviour have been identified; and people are interested in personalized, genome-based health information.

In the **United Kingdom**, Genomics England's 100 000 Genomes project is building the foundation for personalized medicine in a different way. It set out to sequence 100 000 genomes from 85 000 people

with rare diseases and cancer and their families, increasing individuals' access to information about their main condition and providing them with the option to access information about additional "serious and actionable" conditions and their carrier status if they were non-affected parents of children with rare diseases. The project is driven by four simple goals: (1) to benefit patients of the NHS; (2) to create an ethical and transparent programme based on consent; (3) to enable new scientific discovery and medical insights; and (4) to kickstart the development of a genomics industry in the United Kingdom. It is now aiming for a target of 5 million genomes and currently running an exploratory programme for self-paying volunteers, including other disease cohorts and healthy people. Reaching larger numbers requires building health literacy, and one focus of the project is to embed this as much as possible within health care through engagement with primary care workers. As genomics becomes more relevant to primary care and an evidence base is built, professionals will embrace it as something that helps patients. Structures must be built to make that happen, and work has been commissioned with the Royal College of General Practitioners to improve skills in primary care.

The project fits the definition of public health as the science and art of promoting and protecting health and well-being, preventing ill health and prolonging life through the organized efforts of society". It is crucial to the work that the NHS' engagement with genomics is not only ethical and transparent but also that it is seen to be ethical and transparent. The project is guided by a National Participant Panel to ensure that participants' interests are always at the centre, and it is often the individuals who push for greater use of their data. Advocacy is required for technological progress, and public engagement is essential. People often choose to exploit genomic technology if they are informed.

The genomics available now is a small piece of the biological revolution. In the near future, with the inclusion of biological data and matching with environmental data, there is so much potential for new knowledge on disease and matching that it cannot be ignored. At present, genomic information is usually generated by research rather than clinical activity, and the surrounding discussion remains confused. People can decide whether or not to participate in research, but in the provision of health care and the use of this type of data in the clinical space, information must be yielded as part of the test: you need genomics to interpret other genomics. To take a genomics test, you have to share data. There are many questions around data management and consent, and people tend to be very protective of "-omics" data and far less protective of lifestyle information that is equally potentially compromising. The informed consent model used today is a post-Second World War analogue consent in which consent forms are more functional disclaimers for researchers than helpful resources for individuals. Real consent activates people to become partners in the work. People have a wide range of consents that may change over time, and dynamic consent can accommodate that.



Presenters and moderator ©WHO



Audience questions ©WHO/Kamilla Krøier

In current European Region systems, many people have no idea who owns their data and what it is used for – there are big issues with transparency and traceability and solving them in the current setting is complex, if not impossible. An EU General Data Protection Regulation 2 or 3 could potentially solve this. Discussion may need to move beyond the topic of ownership in preparation for a paradigm shift that takes a wider view of the context required to exploit personalized medicine. National biobanks have to grow and collaborate, not just in the Region but globally, so they can combine data and enable us to learn. Analysis can be done at different levels – some questions will need whole data sets, some will look at more specific information and some will require linking of different sets. This complexity raises challenges about processing power, expense and the methods for working with big data. The ability to do all these different things and to know what to do are the real challenges.

## 7.2. DATA EXCHANGE AND INTEROPERABILITY IN EUROPE – A LITTLE LESS CONVERSATION, A LITTLE MORE ACTION

### Issues addressed in the session

The development and application of standards for the exchange of digital data and interoperability of health systems has been discussed in a range of national and international forums for more than two decades. Nevertheless, despite the development of concrete interoperability frameworks, such as the EU Refined eHealth European Interoperability Framework (21) and recommendations for quality management systems, testing tools and certification processes, uniform approaches to adopting standards across the Region remain inconsistent. How can action be accelerated to develop pragmatic solutions for advancing the adoption of digital health standards in the health systems of the future?

### Presenters

- » Catherine Chronaki, Secretary General, Health Level-7 (HL7) Foundation Europe and Vice President, European Federation for Medical Informatics
- » Lars Hulbæk, Director, MedCom, Denmark
- » Moderator: Gunn Hilde Rotvold, Senior Adviser, Patient Pathways, Norwegian Centre for E-health Research

### Reflections from the discussion

- » Achieving international interoperability and establishing terminology prototypes are critical issues.
- » Health organizations and vendors must prepare for sizeable investments in interoperability, and ensure they have strong leadership. Governments implementing these projects should make good plans, agree on finances and ensure a multi-supplier strategy.

### Summary of the presentations

It would be a huge step forward if individuals could have an international patient summary available through their mobile phone that could be understood anywhere in the world. The relevant information for such a summary would include medications, allergies, vaccinations, problems, procedures, diagnostic imaging and more. This patient summary should be conceived as a window to a person's health and a dashboard to support actors in that person's health and care. In working to build this resource or others like it, it is important to ask patients, their families and health personnel how technology affects them.

In 2010, the European HL7 Foundation was established in response to the need for a forum to develop eHealth and technology and to improve the health of the population of Europe. The HL7 organization is dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing and retrieval of electronic health information that supports clinical practice and the management, delivery and evaluation of health services – the critical foundations that make digital health feasible.

In **Denmark**, MedCom is carrying out similar work in a national context. It was established in Denmark in 1994 as a publicly funded, non-profit organization to facilitate cooperation between authorities, organizations and private firms linked to Denmark's health-care sector. It develops standards and profiles for exchanging health care-related data throughout Denmark's health-care sector and supervises and

monitors the national implementation of these standards and profiles. The most difficult part of this work is often changing a standard, which necessitates making new documentation, cooperating with all relevant information technology systems, testing and certifying. A general shift is happening in health care that increases the importance of interoperability: instead of sending data from point A to B, data are shared across systems. In Denmark, the three steps to national implementation of interoperability standards have been (1) obtaining national consensus; (2) running pilot projects; and (3) communicating change with all relevant users.

7 

## Three steps to National implementation

- 1) National consensus**
  - Standards and secure infrastructure: *To ensure a multi-supplier strategy*
  - National business case and project plan: *To ensure the market for eCollaboration*
- 2) Pilot projects**
  - "First pilots": Testing in daily use
  - "Secondary pilot": Implementation in all relevant IT systems
- 3) National implementation - all relevant users**
  - Patient groups
  - Hospitals
  - GPs
  - Municipalities

Slide on the national implementation of interoperability standards in Denmark from Lars Hulbæk

## 7.3. SHAKEN NOT STIRRED – LEADING SUCCESSFUL TECHNOLOGY-BASED CHANGE IN HEALTH

### Issues addressed in the session

The factors contributing to successful technology-based change in health have been well identified in research literature, but their inclusion in national action plans for digital health is uneven, and the implementation science behind such major change initiatives in health is often lacking or poorly applied. This can lead to costly and ineffective solutions that contribute to the fragmentation of health systems operation.

In this session, participants heard from European leaders about their approaches in leading national digital health programmes having a broad impact on transforming the health system. They examined approaches to establishing and ensuring the interoperability of national digital health data and services and the governance mechanisms applied for leading successful technology-based change in health.

### Presenters

- » Henrique Martins, President of the Board, Shared Services and eHealth/information technology authority of the Ministry of Health, Portugal
- » Joanne Boyle, Head of Business Engagement, NHS Scotland
- » Anna Adelöf Kragh, Director, Public and Healthcare Advisory, NNIT A/S
- » Moderator: Elke Jakubowski, Independent Health Policy Consultant, Health Policy Europe

### Reflections from the discussion

- » Strong national agencies with public mandates to implement, monitor and govern transformative innovations in health facilitate success.
- » Change in health requires a broad scope of activity and patience for transformative change over time.
- » Digital innovators need support to carry out their work, even when it is unpopular.
- » Competent high-level officials are valuable assets that should be safeguarded: officials with digital skills are rare, and results can only be obtained after investing a great deal of time.

### Summary of the presentations

Digital strategies and plans are not enough for change to be successful – change requires continuous support for implementation, a progressive implementation culture and people on board that understand how to achieve results. Strong national agencies with public mandates to implement, monitor and govern transformative innovations are well placed to create success, but patience is required – transformative change takes time. Change in health requires a broad scope of activity, including covering relevant policies and seeking and fostering innovation through different types of actions carried out in parallel across different sectors. For example, private sector–led projects and initiatives can cover the limitations of broad public sector policies that are not directly related to, or able to cover, certain particular personal needs.

In **Portugal**, the creation of an independent agency for eHealth has helped align digitalization activities with ministry-led initiatives, and several lessons have been identified. For example, timeliness has proven important in progressive implementation and scaling-up, and using the term “pilot” for any initiative should be avoided, since “this can be intrinsically related to failure in large-scale implementation”. In **Scotland**, the pace of innovation is high: the government is investing in community programmes involving the use of drones, ingestible cameras and digital housing monitored by general practices. Here, local implementation has proven important for success. Digital innovators require space, a public interest mandate and trust. Because people tend to be averse to change, innovators can be unpopular among providers, but it is important to support them in their work.

Governments should be prepared to bring decisions closer to end-users. This requires politicians to be explicit about their goals and objectives, always keeping in mind the population as the ultimate beneficiaries. Although the end-users should benefit most, implementers must remain aware that eHealth solutions and digitalization processes may place additional burdens on doctors (for example, increased reporting burdens, additional security measures to safeguard data protection, etc.), and should ensure that professionals are included in planning and implementing changes. To accommodate this, the workforce should be empowered and trained, with investment in the skills of younger professionals. Further, competent high-level officials are valuable assets that should be safeguarded. Officials with up-to-date digital literacy and skills are rare, and such knowledge can only be obtained after the investment of a great deal of time and effort.

In evaluating services, technical biases that can be inherent in certain digital interventions should be considered and adjusted for. For example, heart rates can increase with awareness of continuous monitoring, digital homes may trigger unnatural behaviour, etc. As health services become more and more digital and technology-oriented, it will be increasingly important to recognize that individuals may need to disengage occasionally from global connectivity, possibly for the sake of their health, to ensure they do not burn out and become unhappy with digital interventions.

## 8.1. REIMAGINING HEALTH-CARE ENVIRONMENTS – THE FUTURE OF HOSPITALS, CITIES AND COMMUNITIES ENABLED BY DIGITAL HEALTH

### Issues addressed in the session

Futuristic scenarios of our hospitals, cities and communities highlight the trend towards increasingly digital, interconnected and “aware” spaces. Advances in the fields of smart materials, sensors, robotics and the Internet of things hold the potential for these environments to become intelligent, distributed and responsive to individual needs, providing highly integrated patient pathways, continuity of care across different parts of the health system and accurate detection and early warning of health conditions.

This session examined the digital health-care environments of the future to gain insight into how our interaction with the health system is likely to change, how these sophisticated innovations can be harnessed in low-resource settings and, above all, how we can make health-care environments of the future safe, accessible and affordable for all.

### Presenters

- » Christian Koerner, Technology Scout, Children’s Hospital Copenhagen, Denmark
- » Terje Peetso, Board Member, North Estonia Medical Centre
- » Moderator: Anne Moen, Professor and Director, UiO:eColab, University of Oslo, Norway

### Reflections from the discussion

- » Reimagining systems starts with getting inspired; using readily available technology; being patient-centred; creating a strong vision; and communicating your values.
- » Countries seeking to make leaps forward should go mobile early, focus hard on health literacy and engage in productive interactions based on patients’ needs.
- » Standards and cross-border exchange formats are increasingly required, and data quality is key.
- » Artificial intelligence can be used as a decision support system for professionals and to assist individuals who have to manage chronic disease at home every day.



Presenters ©WHO



### Summary of the presentations

The concept for developing a new children's hospital in Copenhagen, **Denmark** is based on a strong, emotional initial vision that integrates playfulness into the entire patient process. Mapping of how pre-existing and current facilities and services are used revealed that children have to interact with the children's hospital in up to 17 places to receive care, and parents say they "feel like project managers". The digital vision for the hospital was the response to this problem: to create an efficient facility in which digital solutions support individuals and families both during and between hospital visits; to help employees (including students and researchers) cooperate effectively and flexibly; and to ensure that the right information is readily and securely available for all relevant parties at all times, no matter where they are.

For children, technology will inspire and extend play in the hospital; connect families and support everyday routines; give power and control to patients and relatives; provide support before, during and after visits and enable home admissions; enable secure access to relevant information; and do all this invisibly, in the background. Mobile apps will tell when to leave to be on time for appointments, that they have a parking spot reserved and how they can find it, reducing stress levels. Using geofencing, the apps will know when individuals have arrived at the hospital and allow them to check in via their phones. While waiting, the child can play in the hospital and get notification of the meeting a few minutes in advance, in time to reach their appointment. Videoconferencing facilities in meeting rooms will allow additional specialists or interpreters to dial in – and enable parents or family, at work or elsewhere, to join the consultation. This optimizes resources: it is better for the individual, frees up staff time in the hospital and removes the need for full waiting rooms.

For professionals, new technology in the hospital will enable oversight of equipment, co-workers, pathways and processes; support internal and external collaboration; enable flexible use of rooms and equipment; and give access to real-time data and decision support for treatment and research. Video phone booths will be available for ambulatory staff to take calls with patients at home, and blocks of time will be set aside in case specialists are required. Work is also being done on ways to support admissions at home and improve home monitoring. Advances in treatment could see the home as a place of high-quality care. Artificial intelligence can be used as a decision support system for doctors and nurses – and to assist individuals who have to manage their own chronic disease every day and not just in the couple of appointments they may have every year. With ill children, parents are already often the ones who administer treatment for serious conditions: this can be done at home more, but only if parents are supported with the knowledge and the help they need to instil and maintain confidence.

The North **Estonia** Medical Centre is Estonia's largest hospital, treating about 500 000 individuals per year and providing consultation services for the whole country. The technology currently used by the Centre includes electronic consultations, registration, ambulance and telemedicine solutions, and new systems are constantly implemented. One example is a booking system that enables individuals to search specialists nationwide when booking appointments, giving them a better overview; a smoother cancellation system, avoiding time lost to no-shows; and putting responsibility and ownership of their care in individuals' hands. Further additions will include enabling individuals to check in at home and oversee their timetables, and telemedicine approaches that will enable paramedics attending patients on remote islands to be supported, via video links, by doctors at the Centre.

A common mistake is to think about technology rather than what outcomes are desired. Digital health is a tool to support the health system, not an end in itself, and should be used in the fashion most

appropriate for any given situation. Solutions must be orchestrated, bringing companies together and making them work in collaboration with each other, with facilities and with policy-makers, to achieve great solutions that benefit individuals and populations. Ideas coming into the hospital environment from outside must demonstrate that they save time, save money or improve outcomes. It is important to consider how to shape the workforce – or the market – so that companies do not push useless products into the health-care system. Standards and cross-border exchange formats are required to realize these visions, and data quality is key. Some digital health tools – such as electronic health records – need centralized organization for interoperability purposes; others function better using a bottom-up approach. The goal is a system in which people’s relevant information is added automatically to an electronic system as they move through it, and throughout life. In adulthood, most of us cannot remember the childhood diseases we have had, and many of us will have forgotten medical history that may be important. Health literacy is also crucially important to maximizing the efficiency of health facilities: about half the patients in emergency wards do not need to be there.

Many countries in the Region are further behind the digital curve than **Denmark** or **Estonia** and will be seeking to leapfrog certain levels of development. General rules for reimagining systems are simple: get inspired; use readily available technology; be patient-centric; create a strong vision; and communicate your values. Countries starting from scratch need to design unified systems in which the components work together. In these cases, individuals must be considered part of the solution: “let them do some work,” using mobile phones, playing a part in their own health. Countries seeking to make leaps forward should go mobile early, focus hard on health literacy and engage in productive interactions based on patients’ needs.

## **8.2. MEASURING PROGRESS IN THE DIGITALIZATION OF HEALTH SYSTEMS**

### **Issues addressed in the session**

Ensuring that national health systems digitalize safely and effectively requires that countries adopt pragmatic and standardized approaches to defining and measuring progress and that these approaches encompass a holistic view of social, legal, process, technology and other factors underpinning successful adoption of digital health. This session examined current approaches for measuring the maturity of digital health systems, current monitoring and evaluation methods and key performance indicators being used in the WHO European Region.

### **Presenters**

- » Nick Fahy, Senior Researcher, Nuffield Department of Primary Care Health Sciences, University of Oxford
- » Hege Andreassen, Senior Researcher, Norwegian Centre for E-health Research
- » Moderator: Fabrizio Carinci, Adjunct Professor of Biostatistics, University of Bologna and Principal Epidemiologist, National Observatory of Patient Safety, Italian National Agency for Regional Healthcare Services

### Reflections from the discussion

- » Applying context to data for digital health is crucial: measurement of progress should be context-specific, and systems are needed for local teams to define, record, monitor and use the data they want.
- » Our challenge is to find ways of digitalization in health that support local, context-specific learning and measurement methods that can adapt to these contexts.
- » Societal change and governance models need to be considered when measuring data for health as do varying structural dimensions. Different governance models for digital health may lead to different structural outcomes.
- » We must measure co-variation such as social inequality, the digital divide and gender and age aspects of both professional and non-professional (home-based) health work and relate eHealth indicators and digitalization to other ongoing changes and illuminate how these are connected to each other.

### Summary of the presentations

There are many enduring challenges to using digital technology to put existing knowledge into practice in health systems. Evidence indicates widespread and persistent gaps between evidence and practice in health care (for example, research showing guidelines being applied less than half the time), the reasons for which are not well understood. Not all variation is harmful, but the current variation in implementing knowledge across the Region are clearly problematic.

The complexity of systems and contexts is a constant challenge, and implementation has to reflect the social, context-sensitive and dynamic nature of innovation adoption. Addressing these obstacles requires a robust model – a new framework for theorizing and evaluating non-adoption, abandonment and challenges to the scaling up, dissemination and sustainability of health and care technologies. Improvement in complex systems requires context-specific learning. This means that the measurement of progress must also be context-specific and must focus on supporting learning rather than external accountability. Systems are needed that enable local teams to define, record, monitor and use the data they want, in a timely way.

The wider agenda of organizational innovation in health systems sees digitalization as part of the broader challenge of implementation but also as an opportunity to apply a new set of tools. The challenge is to find ways for digitalization to support local, context-specific learning and measurement methods that are appropriate to these contexts.

Addressing this challenge, the **Norwegian** Centre for E-health Research supports national needs for research and analysis in telemedicine and eHealth, including evaluation research and health technology assessment. The Nordic Council of Ministers established the Nordic eHealth Research Network in 2010 to benchmark the deployment and use of health information technology in the Nordic countries and established the Network as a subgroup of the Nordic eHealth group in 2012. The goals of the Network are to develop, test and assess a common set of indicators for monitoring eHealth in the Nordic countries, Greenland, the Faroe Islands and Åland (in close collaboration with the OECD, WHO and EU) for use by national and international policy-makers and scientific communities to support the development of Nordic welfare.

The project has provided several lessons so far. Testing of 49 common Nordic eHealth indicators from existing national data collections showed relatively high-quality data across the Nordic countries, Greenland, the Faroe Islands and Åland on availability of electronic health information exchange and patient portal functionalities. The intensity of data use is more sporadic in national surveys. Log data offer a potential new source for developing automatic monitoring of the intensity of use of national health information exchange and patient portals but requires common indicator specifications for harvesting the data and developing logs.

Usability data has been systematically collected in **Finland** and **Iceland** (and in **Denmark** since 2018) with harmonized indicators, offering a good basis for wider usage. Work on this is ongoing in **Norway**. Using registry-based data (such as numbers of outpatient consultations or emergency room visits) to assess eHealth outcomes requires explicitly defining both the implemented eHealth system and its anticipated effects.

In a social and technological context, the health-care system comprises a spectrum of different actors. Diffusion of technologies and user numbers can be important indicators in the first stages of digitalization but lose relevance as the systems mature. In **Norway**, as in the rest of Scandinavia, some digital tools (such as blood pressure or blood sugar monitoring for clinical monitoring in institutions or homes) are now standard and have reached 100% use. New solutions and systems are also continually introduced, so care must be taken to select relevant indicators for measuring progress. In welfare technologies, for example, much pioneering work is being done in cities and smaller communities that lack the digital maturity that characterizes the specialist health sector and larger hospitals.

Structural dimensions vary with digitalization, including social inequality, the digital divide and gender and age aspects of both professional and private home-based health work. At home is where most people actually manage most health issues, and medical anthropologist Artur Kleinman has estimated that 80% of health and illness work is dealt with in individuals' private sphere, outside professional attention. In this, context is everything: we must look at wider societal co-variation and relate eHealth indicators and digitalization to other ongoing changes and illuminate how these co-vary and are connected to each other. Different governance models may lead to highly different structural outcomes, and awareness is growing of the need to focus on societal change and governance models when measuring progress.

### 8.3. THE ROLE OF BIG DATA IN REVOLUTIONIZING PUBLIC HEALTH SURVEILLANCE AND ACTION

#### Issues addressed in the session

Big data approaches to improving public health surveillance and insight offer new potential for predicting and detecting disease outbreaks and changing profiles of disease burden. This, in turn, can influence the design and operation of health systems and increase the effectiveness of investment for health security. This session showcased examples of applying big data in public health and health system contexts and examined how these techniques can be better integrated into monitoring the performance of health systems and improving public health capacity.

#### Presenters

- » Ivo Rakovac, Technical Officer, Noncommunicable Diseases, WHO Regional Office for Europe
- » Nick Guldmond, Professor of Integrated Care and Technology, Erasmus School of Health Policy & Management and I.M. Sechenov First Moscow State Medical University
- » Moderator: Stein Olav Skrøvseth, Director, Norwegian Centre for E-health Research

#### Reflections from the discussion

- » Although big data has a great deal of potential to improve public health, there are widespread and often justified issues of trust in technology companies and other actors and whether their agendas are, in fact, optimally aligned with the public good.
- » Using other information that is already available and linking it to health outcomes can help improve surveillance and data use and can inform and improve health interventions.
- » Big data can be an important resource in targeting specific interventions that can vastly influence and change trends in health, such as reaching Sustainable Development Goal target 3.4 to reduce noncommunicable diseases by one third by 2030.

#### Summary of the presentations

Public health involves not just having data but what is done with them. An actionable approach to big data is important for developing data solutions based on solving specific problems rather than amassing data for their own sake. The cycle of information and interaction with big data is similar to data use in academic research. Approaches based on this knowledge can be used to make big data actionable by building profiles and models for validated data solutions. Big data can help realize the potential for leapfrogging with regard to noncommunicable diseases.

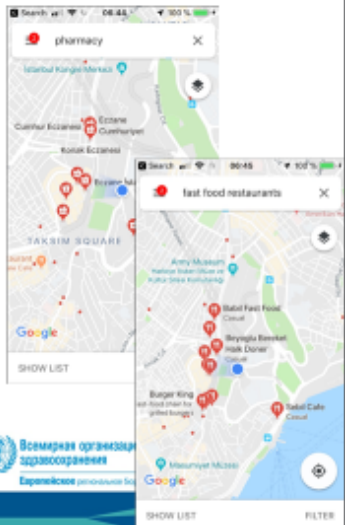
Population-based noncommunicable disease risk factor surveys can be time-consuming and labour-intensive, incurring substantial cost and being subject to inaccuracy because they often address risk factors and self-reported data that can be corrupted by recall bias, stigma and other social pressures. Further, they are at risk of common human-related reporting and analysis errors. In contrast, a big data approach enables access to large amounts of readily available information on behaviour, attitudes, perceptions and environmental factors, especially data on social media patterns of use, digital trails or social exhaust and data in electronic health records. Longitudinal data allow prediction models and causal inference models to be constructed that can be used to create a combined predictive-causal calculator to encourage individuals to improve their noncommunicable disease risk factors. Leapfrogging can be achieved by using big data to identify the few aspects that can vastly influence





and change trends, and then targeting them. For example, targeting cardiovascular diseases and cancer in this manner could accelerate the trend of reducing noncommunicable diseases in low- and middle-income countries from a 50-year time scale to a 10-year time scale.

Digitalizing health can cause problems of trust in information – especially when technology companies are perceived as being primarily interested in financial gain and when innovators do not take heed to show the whole truth of their scientific research. There is also concern that big data can be corrupted by a multitude of little lies. Therapy is required between public health and digitalization to revitalize this relationship, through the work of think-tanks, increased scientific collaboration and research-based innovation.

## Possibilities of integrative NCD risk factor surveillance

- Maximizing use of data
- Example: Combination and linking of classical population survey risk factor data with additional readily available data sources:
  - Location of households (STEPS) or schools (COSI)
  - Linkage with additional relevant environment information possible:
    - Availability of health care facilities
    - Availability of fast food outlets
    - Availability of green spaces
    - Walkability
    - Air pollution



Slide on possibilities of integrative surveillance of risk factors for noncommunicable diseases from Ivo Rakovac

## CLOSING PLENARY

Dr Kluge of the Division of Health Systems and Public Health at the WHO Regional Office for Europe closed the symposium. He covered the main highlights throughout the previous days to outline a vision for people-centred health systems of the future, designed for prosperity and solidarity, leaving no one behind. Carrie Peterson, Division of Health Systems and Public Health, WHO Regional Office for Europe, facilitated the closing plenary.

### Reflections from the closing plenary

- » Include
  - The European Region health system values of equity, solidarity and universalism must be maintained through the digital evolution to come, actively designing and investing in health systems to avoid an unintended increase in social inequities and an unwanted digital divide.
  - Innovation supports a future facilitated by digital health that achieves universal health coverage and enables every individual, in the true spirit of the WHO Constitution, to attain the highest possible level of health and well-being.
  
- » Invest
  - It is crucial to invest in national health systems, and intersectoral approaches to building best-practice foundations for digital health services are the basis of robust and resilient health systems of the future.
  - Invest in building digital health systems with solid foundations that evolve sustainably and progressively leveraging technical and methodological advances as they emerge.
  - Invest in bold, innovative and far reaching partnerships and exploit the action of big political interventions and agreements. The Sustainable Development Goals provide unique momentum to accelerate partnership-building between state actors, individuals and communities, with youth, international partners, academics and researchers and with the private sector.
  
- » Innovate
  - The digitalization of health systems is not merely about doing what we are doing now, only faster and more efficiently, but redefining our understanding of how health services can and should be delivered, how the rights and consent of the individual can be respected and acted on and harnessing the value of data for health.
  - Let us aim for digital health systems in which services are meaningfully integrated, affordable and universally accessible to entire populations and individuals are empowered and informed to prevent most avoidable causes of ill health.
  - Innovation can create a culture of health in which everyone has the opportunity to make choices leading to a healthy lifestyle, contributing to a public health-guided paradigm shift from reactive care to disease prevention.



Hans Kluge, closing plenary ©WHO

Dr Kluge called for European Region health decision-makers to “be bold enough to take action in digital health, because the risk of not doing this is too great”. This is especially relevant, since data-driven health technologies are forging new approaches that appropriately challenge the current models of health systems governance and service provision. Trust has been put in the hands of elected officials, who must actively obtain and maintain the trust of health-care professionals and the public in using safe digital technologies and achieving the highest levels of data protection and security. The voices and choices of people should influence how the health services of the future are designed and operated: digital technologies are fundamental enablers of integrated, people-centred health services. We must learn from the success stories of the European Region and beyond to develop approaches for the concrete, tangible applications of digital technologies in health. In this, we are most likely to succeed when we leverage the collective strengths of countries working together.

We must do this for the sake of a future that embraces digital health in the pursuit of universal health coverage and achieving the Sustainable Development Goals. We must rise above rivalry, avoid political power games and relentlessly forge new partnerships and thereby realize visions and dreams. Our dream is a WHO European Region in which no one is left behind.



## CONCLUSION

Some of the leading messages that were echoed throughout the Symposium were (1) the necessity of strong leadership; (2) governments need to work with industry, guiding them, and ensure that industry does not dominate the digital health space; (3) good governance is imperative; (4) standards and interoperability frameworks in the Region need to be developed and implemented; (5) the individual needs to be placed at the centre of the health system, and digital health is to be driven by needs and people and not technology; and (6) the digitalization of health systems is not just about data but about leveraging the value from data. Overall, three important takeaway messages materialized.

1. Digitalization is challenging our understanding of how and where health care can be delivered and is driving a transition to predictive and preventive models of care.
2. Digitalization of health systems is not simply a notion of continuing what we are doing now more rapidly and more efficiently but:
  - a. puts the individual at the centre of their own health and well-being;
  - b. addresses how the rights and consent of the individual can be respected and acted on; and
  - c. harnessing the value of data for health.
3. Digital health is centrally important to achieving universal health coverage with more efficient and effective modes of providing quality and equitable access to health for all. However, innovating towards a safe future enabled by digital health requires specifically linking investing for digital health with achieving public health objectives.

Good health and well-being are closely linked with equity, and the delivery of equitable health services requires well-governed health systems that facilitate the flow and use of information at all levels – including transparently to citizens. Interest in digital health is increasing significantly, as are many efforts to fund and accelerate progress. Nevertheless, there is an increase in solution complexity, new risks appearing, new public concerns emerging, new partnerships, modalities of engagement and methods of value creation. Consequently, governing this landscape requires leaders who are adept in managing continual change and who can navigate these complex, multifaceted, multistakeholder environments for digital health.

### Partnerships

Countries – and the European Region – should create digital health connections to the rest of the world. Networks should be established and/or used to enhance regional cooperation and promote interoperability within and across borders. People and institutions should be connected to kick-start cooperation. Workshops should be held at which countries can dive deeply into specific technical areas. Permanent places – real, virtual or at periodic gatherings – should be established for stakeholders across the Region to meet and share experiences, skills and lessons. Laboratories should be set up for co-creation, in a joint effort between all stakeholders to remove walls and enhance collaboration around shared goals.

Countries that already have more mature digital health environments should join WHO, other international organizations and other non-state bodies in offering assistance to other countries that require it, assisting with standards, regulations, capacity-building etc. WHO should collect and provide examples of good practices on public–private partnerships. A generic process model should be developed and its use encouraged.

WHO has an important role in exploiting partnership opportunities at the global level and has set up several mechanisms to fulfil it. These include a global coordination mechanism; several new partnerships to examine how industry might form part of the commercial determinants of health; work on the use of orphan data to help in pattern recognition; work around air quality, using Google cars to trace pollution; and projects to increase health literacy for individuals and organizations and enable the public to hold governments and municipalities accountable. WHO can add value globally by partnering with people and using the momentum of big political interventions and agreements to do useful, practical things.

### **Strategic direction**

The European Region health system values of equity, solidarity and universalism underpin health systems in the Region and serve as a model for the rest of the world. This must be maintained through the digital evolution to come, avoiding any situation in which digitalizing societies and health systems causes an unintended increase in social inequities and an unwanted digital divide. We must not only be conscious of that risk but also reaffirm these European Region values by actively designing and investing in health systems to stop this from occurring – instead riding the wave of innovation towards a future facilitated by digital health that achieves universal health coverage and enables every individual, in the true spirit of the WHO Constitution, to attain the highest possible level of health and well-being.

There are many questions around governance and management of technology and data, including how to use, manage and generalize data within the health-care system; how to manage health data owned by private companies; and how to manage the entry into the health space of new digital actors initially unfamiliar with the health landscape. Digital health development is lacking across the Region and within countries. WHO has an important role to play in guiding progress and avoiding the creation of new inequities. WHO has several digital projects supporting this movement, ensuring that the digital health revolution is safe, reliable and leaves no one behind.

The WHO Regional Office for Europe, together with its partners, will lead the development of a European roadmap for accelerating the digitalization of health systems to guide Member States in developing and integrating solid and coherent digital health foundations. The Regional Office is asking for collaboration to shape the best possible vision and roadmap for digital health systems in the European Region – calling on partners to help reimagine the future of digital health systems together.



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Symposium scene ©WHO/Kamilla Krøier



Symposium audience ©WHO/Kamilla Krøier



Symposium organizers and participants ©WHO



Symposium organizing team ©WHO



Lego ambulance ©WHO

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## THE WHO REGIONAL OFFICE FOR EUROPE

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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