REPORT

on

Main eHealth Activities Outside of the EU

Countries common objectives, orientations, problems

Potential for common enrichment

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LIST OF ABBREVIATIONS

ACRONYM	DEFINITON
AHA	Active and Healthy Ageing
AI	Artificial Intelligence
AMA	American Medical Association
COPD	Chronic Obstructive Pulmonary Disease
CPT	Current Procedural Terminology
DICOM	Digital Imaging and Communications in Medicine
ECHO	European Commission's Humanitarian Aid and Civil Protection department
EDI	Electronic Data Interchange
EEAS	European External Action Service
eEIF	eHealth European Interoperability Framework

EHN	eHealth Network
EHR	Electronic Health Record
EIF	European Interoperability Framework
epSOS	European patient Smart Open Services (EU CIP project)
EU MS	European Member State
GP	General Practitioner
HcP	Healthcare Provider
HIMSS	Healthcare Information and Management Systems Society
HL7	Health Level Seven
HMO	Health Maintenance Organization
HP	Health Professional
HTA	Health Technology Assessment
ICT	Information and Communication Technologies
IHE	Integrating the Healthcare Enterprise
IOT	Internet Of Things
IsfTeH	International Society for Telemedicine and eHealth
ISO	International Organization for Standardization
ITU	International Telecommunication Union
JAseHN	Joint Action to support the eHealth Network
LOINC	Logical Observation Identifiers Names and Codes
MAST	Model for ASsessment of Telemedicine applications
MAST-IC	MAST- Integrated Care
MoU	Memorandum of Understanding
NCD	Non-Communicable Disease
NGO	Non-Governmental Organization
PAHO	Pan American Health Organization
PHR	Personal Health Record
ReEIF	Refined eEuropean Interoperability Framework
SDO	Standards Developing Organization
SNOMED	Systematic Nomenclature of Medicine
SNOMED-CT	SNOMED-Clinical Terms
sPSC	Strategic Project Steering Committee
WHO	World Health Organization

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OBJECTIVE, PROBLEMATIC AND METHODS

1. Objective of this document

The present document is included in the framework of the Joint Action to support the eHealth Network (JAseHN). It pertains to Task 8.1 "Participation, Liaison and Influence in global eHealth". This deliverable was prepared in a first draft document, D8.1.3, which allowed to integrate a first level of comments by Member States Contributors. D8.1.3 was then integrated in the present Deliverable, together with relevant knowledge otherwise contained in JAseHN documents.

1.1 An observation of eHealth strategies, policies and projects outside of the EU

As detailed in the following paragraphs, the mandate pertaining to this task is to observe the situation in various countries outside of the EU in order to better understand the development factors and main trends in the worldwide movement towards a tighter integration of ICT tools in healthcare but also to be able to initiate cooperation when advisable and possible.

To obtain a significant and detailed analysis of eHealth and eHealth related activities, it was necessary to select a limited number of countries. These countries and the main motivations for selecting them are presented in 4.2. No European country outside of the EU has been studied, as there are often many similarities with EU-Member States (MS) and existing relations with the EU in the domain. Countries included in the study have in particular been selected with an eye towards revealing common trends and main differences emerging against different background.

1.2 Towards a shared and concrete knowledge on eHealth development factors and best practices

A very important aspect in this work is the necessity to remain close to concrete matters. The Deliverable could not limit itself to general objectives – which are converging more and more on a global scale – nor vague lists of projects inside a general policy but chose to focus on effective programmes and actions, with either measurable impacts or already defined evaluation tools.

The chapters are organized in three parts:

-   I   OBJECTIVE, PROBLEMATIC AND METHODS
-   II   MAIN OBSERVATIONS
-   III   PROPOSALS AND CONCLUSION

Part I is key: observation in very different countries in different parts of the world cannot be concretely done with the numerous existing classification and analysis tools which exist in the EU and international organizations, notably WHO. It is necessary to clarify, simplify, sometimes enhance and/or adapt these tools.

Part II chapters concentrate on main trends and main factors that appear – or don't – in a significant number of countries.

In the reviewed countries, programmes and projects that appear to justify a specific interest *(see 1.3)* have been identified. Their observation is both a way to concretely interpret the objective and methods or eHealth strategy and policy in Part II and a source for cooperation proposals on a concrete basis in Part III.

Accordingly, this work aims at opening a reflection on practical tools allowing for classification and monitoring of such projects on the middle term. They could be stored and organized in a directory which would be extended according to the needs of eHN MS (MS) (see III-15).

The detailed documents, including cooperation proposals for each country or organization are presented in Annexes to this document.

It must be noted that a cooperation and mutual development vision on a worldwide basis will have to confront points of view from a growing number of countries or regional groups of countries, probably in close relation with WHO *(see D 8.1.2 Information Paper on Supporting Preparatory Convergence Meetings Between the eHN and WHO).*

1.3 Identification of Projects of interest

First, as eHealth has now become a component of many health and healthcare centres and projects, reviewed projects either could not be possible or would not have the same extent and potential without eHealth. They are deemed eligible to further analysis and, if necessary, to contact with country experts and EU MS local representatives.

A main criterion to focus attention on a programme or a project is the potential for fruitful exchanges of information with the EU and the eHN, possibly to the point of cooperation. Practices and methods in selected projects could also lead to applications in European projects.

In all cases, any health centre, programme or project should not be registered as a potential for cooperation and/or an example of best practises by the eHN before concrete objectives and at least first realisations or pilot phases can be identified. Moreover, it is necessary that evaluations prove they have a good chance to be sustainable. In the eHealth domain, where many announcements are made, an observation phase is mandatory for recently launched projects.

In a first phase of the work (D8.1.3), observation remained "naïve", using concepts and categories observed in the studied countries themselves. However, the objective of this work is to contribute to a common reference tool and to propose cooperation with projects in countries outside the EU. This is why, in preparation of D8.1.4, it was very important to confront findings with the eHN vision and accordingly with other JAseHN analysis and documents *(see under 4.4).* Many were considered to ensure that the projects identified in countries outside of the EU could be analysed and characterized from the point of view of the eHN. Moreover, as the eHN and eHN MS are in relation with OECD and WHO and work towards convergence of important analysis and evaluation tools, it was necessary to deepen observation on what has already been proposed.

1.4 First level of recommendations

For every country included in the study, proposals for recommendations to the eHN are formulated. They concern a general approach for relations with the country or cooperation in the eHealth domain.

In most cases, proposals focus on precise, concrete projects.

According to eHN rules, the proposal is intended to be applied, if retained, by the whole Network or by a sub-group of voluntary members.

The proposal will take into account the status of the considered country for legal and financial aspects. Indeed, some projects could benefit from EU support. However, this should not be a criterion for selecting them.

This first level of recommendations includes proposals for analysis grids classifying strategies, programmes and projects, based mainly on existing tools and works by WHO and JAseHN.

2. A wide view on the wider world: necessary precautions

Even before considering existing rigorous definitions of eHealth, this wide set of techniques and usages has to be replaced in a more general view. What countries define as eHealth must be considered in relation with characteristics of the country or region and also with the state of health conditions and of healthcare systems.

The information and national analysis are dependent on many specific aspects of a country: general economic, cultural, legal, and historic environment as well as some key development aspects such as training and education, transport infrastructure, Internet access, mobile phone coverage etc.

One must also consider that, even in countries which are not federations, there may be widely varying situations between regions or smaller units. This is especially true in countries with a diverse geographical landscape (coastal zones, mountains, desert areas). In federal countries, legislation itself may vary deeply between states.

2.1 Differences in all dimensions affect all aspects of Health

National backgrounds resulting from the above-mentioned factors have tremendous impact on health, healthcare systems, eHealth and even the very definition of eHealth.

- Health: diseases are different and have different evolutions, depending on the stage and type of development, the climate of a given region, alimentation etc. This impacts all views of eHealth strategy, programmes, projects, indicators.
- Healthcare system: organisation varies deeply between countries. Many factors are concerned, notably:
  o technical prowess of professionals;
  o the role of various stakeholders – which changes according to general rules, history etc. between foreign and national, public and private etc. *(see under 3.2);*
  o orientations long followed for Health system organization and development may create obstacles which will slow or even forbid some paths for eHealth integration in the system;
  o relations between healthcare system, Universities and other education levels, professional training legislation etc.

- Applications of ICT in Health domain: past applications and systems are usually the background of eHealth development – be it hospitals information system, management systems, payment systems etc. They open opportunities but they also often limit the domain concerned by eHealth, which will then tend to be limited to previously covered areas. In all cases, relations with existing digital systems are a critical aspect of any eHealth strategy and project.
- eHealth: in fact, the very definition of eHealth and its characteristics is widely influenced by current ICT development, especially in the healthcare system. In some countries, or in

some regions, development of an accounting software in HcPs organizations may be considered as an eHealth project.

2.2 Development scales

In present and future analysis of programmes and projects, there is a risk of misinterpretation when referring to development scales. As noted above, there is a common general orientation of eHealth projects in the long range, but it is currently still quite vague and fuzzy. Observation has to identify new solutions, notably developed in emerging or developing countries, that by-pass the steps followed by industrialized countries. In fact, the main differences are related to the healthcare system's maturity. Absence of an already well-developed system can facilitate installation of eHealth solutions and especially mHealth ones. Conflicts, legal and organizational difficulties, opportunities and threats may be associated to choice of healthcare system development paths.

In fact, eHealth development is, as mentioned in 2.2, always closely linked to the whole economic, technical, cultural, political evolution – which of course follow very different tracks, even if eHealth is often associated with common objectives and techniques in various countries.

2.3 Structural difference with EU members: the international dimension

There is a difference between countries out of the European continent and EU countries. Since at least the XVIth century, European countries have had a strong influence on the rest of the world and in many cases, national healthcare systems and financing and social protection systems have been built according to European models. However, in many cases also, other, more ancient techniques and organizations have remained (the best known cases are traditional medicine techniques in China and India but this is true in most countries). Then, mainly in the XXth century, in countries outside of Europe, foreign actors – mainly from the USA and to a lesser extent from Europe – started operations through local subsidiaries. The reverse is not true. In Europe, such operations have so far been very rare or very limited, and sometimes forbidden by law.

Due to this difference, the role of foreign actors is low in Europe while it is important – and legal – in other parts of the world, especially in developing and emerging countries, be it through aid programmes, NGOs, commercial HcPs or insurers. For products and services, the only international market in Europe are pharmacy and medical devices.

The introduction of ICT and eHealth has led to a radical and fast shift in situations. These techniques and tools had no past history in any countries, including European ones. Even, countries that were late in the development of their healthcare system can benefit from the "white page" advantage they possess over countries with decades-old systems.

This very difference is of course a source of mutual enrichment and cooperation. It is one of the reasons for the D8.1.4 proposal of analysis and characterisation of programmes and projects using structure and parameters varying from those applied to eHN MS eHealth.

3. eHealth: content, perimeter, definitions

The first difficulty encountered when attempting to provide a definition for eHealth and its perimeter is the present fuzziness of health and healthcare perimeter. The main evolution, reflected in the WHO definition (see 3.3) is the growing inclusion in the definition of health of

welfare, disabilities and sometimes wider social and social protection activities that are themselves extremely variable and fuzzy between countries (or states in federal systems).

Another important aspect to keep in mind is that eHealth is a moving target. eHealth strategies and developments are a multifactorial phenomenon, as reminded above. This is not to say that there are not fundamental objectives and constraints common to all countries, but the paths do differ widely.

Moreover, dynamic forces affect all objectives and developments. These are, contrary to the past situation mentioned above, international:

-   Globalization: more and more, actors are informed on eHealth and in general on application of ICT in other countries – the market forces play their role, as well as international and regional organisations.
-   Evolution of Health Science and Technologies – they modify strategies and targets, clear examples being on the short term NCD treatments, on the longer term neurosciences or genetics.
-   ICT, still accelerating in all domains, from transmission technologies and tools to security – one of the main challenges ahead.

A danger would be to underestimate the speed of penetration and adoption of technologies in any country (in this regard, the example of India is particularly striking).

3.1 A multi-faceted object in a fuzzy domain

As reminded above, the perimeter and definition of eHealth may vary according to many national and local factors. Ongoing evolutions make it more and more difficult to establish stable definitions. Indeed, eHealth may include or concern digitization of all types of Information Systems, from accounting to the most advanced databases and to all systems using communication technologies (including of course mobile, with different levels of mobile phones).

Moreover, current and future developments should not be underestimated:

-   AI
-   Big data (also necessary for AI development)
-   Blockchain
-   IOT
-   Mechanical devices, robots - these developments associate software and ICT tools and hardware to material components, in a new class of products – for example systems for re-education that may be used in institutions as well as at home.

None of these new techniques are currently in the wide generalisation phase but they already play a role in the definition of national programmes in some countries.

3.2 Uncertainties and Certainties: in search of a strong common basis

To concretely analyse eHealth strategies and programmes and to classify concrete projects, it is necessary to take into account differences between concepts that are not related to health but to cultural, social, legal characteristics of a country. Even inside a coherent linguistic area, terms such as for example "private", "social protection" etc. which are supposed to refer to a common reality may refer to slightly or widely different objects.

Another difficulty in interpreting situation and development of projects may arise from structural differences between healthcare system conceptions. In particular, distinction between financing

actors, such as insurers and mutual funds, and healthcare providers (HcPs) has to be made. In some countries, organizations associate both activities (eg. US Health Maintenance Organizations - HMOs).

As eHealth perimeter and definition vary widely, the whole landscape appears fuzzy. This generates difficulties when creating a common observation and reference tool.

Greatest difficulties come from deceptively simple words that anyone in a country understands and that are present everywhere. The best example is probably the definition of "public" and "private".

Public and private

This is one of the greatest semantic difficulties. Every country uses these apparently simple concepts whilst they vary and convey strong representations. Indeed, many different statuses can be called private.

There is an extreme diversity between all actors that are not directly owned and governed by the central government of the country or state: for-profit and not-for-profit HcPs institutions, NGOs, independent HPs and groups of HPs, private insurers and mutual funds (more or less controlled by the central government), organizations of managed care as HMOs in the USA.

In fact, every element in the healthcare chain of services can be "public" or "private" when one considers the legal status only. This is very important for eHealth applications development. For example, drugs distribution may be managed by the Ministry and public service, by commercial companies, by independent small actors.

In most cases, distinction between public and private should be based on role and constraints and not on ownership of capital.

A strong common basis

To try and avoid semantic confusions and characterise projects inside clear and sustainable classifications, the envisioned solution is to find basic strong axes, that can be used in all countries. This will be detailed in II-12.

- Basic health and well-being problems (as pregnancy, NCD etc.)
- Main categories of healthcare activities (as Prevention, Emergency…)
- Main declared objective (as extending access)
- ICT necessary components

3.3   WHO and PAHO definition of eHealth main components

Due to the important role these organizations play, the main categories of eHealth components as identified by WHO and PAHO (Pan American Health Organization - see 4.3 and Annex) are presented below.

(Extracts from "Atlas eHealth country profiles: based on the findings of the second global survey on eHealth. - Global Observatory for eHealth Series, 1 – WHO 2011" [1]). JAseHN D8.1.2 "Information paper on supporting preparatory convergence meetings between the eHN and WHO" provides a full presentation of WHO tools.

WHO definition of eHealth gives a starting point: "eHealth is the use of information and communication technologies (ICT) for health."

(see D8.1.2 presented, discussed and agreed by the eHN 5/5/2016)

This definition needs to be completed with WHO definition of health:

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

(Constitution of the World Health Organization adopted by the International Health Conference held in New York from 19 June to 22 July 1946, signed on 22 July 1946 by the representatives of 61 States and entered into force on 7 April 1948).

This wide definition corresponds to a huge part of human life and activity. It reflects new expectations related to economic and social development.

Inside the eHealth Network of voluntary MS, eHealth is by and large practically restricted to information access and communication and to data exchange applications and systems between different actors (national or cross-border). This is in fact the major part of what is considered in industrialized countries as eHealth, almost excluding healthcare HcPs internal information systems – which are concerned only for their external exchanges and interoperability. This distinction is fuzzy but manageable.

In 2011, PAHO (which is at the same time the WHO representation for the Americas) detailed a list of "some components of eHealth" [2]:

- Electronic medical records (or electronic health record): a real-time longitudinal electronic record of an individual patient's health information that can assist health professionals with decision-making and treatment.

- teleHealth (including telemedicine): this involves the delivery of health services using ICTs, specifically where distance is a barrier to health care.

- mHealth (or mobile health): a term for medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices.

- eLearning: the use of ICT for learning. It can be used to improve the quality of education, to increase accessibility to education (for those geographically isolated or those who have access to inadequate learning facilities), and to make new and innovative forms of education available to more people.

- Continuing education in information and communication technologies: the provision of courses or programs (not necessarily formally accredited) for health professionals that helps them to develop information and communication technology skills for application in health. This includes current methods for sharing scientific knowledge, such as e-publication, open access, digital literacy, and the use of social networks.

WHO and PAHO also consider standardization and interoperability to be a key aspect: the term "interoperability" refers to 'communication between different technologies and software applications for the efficient, accurate, and sound sharing and use of data'. This requires the use of standards i.e., rules, regulations, guidelines, or definitions with technical specifications to make the integrated management of health systems viable at all levels.

4. Methodology

4.1 Desk study

D8.1.4 aims at getting a general view of the eHealth situation in each country included in the study, at identifying interesting projects for information exchange and potential cooperation. To go further, it will be necessary to get in touch with country's officials, experts and managers.

For this study, it appeared necessary to exploit multiple types of sources, reflecting different interpretations of the reality. Seven types have been used:

- Official documents from governments, ministries or organizations in charge of managing and developing health systems and eHealth.

- International organizations producing statistics and studies in the field (WHO, PAHO, World Bank, CIA World Factbook)

- eHealth and Telemedicine national and international associations

- Press – specialized or not.

- Associations, as groups of HcPs, HPs or citizens, scientific societies.

- University and Research Centres studies.

- Private international consulting or investment firms market studies, not produced for a government (their approach is that of a commercial market – which shows different observations of official studies).

The desk study was carried out between 2017/02 and 2017/08. It is important to note that time often runs very fast in the eHealth and mHealth domain. Accordingly, contrary to healthcare organizations and fundamental policies trends, concrete programmes and projects can be rapidly modified. However, if they correspond to clear needs and sustainable methods, they should not disappear. In some cases, if important information has been drawn to the authors' attention since August 2017, it has been taken into account.

Lists of main documents and Web sites on a country are included in this country's Annex. General and international documents are listed in this document.

4.2 Choice of countries

Eleven countries were selected for studying. The list was submitted to and approved by the sPSC.

Selection factors

Multiple criteria were applied. Considered selection factors were:

- Size and economic weight of the country

- Existing relations with EU or with some EU MS

  o Trade
  o Scientific or technical exchanges
  o Cultural and historic relations
  o Existing communities with a strong European heritage (ex. the Italian community in Argentina)
  o Health related cooperation (not directly, as this domain of cooperation concerns eHN MS)

- Important role in eHealth (USA, India etc.)

Selected countries and information on their relations with EU

[mostly extracted from European External Action Service [3] and European Commission International Cooperation and Development sites/ [4]

Argentina

    o "Due to its economic performance, Argentina is considered as a "graduated" country and therefore it is not eligible for bilateral cooperation under the EU financial exercise 2014-2020; however, Argentina will remain eligible to participate in regional and thematic programmes. This provides an excellent opportunity to re-define together new forms of EU-Argentina cooperation." [4]

Australia

    o Cooperation is organized under the EU / Australia Framework Agreement and many sectoral agreements. There is no direct health cooperation – EU could be directly implied inside common research projects (under H2020)

Brazil

    o "Due to its economic performance, Brazil is considered as a "graduated" country and therefore it is not eligible for bilateral cooperation under the EU financial exercise 2014-2020; however, Brazil will remain eligible to participate in regional and thematic programmes. This provides an excellent opportunity to re-define together new forms of EU-Brazil cooperation." [4]

India

    o The relationship between the EU and India has evolved in recent years, from that of aid donor and recipient, to one of partnership with opportunities for mutual benefit. The relations have been continuously reinforced: Cooperation Agreement in 1994, Strategic Partnership in 2004, Joint Action Plan adopted at 2005 Summit and updated in 2008, EU-India Agenda for Action 2020 at 2016 Summit. Opportunities for eHealth research and cooperation should be numerous in main domains – notably education, research and innovation, ICT.

Morocco

    o Strong relations – Morocco benefits from "statut avancé", "advanced status" *[3]*. Various domains can be associated to eHealth: specific centres (ICT and security notably), research, education and training.

Nigeria

    o Nigeria EU Joint Way Forward was signed in 2009 - priorities identified for such dialogue are: Peace and security, good governance and human rights, economic development, including trade and regional integration, energy, environmental sustainability and climate change (health is never directly included per se).

Senegal

o Strong and ancient relations – with France in the XXth century; for more than 50 years with the EU [3][12] – moreover, humanitarian aid centres can be associated with eHealth. Ex: The European Commission's Humanitarian Aid and Civil Protection department – ECHO - is funding the provision of food assistance and nutrition care to some of the most vulnerable Senegalese. The EC's humanitarian partners are providing support to health centres for the treatment of severely undernourished children.

Singapore

o The City State has a recognized high-level healthcare system and aims to become "the first Smart Nation". Moreover, Singapore's relations with the European Union go back decades, and the EU views the city-state as central to its engagement in South-East Asia [3]

South Africa

o South Africa is one of the European Union's 10 Strategic Partners. Here, the collaboration addresses directly some key healthcare aspects: "*current EU financial support to the health sector is focused on improving access to public health services and to increase the quality of service delivery of primary health care through the district health system, in line with key South African health priorities…*" [3]

Tunisia

o Strong and ancient relations. First in the XXth century with France and Italy, cooperation with the EU then developed under an Association Agreement (1995), further strengthened with a Privileged Partnership (2012) [3]. Various domains can be associated to eHealth: specific centres (ICT and security notably), research, education and training.

USA

o The USA and American firms play an important role in the development of key international ICT infrastructure and services and in eHealth standards proposals. The objective in this case is to observe how, inside this global power, eHealth is concretely being developed amongst many different types of HcPs and Healthcare Institutions. Indeed, the diversity of structures is impressive and there are known harsh debates, whilst a growing national effort tends to use eHealth tools for the betterment of the whole population health. Moreover, since the signature of the Memorandum of Understanding (MoU) for transatlantic Cooperation on eHealth/Health IT (2010) with the European Commission, two important lines of action have been developed: 1-about health workforce skills, in order to allow their better education and interest in eHealth development. and 2-about transatlantic interoperability and personal health data exchanges, in order to allow eHR Summary circulation based on common standards[3].

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[1] Senegal and the EU have enjoyed a close relationship for more than 50 years. (which) comprises a (…) political dialogue, strong trade relations, a fisheries agreement, and technical and financial coop. in support of the country's populations. It involves a sustained partnership as much with govern. authorities and public institutions as with civil society and the private sector

[3] Building on epSOS European project, the EU-funded Trillium Bridge project aims to align the use of standards between the EU and the US to share basic patient data between health professionals, when the patient has given his consent.

4.3   Two international organizations

Information was also gathered from two organizations which play a role in many projects, PAHO and the World Bank.

Pan American Health Organization (PAHO)

- o   PAHO is the specialized international health agency for the Americas, created in 1902. It also serves as Regional Office for the Americas of WHO. PAHO has been selected because of its active role in organizing cooperation between countries on many eHealth programmes – whilst it relays also general WHO campaigns and objectives and public health activities.

World Bank

- o   The World Bank is a key actor for financing various kind of health projects in developing countries.

4.4   Tools and grids

exploited JAseHN documents

As stated above, it seemed appropriate to approach this group of 11 different countries without preconceived classifications and methods. However, after a first phase, observations can be linked with already existing ones that have been analysed by JAseHN *(see IV-15.2 Key sources)* and published on its site: JAseHN deliverable D7.1.1 on a platform for the sharing of national eHealth strategies, D7.3 on studies concerning added value of eHealth/mHealth services, D7.4 on Health technology assessment, D8.1.1 on OECD studies, D8.1.2 on convergence meetings between the eHN and WHO. *(see 1.3).* This allowed in particular to perceive important tools from JAseHN and eHN point of view, for example the WHO toolkit or the Model for assessment of telemedicine (MAST).

Towards grids

From observation and analysis of countries documents and confronting them to existing tools, the D8.1.4 proposes lists of aspects and values for eHealth programmes and projects. Discussion on these grids is presented in II-12.

-II-
MAIN OBSERVATIONS IN THIS STUDY

5. eHealth development general lessons

Desk study of eHealth in 11 countries shows both general trends which have already been observed in EU MS as well as specific path corresponding to national culture, level of economic development, information and education of the population and of the concerned professionals. It shows also that the way towards exploiting all the potential of eHealth is not easy. Ambitious programs and declarations are everywhere but often encounter strong obstacles or at best indifference, this having to be abandoned or deeply modified. There are also harsh conflicts. Most often, eHealth developments are in fact handicapped or blocked because of pre-existing difficulties and conflicts inside of the healthcare system.

However, despite the occasional failure of important programmes and even after political revolutions, eHealth development usually comes back on track albeit in new ways and with new tools. Governance, stakeholders and other actors have learnt from past mistakes and cooperate around more realistic objectives.

The same international influences appear everywhere – scientific communication and information, ICT diffusion and appropriation, actions from international actors – from WHO to NGOs and private actors – and in general national and international communication networks and tools.

This means that, indeed, international influence is a powerful factor in the present development of eHealth. However, it still results in many differences, due to the varying natures of the concerned international communities and actors and of the country over which they exert this influence. The following table shows very general and simplified trends. *These are detailed in chapter 11.*

ACTOR/FACTOR	SPHERE OF INFLUENCE
Scientific societies	Practical influence through the role of Universities and Public hospitals in the healthcare system - important in all countries
WHO	Worldwide influence for epidemics surveillance Wide range objectives such as universal access, mainly influencing countries already in possession of a eHealth strategy WHO tools are quite influential though not much used; there are exceptions - notably Nigeria
Regional organisations (eg. PAHO)	Very strong in their geographic area Similar: cooperation between Arab countries Only developing other areas Not pertinent for the USA
Cooperation and aid programmes	Numerous aid programmes and networks active in developing countries - notably from EU and US organizations
NGOs	Strong influence in developing countries
External private HcPs (Insurers, Private	Depending on their role in the country's healthcare system - none in the US, losing ground in emerging (India, Brazil), still strong in other countries inside the richest and often coastal areas. Differentiation

Hospitalization groups - for-profit or not-for-profit	between HcPs (hospitals groups) and Insurance appears at the world insurance market considers emerging and developing countries as strategic markets.
ICT companies	A strong factor in the same areas and with the same limitations
Communication and Consulting actors	Important role, organizing congresses and events Much stronger in ancient industrialized countries and in some cases in emerging ones
Telecom operators	A strong factor - foreign or national - depending on their implantation and autonomy.
Standardization groups (SDOs)	The more important ones are still centred on USA - where their influence is limited due to the fragmentation of the healthcare system. At present point, they play an important role in emerging countries which try to organize interoperability.
HPs associations	Emergence of HP associations, for instance around GPs symptoms taxonomy, could become important firstly organizing exchanges and encounters between doctors, nurses etc.
Patients networks	Slow but real emergence of patients' empowerment in countries engaged in democratic and decentralized processes (Argentina, Brazil)
Cultural influence	Every country in the developing and emerging world has kept ties with Europe - various due to past colonization and other ancient relations. This gives specific colours to the healthcare system and financing system, with some imitations. This is even true in the USA where some actors and some national developments are clearly related to imitation of some European ones, while adapted to local situation.
Proximity of interest and common economic development	Another influencing factor is linked to political and ideological movement. Present evolution reflects the general shift of power between groups of countries, following the Non-aligned movement. Example here is the development of influence of India towards African countries.

The purpose of chapters 5-10 is to identify key aspects and factors of eHealth development that appear in the studied countries. Concrete descriptions and precise evolutions are presented in country specific annexes and key points documents.

5.1   From pioneers to wide deployment of sustainable programmes

Many projects are initiated and supported by pioneers. Others may be launched by official authorities, big HcPs, insurers and other institutions. Some are experimental. In most cases, whilst evaluation is paramount, indicators are not included – which can sometimes become an important difficulty for projects with a limited perimeter. It should be noted that this lack of indicators is also frequent in many ambitious programs.

However, the pioneer phase is necessary. Some important bases may be introduced, even if they don't yield the expected outcome (for example, a judicial framework). Actors learn from the mistakes of the first attempts. They especially learn the necessity of better communication and of cooperation with the wider public and with HPs. They learn to associate researchers, medical doctors and ICT specialists.

This movement is true for all types of pioneer activity, from independent start-ups, innovative HCPs to government programs. In the beginning, there activities are scientifically and technically driven. Then in a second phase, the programmes integrate key aspects that determine sustainability: monitoring through evaluation indicators, available capacities and motivation of workforces in the various concerned institutions (administrations, local authorities, HcPs), capacity building, information and consultation with HPs and patients. Indeed, everywhere, a majority of HPs and other personnel consider eHealth with caution. Of course, new programmes also integrate economic sustainability model or at least reflections and proposals.

In many cases, non-governmental pioneers unite progressively inside associations, think-tanks, scientific societies - a typical and interesting case is the Tunisian Society of Telemedicine which brings together the worlds of health and of ICT. At the same time, government and concerned administrations create a specially devoted organization - such as, for instance, the Office of the National Coordinator in the USA. Close cooperation between those entities is an efficient reinforcement of eHealth development.

5.2 Decentralisation, implication of field stakeholders, bottom up

In the majority of cases, decentralisation brings more stable results than centralisation. For eHealth systems, the old saying is true: "think global, act local". Bottom up approaches allow for better respect of local conditions, engagement of actors, close to the field innovations and better usage. Implementation of a healthcare ICT project impacts numerous stakeholders, including community leaders, healthcare officials at many levels, and various HPs. Engaging with them is usually a successful way to help bridge communication and cultural gaps, and to give a sense of ownership in the project stake; this practice also helps build trust among all concerned parties.

This change of approach has been largely illustrated, for instance, in Argentina and Brazil after the return to democracy.

5.3 Limited but mandatory constraints: legal and standards

At the same time, key constraints have to be enforced and promoted at the national / federal level – they are a condition for actors (including patients) engagement. These constraints relate to legal conditions, especially on privacy, and on HPs and HcPs liability.

While this is not always taken into account by healthcare managers and professionals, interoperability and standards are also an essential condition for successful developments at a wide scale; this implies some form of constraint but above all information and education.

This is coherent with the aforementioned observation. The national level is in charge of defining principles, promulgating laws and regulations in line with predetermined eHealth roadmaps as well as national interoperability frameworks for national projects, while eHealth practical developments are experimented and then deployed according to local engagements and initiatives. In large and federal countries, the legal framework has at least two important levels: federal (national) and states(regional) (see Argentina, Brazil, USA).

To generalize observations, it is necessary to identify the legal and organizational choices of a country. Most often, large countries need to let provinces, or states, or whatever administrative and governance organizations deal with at least detailed application of laws and rules. However, differences may also come from different cultures in different provinces, even in smaller countries (even languages may vary, as in Morocco). The most general situation is that smaller countries have more national rules. Amongst large countries, it depends on the respective role of the federal government and local authorities - and accordingly from the democratic nature of the constitution (examples of changes are for instance Argentina and Brazil). Also, in emerging

countries that have internal tensions and/or less democratic experience, the federal governance may play a much greater role, as is the case in India. Once again, a general observation of a country is necessary to ponder those different factors.

5.4 The possible advance of those who seemed late

Most eHealth preoccupations and projects relate simultaneously to establishments Information Systems and information exchanges between actors. They are also associated with new applications for professionals and patients, mobile or computer ones, as well as developments inside hospitals/clinics or at home. This situation generates some difficulties but also provides an opportunity to adopt a more coherent vision on health information management and to develop systems more centred on the patient and the territory.

Historically, development of eHealth has followed development of ICT itself: Enterprise Information Systems, then first connections with centralised bases, Electronic data interchange (EDI), development of local applications on workstations then mobiles. In older industrialised countries, the following step is progression toward a global vision where data and applications are shared and allow for multiple actors to play different roles on controlling data, from patients to hospital managers and medical managers. New modes for governance and organization are needed, while conflicts and difficulties accompany the change in the general paradigm. As reminded in I-2.2, this seems to be a general development track. Despite this being conceptually true, it is not the case concretely when developing or emerging countries, even sometimes industrialized countries, are considered.

Indeed, decentralization, empowering HPs and patients is adopting a whole new paradigm for organization and processes in the healthcare system, and eHealth provides not yet possible practical applications to foster it. Decentralization, as seen above, depends on the general constitution, policy and legal system. User empowerment is often presented as a principle and remain most often only wishful thinking. In practice, in a country like Australia, which has an elaborated eHealth strategy, it is a strong trend. In other developed ones, it depends on the status of patients or on new choices - the best example is here the Blue Button in the USA (see under and USA Annex). In emerging countries, it is most often not possible or conceivable - where democratic principles have been adopted, HPs and, more, patients are supposed to be represented through local authorities.

Two factors play in all countries an important role for fostering the new paradigm: the first is effort towards universal access for populations isolated from the main healthcare system hospitals and specialists, especially for mother-infant problem. In all countries, it is necessary to empower HPs and other personnel that follow these populations, and to give patients information and ways to reach the system. The second key factor which might become the main influencing one towards patient and/or HPs empowerment is *mHealth* ; indeed the mobile (device) is the first strictly personal digital tool and the most frequent one and all apps are more and more catering to user's specific needs.

This is indeed a key aspect when looking at differences between countries which are in different phases of development and thus adopt different solutions for transitions. The model can also be derailed because of specificities in industrialised countries, the main example being the USA where legal and economic organization holds back many exchanges and communication flows between competing actors.

In developing countries, government and stakeholders are confronted to the necessity of simultaneous developments of different parts of the health system. They have to take into account the needs of various healthcare institutions (as teaching hospitals, specialised ones etc.) as well as the request for patient access. eHealth is in these contexts developed with hospitals

installing advanced management and patient records systems while citizens are using mobile apps and request information. A global vision is needed and the situation improves if it is adopted. Accordingly, for instance, security and safety will be addressed at the general data circulation level instead of being ensured inside every healthcare institution fortified wall. Such evolution can be seen in observed African countries.

In developing and emerging countries, the most important aspect is the frequent by-pass of eHealth development stages. In particular, mHealth usage will from start be wider in countries where other entrenched systems do not exist or concern only a very limited part of the country (currently upper classes in European or American like University hospitals or private clinics). Other forms of by-passing may be related to the general organization of the healthcare system. The most surprising country in this regard is India. In this giant country, the scale of development model has been reversed. After a strong implantation of foreign private companies in the "India of the rich" and international aid for the vast poor population, India has become a world leader in Teleradiology and has launched eHealth applications international aid programs towards developing countries. Only then did the government launch a national effort, in coordination with the private sector, to widely develop eHealth applications for the masses and supported and promoted many mHealth companies. Despite understandable difficulties, this is an impressive and original path.

6. Basic foundations

This chapter is organized in conformity with most frequent approaches in the different countries, which are mainly determined by population and professionals' perceptions:

- inescapable needs and constraints – identity, directories of resources; (6.1, 6.2)
- main difficulties and factors slowing down or blocking eHealth development: safety, security, privacy – the common factor here being population and HPs mistrust; (6.3)
- technical difficulties: a reflect of more fundamental issues: technical matters which appear progressively with the development and deployment phases: interoperability, standards, data approach, themselves closely related; (6.4, 6.5, 6.6)
- a specific application which is considered an essential objective in all countries: EHR (6.7)

The following paragraphs indicate the most important tasks that are necessary to build solid foundations for a development of eHealth, as well as difficulties. It is obvious that these basic objectives imply very often heavy investments, which consequences will sometimes be seen only years later.

In fact, the development of eHealth corresponds to a general transformation of the healthcare system, an integration of ICT and of efficient information circulation in a huge and fundamental social ecosystem. Moreover, as this will be summarized in chapter 8, many developments are necessary in other systems: notably education and training, communication networks.

This makes difficult analysis of individual and collective health impact of general eHealth programmes and eHealth strategies, while in many countries basic investments are necessary, sometimes balanced with other immediate investments in the healthcare system.

However, evaluation is necessary in programmes and especially in precise projects. It has to be understood that it is more the evaluation process than the measured indicators that is fundamental, as promoters have to try and take into account all concerned parties and domains.

Considering specific diseases, treatments and populations, benefits of eHealth is already known, from developments in many countries and scientific studies. All things being equal, this is for instance true for isolated population access, for diabetic control or for emergency orientation systems. However, in many countries, mostly developing and emerging ones, basic information, necessary to measure benefits for patients, do not exist yet, nor the way to collect reliable information on real impact.

In this document, the general potential impact of basic foundations or of important objectives as EHR is not analyzed as it would vary must due to the country's and healthcare system' characteristics. Expected gains for projects are developed in annexes when possible.

i) Inescapable needs and constraints

6.1   Personal identity

Personal identity is a fundamental building block of eHealth projects, a condition for data sharing and exchanges in any digitised systems. It has to be approached carefully for eHealth as it depends on the general legal identity registration in the country but also on the relation between different identities – national, Health or other specific domains, etc.

Different starting points

Moreover, in many developing or even emerging countries, important parts of the population don't have a registered identity (national or local); people may have only an everyday name unknown outside their family and friends circle, village etc. In India, it was considered ten years ago that getting an official identity would be something really new and important for a great number of people.

In other countries, such as the USA for example, various identities are used. Inside the healthcare system, IDs are currently delivered by the insurer or by public service as Medicare (under governance of states).

General or specific health ID

In observed countries, a turning point is the definition of a unique non-ambiguous identifier inside the health space. It is a paramount condition to increase safety for eHealth; it is of course the condition for development of wide eHR systems. A common national ID is a powerful factor for developing services open to all, especially social and health services. However, choosing such an ID and usage rules is always a challenge, with conflicting administrative and civilian systems, and conflicting objectives between safety and privacy.

Generally, for older industrialised countries, or highly developed ones, a specific, healthcare ID system is developed in order to better protect safety, security and privacy inside a domain considered as very sensitive.

On the contrary, developing countries define a national system and differentiate conditions of access to bases containing private health information.

Challenges and control

Indeed, privacy and security are closely associated to ID management and special organisms are created to control either the databases themselves or the corresponding legal and technical rules. In Singapore, the National Health Identification Service (NHIS) is a patient master index; privacy and security are a vital mission of NHIS – Singapore's system has integrated role-based access,

data sensitivity classification and "break-the-glass" functionality. In Australia, healthcare identifiers were introduced in 2010 as the foundation for digital health and as a building block for the My Health Record system (see below) and other government digital health initiatives. The Healthcare Identifiers Service is managed by the government and is used by HPs and HcPs.

An important question is the management and control of identities. Once again, local control is often more efficient. In Argentina and Brazil (see 5.2 and under "data"), control has been returned to Municipalities, under legal constraints.

An impressive, revolutionary and risky solution

A very specific evolution in India has shown that different ways are possible, albeit risky, for a country aiming to go directly from the "no identity" to an advanced system. To access public social services and avoid fraud, India has built a biometric controllable ID for more than 1Md people. Introduced in 2009, the programme, named AADHAR4 (see India Annex), was deployed in 2014. A piece of paper holds a number and a QR code. The number, with validation by a biometric sensor, gives access to the Central Identity Data Repository (CIDR). In order to attain this goal at a rapid pace, the privacy risks have been neglected – moreover many different services, public or private, can use the system. In 2017, the project encountered opposition and legal difficulties as well as serious breaches.

6.2   Directories of resources

In all countries also, eHealth development implies the identification of HcPs and HPs and construction and maintenance of interoperable registries providing necessary details (such as localisation, status, specialties). Their creation is often a preliminary project when envisioning an eHealth system. They are included as key components when launching national programmes – for example, in Argentina, the 2012 National Plan of Cyberhealth created a repository to archive and distribute eHealth resources.

These registries are a solid base for better management and efficiency of the whole system. For example, in Nigeria, an electronic health workforce registry (eRegistry) has improved the management of a subset of the health workforce and enabled the tracking of capacity building activities and health worker competencies. In addition to incorporating Health ICT training into standardized curricula, the eRegistry and other services and applications present an opportunity for a nationally scaled health workforce registry and digitally supported health and ICT workforce education and training.

ii) Main difficulties, main blocking obstacles

6.3   Security, safety and privacy

It is of course a prerequisite to any development, in order to protect open health information systems and communication tools against errors and attacks, to ensure integrity of managed and exchanged data and to protect privacy. In the evolving world of healthcare organizations and techniques and of fast evolution of ICT, it is also a difficult challenge.

In all countries, national/federal governance considers it as critical and as a perquisite for all eHealth programmes. The governments are indeed legitimate as this a protection of citizens' issue; it also allows for citizen inter-states mobility in the case of federal countries.

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4 "Foundation" in Hindi language

However, depending on history, culture, economic development, effective means and results are highly variable.

An evolution

Awareness of this need and of the corresponding risks grows with economic development and growth of a middle class. For instance, in India, the people organizing demonstrations against the biometric ID base are mostly middle class.

In developing countries, governments emphasise the problem and create special controlling entitles. The example of Tunisia is clear: due to the growth of data circulation, a National Instance for protection of privacy was created in 2004. HcPs that intend to develop an external data exchange must request an authorisation. No one has since, which proves the necessity to develop a health data protection culture.

Persuade actors

It is necessary to convince all actors that security, safety and privacy are really ensured - even better than with traditional tools and processes. It is all the more difficult as there have been massive and visible attacks against hospitals patient records and insurance databases.

It is necessary to develop and ensure better security and it is also necessary to launch sustained communication campaigns towards citizens, HPs, HcPs, insurers. This is true in all countries, irrespective of their degree of economic development. It is the condition for establishing (and hopefully maintaining) trust and, hence, allow for eHealth deployment and efficiency.

Control

Control, under national precise rules and guidelines, is more and more decentralised. In Morocco, the regulation requires municipalities to have healthcare providers under their administration, capable of following the regulation, which implies modernization of systems to conform to standards and security, safety and privacy constraints.

Variable results according to organization of the Healthcare sector.

The case of the USA: advanced technology inside a fragmented and competitive system results in emphasis on security, safety, privacy, a domain where the federal regulation is legitimate and most active. This was at the heart of HIPAA national programme (1996) and was reinforced in Hitech Act (2009) and in ACA5 ("Obamacare", 2010) (see USA Annex)

However, it is still an important fear in population and HPs, even HcPs, due to past breaches. Moreover, fragmentation, which is observed in varying degrees in most health systems, is a factor in creating opportunities for hackers.

Risks

The main risk is the current fast evolution and emergence of the new world of mHealth and its many new applications, sometimes integrated in the "cloud". Moreover, combination of multiple developments will lead to difficult problems. Combination of applications and ways of communication for the same individual, through mHealth, social networks, cloud located applications, collection and partial anonymization of personal data for research create new possibilities for breaking privacy. It is the next big challenge in the domain.

iii) Technical difficulties: a reflect of more fundamental issues

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[5] Patient Protection and Affordable Care Act

6.4   Interoperability

Since it became possible to exchange digital information, interoperability has been a kind of Holy Grail for eHealth. It is an elusive and moving target.

Awareness: a slow progression

Interoperability is currently not cited initially as a critical point by stakeholders. This is often the case even with ICT specialists who have only installed and used administrative applications and patient management and medical information in legacy systems. As soon as they are confronted to data exchanges and have to share bases in an open environment, they rapidly change their mind (this appears clearly in periodic surveys by WHO representatives in the different countries [5]).

At the beginning of experiments or programs, most actors – administrative, HcPs, HPs, ICT specialists – see interoperability as a technical challenge, as confirmed by WHO observers. It takes time to progress through the layers to the truly most critical and more difficult one, the semantic layer. Indeed, this layer is closely related to culture, language, organizations. PAHO and other observers consider semantic misunderstanding a complex and serious obstacle to interoperability.

An obstacle: existing Health Systems

Another challenge is the lack of unique interoperability within health systems, due to a lack of integration among the existing information systems.

This leads to some paradoxes, notably in developing or emerging countries, where foreign hospitals and clinics have been for some time the most advanced actors, with closed walls around their information systems. A striking example is India, where information systems of foreign actors (nearly all US companies) are non-interoperable.

Multiple initiatives but a national strategy is mandatory

Interoperability cannot progress without a national strategy. Most countries have eventually adopted one. In the USA, it was a key element in the creation of the Office of the National Coordinator (ONC) in 2004.

Such strategies are also adopted in developing countries, such as Senegal or Nigeria.

Ambitious projects are launched, which must conform to an interoperability framework, which depends on local evolution of infrastructures and existing healthcare organizations whilst being as resilient as possible to fast ICT changes. Project governance and promoters have to select the prioritized needed standards. IHE is generally considered one of the most important, as it describes workflows – a project has to choose an IHE profile. Furthermore, there needs to be a strong coordination between eHealth specific standards and ICT ones – the difficulty here being that these evolve fast along with technical capabilities.

Efficient moves: national programmes and concentration on data

The examples of Argentina and Brazil are clear.

The national/federal government provides main directions and the states and municipalities produce coherent data which stimulate de facto interoperability in a growing number of systems.

In Argentina, an important principle of SISA (Integrated System for Argentina Sanitary Information – see Annex) is respect of federalism – i.e. negotiating with all partners and signing conventions with concerned authorities.

As the head of SISA declared: "Basically, SISA is designed to resolve the fragmentation of healthcare information. SISA will help to facilitate work, so that one isn't always filling in

hundreds of forms, so that we're always using the same language, codes and criteria to make everyone's job easier."

In Brazil, national interoperable systems as Health Records Register, National Health Card, Telehealth, Health Portal, Ministry Office for Support of Strategic Management (SAGE) play the same strategic role. In fact, eHealth is a component of eGovernment.

International movement

(see under 11)

International organizations are powerful actors and promoters in the battle for interoperability, each of them

An agreed upon model is the eHN adopted "Refined eHealth European Interoperability Framework" [6][6.] PAHO, notably, cooperates actively with EU MS around EIF.

From lip service to real action

In all countries, legacy systems as well as dynamic new developments have created fragmented non-interoperable healthcare information systems. The importance of new programmes has stimulated a real demand for interoperability since the beginning of the 2010s to the current period. It is now a key challenge for all actors.

6.5   Standards

As seen above, standards are necessary for interoperability. The problem is that interoperability is often developed for important programmes with simultaneous intervention of conversion and EAI-EDI platforms.

Those that should be present in all programmes and projects should be ISO general ones and specialized ones created and governed by wide groups of stakeholders, SDOs (such as HL7, IHE, DICOM, SNOMED International, Personal Connected Health Alliance…). These have a technical role but they also have a great promotion and communication activity.

Moreover, in many countries, incentives are proposed for exchanges that appear critical, notably messaging services – for example, in order to receive the eHealth Incentive, Australia imposes a standards-compliant secure messaging capability.

As noted, the progression in the standardization/interoperability layers is slow. Despite the semantic layer being considered the most important, it is also left to intermediary services.

This is why SNOMED-CT has become a powerful international organization but is still limited principally to research and experimental or limited applications, even if many countries are members.

A confirmation is given by this example: Recommendation ITU-T H.860 (2014), Multimedia eHealth data exchange services, which specifies a common health schema applicable to a wide range of health systems, refers exclusively to WHO ICD for diagnostics and complaints, AMA CPT for procedures and LOINC for clinical observation. No reference is made to clinical terminologies such as e.g. SNOMED CT. *[see JAseHN D.8.1.2]*

6.6   Health Data

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[6] The ReEIF distinguishes 6 main levels: Legal and regulatory, Policy, Care Process, Information, Applications, IT Infrastructure

More and more countries start with data collection and as much as possible unification of data capture and management on important lifelong elements – pregnancy, birth, death, epidemiology, contacts with the health system, social assistance etc. It is a preparation for interoperability and then for local eHRs. Typical and strong examples are Argentina's SISA (see Annex) and Brazil DATASUS service in the Ministry of Health.

This approach is followed after unique national controls have proved inefficient in big countries and return to federalism and local autonomy have shown that local authorities are much abler to deal with local data. Simultaneously, the national or federal level is legitimate in defining data standards for personal data as identity, date of birth, death statistics etc.

iv) An essential objective and application

6.7 eHR

All countries generally consider eHR a central objective but also one that cannot be attained without a serious and long preparation, including the aforementioned key points (identity, registries etc.). To that end, many developments aim at guaranteeing validation of data and interoperability of repositories. In countries like Argentina, with wide autonomy of states and recent effort towards a unified system and interoperability, public agents in charge of these subjects admit that no national eHR can be attained before some years and they start by building a coherent system emphasizing data definitions and communication.

In Argentina, SISA paves the way towards a national EHR, notably through the publication of data dictionaries and compatible codes for different types of records and specialties.

The head of SISA declarations are quite meaningful in this respect:

- Do you think that this will one-day lead to a healthcare system that connects the whole country?

That's the idea but we know that there's a long way to go. The other piece of advice, I don't know if it's advice or just a thought, is to keep in mind that this process takes time, many months and years of work and a lot of records. Everything will come together in time to create the citizen's record and ensure the regular functioning of all the nominal records. [7]

National eHRs are not generally implemented and remain in the development phase. However, at local levels (sometimes wide urban areas) many developments exist (in Argentina and other countries).

7. Common fostering factors

7.1 Universal health coverage / universal access

WHO definition

Universal health coverage has been defined as a key objective for the 21th century by the declaration of United Nations General Assembly Sixty-Seventh Session Global Health and Foreign Policy adopted on December the 12th 2012. [8]

> Universal health coverage is the goal that all people obtain the health services they need without risking financial hardship from unaffordable out-of-pocket payments. It involves coverage with good health services – from health promotion to prevention, treatment, rehabilitation and palliation – as well as coverage with a form of financial risk protection. A

third feature is universality – coverage should be for everyone. Although many countries are far from attaining universal health coverage, all countries can take steps in this direction. Improving access is one such step.

Universal health coverage is attained when people actually obtain the health services they need and benefit from financial risk protection. Access, on the other hand, is the opportunity or ability to do both of these things. Hence, universal health coverage is not possible without universal access, but the two are not the same.

Access has three dimensions:

- Physical accessibility. This is understood as the availability of good health services within reasonable reach of those who need them and of opening hours, appointment systems and other aspects of service organization and delivery that allow people to obtain the services when they need them.

- Financial affordability. This is a measure of people's ability to pay for services without financial hardship. It takes into account not only the price of the health services but also indirect and opportunity costs (e.g. the costs of transportation to and from facilities and of taking time away from work). Affordability is influenced by the wider health financing system and by household income.

- Acceptability. This captures people's willingness to seek services. Acceptability is low when patients perceive services to be ineffective or when social and cultural factors such as language or the age, sex, ethnicity or religion of the health provider discourage them from seeking services.

A general trend

In nearly all observed countries, universal access and universal financial coverage have been important elements of health system organization. However, financial and social security reforms have triggered political debates and have often contributed to the impulse towards national reorganizations before the launch of eHealth applications and specialized centres aiming at progressing towards universal access.

For financial coverage and social protection, a common trend towards reduction of social differences appears. Health has become such an essential concern that huge discrepancies are socially and economically not acceptable any more. Evolution towards more equality is the source of harsh conflicts but eventually all countries move forward – be it in those where public social security systems are dominant or in countries where open free market is the general norm.

Contrary to social protection itself, universal access to essential healthcare services is always regarded as a necessary progress – even if this is only likely paying lip service for some stakeholders. Here, only practical measures are to be considered. In all countries, establishing universal access is a key objective and a strong motivation in developing eHealth. The main problem is access differences between urban areas, especially important cities and, distant from them, rural, mountainous or desert areas lacking HcPs and HPs. These differences are closely related to socio-economic and cultural ones. Many eHealth centres are established and applications developed in order to allow HPs in these areas to get support and expertise from specialists and regional or University hospitals. For the population, if it is possible given infrastructure, mHealth is privileged (even through feature phones).

7.2   Evolution of diseases and population structure

One of the main factors of eHealth development is the evolution of the whole health organization. All across the globe, it is impacted by similar factors: growing importance of NCD,

demographic change, including the growing concern over the elderly and dependant people at home, medicine techniques progress and middle classes growth.

Emerging countries and less developed ones simultaneously have to fight old threats (mainly infectious diseases) and to create structures and centres to address what the EU calls Active and Healthy Ageing. In many places, governments have to arbitrate conflicts on allocation of financial resources. Everywhere, these conflicts are related to differentiation between social groups. Disadvantaged populations in remote zones need access to healthcare; GPs and HPs need access to specialists; this need is one of the first drive for eHealth. For richer people and advantaged urban zones (though this is not true everywhere), home surveillance, home cure and home care are growing.

7.3   Public health

An essential eHealth development factor is the growing concern over public health and level of exigency.

All countries cooperate in epidemic international surveys and control. Local authorities are more and more concerned with citizens' health, education, prevention measures, and detection of threats. Big cities lead the movement and need health information as well as cooperation with HcPs for launching education campaigns on drug, tobacco, sport and exercise etc.

Public Health needs more comparable data and stimulates data collection and interoperability. The fast development of continental or even global epidemics as well as addictions, or even international fraud (notably for counterfeit medical products) imposes cooperation in order to collect, validate and exploit common data. Even in the USA, where states legislation rules most of eHealth applications, the Centres for Disease Control in the different states work under common rules and solutions.

7.4   Knowledge diffusion

Diffusion of knowledge mainly follows a central-peripheral track7. Largest knowledge databases are international, with participants such as the huge National Library of Medicine in the USA. Apart from scientific information, virtual libraries also give access to all information that is necessary to develop eHealth – as processes, models etc. They then are adapted and disseminated, often by University hospitals and national scientific associations.

In Latin America, PAHO's role is especially focused on Scientific Information. Argentina and Brazil have a special agreement with participation in BIREME (PAHO Latin American and Caribbean Centre on Health Sciences Information) and WHO's Virtual Health Library. Current projects include:

- Virtual Health Library project, which promotes the inter-institutional partnerships for the production of health information
- Scielo, an electronic journals portal for comprehensive and unrestricted scientific content
- Capes portal, which makes international journals available free of charge to all of Brazil's teaching institutions

Then, they create specialized documents for HPs teams on the ground.

Many other countries healthcare authorities understand the importance of knowledge diffusion and circulation. India has created the National Knowledge Network (NKN) (Universities,

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7 Central-peripheral seems here a more adapted expression than top-down to reflect the concerned process

Research, International) and the National Medical College Network (Scalable, Hierarchal, Secured IPv6 compatible Network riding over NKN).

Senegal has started pooling of knowledge and competencies in a national eHealth registry, to which the government has committed continued support. The registry is in itself an important step to enhance the development of telemedicine in the country, as it may be used as a formative tool for greater coordination. It includes the organizations and activities involved, information on the technology used (especially software), and the data collected.

7.5 Special centres, organizations and applications for common major problems

Mother and infant

All countries observed in this study have developed centres and special applications to address questions related to pregnancy, childbirth and infant health. These tools are generally successful since they correspond to a clear need and are usually well accepted. Reductions of maternal and infant mortality are clear indicators. Most of these systems address all women but are actually oriented towards poorest, or less educated and informed parts of the population, or sometimes only to women living far from clinics and hospitals. They use, depending on availability, different levels of eHealth: most often mHealth (e.g. phone reminders for examinations and appointments), but they also target local HPs (rarely GPs but nurses, midwives, for communication with an obstetrician).

Many of these programmes have benefited of WHO's initiative "Be he@lthy, be mobile", launched with the International telecommunications union (ITU) (see under chapter 11)

- A remarkable example is Mom Connect, a nationwide mHealth project in South Africa. It is a free service that aims to use mobile health tools, messaging services and other platforms to create awareness among pregnant women about available health services for their infants and themselves. (see South Africa Annex).

An example of the numerous possible applications in Nigeria:

- Zero Mothers Die App, a mHealth application providing critical maternal health and new-born care information to pregnant women, new mothers and the frontline health workers serving their communities; the Zero Mothers Die Consortium is composed of the Advanced Development for Africa Foundation, Millennia2025 Women and Innovation Foundation and Universal Doctor Project, in partnership with UNAIDS, Airtel and Global Partnerships Forum.
- OMOMI (meaning "my child"), a mobile platform consisting of a mobile app and an SMS service that enables mothers and expectant mothers monitor their children's health, as well as provide access to relevant maternal and child health information plus medical expertise.

Gifted Mom software, a health app that provides automated SMS alerts to subscribers. It enables pregnant women track their antenatal care schedule; the platform sends notifications about pregnancy related facts. It also allows women to ask questions about their condition and provides answers to those questions.

Other general centres and actions

New programmes and projects are centred on NCDs: diabetes, heart failure, chronic obstructive pulmonary disease (COPD) and more and more frequently, cancer. NCDs are the other key objective of "BeHe@lthy be mobile" (see under chapter 11).

All include (also the case for mother and infant projects) educational elements for the population and for the first proximity level personnel.

8. Common difficulties, insufficient efforts, heavy investments still needed

8.1 Education and training

Need for education and for on the job training is immense in all domains of eHealth and in all countries, for all professionals and all of the workforce.

The situation is evolving but there are still not enough initial trainings for HPs where knowledge of basic ICT and eHealth usage and potential is included.

ICT specialists are in high demand in all economic sectors and it is difficult to recruit them. Moreover, trained engineers and technicians are also needed, with knowledge of specific health domain questions.

Training is also insufficient for managers in and out of the sector, notably in public administrations and local authorities.

This point is regularly monitored by WHO observers [5].

An eHealth application is especially helpful in that regard: eLearning. This is more and more developed from University and high level specialized centres, for on the ground HPs.

For all reviewed countries, investing in education and training is a huge effort and it is probably the most important for deployment.

8.2 Insufficient consideration of local and concrete constraints

Once a budget is found and an economic model validated, it is often slowed down because promoters neglect local conditions and differences between them (see 5.2) – and corresponding time and financing needs.

8.3 Insufficient communication and promotion

Most often, apart from trust about legal guarantees and responsibilities, deployment is handicapped by lack of workforce availability but also by reluctance and often insufficient timeframe to enter the new domain. In fact (for example in Argentina), municipal or regional hospitals have difficulties in entering in new logics, often because they do not have enough time for it.

8.4 Legal rules

A serious constraint to full exploitation of eHealth and especially Telemedicine comes from a rule that had been established in the past: in many countries (notably in most states of the USA), Telemedicine is only possible between HcPs sites. This prevents even a doctor visiting a patient at home to call an expert and to request reimbursement for the consultation.

8.5   Security and privacy

Unfortunately, another insufficiency concerns a central domain, security and privacy. In fact, the majority of spectacular breaches concerns installed health information systems, especially in hospitals. Indeed, very dangerous threats have been emphasized. For instance, in the USA8, huge and very public leaks and hacks have led to the publication of characteristics and records of millions of people. This has obviously a very negative impact on trust in outside communication and Internet access and consequently on eHealth.

For new domains and applications, the risks are obviously very great but technical operators take them into account from start and legal regulations have been enforced. Unfortunately, social and political pressure often lead to underestimate or neglect the security and privacy stringent requirements, bypassing pilot projects and evaluation. Going too fast is the main risk here. An example is the India AADHAR identity base, which has suffered large hacking (see 6.1 and India Annex) and needs an overhaul.

8.6   Infrastructures and equipment

In all countries, high-speed data networks usually do not reach remote areas where the need for videoconference and image transmission is the strongest.9 This is also true for mobile networks coverage. Moreover, in less developed countries, many people only have feature10 phones, which limits applications to voice and signalling channels.

It is widely admitted that connected objects and the Internet of Things are disruptive technologies that help addressing some key objectives of the health policies as prevention, mobility, at home patient monitoring. However, most systems and applications are still in pilot phase. In the countries that have been reviewed, they are not yet included in wide programmes and general eHealth policies. Accordingly, the present document will not mention this type of projects. Nevertheless, a regular survey is mandatory, as reminded in part I.

8.7   Conditions for development of eHealth and evaluation

As noted in this document (see notably 12.2), it is a constant necessity to integrate evaluation in the development of eHealth. This is of course clearly explained in the WHO toolkit. However, it must be stressed that it is rarely the case, even in projects which have integrated indicators – for instance because World Bank financing makes it mandatory.

This is not surprising for a recent phenomenon, at least when new programmes and project are starting and when promoters, authorities and users do not know most conditions and possible difficulties or neglect them. Moreover, for most people at the beginning, eHealth and Telemedicine are viewed as technical objects and ICT technicians are relied on to solve possible problems. Indeed, it appears that it is only when specialized agencies are created (in most countries it happened in the last five to ten years) which, building on experience, the different indicators and parameters are considered (ONC in the USA, special department in Argentina, NDHA in India etc.). Other actors that can play a role are eHealth associations, if they include health and ICT actors, as in Tunisia.

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8 Many examples are found in the USA, probably because they are known and failures are not concealed.

9 Even in the USA, where 25% of the population was not connected to the Internet in 2015, due to size of the country and cost of connection.

10 There is a limited and diverse range of capabilities for these basic mobile phones.

To be able to integrate indicators when designing or launching a project, one needs information and statistics on health and healthcare system. It is also fundamental to adapt known eHealth methods to local conditions, a bottom-up approach which is often underestimated by central Ministry (or even State Ministry in federal countries). Accordingly, the WHO toolkit details initial conditions that must be taken into account – be it geographical, capacity resources, communication tools, health local situation etc. The problem is that these are very often not known, especially with the necessary relevant local details. Anyway, as reminded above (5), the most important in evaluation is probably the promoter's frame of mind and methodology. Even if information is not sufficient now, applying a rigorous evaluation approach imposes to consider all possible factors and impacts, all concerned groups and domains.

In many cases, the first evaluation concerns the number of HPs, or personnel, or patients enrolled in the programme – this information is currently given by the reviewed projects and is confronted to the attainable objective. This is clearly a first level indicator which shows that the acceptability of the project – it is of course only a beginning.

> Example: the evaluation of the Indian project Mother and Child Tracking System (MCTS), launched in 2012 to facilitate timely delivery of antenatal and postnatal care services and organize missions for the first level HPs in the remote and poor areas (Auxiliary Nurses Midwives).
>
> The Public Health Foundation of India evaluated the expected performance of MCTS in areas in Rajasthan and Uttar Pradesh in 2012, applying a Data Quality Assessment and a survey to identify implementation challenges. The survey comprised semi-structured questionnaires for health staff in the sampled districts, observation checklists and survey investigator notes. This study concluded that there were many practical obstacles for data collection, communication tolls etc. and that the responsible personnel for control were not sufficiently trained to apply the programme. There was still much to do.

Once again, non-European countries encounter obstacles that are much less important in Europe, for two reasons: extreme diversity of actors in nearly all reviewed countries, or less experience of sustainable and coordinated development. Hence, the groupings of countries are those which could promote evaluation rules and models. PAHO, which is directly engaged in Latin America projects, has cooperated with the EU and EU MS to define a "Framework for the Implementation of a Telemedicine Service" [10], published in 2016. Largely based on the WHO toolkit, the document addresses the conditions and the whole process to create, develop and implement a sustainable project, as well as follow-up, evaluation and optimization level. For the telemedicine part itself, PAHO follows the Model for Assessment of Telemedicine Service (MAST11) (see JAseHN D7.4 on HTA in Key Sources). Here, PAHO exploits its rich experience in concrete developments to develop the framework.

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[11] MAST was developed in 2009 by an EC MS Institutions consortium and applied and validated in 2013 in Renewing Health Project

9. Towards "public-private" cooperation

9.1 Which public and private systems?

As underlined in I-3.2, these denominations do not define clear and comparable sectors in all countries. However, if one considers HcPs, the most commonly drawn border between the two is often "who finances what". Currently, public structures investments are funded by Governments, States (Provinces, Regions) in federal countries, Municipalities. In nearly all countries observed in the study, most of the public system is developed for the poorest segments of the population. The main exception concerns some central University hospitals.

Two types exist inside the private sector: HcPs that are financed on the market and HcPs that are financed through not-for-profit foundations, associations and in general NGOs. In most countries, this distinction is also true for ambulatory care, while physicians are either independent professionals or are employed in public clinics.

At the same time, the patient payment for services has to be taken into account: very often free in most parts of the public sector, it comes partly from direct patient expense in countries where there is an important difference between upper classes and the other segments of the population but the greatest proportion comes from private insurance subscribed by the patient. The trend is to develop public social insurance and mutual funds, accompanying the development of registered employees and middle-class populations. India, for instance, follows this typical evolution. Indeed, from a commercial point of view, healthcare is a fast-growing market and private initiatives and funds as well as international companies play a growing role. They can be local ones (in India or Brazil notably) or international groups – among them the USA or EU countries, depending on the general trade and relations. In developing countries and emerging ones, international NGOs are very active to help the poor or displaced populations.

9.2 The boundaries and oppositions between systems are blurring

The existence of two distinct systems is a current reality in many countries at all levels of development: one for the poor and one for the rich. However, both systems have more and more to cooperate and to support common developments. In that domain, eHealth is a major factor and a main tool for many reasons:

- In the information society, there is no such thing as a completely closed domain – information as well as tools circulated.
- All elements of health and healthcare systems are dependent on national and regional systems and resources which do not belong to the Health domain - notably Research, Education and Training as well as Financing mechanisms. These are strong common factors for eHealth and ICT development and for reduction of barriers.
- Citizens and patients move inside the whole national system and notably between states in federal countries (and even beyond country borders) and, despite social differences, they need continuity or care and health information exchanges, and they ask for them.
- Major immediate health threats are common to the whole population.

Hence, all countries organize cooperation, interoperability and common regulation through different mechanisms: creation of national agencies, mandatory interoperability and standards.

Two types of reforms lead to similar results. Those, as Argentina or India, which had mostly socialized systems, let open market forces create private health businesses on a wider scale. whilst the more free market oriented countries create public clinics and extend access to private HcPs through evolution of insurance and social protection system allowing for access to private services.

9.3   More cooperation

In fact, cooperation starts at all levels and includes a growing number of actors. Good examples are Tunisia and India. In Tunisia, the progresses that have been made through many political and economic difficulties could not have been possible without the continuous effort of a Society for Telemedicine and eHealth that associates HPs and ICT specialists – of course with their respective structures/companies. In India, programmes are conducted directly by association of administrations, healthcare organizations and ICT or Healthcare private companies.

9.4   A somehow different role

One must remember that innovative eHealth developments can arise from researchers in University hospitals as well as from ICT actors creating start-ups. However, it is important to underline the fact that, in many cases, the first users are private ones – in that case any HcP is free to adopt new tools if they comply with the legislation (notably for safety and privacy). Those private users play an important role in the development of application.

9.5   Some difficulties for observation

Official reference documents are produced by official administrative structures, from national to local, which tend to concentrate attention on systems they manage, control and develop. The consequence is that the commercial sector, and sometimes all of the private sector, is neglected in initiatives or at least in project descriptions.

This type of presentation sometimes conceals a phenomenon that is actually quite important. Private actors, usually better funded and free from public administration management rules, are less constrained than public actors. Moreover, they exist because they rely on private money for investment (be it from citizens, donors, financial funds). This is why, apart from University hospitals, in many observed countries, eHealth innovations and telemedicine tools are developed often first in the private HcPs domain before deployment of the application, or a similar one, in the generally wider but more financially constrained regional and local public hospitals and centres.

10. A new type of eHealth

All the above-mentioned evolutions, programmes and projects have somehow prolonged known processes and have respected cultural, social, organizational rules while adapting them. They have stimulated an acceleration in eHealth development after a slow start due to resistance of the previous generation of systems. However, in doing that, they have modified enough parameters to create a rupture, with at least four major elements.

- Patient empowerment. This becomes an objective for many actors and appears in many developments. A typical one is the USA' Blue Button12 (see USA Annex) which lets the patient decide which data can be transmitted between organisms that have collected them, on a voluntary basis for the concerned organisms.
- mHealth. In the huge flood of mobile applications, only a few numbers have taken into account existing legal and security/privacy constraints. This flood has taken most health and healthcare authorities as well as HcPs with their pants down. On the contrary, individual users, perhaps not very empowered, massively adopt these services.

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[12] A symbol appears on the site of voluntary public or private services that store patient data – he may download them and control their communication to other service providers

- Blurring or disappearance of borders between health, well-being, wellness and personal activities. This phenomenon was in fact slow because of administrative and economic organizations which are not tailored to such a worldview but mHealth and individuals are not hampered by these concerns.
- Innovative applications and processes (see under "innovative projects" in 12.2). Those completely modify existing processes.

Clearly, these new and recent developments are a powerful fostering factor for eHealth. They have not yet been really combined with AI, Big data etc. but they are collecting the necessary information to accelerate them. They will probably progress faster in developing or emerging countries. Once again, an example is India, which fosters mHealth start-ups expansion, already on an international scale.

11. International influence and growing international cooperation

A main factor fostering development of eHealth is the impressive surge in influence of international actors of all types and their growing cooperation – between them and with the national governments and stakeholders.

eHealth is more and more a key component of globalisation. Some examples are given here.

Official international organizations

WHO-PAHO, ITU, World Bank, UN, OECD…[13]

Cooperation between actors of health, ICT, economy, finance in every country is reflected in cooperation between international official intergovernmental organizations. It is a powerful fostering factor of eHealth development and converging characteristics.

- Of course, WHO plays an important role while OECD considers the more and more growing importance of eHealth for economy and for the Health related sectors see JAseHN D81.1, D81.2). WHO's impact on projects, from a technical viewpoint, comes initially from the necessity of common and standardized information to realize the global epidemic surveillance network. WHO has developed the eHealth Observatory which produces periodic reports.
- PAHO (see 4.3 and PAHO Annex) has a direct intervention, grouping voluntary countries in common projects.
- The trend towards health and eHealth regional associations is now important. Regional organizations (continental geographical areas as defined by WHO) created initially for political and economic grouping are more and more concerned - the main example is the African Union, which has developed the Africa Health Strategy 2016-2030, strongly linked to WHO recommendations and programmes. The African Union is firstly concerned with public health, pandemics and epidemics, but this lead to observations about healthcare systems and information systems. Similar concerns determine the Association of Southeast Asian Nations (ASEAN) growing intervention and health ministries meetings, notably for NCDs, children protection and health.

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[13] The trend towards international cooperation is confirmed by the creation in February 2018 of a new organization, the Global Digital Health Partnership (GHDP), that brings together thirteen countries, Hong Kong Special Administrative Region and WHO. Objective is to « support best use of digital technology in modern healthcare ». The group wants to unite « governments, public agencies, and multinational organizations responsible for policy, funding, and delivery of health services to their citizens. »

- Other regional groups, which have been initially based on economic cooperation, extend their action towards social development and health policies. An example is the Union of South American Nations (UNASUR), formed by 12 States inside Mercosur, which partners now with WHO and wants to attain health integration amongst its members.
- A more direct health grouping proposal has come from India towards its neighbours of the Bay of Bengal Initiative for MultiSectoral Technical and Economic Cooperation. The proposal is to create a special sub-group concentrating on health information exchanges.
- WHO and the International Telecommunication Union (ITU) have launched the "Be He@lthy Be mobile" programme. It helps countries set up large-scale projects that use mobile technology, in particular text messaging and apps, to control, prevent and manage NCDs such as diabetes. This has for example allowed Senegal to launch the mDiabetes campaign in 2014. "Be He@lthy Be mobile" also supports mother-infant programmes. (see JAseHN D8.1.2).
- The World Bank finances programmes but mostly precise projects.14 The Bank supports eHealth development in accordance with WHO objectives and principles. Healthcare progress is viewed as a key component of development. eHealth and mHealth are at the forefront for developing countries and the Bank follows main recommendations of WHO eHealth Strategy Toolkit – for example the necessity to integrate evaluation tools in projects (see Annex). Some precise health domains are included in key objectives: child mortality, maternal health, combat against HIV/AIDS, malaria, and other diseases. These domains are precisely those where eHealth applications are very efficient.

Research, education, international reference networks

As already underlined, this domain is the most important – grouping here virtual libraries, Universities networks, education and professional training. It is also a domain where international cooperation is important, through scientific exchanges, librarian world, production of MOOCS and other tools, associations of teachers…

Specialized countries groupings

Such groupings are created due to action of an official international organism or of industrial association. Example is the Afro-Arab Telemedicine Network organized by the ITU.

Other groups will appear, around important actors of a geographic zone. An example here is the 2017 Indian proposal to create a specialized alliance inside the Bay of Bengal Initiative for Multi-Sectorial Technical and Economic Cooperation, formed in 1997 between Bangladesh, India, Myanmar, Sri Lanka, Thailand, Bhutan, Nepal. The leader of the project is JIPMER Hospital[15], which has telemedicine collaborations with institutes in Japan, Korea, Malaysia, Indonesia, the United Arab Emirates, Saudi Arabia, Germany, France, the United Kingdom, and is part of major international networks (such as GEANT[16] in Europe).

General countries groupings

Organizations in geographic zones have included health in their important objectives. This is the case for the African Union, which has made the fight against AIDS as a priority. This implicitly makes mHealth a key tool for collecting information, assisting workforce and local authorities.

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[14] See under (12.2) the concrete difference between programmes and projects

[15] JIPMER is presented as one among the top best five medical institutes in India and the number one center in medical education and training.

[16] GÉANT is the pan-European data network for the research and education community.

Private stakeholders' groupings and societies

- Citizens and patients' associations and social networks
- Communication and information, organizations working specifically on eHealth' promotion and communication (as Healthcare Information and Management Systems Society – HIMSS)
- Forums and scientific societies, as the International Society for Telemedicine and eHealth (IsfTeH).

Private international not-for-profit organizations and institutions

- In developing countries and emerging ones, non-governmental organizations (NGOs), are very active in the health domain and they support more and more mHealth projects.

Associations supported by governments and not-for-profit structures

Two examples of very active associations: the Pan African e-network and the Réseau en Afrique francophone pour la télémédecine (RAFT - network in French-speaking Africa for telemedicine). They bear remarkable similarities: they are both the results of an international partnership (with India in one case, Geneva University in the other), they both operate on a continental level, they both focus on eLearning for health professionals, mainly via conferences provided by doctors from India and Geneva, and they are both organized around specialized local health centres.

Private firms

During the first phases of development of healthcare systems and then of healthcare information systems, private for-profit and not-for-profit companies, based in the USA and less frequently Europe, developed advanced hospitals and specialised centres for urban high-income population in other parts of the world. Some also developed or sponsored aid programmes for the poorer parts of the population. They were joined by insurance actors. In all countries outside Europe, their role is important. In the more recent periods (the 2000s and even more in the 2010s), they entered like all actors in cooperation with national governments; it was a need of the market or a constraint by governments.

Among international industrial firms, telecom operators play a special role in all countries. They are a powerful promoter and actor of eHealth, in a very competitive market.

Official policies and projects do not refer in general to the intervention of other industries and private companies, which is however a powerful and concrete engine for eHealth and especially for interoperability: ICT companies, technical devices producers, from the radiology and other connected equipment to captors and mobile or home ones.

Consulting groups, which operate worldwide, also have a great influence as they advise national governance and important stakeholders.

12. A reflection on analysis tools: towards grids and a possible database

As stated in the methodology (I-1.3, I-4.4), it is necessary to define common grids to characterize projects. At this stage, two grids are envisioned: for programmes and for precise concrete projects. These could be linked when projects are included in more general programmes.

The objective here is not to develop a worldwide eHealth policies and programmes classification. This is the purpose of common work between the eHN, WHO and ITU *(see notably D8.1.2)*. It is not either to share eHealth strategies at the same precise level that what is prepared by JAseHN D7.1.1 for eHN MS. However, D7.1.1 is a precious source to identify some key elements towards characterizing programmes and eventually projects. At the present stage, a conceptual framework

is still not practically applicable for a wider group of countries, that are very different from European ones and constitute a very heterogeneous group.

A key objective for this deliverable is to provide elements to identify projects that present opportunities for mutual exchanges and even cooperation with eHN MS. Then, these projects, if considered worthwhile, would be analysed more deeply through direct exchanges with local experts or interested MS representatives. Of course, as many parameters as possible will correspond to those used in WHO, eHN and JAseHN documents (see I-4.4). This is, the authors hope, a base for discussions and exchanges.

To build a sustainable mechanism allowing eHN MS to share information on non-EU projects - and even to share it with concerned non-EU countries -, the eHN MS and the EU who have respectively a rich experience could start from platforms as suggested in ePSOS, eHGI, and the more recently by EXPAND. Indeed, much work has been done on rules for interoperability, conversions, security when sharing eHealth information and projects and dealing with languages, thesauri, taxonomies.

12.1   eHealth policies and programmes analysis grid

The domain is very large. It includes all applications and systems concerning healthcare as well as well-being if there is a medical objective in its control (even primary prevention, for example through a connected check-weighing scale). The well-being applications for all citizens, now a very strong market, is excluded - as much as possible since new approach of medicine makes borders more and more fuzzy.

As explained in I, many differences are not easily visible to a foreign observer. To avoid ambiguity and allow for longer term vision, a programme will be first positioned along general axes, then precisions must be given on actors and on key impacted domains[17]. The main difference with much more advanced models comes from the great diversity in programmes status and governance. There may be no national strategy when the programme is launched and even when it runs. Programmes (and projects) can be conceived by independent actors, or at least totally separately from an eHealth development policy, and even derail it.

The first axes reflect common differentiating approaches:

- Fundamental health problems
    o Life events: main example - from pregnancy to mother-child relation
    o Behaviours – addiction – ex tobacco, stress
    o Pathologic episode: infection – fracture etc.
    o NCD: cancer, diabetes mellitus etc. and those related to ageing – arthrosis, Type 2 diabetes, etc.
    o Mental Health
- Main categories of Healthcare activities
    o Primary prevention
    o Secondary prevention
    o Diagnosis
    o Cure
    o Care
    o Emergency
    o Surveillance

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[17] Categories combine analysis grids presented in I-4.4

- o Public Health
- Central objectives
    - o Universal access
    - o Active and Healthy Ageing
    - o Citizen empowerment
    - o Pregnancy, childbirth and infant [18]
    - o Specific NCD (COPD, heart, diabetes, cancer, aids, psychiatric diseases etc.)[19]
    - o Healthcare system organization, efficiency
    - o Performance-based governance
    - o Enabling data use for secondary purposes (public health, research)
    - o Open government health data

The programme is then characterized by actors, key domains, applications and techniques, but with less details and precisions that will be used to describe projects.

- *Healthcare system maturity* - As explained in I, identification of eHealth maturity stage is somehow risky because of possible short-cuts. Here, the main difficulty is to agree on indicators to characterize Healthcare system maturity.
- *Programme history* – decision, reorientation etc.
- Targeted group
    - o Patients, patients and Citizen associations
    - o HPs (distinguish between professions or not)
    - o Other concerned workforce (as ICT specialists)
    - o HcPs, Care Centres – (distinguish status – "public", private for profit or not)
    - o Local authorities
    - o Private insurance systems (insurers, mutual funds)
    - o Public social security systems
    - o Ministry of Health and administration (Nat., Regions…)
- *Promoters* - those who have been active in the building of the programme (values are the same)
- *Governance* - those who control the development. Same possible actors, which may be associated.
- *Concerned foundations tools and domains (if appropriate)*
    - o Citizens/Patients identity
    - o HPs identity, speciality, roles, characteristics
    - o HcPs and units/services directories
    - o Security, safety and privacy
    - o Interoperability and standards
    - o Health record (EHR, EMR, PHR)
- Applications
    - o Telemedicine
    - o Communication and access (messaging, networks, portals)
    - o Imagery, PACS
    - o Other archiving

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[18] This domain is specific but it is a central objective for all.

[19] This objective reflects a worldwide evolution that corresponds to new processes, notably home centred

- o Information request and result - Biology, pathology
- o Products prescription, distribution, control (pharmacy, devices…)
- o Tele-action
- o Reference databases
- o Information on resources and availability (emergency units, surgery, senior' residence etc.)
- o Organization - Platforms for HPs around patient, associating patients…
- o Information, education – for HPs, patients' therapeutic education, simulation…

- *Technical tools*

- o Technical support: network, specialized secured networks
- o Communication - mail, social networks, EDI, EAI…
- o Device – mobile (feature to smart phone), PC, tablet, smart card…
- o IOT, connected objects
- o IA, Big data

Using the WHO Toolkit?

To analyse policies and programmes, it seemed possible to use the WHO Toolkit *(see JAseHN D8.1.2)*. Indeed, the toolkit, developed with ITU, has the great advantage of including a systematic identification of all factors in eHealth possible development. However, the toolkit is mainly a high level input to a key target group: government, ministerial and health sector leaders. This is not the objective of programmes characterisation in the present document – even if it is a precious contribution to identify key aspects. Policies and programmes here may be developed by local authorities, private groups, users' associations etc. In some countries, many programmes started long before the Ministry of Health or the head of an important group decide to develop a strategy. Another difficulty comes from the original source, which is the Australia initial toolkit – a country fairly similar to EU MS. This is why the authors of D8.1.2 observe that "*The use of document is however facing a paradox: The toolkit seems to suffer from a deficit of diffusion/ownership in countries which could make the wider use of it (where the minimum prerequisites in term of availability of resources and basic infrastructure are met) while it is more widely promoted in less advanced countries but many countries lack the expertise and experience to make effective use of the tool."*

However, at least one of the countries reviewed here has decided to adopt the toolkit and to base its eHealth strategy and development on it: Nigeria. Of course, this corresponds to a government strategy. It will be very important to follow the development in the coming years and to see how the convergence with existing projects is managed.

12.2 eHealth Projects Classification and Criteria for interest

A project is a set of actions that are conjointly managed. It can be a component of a wider policy or programme, or it can be an independent development.

Management may be transferred from a first initiating group to another actor, for instance a public authority, but there must be a continuity.

In this analysis grid, the characteristics of a project refer to its phases. Indeed, after a project has been noted as interesting, a master record is created and should be periodically completed – especially after local inquiries. The grid is dynamic – values for data can evolve and phases in the project life defined.

- A pragmatic vision

A project should be analysed, every time it is possible, from multiple sources, avoiding communication artefacts and political announcements.

It is interesting to note that selection of projects needs some form of evaluation[20]. An important aspect is to gather any available information on concrete impact and evaluation indicators.

- Genericity - the projects basic foundations imply:
  - A possible integration in the healthcare system and the general country environment (Healthcare, ICT, country or area fundamental characteristics)
  - Coherence with key elements in organization and objectives of the healthcare system and in line with health objectives; the project should build on a clear view of healthcare system evolution and not concentrate only on technical aspects
  - Availability of resources that are essential for the project (as a reference database for example)
  - Respect of interoperability rules and tools, at the common level of the concerned country
- Scalability and Resilience
  - The project is able to grow and reach a wider scale (for example evolves from a small area towards a region or the whole country – which sometimes implies complex growth in scale, different tools…). This is also related to availability of essential resources.
  - The project is able to adapt to technical evolutions – that are inevitable – as it is built on healthcare processes and human organization and not only on a technical opportunity
- The case of innovative projects

A special approach is to be adopted for innovative projects. Such projects follow a fundamental health objective but may change the process as well as traditional documents instead of mainly digitizing them (for instance prescription). They respect other conditions than those that remain inside the existing system framework. They will be selected based on promoters, on stakeholders' opinion, of course on known impact.

Classification structure and analysis criteria

After observations and confrontation with existing tools, the following general structure can be proposed. The main task will be to agree on indicators when necessary. Every project description should be progressively completed after key criteria have shown it was interesting to study it further.

- Where
  - Country
  - Region of the world (probably differentiating WHO values - ex North Africa and Sub-Sahara)

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[20] eHN approved Health Technology Assessment (HTA) general model, with derived MAST (telemedicine) and MAST-IC (integrated care), analysed in JAseHN D7.4, provide a rich guideline.

- Healthcare System stage/maturity (see 12.1)
- Concerned area (National / Regional-State / Municipality / HcP local group)
- Relation with a national or general programme/policy (if appropriate)
- When and progress
  - o Date launch (decision)
  - o Date deployment (envisioned)
  - o Date deployment (effective)
  - o Status (to launch, starting, pilot, running)
- Project maturity (possible criteria)
  - o Quality of accessible documentation (initial, on pilot phase, deployment)
  - o Achievements indicators defined, evaluation measures planned, internal/external evaluation already
  - o Proportion of potential actors enrolled (HPs, HcPs, patients…)
  - o Validation of pilot phase, validation by national eHealth authority, other..
  - o Achievements measured, evaluation results
- Health objectives (see 12.1)
- Key eHealth foundations concerned or impacted, even if the project does not address them directly (see 12.1)
- Innovation – Estimation on innovation degree - criteria and indicators to be defined (see above)
- Actors
  - o Main targeted group
  - o Main acting group (For instance midwives in a program for childbirth)
  - o Promoters: those who have initiated the project. All groups may be promoters (for instance patients through associations).
  - o Governance: those who organize and control deployment
  - o Financers (project development)
  - o Financing of running costs according to business model
  - o International actors (NGO, businesses, WHO, PAHO, eHN MS etc.)
- Workforce
  - o Resources availability
  - o Training needs and methods
- Evaluation indicators included? - Every selected project should include evaluation tools as soon as possible. Those tools may evolve due to variations in the project or according to the stage of development, or to evolutions in the environment.
- Achievements
  - o Impact - the most important characteristic. Impact has to be defined at every step: when the project is conceived, started, in pilot phase, deployed.
  - o Success (difficulties, promising, great, to be abandoned)

       o   Systematic evaluation (see HTA model)[21]
- Technical Aspects
  - Application(s) – see 12.1
  - Indispensable and decisive technical tools (infrastructure, devices) – see 12.1
  - Concerned standards and interoperability rules and conformance reference – To define criteria and method, the key elements will come from EU CORDIS H2020 programme "EU eHealth Interoperability Conformity Assessment Scheme".
  - Necessary available technical resources - not directly technical: existence of a reference database, or an existing agreed upon ontology, mobile coverage
- Possible way ahead – indications already available about possible exchanges or cooperation with the eHN, a MS or a group of MS.

12.3 Towards a possible eHN platform and database for non-EU projects

Projects regarded as interesting for exchange of information or cooperation may evolve rapidly due to evolution of medical techniques or ICT, political change, or because they encounter difficulties. Projects regarded as interesting for a eHN country or a group of countries may interest other MS for ulterior developments. A platform for sharing projects information and exchanging about them could be envisioned around a database.

A first approach of detailed data and their possible values is presented in the previous paragraph *(12.2)*. This is not to be mistaken with national or regional programmes *(12.1)*. However, a similar mechanism should be envisioned on the platform, notably because concrete projects are often related to a wide programme. This is more and more the case as eHealth is nationally controlled by a dedicated entity and financing rely on coherence with programmes controlled by this entity or a wide group of stakeholders.

The following outline concerns concrete projects. For every project, it is necessary to follow a process through three main stages

Step1: Detection of interesting projects

As this has been done here, a first external observation of a country can bring attention to projects. It will be necessary to precise which type of common enrichment and even cooperation could probably be envisaged for eHN MS. A provisional draft could be:

- Learn: the project is a rich source of information for a country confronted to similar problems or working in any similar international action
- Mutual enrichment: development of exchanges between project actors and concerned parties in the eHN MS, active in projects in the same domain or participating to such ones in other countries.
- Help and support: which can be technical, promotion, financing.
- Participation: co-construction of the project and similar ones.

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[21] Value for this parameter corresponds to local evaluation (perhaps using different approach) and/or to external EU MS observer after the project has been studied

At this exploratory stage, desk research and existing relations are the only source. It is necessary to join information on present economic and cultural relations, participation in EU programmes, activity of private EU firms and associations.

Step 2: Store in observatory base

It is necessary to build a provisional base for detected projects, accessible to a limited list of experts. Tasks then are contact with local representatives of an eHN MS or other partners – get information on the project (such as integrated evaluation tools), applying as much as possible an HTA methodology and MAST or MAST-IC tools, following a WHO toolkit, starting a limited external evaluation. The project will stay in this base (in fact a partial projection of the followed projects base) until it is considered mature. However state of the project will remain in this base for ulterior review if necessary.

Step 3: Followed projects base

The base includes data from internal and external evaluations, adding data of the country evaluation grid if there are some local specificities (as this is the case with PAHO method). The base must allow for following, i.e. capable of producing a state of the project at different steps and registering important evolutions. The project, even stopped, stays in the base.

To build the platform and databases, two important aspects will need to be discussed:

➜ *Authorized access*

Access control to the followed project base must be defined by the concerned eHN MS – notably those who finance the external experts to identify and follow projects and perform external evaluations. Authorized followers may be concerned public authorities and agencies as well as selected EC and EU institutions and participating private firms and associations.

Other eHN MS should have access to data that are defined as open to the whole Network.

It seems that the project data should be accessible to the non-EU country official partner, except in the "learn" mode (cf. above)

➜ *Failures*

Importance of failure analysis is often underestimated. It is also very difficult to perform because sources, notably on the Internet, are rare and many information sources disappear. However, this analysis is important and information should be saved.

-III-
CONCLUSIONS AND WAYS AHEAD

Deliverable 8.1.4 had to explore main eHealth activities outside of the EU. An aim of the Joint Action task supporting the eHealth Network was to concretely allow the eHN as a whole and eHN MS to develop mutually fruitful exchanges with other countries and grouping of countries, identify potential cooperation and facilitate it.

In fact, to find out whether common trends and objectives could be observed in different situations, observations were made outside of the European continent. Eleven countries were chosen. It was necessary to take into account profound differences between cultures, economic and social situations, political organizations, as well as differences between health needs, healthcare systems and actors organizations. It seemed that there were completely different visions of eHealth.

This is not the case. Admittedly, the roads chosen are very different but common challenges, trends and objectives are visible. Moreover, all countries – be it developing, emerging, industrialized - can bring competencies, promising projects and innovations to the table. Accordingly, there are great opportunities for reciprocal information exchanges and in cooperation around projects. All countries regard in particular the EU and EU MS as very attractive partners. All preferably develop relations with EU MS with which they have ancient relations.

13. A global world

A common trend

More or less rapidly, eHealth has become an official objective of most actors in all countries, even if it is in first phases often only lip service from some stakeholders. eHealth is an answer to social and technical divides that affect healthcare access for populations in remote regions as well as for the poorest groups; it is also a tool used to reduce healthcare systems fragmentation, which has in fact been the norm everywhere outside Europe, due to competing public or private structures as well as differences between States in federal countries. Currently, actors are starting to understand that such fragmentation is no longer accepted by the citizens – especially middle-class ones – and is also a handicap in a communicating and competitive society. Everywhere, barriers and borders are blurring between organizations of different status (notably between "public" ones controlled by government and States and private/for-profit and non-for-profit). They are also blurring between healthcare and welfare actors, corresponding to the more and more fuzzy distinction between health and welfare.

An unescapable eHealth national strategy

Governments and public authorities are always promoters of eHealth. In developing, emerging and industrialized countries, they understand its importance for better access to healthcare and internal mobility of the citizens as well as a tool towards a less fragmented and more controllable system. Unfortunately, they also see eHealth as a new domain and a technical challenge and apply traditional centralized procedures, which inevitably lead to political and organizational conflicts and more often yet to a general ignorance or detachment of the public and other stakeholders.

In second phases, they understand the importance of consultation and association of all parties. Simultaneously, they create a strong service inside the Ministry of Health or a national agency under its control. Indeed, they understand that eHealth is health and a component of health

national strategies and priorities and also a key component of eGovernment. To eliminate legal obstacles, governments act to modify legal barriers that very often prevent most eHealth activities. Moreover, this is a clear sign of national authorities' engagement.

The strategies integrate more realistic objectives, prioritize clear gains and more easily deployed applications: telemedicine as a mean towards universal health coverage. They maintain key objectives as the way to go – such as the EHR everywhere – but they admit it is a long way ahead and minimum needs for their fulfilment have to be satisfied.

Fear, uncertainty and doubt

The main obstacle to eHealth is that citizens, patients, professionals and also many HcPs managers were sceptical, suspicious or even hostiles. They have been changing their mind in recent years albeit still slowly. This is not mainly because of conservatism. It has much to do with programmes which have not taken into account, and sometimes completely ignored, concrete realities of day to day work and local specificities. However, the greatest obstacle comes from fear about security, safety and privacy. This is not due to the diffusion of so-called "fake news" or irrational behaviour but to real, published, hacks or simply human and technical failures. Another negative aspect of the first waves of programmes was the absence of business model for operating expenses.

However, the situation is at first radically different in developing countries and in emerging ones, because the main preoccupation is accessing a healthcare system, and also because there is less consciousness of what privacy is and what could constitute a threat. This is true in all countries for developments of eHealth and mHealth that are used to open access to the healthcare systems for populations and for professionals. mHealth is particularly important as most people are not conscious of risks or neglect them. Of course, things are rapidly changing, at least for information and data systems, due to Internet and mobile access and development of a better informed middle class.

Communication campaigns are developed everywhere, but they often lack concrete and scientific proofs about eHealth efficiency. In many domains, developments are too recent to allow for scientific and economic evaluation of gains and eliminate perverse effects. Most actors are still in the learning phase.

Open information society

Another important obstacle comes from existing systems. Hospital legacy systems are not interoperable. This is not only a technical problem, since hospital internal processes have been built behind closed walls and not for communication. The same situation occurs in many administrative systems. One consequence is that developing countries may use cross-roads to digitize processes and fully exploit eHealth and especially mHealth potential.

Strength through cooperation and democracy

Since around the last 10 years, there has been a growing comprehension of the necessity of a bottom up approach and of participation of all actors at all levels to eHealth development and governance. This includes citizens, patients' association, local authorities, HPs, HcPs. Furthermore, it is necessary to associate public and private actors.

The "think global, act local" principle is more and more the rule. Moreover, this trend is associated to efforts towards Universal Health Coverture and more democratic organizations.

Systems Interoperability and the way around through data sources

Development of eHealth needs interoperability. Due to existing systems but also to diversity of processes and organizations, it is always a difficult challenge and one that is often misunderstood. Because most actors consider it a technical ICT problem or hope – or fear - that it will be solved

with adoption of unique Information systems solutions. Most often, the hardest part is semantics harmonization, still far away for everybody, except in the research domain.

However, the now generalized trend to privilege data is one important way, chosen by various countries and obvious in mHealth. The journey starts with non-health data, such as elementary identity data, administrative forms, payment mechanisms etc. These can legitimately be unified by a national agency and controlled by local authorities or offices. Their integration inside health information system is a first step. In mHealth, standard data formats are in most cases a condition for market development of new services.

Tools and methods

Tools and methods necessary to develop eHealth in a secure, ethic, economic manner abound and they are known and even officially recommended in all countries, thanks to the international organizations that produce and promote them and above all associate representatives of authorities and stakeholders in workgroups and boards. This includes in particular methods for development of policies and programmes, projects management, evaluation and assessments, standards – notably the WHO eHealth Strategy Toolkit, HL7, IHE, ICD 10, SNOMED CT, ICD 11. Of course, the situation is different for communication and material standards; that communication is mandatory and often depend on worldwide industrial groups and operators. However, for the same reasons that limit interoperability, methods and health information standards that affect processes and working methods are rarely or limitedly used. In fact, it is a long process but it has started, that is the case in Europe.

It will sometimes need simplification or adaptation to take into account profound differences between healthcare systems and daily working practices when considering the current situations in the whole planet. Moreover, most of the tools and models have been conceived before the emergence of the new health, healthcare and health information systems and innovative processes and services, notably in mHealth.

Workforce, knowledge, education, training

Most of the first set of programmes underestimated the key constraint of workforce numbering and capacity. This is true for all professions and at all levels. This is now a major obstacle. More generally, diffusion of knowledge, scientific and practical, is a constant objective. Much has already been done, firstly for health international scientific libraries – less for organization. Then, primary and continuous education is developed, notably from Universities and speciality hospitals, towards medical doctors and other professions and towards ICT professionals, most often using eLearning for on the field training. It is everywhere still a difficult challenge but it also recognized as one the most important investment for ensuring eHealth development, resilience and sustainability.

A flurry of projects and the emergence of a new world
Ruptures are coming…

Despite difficulties, conflicts between the different groups, political turnover at the national level, all forms of eHealth are being developed and more and more on the right tracks, i.e. adapted to local conditions and converging towards improvement of fundamental health and social objectives in the country as well as at the international level.

A flurry of very interesting projects was launched in the last 5 years, taking into account the learning of prior experiences.

Moreover, a new world of eHealth is strongly emerging: population and patient empowerment, mHealth, blurring or disappearance of frontiers between health, well-being, wellness and personal activities, innovative applications and new processes. This movement confronts everybody to new risks and new challenges, but the greatest mistake would be to underestimate it.

The growing role of international actors

International actors of all categories play a more and more important role. Official and non-commercial ones integrate countries in global and cooperative actions and information campaigns. Organizations such as WHO and PAHO cooperate with the ITU and the World Bank on common programmes and projects; they refer to common objectives like Public health or Universal access. NGOs, scientific societies, world associations for promotion of eHealth, SDOs, converge and organize on an international scale. Private companies' subsidiaries in foreign countries, HcPs, insurance, technical industries, which used to remain separated from national systems policies are now joining forces with national public systems. Of course, telecom operators have a specific interest and a precious role in promoting eHealth tools. Coordination between countries in a same geographic and economic zone is also a growing factor, an already ancient example being PAHO.

A privileged place in an international health information society

A majority of people and actors in all other parts of the world considers the EU and EU MS as a model for eHealth development. They admire first the fundamental objectives that have been since long shared in the Union: universal access and social protection, through building of sustainable financing systems, public control of quality, security, safety and privacy. They are impressed by exchanges with scientific University centres with whom they sometimes have very ancient relations. They are also impressed by the efficient collaboration inside the EU for developing information society in a grouping of countries; this is notably illustrated by the world interest for the EIF programme. Jointly with many ancient historical links and key present programmes in EU MS, this opens rich perspectives for mutual information and knowledge exchanges and cooperation around projects. The D8.1.4 Annexes identify an important list of such projects.

14. Tasks at hand

Many common eHN MS efforts can facilitate richer exchanges and cooperation with other countries and groupings of countries. Building on the voluntary nature of the eHN, such efforts can be deployed by open groups of eHN MS.

Extend the interesting projects search

The survey and the following of existing projects should be pursued. It is potentially a rich resource to help understand practical situations and potential of eHealth in many different contexts. A specific database could be developed. It would be used – and enriched - by eHealth governance organisms in MS, political and economic authorities, university and researchers, industry.

Still better tools

Observation has shown that much was still to be done for allowing better mutual understanding with other countries in other continents.

For librarians and researchers, medical and scientific thesauri, terminologies and databases offer the richest tools of all sectors. This is not the case for organizations and processes of the complex world that is developing and mixes medical activities with social and everyday life ones. A better way to start would be to try and understand how common problems are addressed in different countries, through organization of cooperation on selected projects and to organize a network of research centres to build a reference base.

Of course, a multilingual reference thesaurus is also necessary; its construction could rely on precise projects and policies comparisons.

To better classify and understand situation sometimes apparently very diverse in healthcare, it will be important to agree on indicators for maturity of healthcare system, for projects impact and for description of innovative projects.

Standards

Participation in SDOs and cooperation with other countries standardization institutes when appropriate is essential. It appears that standards related to eHealth must be resilient to evolutions in health scientific knowledge and techniques as well to the fast-evolving world or ICT. A new wave of ruptures is coming. Accordingly, cooperation on these domains is mandatory, as well as exchanges with other groups and countries. Standards integrate specific aspects of countries where they have been conceived or which have participated actively in their definition. In the new world, where developing countries can also bring innovations to the table, it is important that all groups work on reciprocity and open data principles and build rules that allow and even stimulate proposals from all countries.

Reinforce cooperation with grouping of countries

PAHO's fruitful relation with the EU shows the interest of cooperating with an organization working on a geographic zone. Above all, PAHO shows the very positive effect of such organization to foster eHealth development in the concerned zone. Other organizations could be approached to consider possible relations, as the African Union, ASEAN, Pacific Community and other groupings emerging now (see above Indian project).

eHN can build on the numerous EU programmes that are already of great interest for all countries and in particular reinforce cooperation around reEIF.

Much to do, much to gain

eHealth is one of the most important developments of the era. eHN MS have great advantages in the domain but they also encounter some obstacles associated with their existing systems. Mutual exchanges of information and of learnings from programmes and projects will bring enrichment and opportunities to all.

-IV-
KEY SOURCES

15. Main documents and Web sites

Key sources for a particular country are in the country' specific annexes.

Other key sources for the master document are listed under.

15.1   External to JAseHN

[1]   Atlas eHealth country profiles: based on the findings of the second global survey on eHealth. - Global Observatory for eHealth Series, 1 – WHO 2011
http://www.who.int/goe/publications/ehealth_series_vol1/en/

[2] PAHO eHealth 2011
http://www.paho.org/ict4health/index.php?option=com_content&view=article&id=80:compo nents&Itemid=0&lang=en

[3] European External Action Service
 https://eeas.europa.eu/headquarters/headquarters-homepage

[4] European Commission International Cooperation and Development
 https://ec.europa.eu/europeaid

[5] WHO Global Observatory for eHealth
http://www.who.int/goe/data/en/

[6] eHN Refined eHealth European Interoperability Framework 2015)
https://ec.europa.eu/health//sites/health/files/ehealth/docs/ev_20151123_co03_en.pdf

[7] "Press for all Latin America: eHealth reporter"   Working Towards a Single Health Record for Every Citizen" (14/12/2012)
http://ehealthreporter.com

[8] The world health report 2010 – Health systems financing: the path to universal coverage. Geneva: World Health Organization; 2010.
http://www.who.int/whr/2010/whr10_en.pdf [accessed 2 June 2013]

[9]   PAHO-WHO 158th Session of the executive Committee. Strategy and plan of action on eHealth midterm review. Final Report (21/4/2016)
CE158-INF-13-A-e.pdf

[10] PAHO, with Universitat Oberta de Catalunya – 2016 -
Framework for the Implementation of a Telemedicine Service
http://iris.paho.org/xmlui/bitstream/handle/123456789/28414/9789275119037_eng.pdf;seque nce=1

15.2 JAseHN documents
jasehn.eu/index.php/downloads/

- D7.1.1 Report on The Establishment of a Platform for the Sharing of National eHealth Strategies
- D7.3 Studies concerning added value of eHealth/mHealth services
- D7.4 Health Technology Assessment (HTA)
- D8.1.1 Overview of OECD Studies on eHealth and Core Outcome
- D8.1.2 Information Paper on Supporting Preparatory Convergence Meetings Between the eHN and WHO

-V-
ANNEXES

I – Countries

For each country studies, a "Key Points" document is included with the detailed reports.

I.1.1 Argentina eHealth policies and activities

I.2 Australia eHealth policies and activities

I.3 Brazil eHealth policies and activities

I.4 India eHealth policies and activities

I.5 Morocco eHealth policies and activities

I.6 Nigeria eHealth policies and activities

I.7 Senegal eHealth policies and activities

I.8 Singapore eHealth policies and activities

I.9 South Africa eHealth policies and activities

I.10 Tunisia eHealth policies and activities

I.11 USA eHealth policies and activities

II - International organizations

II.1 PAHO eHealth policies and activities

II.2 World Bank eHealth recommendations