



Theme 2019:

*International Cooperation as Key Principle in Space Activities*

# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

**Silvana Dellepiane - Moira Gerace**

# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

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- WHO Leadership priorities and UHC
- The logic ICT context
- Culture, Cooperation and Technology

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## 1. INTRODUCTION

- Sustainable Goals
- WHO Leadership priorities and UHC
- The logic ICT context
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End of 2015: transition from UNITED NATIONS Millennium Development Goals (MDGs) (proposed in the late 90s) to Sustainable Development Goals (SDGs).



### SDG 3 – Ensure healthy lives and promote well-being for all at all ages

As one of the Sustainable Development Goals (SDGs) set by the UN at the September 2015 global summit held in New York, SDG 3 – better health care and general well-being has always been a major challenge, especially in the developing world.

Workers in various industries that are supposed to propel economic growth can only maximise their productivity if they are physically well and fit to comfortably handle their jobs' magnitudes. The rest of the SDGs, which are all aimed at fuelling economic growth in the long run, thus somewhat depend on the implementation of this goal.



The World Health Organization is a specialized agency of the United Nations that is concerned with international public health. It was established on 7 April 1948, and is headquartered in Geneva, Switzerland.







World Health Organization

## Setting the scene



"In a context of growing inequality, competition for scarce natural resources and a financial crisis threatening basic entitlements to health care, it would be hard to find a better expression of health as a fundamental right, as a prerequisite for peace and security, equity, social justice, popular participation and global solidarity..."

WHO Twelfth General Programme of Work (GPW12)

### More complex health challenges

#### Rising healthcare spending

Healthcare spending is rising faster than GDP in developed countries, adding pressure to increase efficiency.



#### Changing burden of disease

63% of all deaths are now caused by noncommunicable diseases...



but progress is still lagging in reducing maternal and child deaths, and turning back the epidemics of HIV, TB, malaria and other diseases.



#### Greater complexity in response to health needs

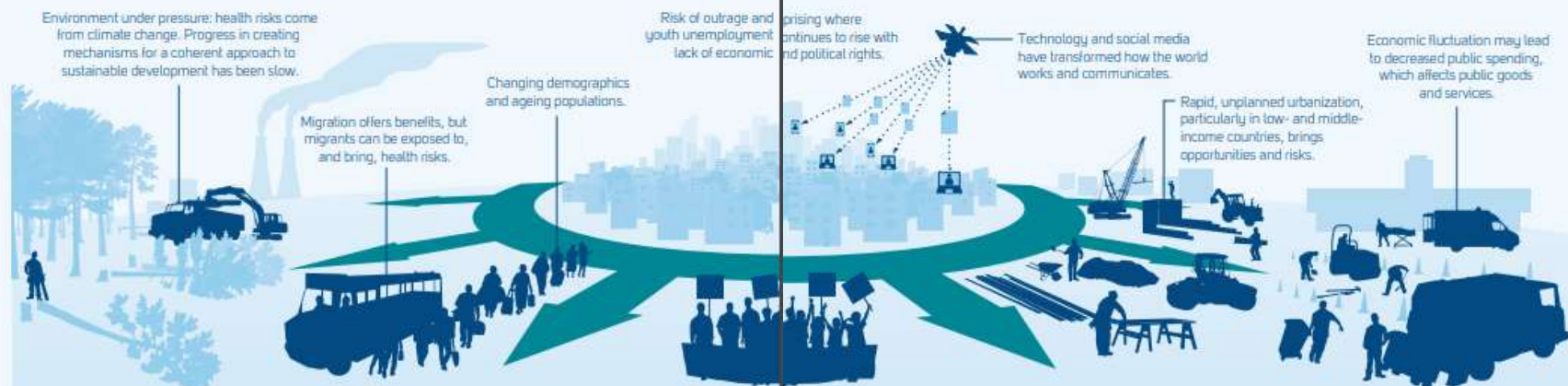
A complex landscape, with new players...



Need to work with different sectors influencing the determinants of health. Need for holistic approach to emergency risk management, removing artificial distinctions between relief and development.

New political, economic, social and environmental realities...

## 2014 A changing world – where are we going?



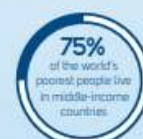
### Globalization

Living standards have improved for some but there is wider inequality and lack of balance between economic, social and environmental policies.



### Poverty and inequality

Inequality deepens poverty and increases gaps in health outcomes. This calls for new ways of working among multiple sectors.



### Power

Relative powers of States, markets, civil society and social networks of individuals have changed: progress requires significant collaboration among all stakeholders.



## Diapositiva 6

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**SD1**

Silvana Dellepiane; 02/07/2019



The UN's target is to attain sustainable health care and general well-being for all by 2030. Here are the targets set with regard to the goal 3:

- 1. Reduce the number of maternal deaths to **less than 70 in 100,000 live births**.
- 2. Eradicate preventable newborn and under-five mortality, with each country to cut neonatal deaths **to less than 12 per and under-five mortality to 25 per 1,000 live births**.
- 3. Prevent hepatitis, communicable diseases and water-borne diseases and completely do away with tuberculosis, AIDS, malaria and other tropical diseases.
- 4. Reduce the rate of premature deaths from non-communicable infections by **one third** though prevention and treatment of the infections.
- 5. Reduce the abuse of substances such as alcohol and narcotic drugs by ensuring prevention and treatment centres are available and affordable.
- 6. Ensure access to reproductive and sexual health-care services to everyone.
- 7. Achieve global health coverage through access to safe, quality, effective and affordable vaccines and medicines for all, access to quality basic health care services, and financial risk protection.
- 8. **Reduce by more than half** the rates of illnesses and deaths from harmful chemicals and water, soil and air pollution and contamination.
- 9. Back the research and development of medicines and vaccines for both communicable and non-communicable ailments that affect developing nations, make essential vaccines and medicines available and at affordable prices in accordance with the Doha Declaration on the TRIPS Agreement and Public Health.
- 10. Increase health financing and recruitment, training and retention of health workers in developing countries, more so the least developed ones and small island developing nations.
- 11. Boost the capacity of countries, especially those in developing regions, for early warning, reduction of risk and national and global health risk management.



### **SDG 3 – Substantial Improvement of Health Situation over Time**

According to a report by the WHO, between 1970 and 2010, **life expectancy** in developing countries shot **from 40 to 70.1 years** while **child mortality rate fell from 89 to 51 per 1,000 live births** between 1990 and 2011. This is partly due to improved health care services among various countries across the globe, something we should be proud of as the international community. But then, in spite of this progress, it's sad to learn that so many people in developing countries are still falling victim of preventable diseases such as malaria, tuberculosis and HIV.

#### **HIV Poses a Major Threat in Sub-Saharan Africa**

- In 2013, around 35 million people around the world were living with the HIV virus, 25 million of them from Sub-Saharan Africa. In the same year, there were 2.1 million new cases of the infection worldwide, 38% lower than the 2001 estimate. 240,000 of them were children and 250,000 adolescents, two thirds of which were girls.
- The total number of adolescents living with the virus in the year was estimated at 2.1 million. As of 2014, HIV was the leading cause of death among women of reproductive age in the world. Of the 13.6 million people taking antiretroviral therapy, only 6.4 million were women. According to a report by the United Nations World Health Organisation (WHO), HIV is currently the leading cause of adolescent deaths in Africa and the second biggest cause of deaths of adolescents globally.
- Adolescent girls (aged 10-19) and young women have been shown to make for the better part of the tally due to the violence, discrimination, exclusion and gender based inequalities which puts them at a higher risk of contracting the disease. In many cases, the bodily autonomy and privacy of most adolescent girls is not respected as most of them report having their first sexual experienced forced.

#### **Malaria**

- Malaria, on the other hand, is not as deadly as HIV but the number of deaths attached to it over the past three decades has made it a major point of concern too. Between 2000 and 2015, malaria has caused more than 6.2 million deaths with more than 60% of the total tally being children under five years in Sub-Saharan Africa. The global malaria deaths total has fallen by around 37% and the mortality rate by 58% over the past 15 years.

#### **Tuberculosis**

- Tuberculosis was among the deadliest and most feared ailments during the 90's, but since the turn of the century, cases of infection and death arising directly from it have fallen by a staggering 46%. 37 million lives were saved by prevention, diagnosis and treatment interventions of the disease between 2000 and 2013. Over that period, the tuberculosis prevalence rate fell by 41% and the mortality rate by a remarkable 45%. Also, since 2004, TB-related deaths of HIV positive people has reduced by 36%.

## SDG 3 – Substantial Improvement of Health Situation over Time (cont.)

### Child Mortality and Health

- On general child health, the number of children who die each day has reduced by 17,000 since 1990, but more than 6 million children below the age of five still die each year. Education has shown to play a role in the prevention of mortality rates as children of educated mothers, even those who didn't proceed past primary school, have higher chances of living past the age of five than children of uneducated mothers.
- Also, children from poor and extremely poor families are twice as likely to die before their fifth birthdays as their counterparts from wealthy families. There have been global endeavours to try and curb the situation, but still the proportion of child mortality in Southern Asia and Sub-Saharan Africa has been on a steady rise. A statistic shows that **four fifths of all child deaths** occur in these two regions.

### Maternal Mortality

- Perhaps the most remarkable improvement, as far as global health is concerned, over the past two decades is maternal mortality, which has fallen by 50% since 1990. The prevalence in Northern Africa and some parts of Asia has fallen by two thirds, and this could be largely due to the increase in antenatal care from 65% in 1990 to 83% in 2012. Even with this increase though, little over 50 per cent of women in developing countries can access sufficient health care.
- The gap between developing and developed nations with respect to this is perhaps the most unsightly facet of the maternity health subject as the proportion of women who do not survive childbirth relative to those who do is **14 times higher** in developing countries than in developed ones.

### Final Note

- The statistics are pretty cringe-worthy but, on the whole, we are making positive progress, considering the global health situation some decades back. Progress towards achieving this Sustainable Development Goal should be handled with the seriousness it calls for because it's at the centre of whether or not we are going to achieve the rest of the goals.

## TWELFTH GENERAL PROGRAMME OF WORK

Not merely  
the absence of disease



## CONTINUITY: ENDURING PRINCIPLES AND VALUES

WHO remains firmly committed to the principles set out in the preamble to the Constitution (Box 1).

### Box 1. Constitution of the World Health Organization: Principles

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

The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

The health of all peoples is fundamental to the attainment of peace and security and is dependent on the fullest co-operation of individuals and States.

The achievement of any State in the promotion and protection of health is of value to all.

Unequal development in different countries in the promotion of health and control of diseases, especially communicable disease, is a common danger.

Healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.

The extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health.

Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people.

Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures.

# Leadership priorities

Our leadership priorities give focus and direction to our work. They are areas where it is vital for WHO to lead — the key issues which stand out from the body of our work.

## WHO values

WHO has been at the forefront of improving health around the world since 1948

## Health:

is a state of complete physical, mental and social well-being, not just the absence of disease or infirmity

is the fundamental right of every human being, everywhere

is crucial to peace and security

depends on the cooperation of all individuals and States

should be shared: extending knowledge to all peoples is essential



World Health Organization



## WHO directs and coordinates international health by:

providing leadership on matters critical to health

shaping the health research agenda

defining norms and standards for health

articulating policy options for health

providing technical support and building capacity to monitor health trends





World Health  
Organization

## Outcomes

Increased access to health services or reduction of risk factors

Outcomes are demonstrable changes in the countries where we work. We measure progress towards each outcome by looking at policy changes, institutional capacities, reduction of risk factors or levels of service coverage and access.

## Impact

Improved health outcomes achieved

The overall impact of the Organization sits at the highest level of the results chain, with eight impact goals. Outcomes can combine in different ways to contribute towards one or more impacts.

### Impact goals



Reduce under-five mortality



Reduce maternal mortality



Reduce the number of people dying from AIDS, tuberculosis and malaria



Reduce premature mortality from noncommunicable diseases



Eradicate polio



Eradicate guinea worm



Prevent death, illness and disability arising from emergencies



Reduce rural/urban differences in under-five mortality

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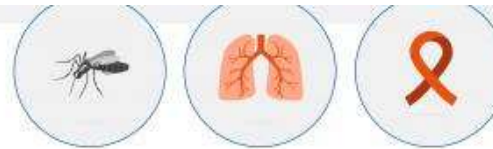
Impact goal	Impact indicator	Impact target
Reduce under-five child mortality	Under-five child mortality rate	Reduction by 2/3 by 2015 compared with the 1990 baseline
Reduce maternal mortality	Maternal mortality ratio	Reduction by 75% by 2015 compared with the 1990 baseline
Reduce the number of people dying from AIDS, tuberculosis and malaria	Number of people dying from AIDS, tuberculosis and malaria	Reduction of 25% in the number of people dying from AIDS by 2015 compared with the 2009 baseline (i.e. 1.425 million) Reduction of 50% in the number of people dying from tuberculosis by 2015 compared with the 1990 baseline Reduction of 75% in the number of people dying from malaria by 2015 compared with the 2000 baseline
Reduce premature mortality from noncommunicable diseases	Premature mortality from noncommunicable diseases	Reduction in the probability of dying from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases for people aged 30–70 years by 25% by 2025
Eradicate poliomyelitis	Eradication of poliomyelitis	Eradication of poliomyelitis completed by the end of 2018
Eradicate dracunculiasis	Eradication of dracunculiasis	Eradication of dracunculiasis completed by 2015
Prevention of death, illness and disability arising from emergencies	Percentage of major acute emergencies in which the crude mortality rate (CMR) returns to accepted baseline levels within three months	70% of emergencies
Reduction in rural-urban difference in under-five mortality	Reduction in rural-urban difference in under-five mortality	Reduction in the absolute gap in under-five mortality between rural and urban areas by 25% in 2015–2020

ANNEX

🔍 + -



Contribution and objectives of EU and its Member States to end **MALARIA**, **TUBERCULOSIS** and **HIV**



# UHC2030 Universal Health Coverage

**UHC2030 is the global movement to build stronger health systems for universal health coverage**

- UHC2030's mission is to create a movement for accelerating equitable and sustainable progress towards universal health coverage (UHC).
- There is a global commitment to achieve Universal Health Coverage (UHC). When all 193 Member States of the United Nations (UN) agreed on the Sustainable Development Goals (SDGs) in New York in 2015, they set out an ambitious agenda for a safer, fairer and healthier world by 2030. The goals include a broad array of targets across different sectors. The target to achieve UHC is a beacon of hope for a healthier world.
- The inclusion of UHC in the SDGs presents an opportunity to promote a comprehensive and coherent approach to health, focusing on health systems strengthening (HSS). UHC is based on the principle that all individuals and communities should have access to quality essential health services without suffering financial hardship. UHC cuts across all health targets and contributes to health security and equity.
- UHC2030 partners recognize that achieving UHC requires **coordinated efforts across multiple sectors and development of strong, sustainable and equitable health systems that help to improve health outcomes.**
- UHC2030 provides a multi-stakeholder platform that promotes collaborative working at global and country levels on health systems strengthening (HSS). We advocate increased political commitment to UHC and facilitate accountability and knowledge sharing. In countries receiving external assistance, we continue to promote adherence to effective development cooperation principles as the most important way to ensure coordination around HSS.

## HOW WE SUPPORT COUNTRIES

### » Convening and brokering

We engage in policy dialogue, to coordinate and align plans across various levels of the health system, as well as between immediate humanitarian aid and long-term development concerns.

### » Being flexible

We provide flexible funding for country-selected priority areas; flexibility also means that those priorities can change suddenly with a disease outbreak or a new government, or evolve over time with new insights learned at each step of implementation.

### » Having strong presence in countries

We deploy senior health systems' advisors, currently about 20, in WHO country offices, in direct support of the Ministry of Health. Backed up with WHO's expertise from regional offices and headquarters, these advisors support the national authorities upon request, both for ad-hoc requests and long terms projects, in a timely and tailored manner.

### » Building capacity

We provide support for capacity building so that the Ministry of Health is well equipped to face persistent and new challenges in the 21st century, by offering training at national and subnational levels.

### » Providing technical expertise on universal health coverage

We draw on the technical expertise of WHO's three administrative levels on universal health coverage. We collaborate with leading networks and communities of practice, pushing together for the UHC2030 agenda.

### » Cross-fertilizing knowledge between countries, regions and at global level

We take advantage of the wealth of experience gained over the past years of programme implementation by shedding light on what works well and less well in putting in practice universal health coverage in countries. We convene forums for cross-country learning, publish on cross-cutting lessons learned for UHC, and produce normative guidance on health systems governance and financing.

## Three key pillars:

- i. STRATEGIC PLANNING & HEALTH SYSTEMS GOVERNANCE
- ii. HEALTH FINANCING
- iii. EFFECTIVE DEVELOPMENT COOPERATION



The Universal Health Coverage Partnership is supported and funded by the **World Health Organisation**, the **European Union**, the **Grand Duchy of Luxembourg**, **Irish Aid**, the **Government of Japan** and the **French Republic**, **Ministry of Europe and Foreign Affairs**.





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Our missionWhat we doNews & EventsDocumentsAbout UsUN HLM 2019

# Moving together to build a healthier world



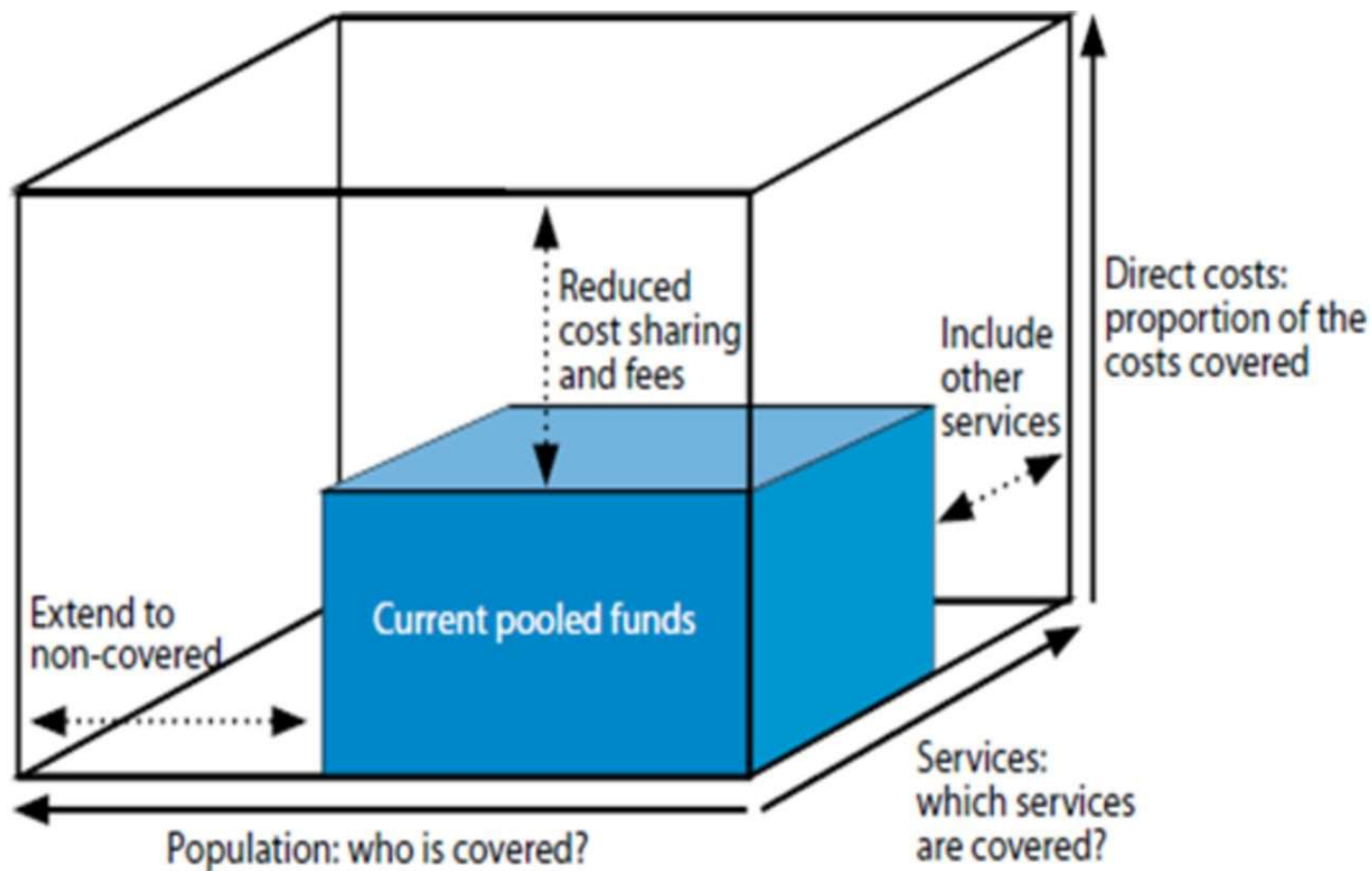
## The UN High-Level Meeting (UN HLM) on Universal Health Coverage, 23 September 2019, New York

The UN High-Level Meeting (UN HLM) on Universal Health Coverage will take place on 23 September 2019 during the United Nations General Assembly (UNGA) high-level week. This is a great opportunity for all universal health coverage (UHC) champions and advocates to make your voice heard and help mobilise high-level political attention globally and in your countries.

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Three dimensions to consider when moving to universal health coverage.

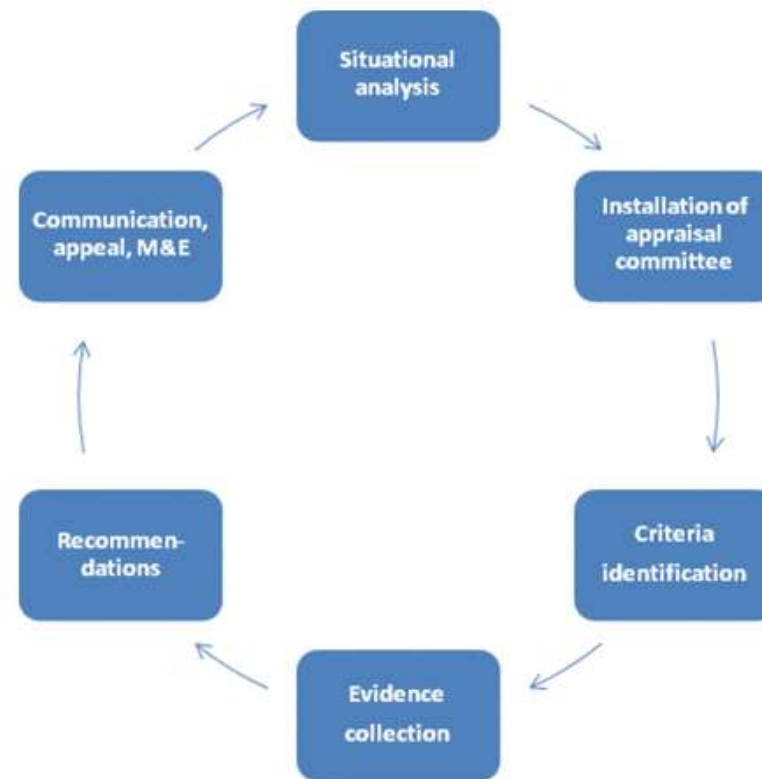


R Baltussen et al. BMJ Glob Health 2017;2:e000342



## First choice: The use of evidence-informed deliberative processes to identify high-priority services

Health authorities first need to classify services in low-priority, medium-priority and high-priority classes, and they should periodically review this, for example, every 4 years. The use of evidence-informed deliberative processes has implications for the organisation of processes to support this (figure 2), and we discuss this for all six steps below.





# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

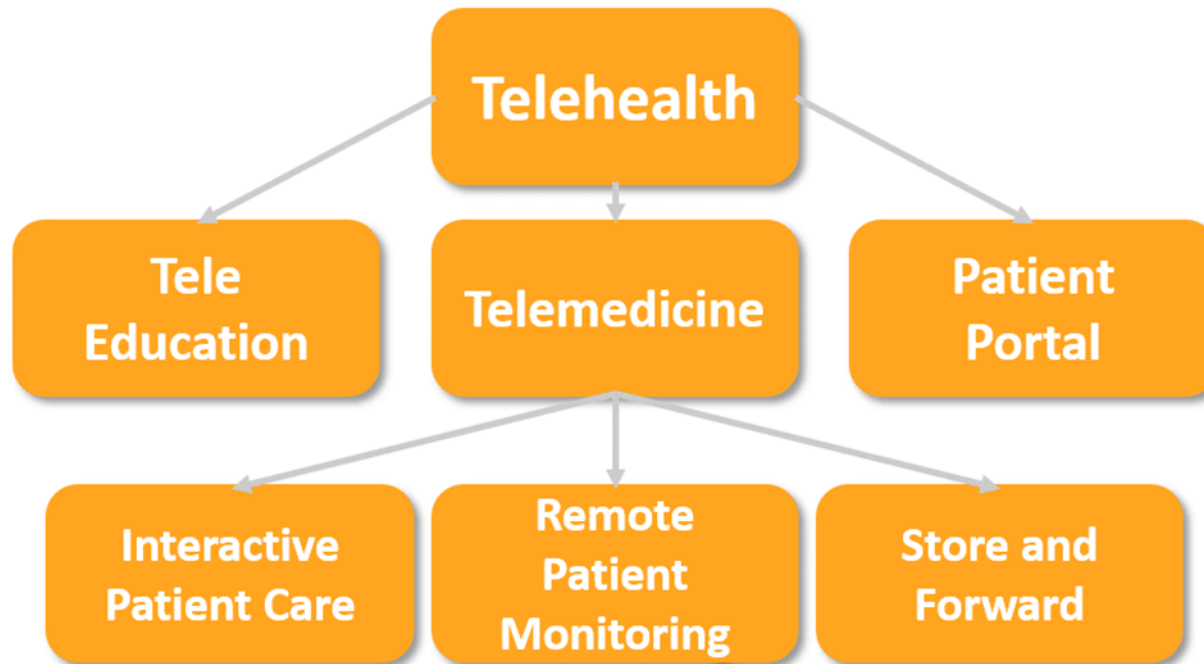
## 2. E-Health

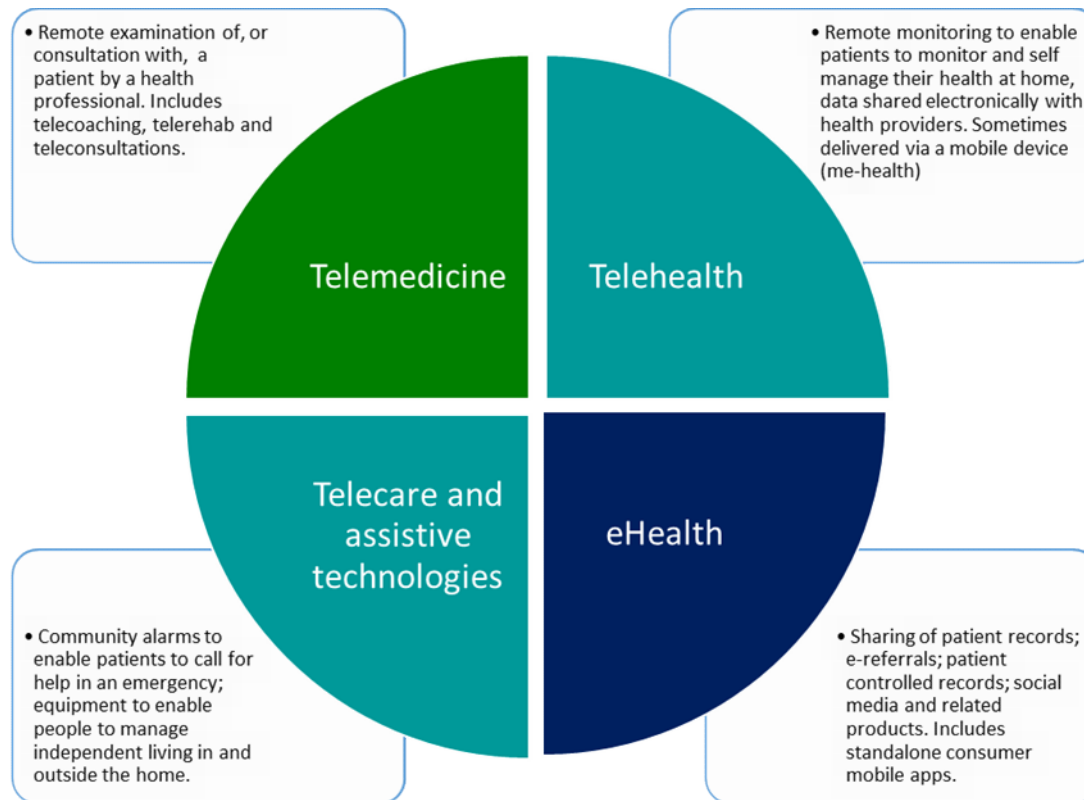
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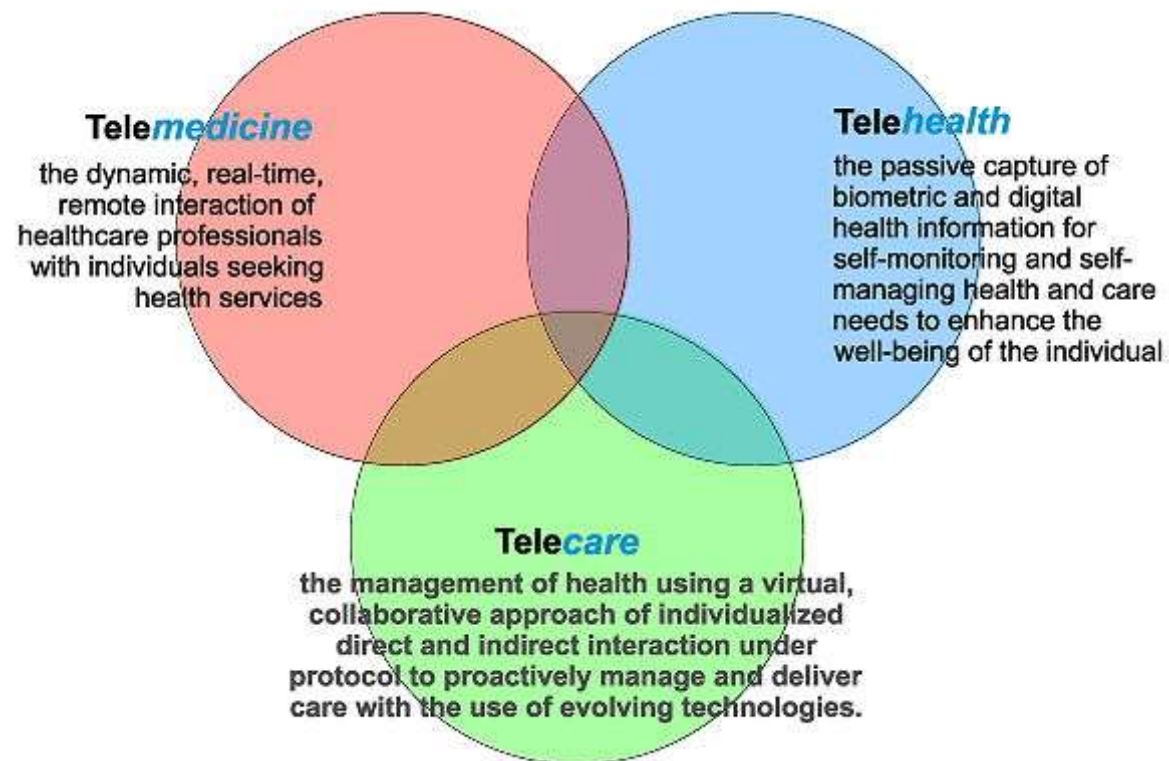
# Medicine at a distance

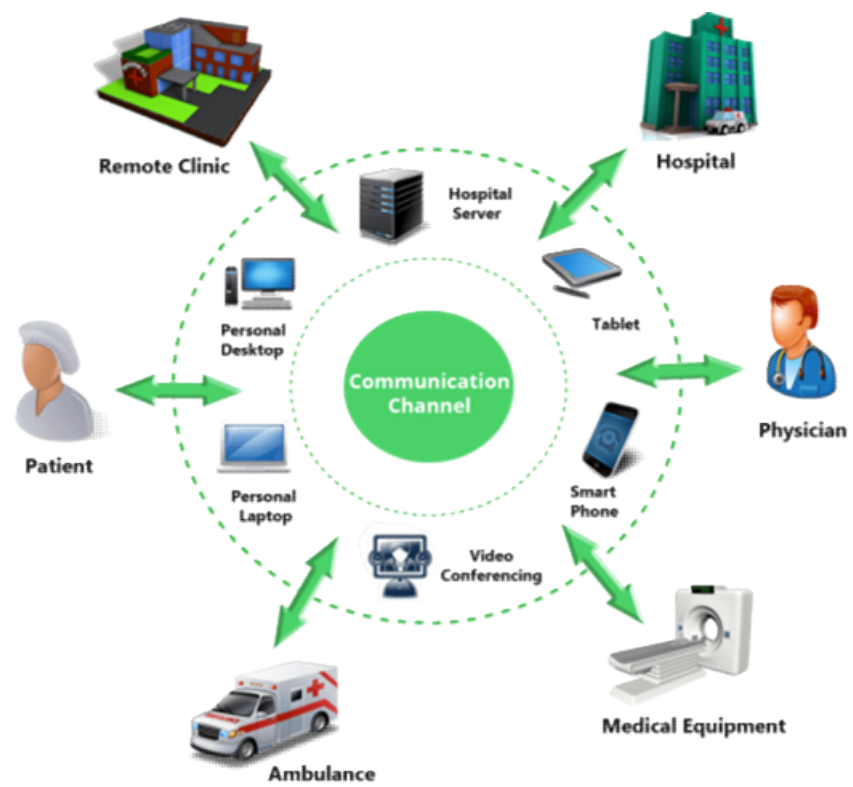
- Ever since the invention of electronic communication devices physicians have used technology in the care of patients, practicing “medicine at a distance”
- In the 1950s, the Mayo Clinic in USA received an electronically transmitted EKG from Australia;
- astronauts were telemetrically monitored in space in the 1960s;
- the 1970s saw an early emergence of telemedicine to Indian reservations to improve their access to healthcare.
- In the 1990s, the digitization of radiological images enabled the interpretation from virtually any location in the world and teleradiology was born.
- Especially over the last 10 years, as technology has become more affordable and reliable, telehealth has moved into the mainstream, especially in the US.
- The most common definition for Telehealth is the “delivery of healthcare at a distance” which encompasses online patient education and giving patients access to their health information via patient portals.
- Telemedicine, as a subset of telehealth, is defined as “practicing medicine at a distance”, i.e., healthcare providers examining, observing, consulting, and treating patients. As illustrated in the Telehealth Taxonomy, the three main modalities by which Telemedicine is practiced include:
- **Interactive Patient Care (IPC)** – live, interactive communication between a provider and a patient, i.e., secure consults, visits, and exams over video, voice, or text
- **Remote Patient Monitoring (RPM)** – periodic, asynchronous, or continuous monitoring and transmission of vital signs, including weight, blood pressure, oxygen saturation, glucose levels, heart rate, or heart rhythm
- **Store-and-Forward** – asynchronous capture and transmission of images, video and sound, e.g., faxing EKGs, sending pictures of melanomas, and teleradiology.
- Simply put, Telehealth offers an alternative way to delivering healthcare and practicing medicine. The only difference to traditional care is that the patient and the physician (or other providers, educators, or therapists) are not at the same physical location. Telehealth thus gives patients easier access to care, while enabling physicians to share their expertise beyond their physical location.

## A Telehealth Taxonomy











# The 9 most common Telemedicine Services in US



## telemedicine

Within the **home environment**, telemedicine can provide rural or less mobile patients access to primary care and specialty care. But also ad hoc access to care is easily set up, especially by using external telemedicine service providers who specialize in 24×7 urgent care.

- A second and highly beneficial set of telemedicine services in the patient's home involves remote patient monitoring – either for preventing avoidable readmissions for many common (and costly) indications such as Congestive heart failure (CHF) “heart failure,” or Chronic Obstructive Pulmonary Disease (COPD) or for the long-term monitoring of chronically ill patients (e.g., diabetes, cardiac diseases) to avoid unnecessary hospitalizations.

Within the **clinical environment**, the highest value and most commonly implemented use cases involve access to a neurologist for stroke evaluations in the ER or remote pre-admission assessments and triage with patients at nursing homes.

- In rural clinics, access to specialty care provider greatly eliminates the need for patient travel in many situations.

# telemedicine

- **Follow-Up Visits at Home:** Most outpatient interactions with physicians today are limited to a handshake and a good conversation. So why not spare patients the trip to the doctor's office? If the physician wants to review test results with a patient or if a patient wants to check in with a specialist on some questions, it can be done just as easily from the patient's tablet, computer or smartphone at home, in the office or even from the hotel room while traveling for business or leisure.
- **Urgent Care Visits from Home:** Oftentimes what ails us – a common cold, a headache, or an upset stomach – can easily be addressed and treated with some simple care recommendation or an easily obtained prescription. Obviously, many urgent care conditions cannot be treated virtually – but access to this service can also serve as triage – should I call an ambulance, go to the ER or see my GP the next day?
- **Behavioral Health Visits at Home:** There is strong correlation between mental health disorders including depression, eating disorders, or low self-esteem and associated diseases such as obesity, hypertension, diabetes, and cardiovascular diseases. Thus, especially regular access to behavioral health visits is key to managing a person's overall health. Plus, it removes common barriers and root causes of missed in-person appointments. Telemedicine offers a secure, easy solution to connect patients with providers.
- **Post-Discharge Monitoring and Video Care:** The one-time reimbursement for an episode of care has led many hospitals to seek the prevention of avoidable readmissions by monitoring the patient's vital signs for the weeks past discharge. Some hospitals have seen readmission rates drop by 80 percent and investments into the monitoring have yielded ROIs of over 1,000 percent.
- **Long-term Chronic Diseases Monitoring:** Especially for patients with multiple chronic diseases long-term monitoring can bring significant benefits for the patient, the patient's family, and the care providers. Through periodic monitoring and interaction via video, the decompensation of a patient's condition, especially when compared to a baseline, can be detected very early and be improved simply through medication adjustments or ambulatory interventions.
- **24x7 Access to Stroke Specialists in the Emergency Room (ER):** When a patient experiences a stroke, the quicker the life-saving treatment tissue plasminogen activator (tPA or PLAT) can be administered, the better the health outcome and the lower the treatment cost. With telemedicine, the on-call neurologist can interview the patient, review the CT scan and exam the patient using a high-definition pan-tilt-zoom camera to search the patient's face for the stroke-typical drooping of the facial muscles before working with the ER staff to initiate the right course of treatment.
- **24x7 Access to Behavioral Health in the ER:** In many American ERs, oftentimes rooms are occupied by mentally unstable patients that must be kept under observation, pending a psychiatric evaluation. 24x7 access to Behavioral Health specialists improves access and keeps the ER's capacity up and the risk for other patients and staff down.
- **Pre-admission Triage at Nursing Homes and Urgent Care Centers:** Unnecessary admissions, sometimes motivated by reducing the organization's liability, sometimes due to the lack of clinical expertise, account for a high percentage of avoidable care cost. With a quick remote assessment and triage of a patient's condition, avoidable transportation and acute care cost can be avoided or in many cases lead to a direct admission to the hospital, avoiding a costly stay in the ER.
- **Virtual Visits with Specialists at Local Clinic:** For many patients in rural areas access to specialists oftentimes brings with it the hassle of a multi-hour drive. With telemedicine, specialists can now easily make a "house call" at the patient's local clinic. And with the availability of many basic exam tools as a digital version, such as video otoscopes and digital stethoscopes, even basic exams can be conducted with the help of a clinically trained telepresenter. Virtual visits with specialists allow patients to learn about treatment options, prepare for procedures or receive post-operative follow-up care.

Just a quick glance at the healthcare systems in the US, Canada, and Scandinavia reveals that telemedicine in the not-so-distant future will become the default way to receive care. Positioned at the intersection of value, convenience, and quality, telehealth is here to stay until the day we all have implantable Tricorders measuring and treating our diseases.

[Shaping the Future of Care Delivery with Telemedicine BY [CHRISTIAN MILASTER](#) / FRIDAY, 27 OCTOBER 2017 / PUBLISHED IN [INNOVATIVE CARE](#), [TELEHEALTH](#)]

# eHealth

- eHealth is the use of information and communication technologies (ICT) for health. eHealth can be used in treating patients, conducting research, educating the health workforce, tracking diseases and monitoring public health.
- The use of the Internet, email, social networking sites and mobile phones are rapidly expanding in the African Region. Between 60% and 80% of people in the Region are estimated to be using mobile phones. These tools and platforms are creating opportunities for the effective use of eHealth solutions, applications and services to improve national health systems.
- Telehealth and telemedicine services can eliminate distance and time barriers while encouraging positive lifestyle changes to prevent and control common diseases. SMS or text messaging can deliver information to fingertips 24-hours a day.

eHealth can be practically applied to different health scenarios such as:

- local health workers working with mobile-based reminder systems to improve compliance and overall health outcomes;
- a local immunization centre sending SMS reminders to parents and provide educational messages about the diseases they protect against;
- using mobile technology during emergencies to dispatch mass announcements about satellite clinic locations and schedules.
- There is great potential for eHealth to improve overall well-being in the Region and some countries have already started programmes centred around it.

## WHO's work on digital health

This guideline represents the first of many explorations into the use of digital technologies and has only covered a fraction of the many aspects of digital health.

In 2018, governments unanimously adopted a World Health Assembly resolution calling on WHO to develop a global strategy on digital health to support national efforts to achieve universal health coverage. That strategy is scheduled to be considered at the World Health Assembly in 2020.

Although WHO is expanding its focus on digital health, the Organization has been working in this area for years, for example, through the development of the eHealth Strategy Toolkit in 2012, published in collaboration with International Telecommunications Union (ITU).

To support governments in monitoring and coordination of digital investments in their country, WHO has developed the [Digital Health Atlas](#), an online global repository where implementers can register their digital health activities. WHO has also established innovative partnerships with the ITU, such as the [BeHe@lthy](#), [BeMobile](#) initiative for the prevention and control of noncommunicable diseases, as well as efforts for building digital health capacity through the WHO Regional Office for Africa.

Over the years, WHO has released a number of resources to strengthen digital health research and implementation, including the [mHealth Assessment and Planning for Scale \(MAPS\) toolkit](#), a handbook for [Monitoring and Evaluation of Digital Health](#), and mechanisms to [harness digital health to end TB](#).

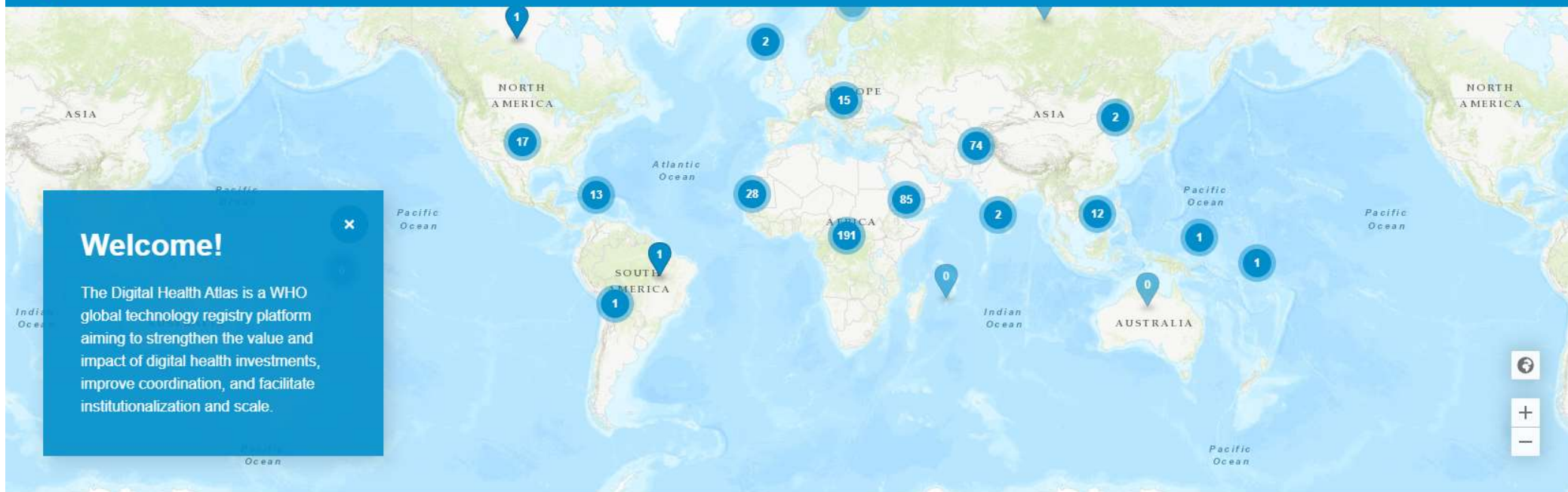
On 6 March 2019, Dr Tedros announced the creation of the Department of Digital Health to enhance WHO's role in assessing digital technologies and support Member States in prioritizing, integrating and regulating them.

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## Welcome!

The Digital Health Atlas is a WHO global technology registry platform aiming to strengthen the value and impact of digital health investments, improve coordination, and facilitate institutionalization and scale.





# Maximising digital health technology to improve quality and patient safety in Africa

**Cotonou, Benin 19 June 2018** - The World Health Organization(WHO) has urged countries to maximise the use of digital health technology to improve patient safety and equitable access to quality health care.

- Dr Tedros Adhanom Gebreyesus, the Director-General of the World Health Organization made the call while addressing delegates attending the second International Conference of Ministers of Health and Ministers for Digital Technical Technology on Health Security in Africa (CIMSA). The event has attracted over 300 delegates including the participation of Ministers of Health, Ministers of ICT, WHO Regional Director for Africa, Dr Matshidiso Moeti, development partners and telecoms companies.
- Every year, **millions of patients die or are injured because of unsafe and poor-quality health care**. Most of these deaths and injuries are **totally avoidable**. **Adverse events due to medical errors are now estimated to be the 14th leading cause of death and injury globally**, putting it in the same league as tuberculosis and malaria.
- There are an estimated 421 million hospitalizations in the world every year, and on average, 1 in 10 result in adverse events due to poor health care.
- “The needless suffering of patients and their families is bad enough. But each adverse event erodes the most precious resource in health care: trust. Medical errors aren’t just bad medicine; they’re bad economics. The economic costs of medical errors are astronomical and the investments needed to improve patient safety pale into insignificance compared with the costs of harm”, said Dr Tedros.

- The Director-General pointed out that electronic health records, the use of smart phones and smart watches, electronic medical prescriptions, artificial intelligence, eLearning, and many other existing digital technologies can play a vital role in improving patient safety, raising awareness, training health care professionals and empowering patients and families. He called for committed leadership both at the national level and individual health facility level, clear policies and governance mechanisms, and data-driven improvements - including full implementation of health data standards and full use of available data for decision-making.
- Speaking during the opening of a panel discussion on “Enhancing the collaboration between the Ministries of Health and ICT on e-Health in Africa”, the WHO Regional Director for Africa, Dr Matshidiso Moeti said: **Digital solutions are the future of equitable, quality health care** and resilient health systems and over the past years, great strides have been made in boosting telemedicine, eLearning, mHealth and social media in the African region”.
- Comprehensive and up-to-date repositories of digital solutions have been put in place by WHO to assist countries to make better decisions. Together with the International Telecommunications Union (ITU), the World Health Organization has implemented an mHealth programme called **“Be Healthy Be Mobile”** which is helping to alleviate noncommunicable diseases in the region. Similarly mobile applications are being used as part of the Ebola outbreak in the Democratic Republic of Congo to collect and transmit contact tracing and alert data. **The launch of an electronic portal** using geographic information management systems now allows all partners to have **access to epidemiological data**, information on entry points and health infrastructures, thus allowing a better understanding of the dynamics of the current **Ebola virus epidemic**.

- Dr Moeti however urged countries to take firm action to address the unregulated spread of digital solutions that have no chance of being scaled up to benefit the wider population, as it leads to wastage of resources “Collaboration between the health, information and communication technology and other sectors is essential to improve access to health care, patient safety and the achievement of universal health coverage”, she added.

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World Health Organization  
REGIONAL OFFICE FOR Africa

WHO Guidelines on eHealth

TELEMEDICINE  
Opportunities and developments in Member States

mHealth  
New horizons for health through mobile technologies

Management of patient information  
Trends and challenges in Member States

WHO compendium of innovative health technologies for low-resource settings

Safety and security on the Internet  
Challenges and advances in Member States

Legal frameworks for eHealth

eLEARNING for undergraduate health professional education

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Altri Preferiti

# 27 countries have eHealth Strategies (as of end of 2017)

National eHealth Strategy Toolkit



Cabo Verde



Comoros



Mauritius



Sao Tome and Principe



Seychelles





Yes

In progress

No

No data

Non AFRO

5 |

 World Health Organization

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World Health Organization  
REGIONAL OFFICE FOR  
Africa

# eHealth Strategies progression – Global

Fig. 1.2. Timeline of country adoption of eHealth policies or strategies, 1990–2015



Year	Countries
1990	San Marino
1995	Finland
1995-2000	Norway
2000	Canada
2000-2005	Estonia, Malawi, Singapore
2005	Latvia, Sudan, USA
2005-2010	Republic of Moldova, Cabo Verde, Switzerland
2010	Iceland, Jordan, Uzbekistan
2010-2015	Georgia, Kenya, Maldives, Poland, Bangladesh, Paraguay, Qatar, Rwanda
2015	Argentina, Bhutan, Bulgaria, Chile, Democratic Republic of Korea, Dominican Republic, Ethiopia, Gambia, Japan

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Co-funded by the  
Erasmus+ Programme  
of the European Union

Theme 2019:

*International Cooperation as Key Principle in Space Activities*

# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

**Silvana Dellepiane - Moira Gerace**

# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

## 1. INTRODUCTION

- Sustainable Goals
- WHO Leadership priorities and UHC
- The logic ICT context
- Culture, Cooperation and Technology

## 2. E-Health

- Medicine-at-a-distance
- Telemedicine practice
- WHO digital health
- Maximising digital health technology AFRO Region

## 3. DATA PROTECTION

- Medical records
- GDPR Legal issues

## 4. A CASE STUDY: C.A.R.

- Geopolitical vision
- Healthcare and conditions of children
- Hospital of Maïgaro
- Telemedicine: Needs and requirements

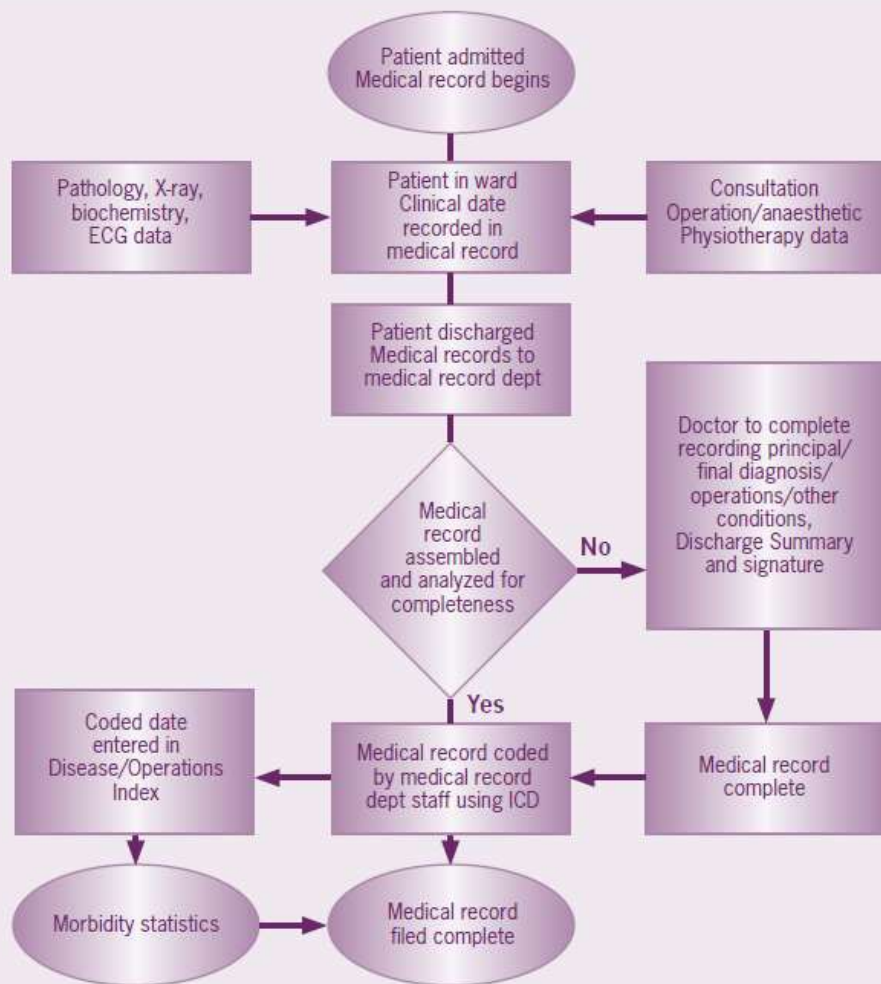
## 5. DIGITAL DIVIDE and TELEMEDICINE IN AFRICA

- ICT technology Dissemination
- Satellite communications

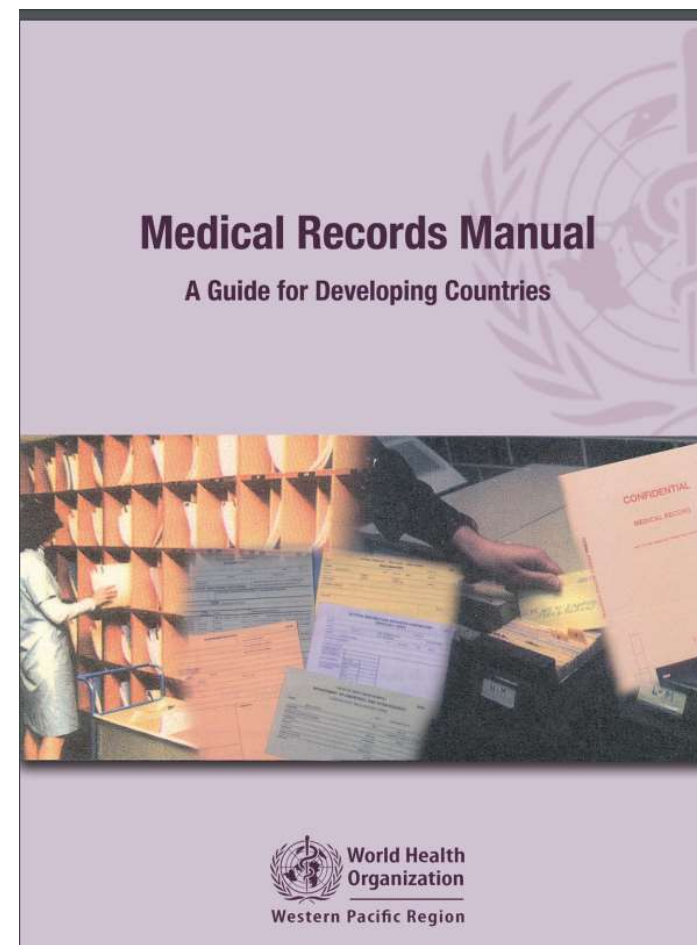
## 6. TELEMEDICINE: A PILOT STUDY IN C.A.R.

- The approach
- The Project development
- The Project architecture
- The software development
- The platform
- The experiment on site

## 7. CONCLUSIONS



The flow of data from the patient's admission to the return of the medical record to file



# What is Data Protection?

- Data Protection refers to legislation that is intended to:
  - protect the right to privacy of individuals (all of us)
  - ensure that Personal Data is used appropriately by organisations that may have it (Data Controllers).

Personal data is any information that can be used to identify a natural person – “Data Subject”

- Name
- Date of Birth
- Address
- Phone Number
- Email address
- Membership Number
- IP Address
- Photographs etc

Some categories of information are defined as Special Categories of Personal Data and require more stringent measures of protection. These categories include:

- Religion
- Ethnicity
- Sexual orientation
- Trade union membership
- Medical information etc.

Although not listed as “special categories of personal data”, the following are also awarded additional protection:

- Criminal Data
- Children’s Data

# Seven Principles of Data Protection

The key objectives of Data Protection can be summarised as follows:

1. Lawfulness, Fairness, Transparency
2. Purpose Limitation (Use only for one or more specified purposes)
3. Data Minimisation (Collect only the amount of data required for the specified purpose(s))
4. Accuracy (Ensure data is kept up to date, accurate and complete)
5. Storage Limitation (Kept for no longer than necessary for the specified purpose(s))
6. Integrity and Confidentiality (Processed ensuring appropriate security of data)
7. Accountability (Essential not only to be compliant, but to be able to demonstrate compliance)

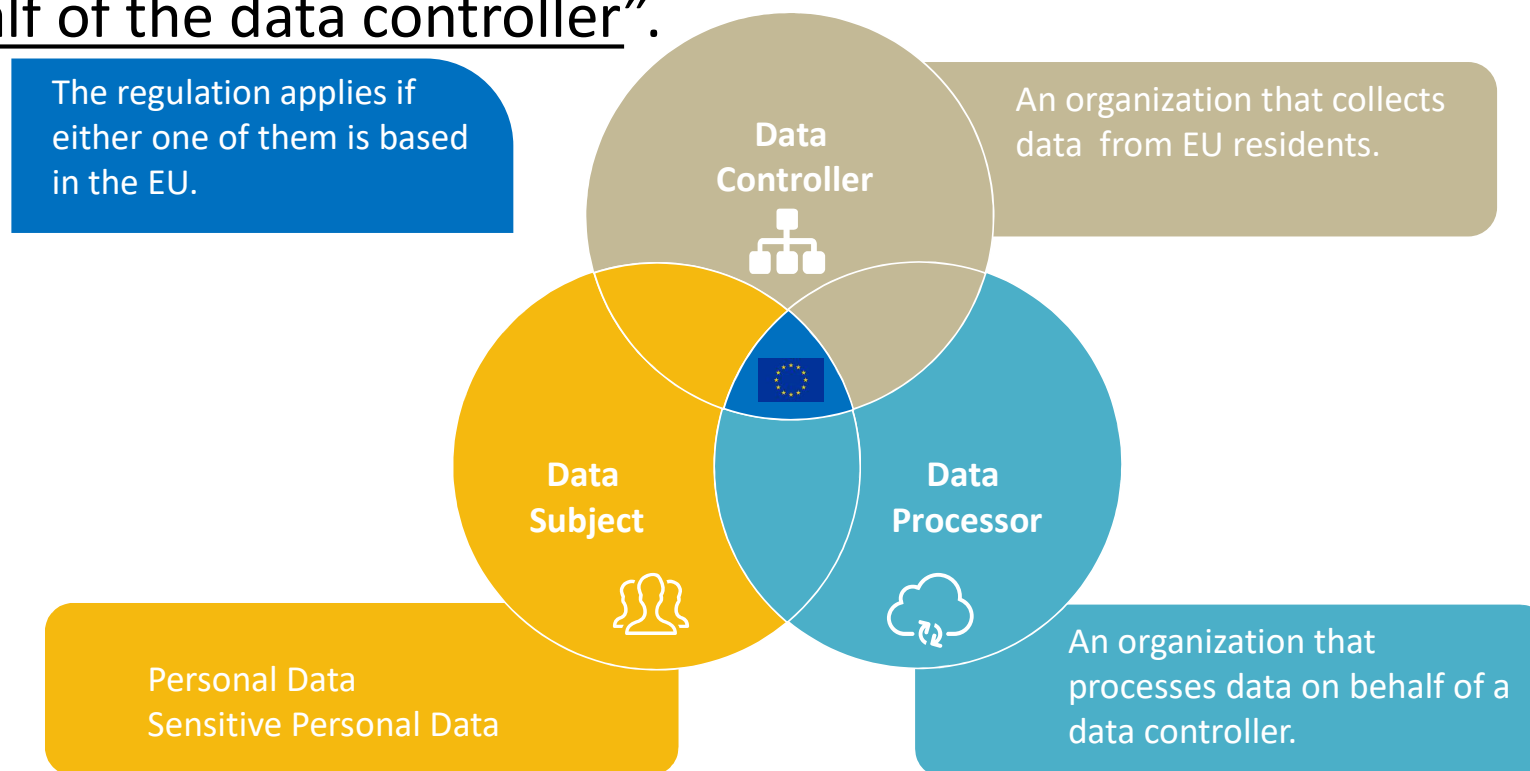
# What is GDPR

- The General Data Protection Regulations (GDPR) is new EU legislation that comes into effect on May 25<sup>th</sup> 2018.
- It very clearly sets out the ways in which the privacy rights of every EU citizen must be protected and the ways in which a person's 'Personal Data' can and can't be used.
- It places the onus on any person or entity involved in the processing of a person's information (Data Controller/Data Processor) to comply with the legislation and to demonstrate compliance
- It carries significant penalties for non-compliance



# Data Controller or Data Processor?

The GDPR states that a data controller “determines the purposes and means of the processing” whereas a data processor acts only and always “on behalf of the data controller”.



# How to comply

The Data Protection Commissioner has issued a guide to compliance, consisting of 12 steps.

1. Becoming Aware
2. Becoming Accountable
3. Communication with members
4. Personal Privacy Rights
5. Subject Access Requests
6. Legal Basis
7. Consent
8. Children's Data
9. Reporting Breaches
10. Impact Assessments
11. Data Protection Officers
12. International Organisations



## Step 1 - Awareness

- GDPR will benefit all of us, it will ensure that our Personal Information is protected
- It will also ensure that, as a Data Controller, each organization will be accountable for how it collects, uses and stores Personal Information
- Every Member should be aware of the changes that GDPR will bring and how that impacts them.
- This awareness will also benefit all of us in our personal lives.

## Step 2 - Become Accountable

- It is imperative that each organization understands exactly what Personal Information it holds and how it uses it
- To ensure that this is clear, it is important that every organization makes an inventory of the personal data that it holds and the processing activities undertaken
- This Inventory or 'Processing activities log' should examine data under the following headings:
  - Why is it being held?
  - How was it obtained?
  - Why was it originally gathered
  - How long is it being retained for?
  - How secure is it?
  - Is it shared with any third parties?
  - Where is it stored?

## Step 2 - Become Accountable

- All registered members' information is stored on the central Management System.
- Other systems may be in use and most of the third party providers of these kinds of systems (online registration, text messaging, fundraising) will be well aware of GDPR and will be able to advise on how they are ensuring compliance.
- Providers of third party systems should be contacted to verify that they are in compliance with GDPR. Ensure all third party relationships are governed by a contract/other legally binding instrument to include penalties for non-compliance.
- Other likely categories of Personal Information will include
  - Text or messaging systems
  - Email lists or distribution groups
  - Information captured on websites

## Step 3 - Clear Communication

- It is required that individuals are aware of certain information before their data is obtained.
- Existing membership forms, and other forms used to collect data must be updated to specifically tell individuals the following:
  - The organization identity
  - The reasons for collecting the information
  - The uses it will be put to
  - Who it will be shared with
  - If its going to be transferred outside the EU
  - The legal basis for processing the information
  - How long it will be retained for
  - The right of members to complain
  - Whether it will be used for automated decision making
  - Other specific personal privacy rights relevant under GDPR



## Step 4 – Personal Privacy Rights

- GDPR enshrines certain rights for individuals that must be supported by every Data Controller.
- These rights include:
  - Subject Access
  - To have inaccuracies corrected
  - To have information erased
  - To object to direct marketing
  - To restrict processing of their information including automated decision making
  - Data portability - Ability to receive all of their information in a standard format to move to another provider

## Step 5 - Subject Access Requests

- Under Data Protection, a person has always had the right to request access to **all** of the information held about them
- This is called a Subject Access Request (SAR)
- Subject Access Requests must be completed within one month free of charge
- Holding an accurate inventory of information will be a key enabler for completing SAR efficiently
- Data has to be provided in a standard format
- The person must also be informed of further information, including the relevant Retention Periods for the data held and their right to have inaccuracies corrected

## Step 6 - Legal Basis for Data Processing

- Processing of Personal Information can only occur when there is a legal basis for carrying it out.
- Legal Basis can be established where one of the following applies:
  - The person has given explicit consent
  - Necessary for performance of a contract
  - Compliance with a Legal Obligation
  - To protect the vital interests of the person
  - A task carried out in the public interest
  - For the legitimate interests of the data controller
- The legal basis for processing should be recorded

## Step 7 - Obtain & Manage Consent

- Individuals must be **informed of what their data is going to be used for, who will have access to it, where it will be stored and how long it will be held for.**
- They **must give their consent** for their data to be used.
- Consent must be '**freely given, specific, informed and unambiguous**'.
- Members **cannot be forced** into consent or **unaware** that they are giving consent.
- Obtaining consent requires a **positive indication of agreement** – it cannot be inferred through silence (not objecting), pre-ticked boxes or inactivity.

## Step 7 - Obtain & Manage Consent

- Consent must be '**refreshed**' – It cannot be deemed as indefinite
- Consent **must also be verifiable** – Data Controllers must be able to demonstrate that consent was given and an audit trail should be maintained
- 'Legal Basis' can be used to process information in the absence of consent in certain, very specific, circumstances
- It must be easily possible for a person to **withdraw their consent**

## Step 8 - Children's Data

- Under GDPR, children are not permitted to give consent for Data Processing
- A child's Parent or Guardian must give consent on their behalf
- Procedures must be in place to verify individual's ages (for juveniles)



## Step 9 - Report Data Breaches

- If unauthorised access to Personal Data occurs or Personal Data is lost or stolen, this **must be notified** to the Data Protection Commissioner within 72 hours of being identified.
- This is a requirement for all paper information and all electronic information (**unless the data is encrypted** or anonymised).
- If the breach is likely to cause harm to the individual (Identity Theft or breach of confidentiality) then the **individual must also be informed**.
- A procedure to detect, report and investigate data breaches should be in place.
- It is imperative that Data Breaches or possible Data Breaches are not ignored in the hope that no one will notice, they must be investigated and reported if appropriate to do so.

# Step 10 – Data Protection Impact Assessments

- GDPR seeks to ensure that all significant new processes, initiatives or projects undertaken consider and ensure GDPR compliance
- The concept of ‘Privacy by Design and by Default’ is a key theme within GDPR
- This requires that a Data Protection Impact Assessment must be undertaken to understand the potential impact of that project / initiative on the privacy of individuals prior to the processing taking place
- Organizations that are considering projects with ‘high risk’ processing (i.e. new technology) or installing CCTV should conduct a Data Privacy Impact Assessment
- A Data Privacy Impact Assessment can be conducted by meeting relevant stakeholders, identifying potential privacy issues and agreeing ways to mitigate the risk of issues occurring
- Data Protection Impact Assessments must be documented and retained

## Step 11 - Data Protection Officers

- Every organization should identify someone to coordinate their approach to meeting their Data Protection obligations
- This will involve identifying and recording the specific locations where data is held, ensuring that access to the data is controlled, ensuring that consent is obtained in the appropriate manner and maintained accordingly

## 12 - International Organisations

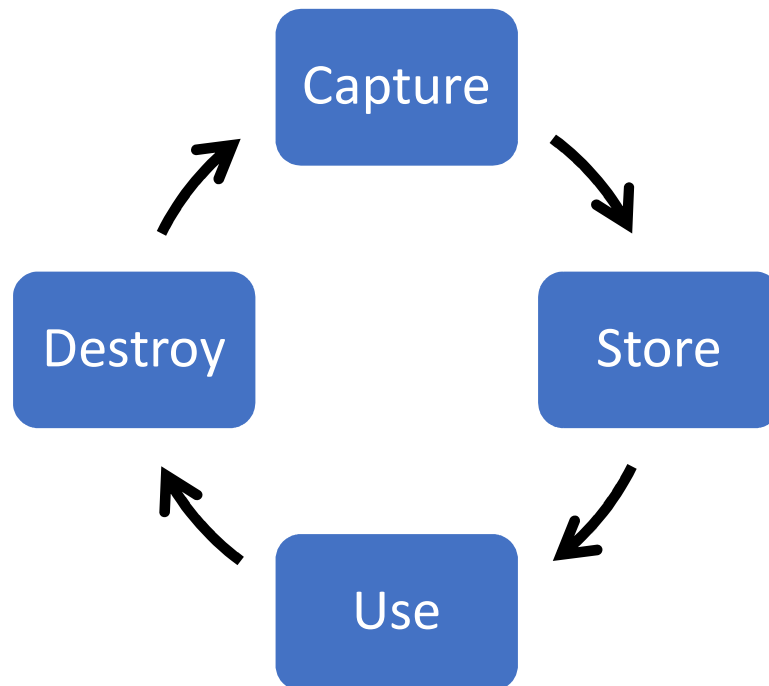
- GDPR includes a 'one-stop shop' provision for Organisations that operate in more than one jurisdiction
- A Lead Supervisory Authority can be nominated

# GDPR Timelines

- GDPR is coming into effect on May 25<sup>th</sup> 2018
- All data processing from that date will legally be required to comply with GDPR.
- There are consultations and working groups on-going within the EU and Member States to produce guidance on certain elements of the regulations.
- Recital 171 of GDPR makes allowance to bring 'non-GDPR' processing already underway into compliance within 2 years.
- If consent was already obtained in a manner consistent with GDPR, it is not necessary to obtain consent again (immediately after May 25<sup>th</sup>).

# Information Life Cycle

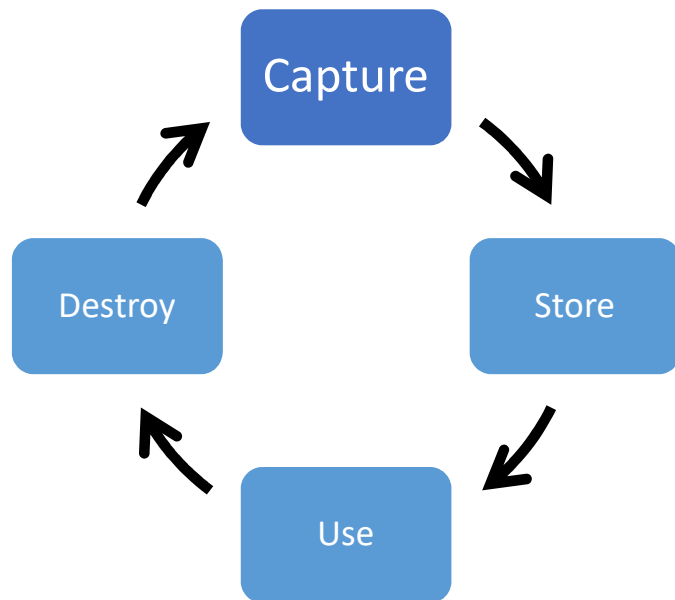
The diagram below illustrates four main stages in the life cycle of information



1. **Capture** – Obtain and record information
2. **Store** – Save the information electronically or in paper format
3. **Use** – Use or reuse information
4. **Destroy** – Delete, erase or shred information

# GDPR Information Life Cycle

Under GDPR, the information life cycle will remain broadly the same, however there are additional factors to be considered at each stage



## Capture

1. What you are allowed to capture
2. How you may do so
3. What you must tell the person in advance
4. What you must get from them (their permission)

## Store

1. How you must store it
2. Where it can be stored
3. Obligations of third parties
4. What happens if you lose it

## Use

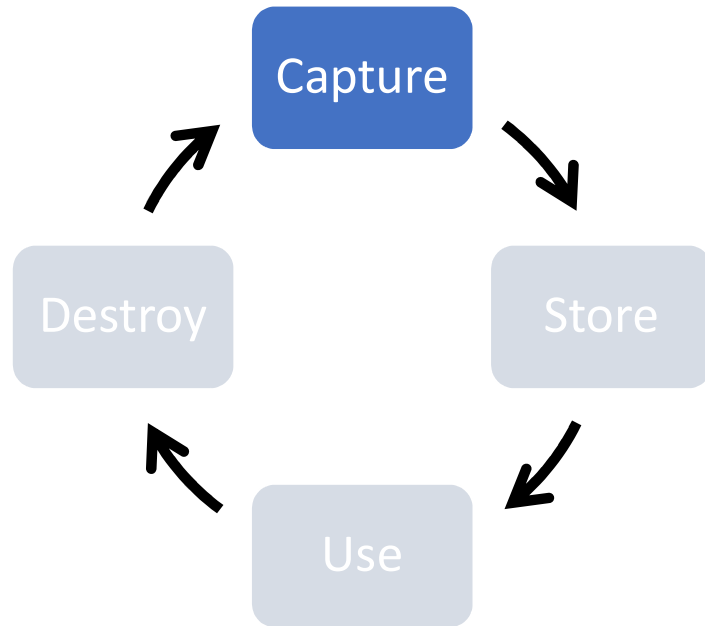
1. What you can use it for
2. What you can't use it for

## Destroy

1. How long you can keep it for
2. When you must destroy information

# GDPR Information Life Cycle

## Capturing Information under GDPR

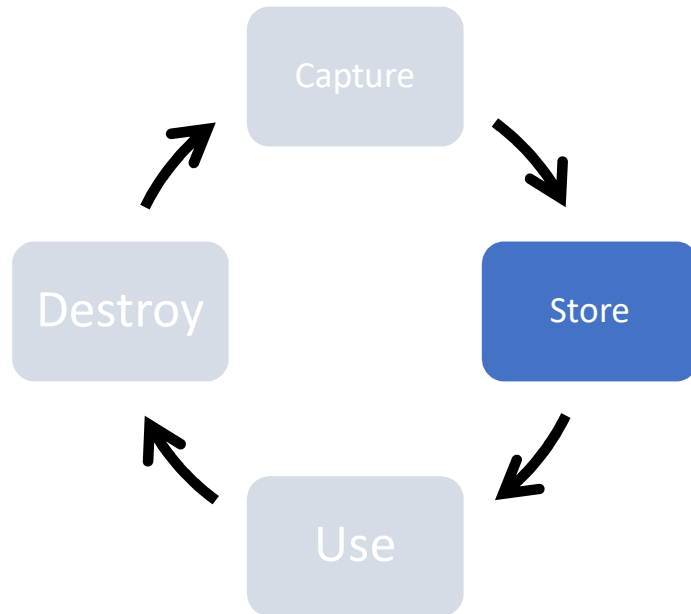


1. **Data Minimisation** (Only ask for what is needed)
2. **Privacy Notices** (Clearly inform what, why, who and where)
3. **Data Subject Rights** (state the persons rights under the legislation)
4. **Obtain Consent** (consent must be freely given and explicit for the purpose or purposes)



# GDPR Information Life Cycle

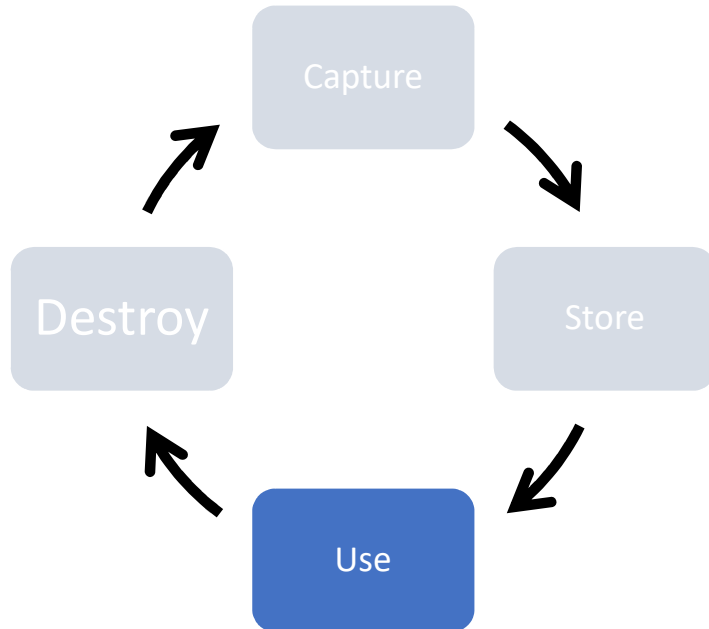
## Storing Information under GDPR



1. **Safe and Secure** (Information must be stored appropriately e.g. locked cabinets/password protected files)
2. **Restricted Access** (Only authorised persons should have access to it)
3. **Data Inventory** (Information captured should be recorded)
4. **Subject Access Requests** (Must be in a position to provide ALL information held)
5. **Contracts with Data Processors** (Any third parties must have GDPR contracts in place)
6. **Data Breaches** (Processes to detect, report and investigate Data Breaches must be in place)

# GDPR Information Life Cycle

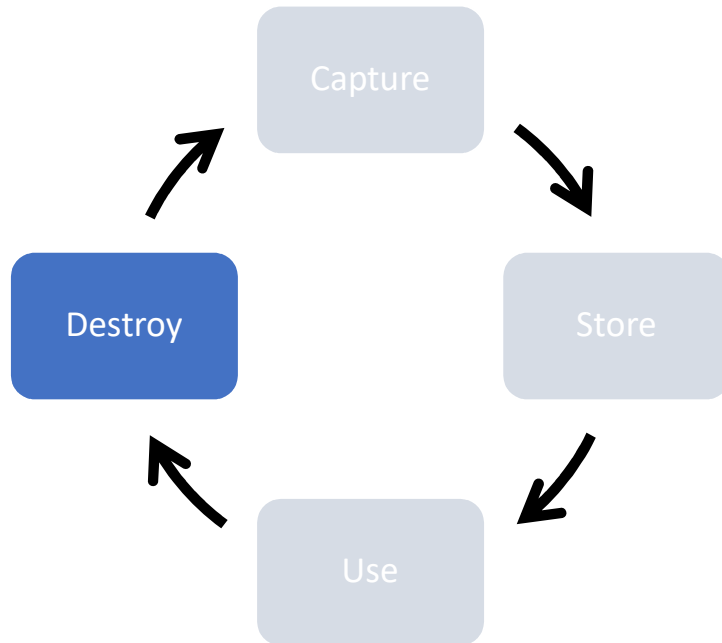
## Use of Information under GDPR



1. **Appropriate use** (Must be for the purpose(s) originally stated)
2. **Consent** (Must have person's consent or a lawful basis for processing it)
3. **Manage Consent** (Individuals have the right to revoke consent for part or all of the processing, this must be managed)
4. **Restricted** (Profiling or automated decision making are restricted)
5. **International Transfers** (Any processing that occurs outside EU must have been communicated to person at time of data capture and must have additional safeguards in place)

# GDPR Information Life Cycle

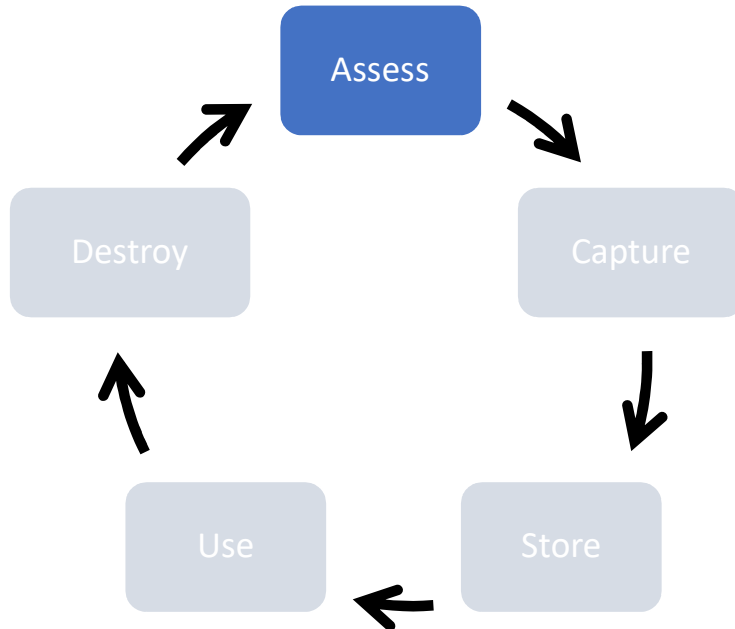
## Destruction of Information under GDPR



1. **Retention Period** (Retention periods must be documented and justified and data must be destroyed after its useful retention period has expired).
2. **Right to erasure** (Must be erased upon request from person)
3. **Portability** (Must be provided in standard format)
4. **Third Party Copies** (All copies of information must be deleted including those held by third parties. Systems like Whatsapp can be an issue here due to the lack of control over the personal data held within it.)

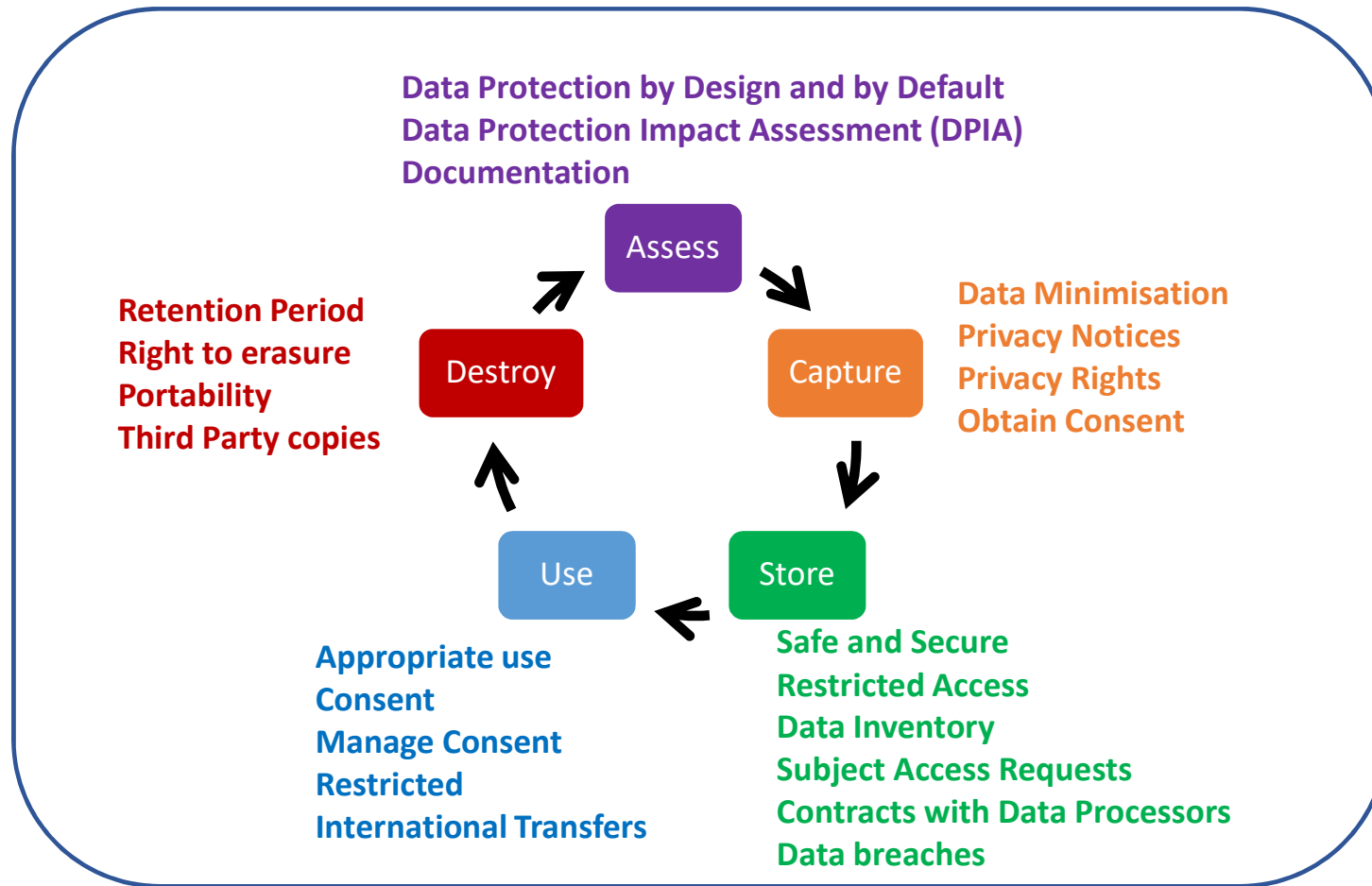
# GDPR Information Life Cycle

There is a fifth step required under GDPR, that is the needed to ensure Privacy by Design through upfront assessment of relevant projects

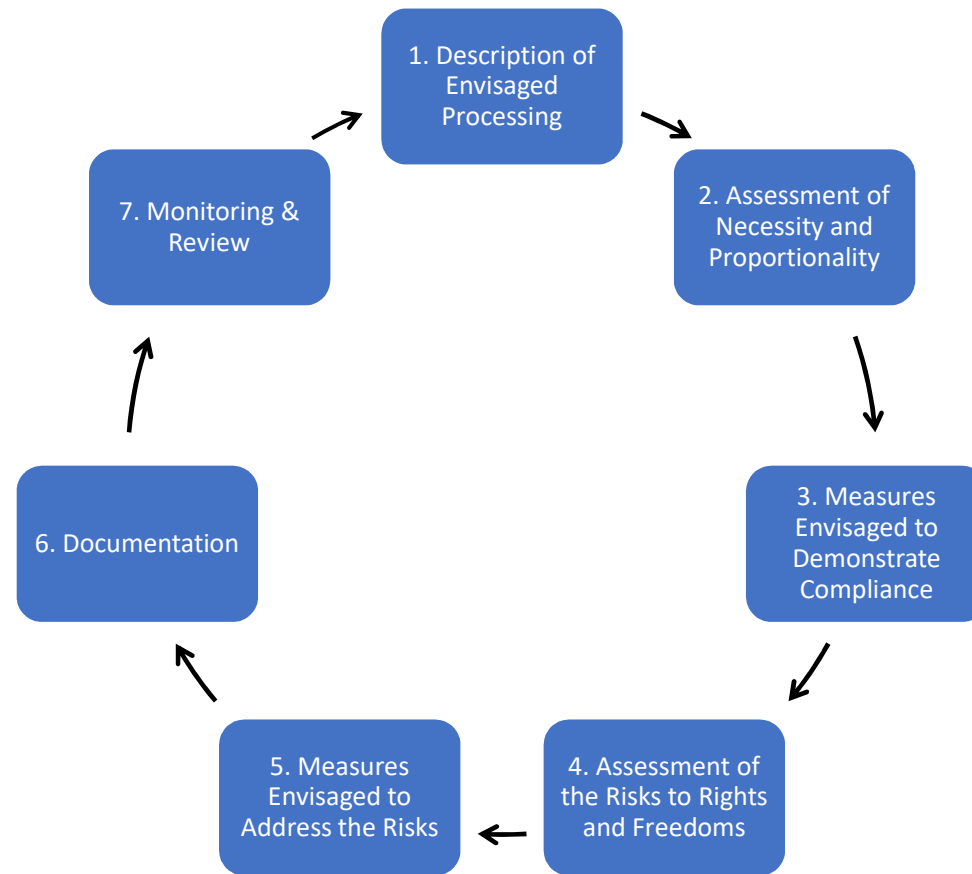


1. **Data Protection by Design and by Default** (All relevant projects or initiatives must consider impacts on privacy from the outset)
2. **Data Protection Impact Assessment (DPIA)** (Must be conducted for new technology, profiling, large scale processing, or engagement of a new third party data processor)
3. **Documentation** (Decisions and rationale for decisions around Data Protection should be documented)

# Summary of GDPR Information Life Cycle

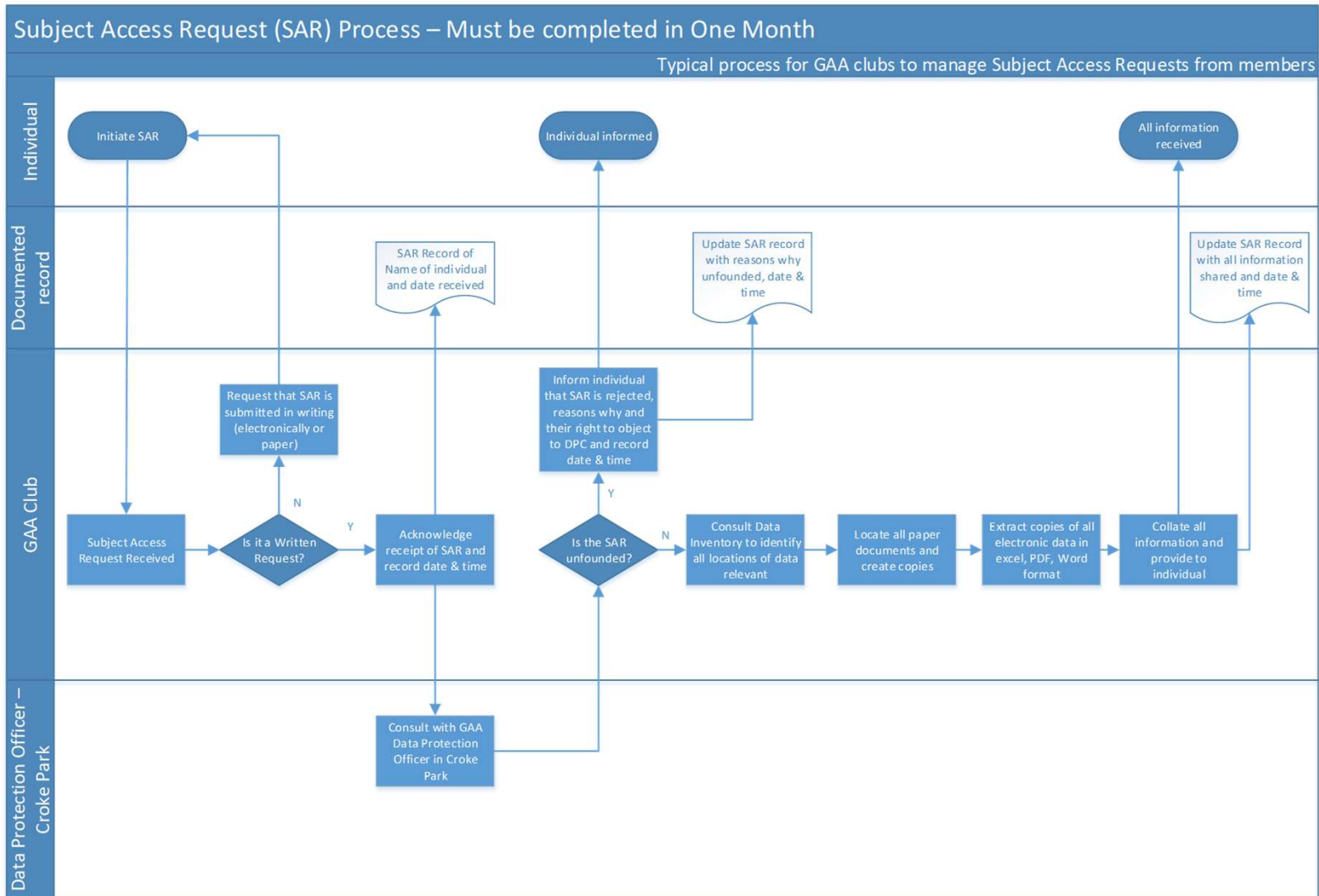


# Data Protection Impact Assessment Process

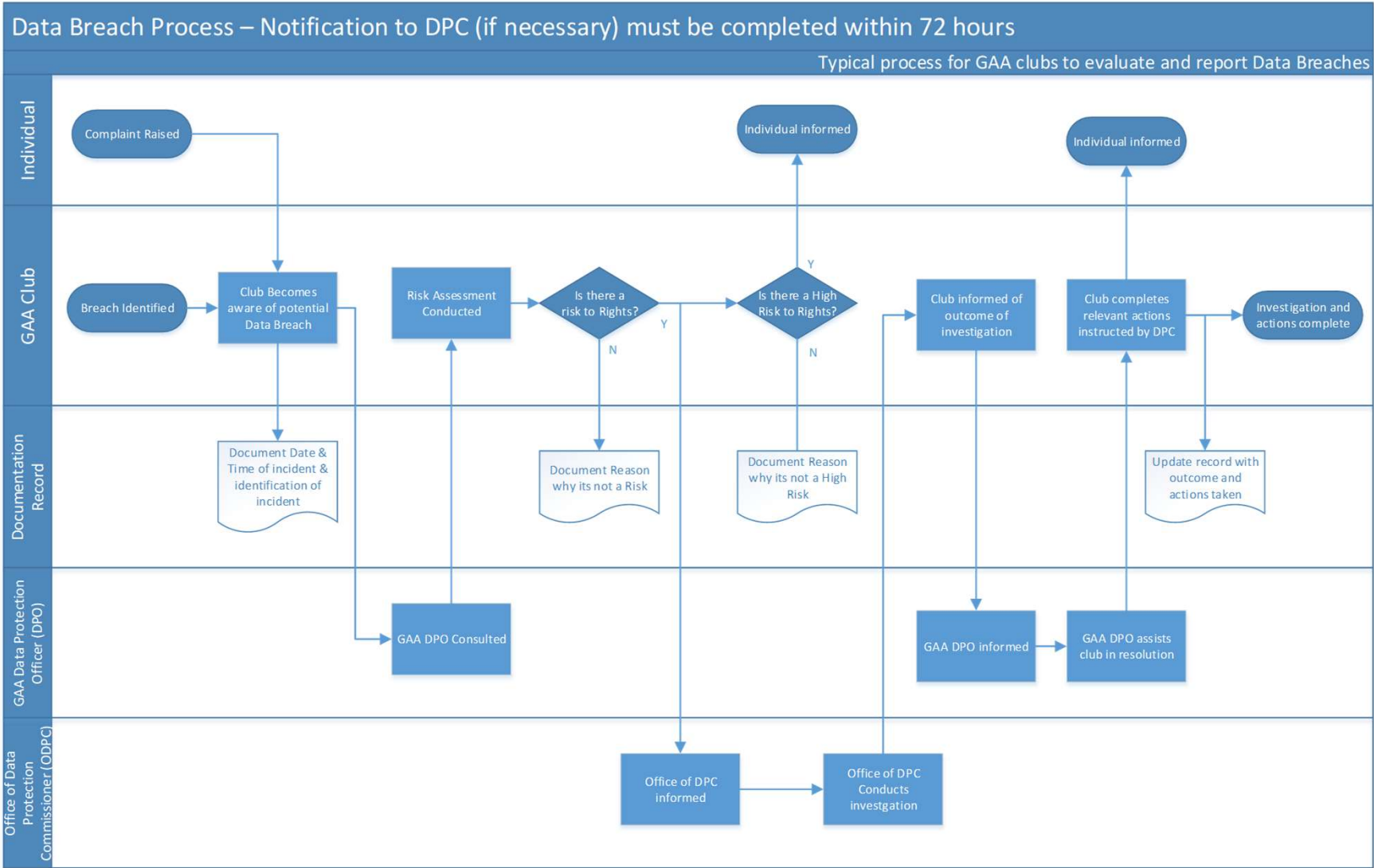


# Sample Log of Data Processing Activities

Item	Description
<b>Data Subject</b>	The individual who's data is processed i.e. Club Member
<b>Data File/ System</b>	Form or system that the data is collected on
<b>Identifiable Fields</b>	List of the Personal Data Items collected
<b>Special Categories</b>	Are there any special categories collected? (Religion, Ethnicity, Sexual Orientation, Trade Union Membership, Medical Information etc)
<b>Children's Data / Criminal Convictions</b>	Is there Children's Data or Garda Vetting Data included
<b>Collected From</b>	Who provided the information
<b>Method</b>	The method in which the data was collected
<b>Purpose for Processing</b>	The purpose for collecting it
<b>Legal Basis for Processing</b>	The Legal basis for processing it
<b>Point of Contact</b>	The point of contact in the club (Registrar, Children's Officer etc)
<b>How and where is it stored?</b>	The locations in which the data is stored
<b>Third Party Processor</b>	Names of any third party Data Processors
<b>Shared within GAA?</b>	Is the data shared within the GAA (Croke Park, County Board, Provincial Council)
<b>Transfer outside EEA - If yes, add details of safeguards</b>	Is the data transferred outside Europe
<b>Retention Period</b>	How long is it held for
<b>Disposal Technique</b>	How the data is destroyed
<b>Accessible By</b>	Who within the club has access to it
<b>Security Measures</b>	How is the data protected? (Password Protection/ Locked Cabinet/ Encryption/ Data Backed Up)







# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

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## 7. CONCLUSIONS

[BMJ](#). 2000 Aug 19; 321(7259): 465–466.

doi: [10.1136/bmj.321.7259.465](https://doi.org/10.1136/bmj.321.7259.465)

## Information technology and telemedicine in sub-Saharan Africa

### Economical solutions are available to support health care in remote areas

- The internet is making inroads into Africa: whereas three years ago only 12 countries in Africa had internet access, it is now available, at least in the capital city, in 53 out of 54 African countries. Free online resources include journals, research databases, and training courses.
- Email has many advantages in poor countries: it is cheap, hardware and software requirements are simple, and the information does not have to be transmitted in real time.
- These benefits have been shown by SatelLife, a charitable organisation based in Boston. Using a low earth orbit satellite and phone lines, it provides email access in 140 countries, serving over 10 000 healthcare workers.
- Where adequate telecommunications links exist, SatelLife and other organisations provide higher capacity email and internet connections. These allow sending email attachments such as image files, permitting a form of low cost telemedicine.
- The patient's findings are described in an email, and digital photographs of the patient and their investigations, such as electrocardiograms and x ray films, are attached.
- This “store and forward” telemedicine does not allow real time interaction, but it permits specialist support in the management of difficult cases and is economical. Modern digital cameras are small, robust, easy to use, and cheap (\$300-800). They can create high resolution images (1900×1400 pixels or better) that are adequate for teledermatology. With modification this technique can be effective for telepathology and teleultrasound.

[BMJ](#). 2000 Aug 19; 321(7259): 465–466.

doi: [10.1136/bmj.321.7259.465](https://doi.org/10.1136/bmj.321.7259.465)

## Information technology and telemedicine in sub-Saharan Africa

Economical solutions are available to support health care in remote areas

- Access to radiological expertise remains a challenge in developing countries. Digital radiology offers a potential solution but is expensive—laser film scanners cost around \$30 000. Consumer image scanners are cheaper and can provide reasonable quality but are not suitable for full size radiographs. Another approach is to photograph an x ray image on a lightbox with a digital camera. This can provide adequate diagnostic quality in many cases and is becoming increasingly practical as cameras approach the ideal resolution for digital x ray images of 2048×2048 pixels.
- Digital image compression techniques (wavelet compression) can reduce a file of high quality chest radiographs to a size suitable for email (under 300 kb), thus enabling anyone with email to consult a radiologist for an opinion.
- These techniques may not provide the quality of data we expect in modern hospitals. However, if used by healthcare workers trained to follow simple photographic and email procedures they can improve specialist access in remote areas. Photographing x ray films taped to the window of a clinic in Ghana, West Africa, may seem rudimentary, but this approach allowed doctors in Massachusetts to advise Ghanaian healthcare workers in 1998.
- Initiatives to train African healthcare workers in the use of information technology are also essential, such as those set up by the Fogarty International Center of the US National Institutes of Health. Simple, low cost techniques should be emphasised, rather than expensive video conferencing approaches that struggle to achieve sustainability even in developed countries.

# Italy



<b>Country context</b>	Population (000s)	60,990	Life expectancy at birth (years)	83
	GHI per capita (PPP Int \$)	34,100	Total health expenditure (% GDP)	9.1
	Physician density (per 10 000 population)	3.76	ICT Development Index rank	30
	Nurse & midwife density (per 10 000 population)	5.44	Mobile-cellular subscriptions (% population)	159.76
	Hospital bed density (per 10 000 population)	36	Internet users (% population)	58

## 1. eHealth foundations

National policies or strategies			
	Country response	Global "yes" response <sup>a</sup>	Year adopted
National universal health coverage policy or strategy	Yes	75%	1978
National eHealth policy or strategy	Yes	58%	2006
National health information system (HIS) policy or strategy	Yes	66%	2001
National telehealth policy or strategy	Yes	22%	2014
Funding sources for eHealth			
	Country response	Global "yes" response <sup>a</sup>	Funding source % <sup>b,c</sup>
Public funding	Yes	77%	>75%
Private or commercial funding	Yes	40%	<25%
Donor/non-public funding	Yes	63%	<25%
Public-private partnerships	Yes	42%	<25%
Multilingualism in eHealth			
	Country response	Global "yes" response <sup>a</sup>	Year adopted
Policy or strategy on multilingualism	Yes	28%	1948
Government-supported Internet sites in multiple languages	Yes	48%	
eHealth capacity building			
	Country response	Global "yes" response <sup>a</sup>	Proportion <sup>d</sup>
Health sciences students – Pre-service training in eHealth	Yes	74%	<25%
Health professionals – In-service training in eHealth	Yes	77%	50-75%

## 2. Legal frameworks for eHealth

Policy or legislation – purpose	Country response	Global "yes" response <sup>a</sup>
Defines medical jurisdiction, liability or reimbursement of eHealth services such as telehealth	Yes	31%
Addresses patient safety and quality of care based on data quality, data transmission standards or clinical competency criteria	Yes	46%
Protects the privacy of personally identifiable data of individuals irrespective of whether it is in paper or digital format	Yes	78%
Protects the privacy of individuals' health-related data held in electronic format in an EHR	Yes	54%
Governs the sharing of digital data between health professionals in other health services in the same country through the use of an EHR	Yes	34%
Governs the sharing of digital data between health professionals in health services in other countries through the use of an EHR	Yes	22%
Governs the sharing of personal and health data between research entities	Yes	39%
Allows individuals electronic access to their own health-related data when held in an EHR	Yes	29%
Allows individuals to demand their own health-related data be corrected when held in an EHR if it is known to be inaccurate	Yes	32%
Allows individuals to demand the deletion of health-related data from their EHR	No	18%
Allows individuals to specify which health-related data from their EHR can be shared with health professionals of their choice	Yes	28%
Governs civil registration and vital statistics	Yes	76%
Governs national identification management systems	Yes	65%

# Central African Republic



<b>Country context</b>	Population (000s)	4,616	Life expectancy at birth (years)	51
	GHI per capita (PPP Int \$)	600	Total health expenditure (% GDP)	3.9
	Physician density (per 10 000 population)	0.05	ICT Development Index rank	156
	Nurse & midwife density (per 10 000 population)	0.26	Mobile-cellular subscriptions (% population)	25.26
	Hospital bed density (per 10 000 population)	10	Internet users (% population)	3

## 1. eHealth foundations

National policies or strategies			
	Country response	Global "yes" response <sup>a</sup>	Year adopted
National universal health coverage policy or strategy	No	75%	N/A
National eHealth policy or strategy	No	58%	N/A
National health information system (HIS) policy or strategy	No	66%	N/A
National telehealth policy or strategy	No	22%	N/A
Funding sources for eHealth			
	Country response	Global "yes" response <sup>a</sup>	Funding source % <sup>b,c</sup>
Public funding	No	77%	Zero
Private or commercial funding	No	40%	Zero
Donor/non-public funding	No	63%	Zero
Public-private partnerships	No	42%	Zero
Multilingualism in eHealth			
	Country response	Global "yes" response <sup>a</sup>	Year adopted
Policy or strategy on multilingualism	No	28%	N/A
Government-supported Internet sites in multiple languages	No	48%	
eHealth capacity building			
	Country response	Global "yes" response <sup>a</sup>	Proportion <sup>d</sup>
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Health professionals – In-service training in eHealth	No	77%	N/A

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Governs civil registration and vital statistics	—	76%
Governs national identification management systems	—	65%



### 3. Telehealth

Telehealth programmes country overview		
	Health system level**	Programme type**
Teleradiology	Intermediate	Established
Teledermatology	Local	Informal
Telepathology	Intermediate	Pilot
Telepsychiatry	Local	Informal
Remote patient monitoring	Intermediate	Established

### 4. Electronic Health Records (EHRs)

EHR country overview		
	Country response	Year introduced
National EHR system	Yes	2012
Legislation governing the use of the national EHR system	Yes	
Health facilities with EHR	Use EHR	Facilities with EHR %**
Primary care facilities (e.g. clinics and health care centres)	Yes	25-50%
Secondary care facilities (e.g. hospitals, emergency care)	Yes	25-50%
Tertiary care facilities (e.g. specialized care, referral from primary/secondary care)	Yes	25-50%
Other electronic systems	Country response	Global "yes" response <sup>1</sup>
Laboratory information systems	Yes	35%
Pathology information systems	No	18%
Pharmacy information systems	Yes	33%
PACS	Yes	26%
Automatic vaccination alerting system	No	10%
ICT-assisted functions	Country response	Global "yes" response <sup>1</sup>
Electronic medical billing systems	No	58%
Supply chain management information systems	Yes	58%
Human resources for health information systems	Yes	69%

### 5. Use of eLearning in health sciences

eLearning programmes country overview		
Health sciences students – Pre-service	Country response	Global "yes" response <sup>1</sup>
Medicine	Yes	58%
Dentistry	Yes	39%
Public health	Yes	50%
Nursing & midwifery	Yes	47%
Pharmacy	Yes	38%
Biomedical/Life sciences	Yes	42%
Health professionals – In-service	Country response	Global "yes" response <sup>1</sup>
Medicine	Yes	58%
Dentistry	Yes	30%
Public health	No	47%
Nursing & midwifery	Yes	46%
Pharmacy	Yes	31%
Biomedical/Life sciences	Yes	34%

### 3. Telehealth

Telehealth programmes country overview		
	Health system level**	Programme type**
Teleradiology	±	±
Teledermatology	±	±
Telepathology	±	±
Telepsychiatry	±	±
Remote patient monitoring	±	±

### 4. Electronic Health Records (EHRs)

EHR country overview		
	Country response	Year introduced
National EHR system	No	N/A
Legislation governing the use of the national EHR system	±	
Health facilities with EHR	Use EHR	Facilities with EHR %**
Primary care facilities (e.g. clinics and health care centres)	N/A	±
Secondary care facilities (e.g. hospitals, emergency care)	N/A	±
Tertiary care facilities (e.g. specialized care, referral from primary/secondary care)	N/A	±
Other electronic systems	Country response	Global "yes" response <sup>1</sup>
Laboratory information systems	N/A	35%
Pathology information systems	N/A	18%
Pharmacy information systems	N/A	33%
PACS	N/A	26%
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Health professionals – In-service	Country response	Global "yes" response <sup>1</sup>
Medicine	N/A	58%
Dentistry	N/A	30%
Public health	N/A	47%
Nursing & midwifery	N/A	46%
Pharmacy	N/A	31%
Biomedical/Life sciences	N/A	34%



## 6. mHealth

### mHealth programmes country overview

Accessing/providing health services	Health system level**	Programme type**
Toll-free emergency	National	Established
Health call centres	Local	Pilot
Appointment reminders	Intermediate	Established
Mobile telehealth	Local	Informal
Management of disasters and emergencies	National	Established
Treatment adherence	Local	Pilot
Accessing/providing health information	Health system level**	Programme type**
Community mobilization	National	Established
Access to information, databases and tools	Local	Informal
Patient records	Intermediate	Established
mLearning	Local	Established
Decision support systems	Local	Informal
Collecting health information	Health system level**	Programme type**
Patient monitoring	Local	Informal
Health surveys	Local	Informal
Disease surveillance	Local	Informal

## 7. Social media

Social media and health	Country response	Global "yes" response†	Year adopted
National policy or strategy on the use of social media by government organizations	No	18%	N/A
Policy or strategy makes specific reference to its use in the health domain	±	5%	
Health care organizations – use of social media	Country response	Global "yes" response†	
Promote health messages as a part of health promotion campaigns	Yes	78%	
Help manage patient appointments	Yes	24%	
Seek feedback on services	Yes	56%	
Make general health announcements	Yes	72%	
Make emergency announcements	Yes	59%	
Individuals and communities – use of social media	Country response	Global "yes" response†	
Learn about health issues	Yes	79%	
Help decide what health services to use	Yes	56%	
Provide feedback to health facilities or health professionals	Yes	62%	
Run community-based health campaigns	Yes	62%	
Participate in community-based health forums	Yes	59%	

## 8. Big data

Policy or strategy – purpose	Country response	Global "yes" response†	Year adopted
Governing the use of big data in the health sector	No	17%	N/A
Governing the use of big data by private companies	No	8%	N/A

### LEGEND

\* Country context indicators  
ICT Development Index Rank, 2015 - <https://www.itu.int/net4/ITU-D/ict/2015/>  
All other country indicators, Global Health Observatory, 2012-2014 - <http://www.who.int/ghe>  
\*\* Glossary  
§ Indicates the percentage of participating Member States responding "yes"  
— Don't know  
N/A Not applicable  
± Indicates question was unanswered  
‡ Question not asked  
Zero No funding

International level: Health entities in different geographic regions  
Regional level: Health entities in countries in the same geographic region  
National level: Referral hospitals, laboratories and health institutes (mainly public, but also private)  
Intermediate level: District or provincial facilities: public and private hospitals and health centres  
Local or peripheral level: Health posts, health centres providing basic level of care  
Informal: Use of ICT for health purposes in the absence of formal processes and policies  
Pilot: Testing and evaluating a programme  
Established: An ongoing programme that has been conducted for a minimum of 2 years and is planned to continue



## 6. mHealth

### mHealth programmes country overview

Accessing/providing health services	Health system level**	Programme type**
Toll-free emergency	±	±
Health call centres	±	±
Appointment reminders	±	±
Mobile telehealth	±	±
Management of disasters and emergencies	National	Pilot
Treatment adherence	±	±
Accessing/providing health information	Health system level**	Programme type**
Community mobilization	±	±
Access to information, databases and tools	±	±
Patient records	±	±
mLearning	±	±
Decision support systems	±	±
Collecting health information	Health system level**	Programme type**
Patient monitoring	±	±
Health surveys	±	±
Disease surveillance	±	±

## 7. Social media

Social media and health	Country response	Global "yes" response†	Year adopted
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Established: An ongoing programme that has been conducted for a minimum of 2 years and is planned to continue

https://business.esa.int/projects/sahel

**sahel**

ACTIVITY	Demonstration Project
STATUS	Completed
THEMATIC AREA	Education & Training

The objective of this demonstration project is to support the extension of health services in Africa through the use of satellite based technology in complement of other forms of Information and Communication Technologies.

In order to achieve this general objective, three intermediate objectives have been defined as follows:

- **First Objective:** Medical eContent via Satellite for African Health Workforce
- **Second Objective:** Satellite-Based Clinical Services for Remote Areas
- **Third Objective:** eHealth Management Information System Pilot

The main strength of the SAHEL initiative is that it includes the complete value chain of actors from medical staff and contacts on the ground, to medical experts in Africa and technical partners in charge of the satcom based interconnectivity services.

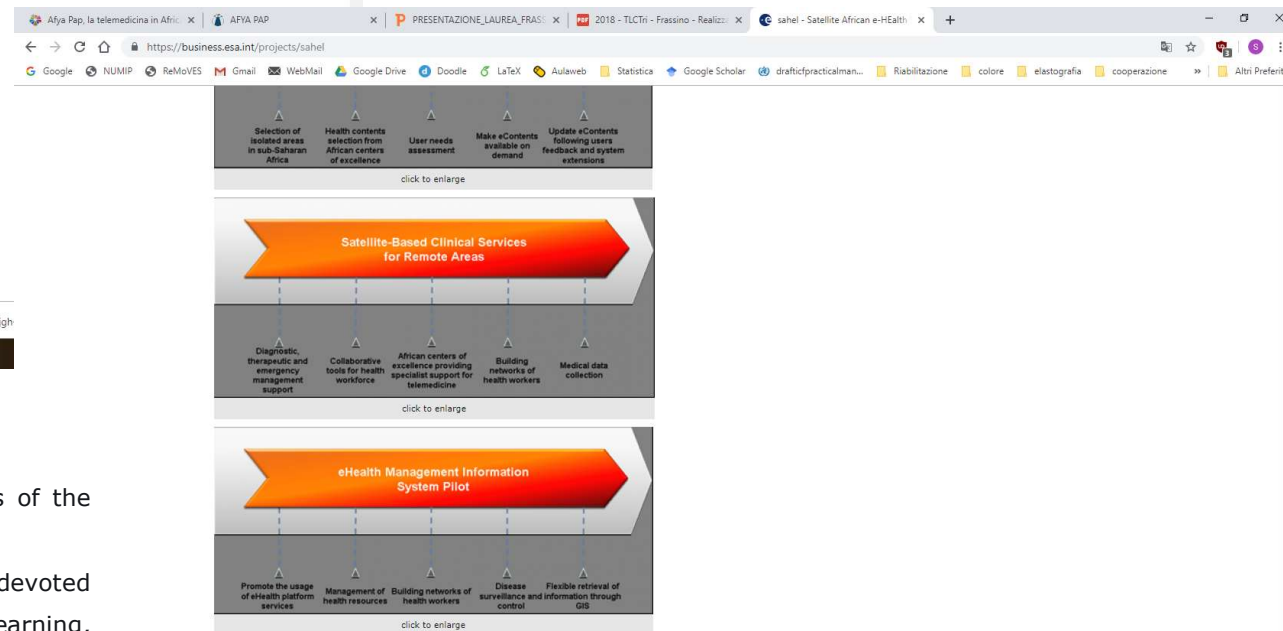
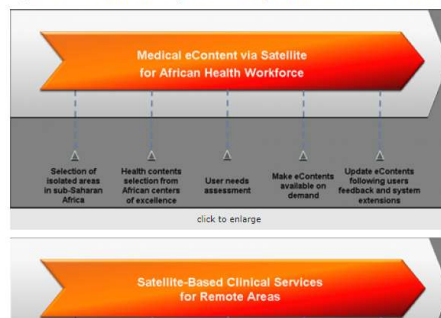


Figure 1: The 3 objectives of the SAHEL project.

two pilot countries (Kenya and Senegal) have been taken as examples of the current situation in East and West Africa.

The SAHEL project is entering now its more engineering-centred phase devoted to the tailoring of the SAHEL platform for the three services (medical eLearning,

Clinical Services and eHMS) to the expressed user needs.

Users and their needs

GDPR\_Template...pptx Access to Health...pptx GDPR Presentatio...pptx SilvanaDellepiane...pptx bmjgh-2017-Augu...ppt bmjgh-2017-Augu...jpg Mostra tutto X

18:43 02/07/2019



# DREAM Programme: Use of Telemedicine as a Model to Cooperation with Africa

**Michelangelo Bartolo**

*S. Giovanni Addolorata Hospital, Italy*

**Andrea Nucita**

*University of Messina, Italy*

## ABSTRACT

*This chapter is the description of the authors' experience in providing healthcare consultation and support in African countries. The project, named DREAM, was developed to provide support to in fighting pandemic diseases such as HIV using telematics for data gathering and remote consultations.*

## INTRODUCTION

DREAM (Drug Resource Enhancement against AIDS and Malnutrition) is a programme made from the Community of S.Egidio started in 2002 in Mozambique and now spread in 10 countries of sub-Saharan Africa (Mozambique, Malawi, Tanzania; Kenia, Rep. Guinea; Guinea Bissau, Nigeria, Angola; Cameroon, Congo). It is a holistic programme to fight HIV and Malnutrition. Up today DREAM has 33 centres already operational and 13 molecular biology laboratories that guarantee constant monitoring to DREAM patients. More than 95.000 patients are under assistance and 55.000 of them are in HAART treatment.

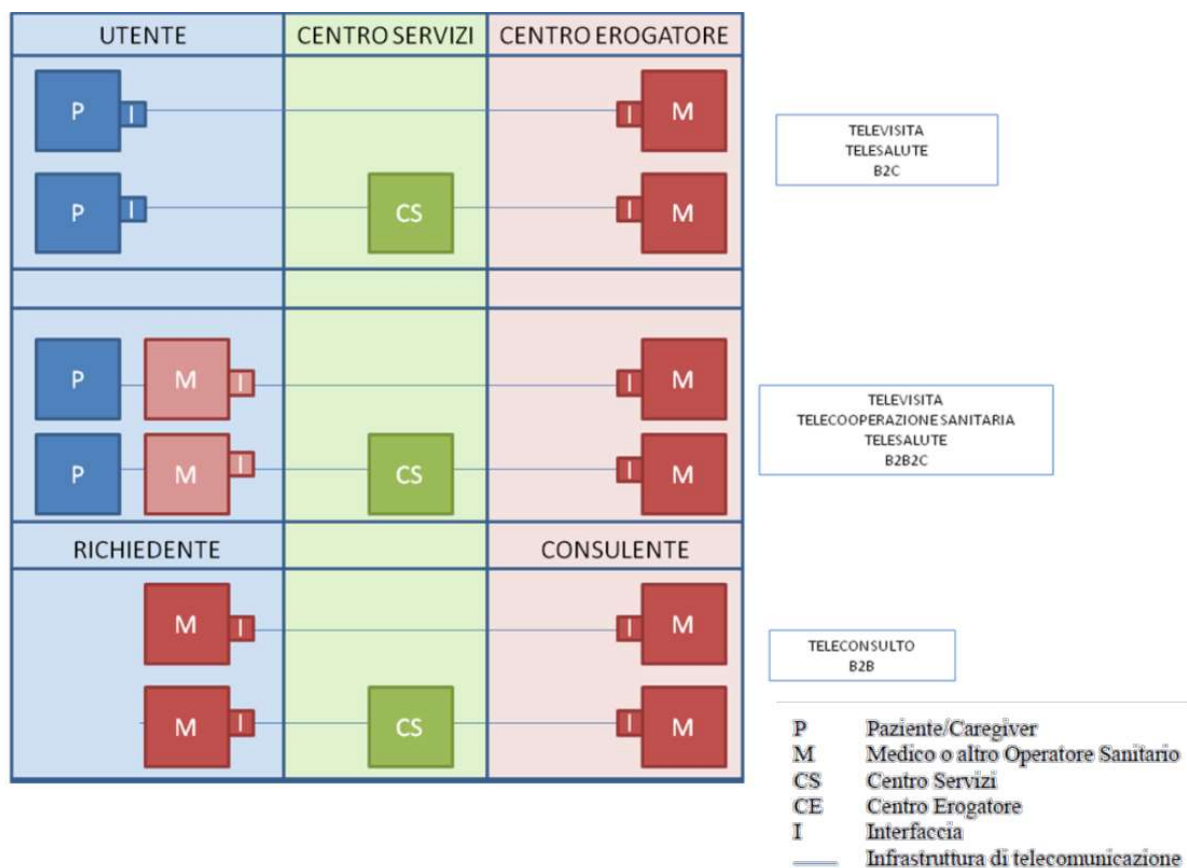
DOI: 10.4018/978-1-4666-2979-0.ch006

## BACKGROUND

This pandemic has characteristics that make it unique in its kind and which can be summed up as follows.

The HIV/AIDS infection is mainly concentrated in countries with limited resources, and in particular, in sub-Saharan Africa. It has become the first cause of death here and the new infections per year still outnumber the deaths. In fact, according to the WHO statistics, there are 33 million infected people in the world, around 60% of whom live in sub-Saharan Africa. Every year it is estimated that around 2 million people die from HIV/AIDS, and over 70% of them in sub-Saharan Africa.

## Telemedicine services



# TELEMEDICINE and TELECOMMUNICATIONS TECHNOLOGIES

## Real Time vocal/video connections

Call type	Minimum speed download/upload	Recommended speed download/upload
Call	30 kbps / 30 kbps	100 kbps / 100 kbps
VideoCall / Video sharing	128 kbps / 128 kbps	300 kbps / 300 kbps
VideoCall (good quality)	400 kbps / 400 kbps	500 kbps / 500 kbps
VideoCall (HD)	1,2 Mbps / 1,2 Mbps	1,5 Mbps / 1,5 Mbps
Group VideoCall (3 persons)	512 kbps / 128 kbps	2 Mbps / 512 kbps
Group VideoCall (5 persons)	2 Mbps / 128 kbps	4 Mbps / 512 kbps
Group VideoCall (more than 7)	4 Mbps / 128 kbps	8 Mbps / 512 kbps

Bandwidth requirement

## Internet connection for data-sharing

Minimum Requirement:  
**300kbps symmetric**  
**STABILITY**

## Mobile technologies

Class	Technology	Download	Upload
2G	GSM	9.6 kbps	< 9.6 kbps
2.5G	GPRS	60-80 kbps	20-40 kbps
2.75G	EDGE	170-230 kbps	60 -120 kbps
3G	UMTS	384 kbps	100 kbps
3.5G	HSPDA	7200 kbps	1500 kbps
4G	NA.		
5G			

# Internet dissemination

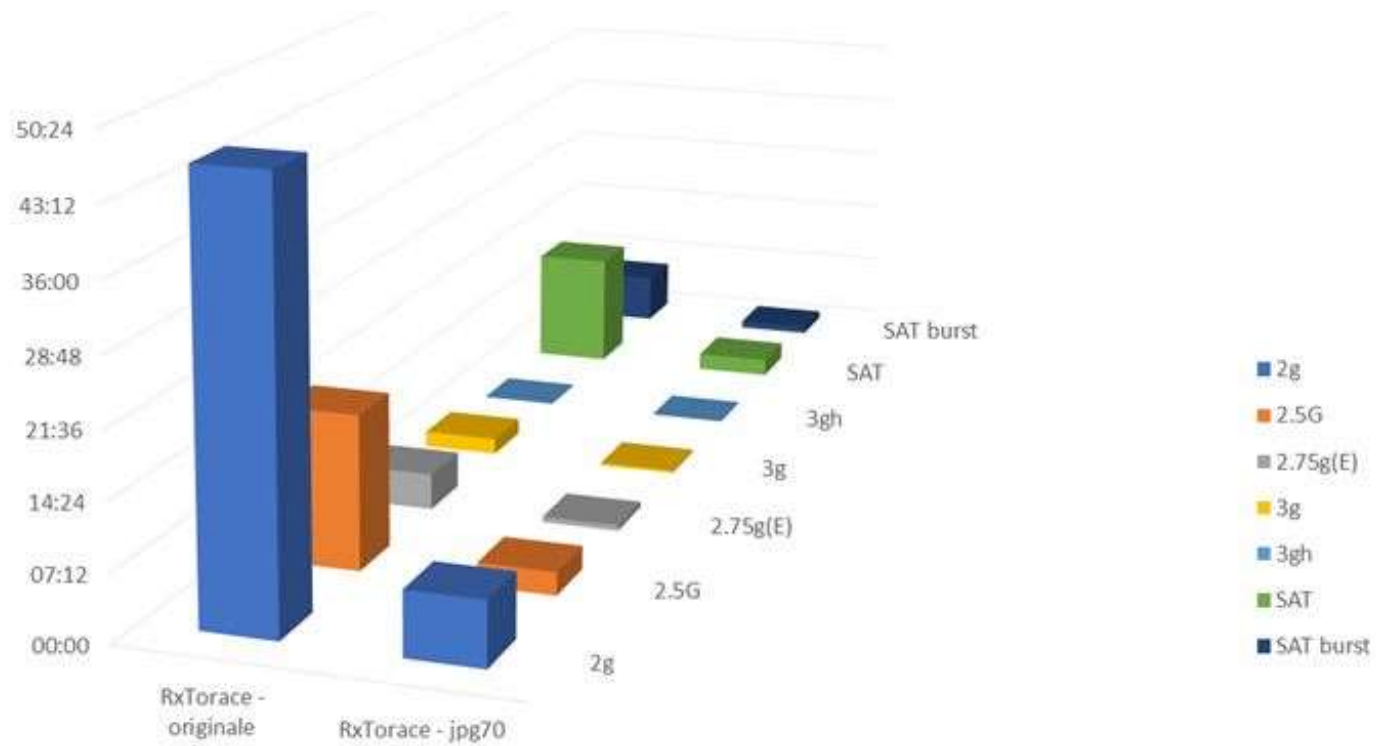
## Central African Republic

- ▶ Telephony 10 towns
- ▶ Mobile telephony 17 towns
- ▶ Population coverage < 30%

RADIOMOBILE	RADIOMOBILE	RADIOMOBILE	SATELLITARE	SATELLITARE
2G	2,5G	3,5G	VSat	VSat
Moov	Azur	Telecel, Orange	Teleport	Teleport
Limited coverage Maigarö	Sufficient coverage Maigarö 53 / 26 Kbps	Only major centers	Provider Maigarö 100 / 52 Kbps	Provider Maigarö 3500 / 1500 Kbps

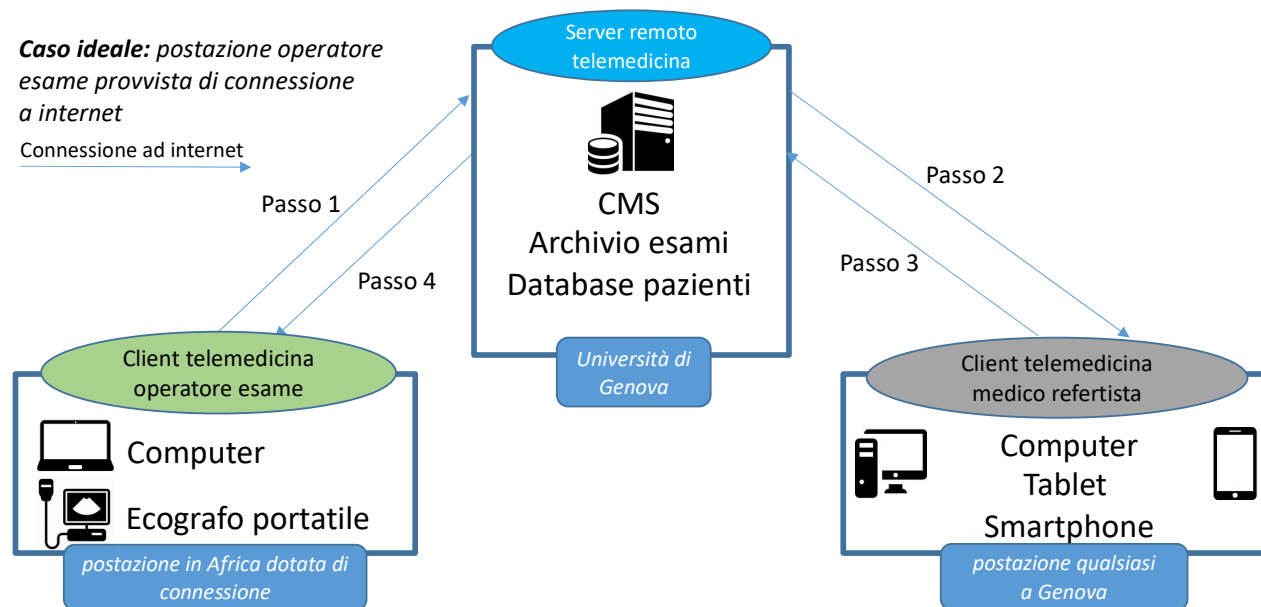
New  
CONTRACT

# Transmission time



	RxTorace - originale	RxTorace - jpg70
■ 2g	46:18	06:54
■ 2.5G	16:40	02:29
■ 2.75g(E)	03:55	00:35
■ 3g	01:44	00:16
■ 3gh	00:07	00:01
■ SAT	12:49	01:55
■ SAT burst	05:33	00:50

# Telemedicine architecture (mode 1)



Passo 1: caricamento esame da refertare sul server remoto da parte dell'operatore.

Passo 2: notifica *richiesta di referto* al medico preposto. Il medico accede al portale e visiona.

Passo 3: caricamento del referto sul server remoto da parte del medico.

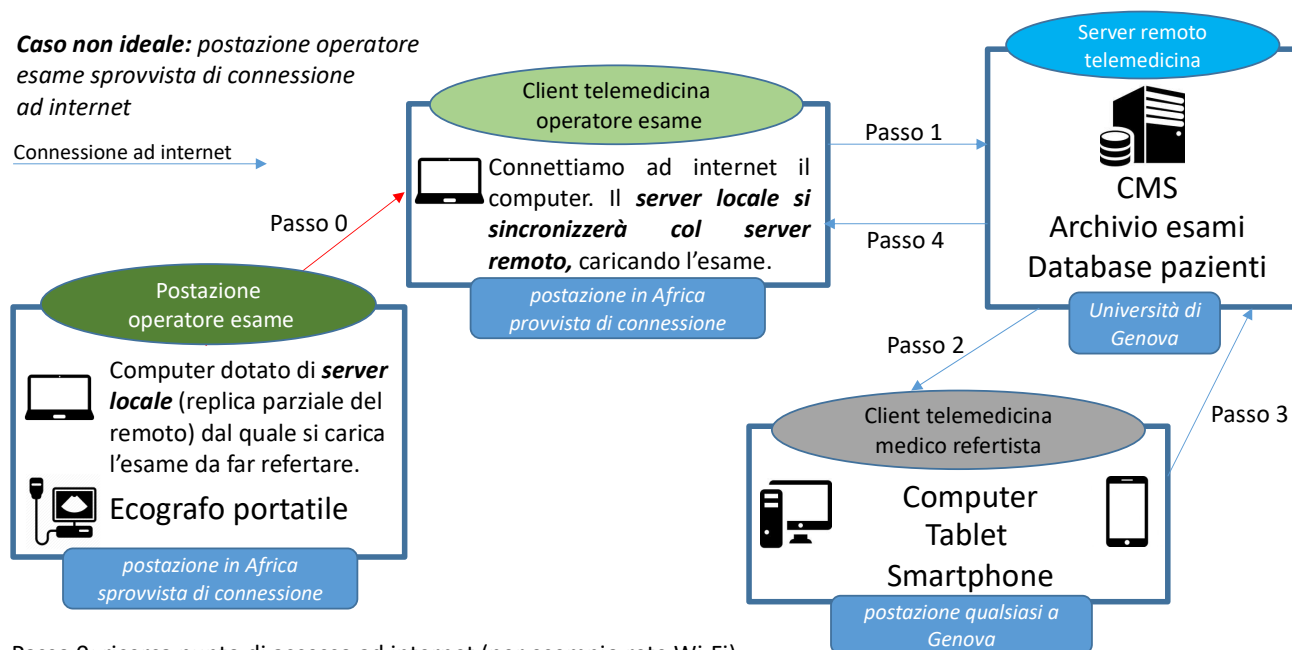
Passo 4: notifica *referto pronto* all'operatore. L'operatore scarica il referto.



# Telemedicine architecture (mode 2)

**Caso non ideale:** postazione operatore esame sprovvisa di connessione ad internet

Connessione ad internet →



Passo 0: ricerca punto di accesso ad internet (per esempio rete Wi-Fi)

Passo 1: sincronizzazione dei server e caricamento esame da refertare sul server remoto da parte dell'operatore.

Passo 2: notifica *richiesta di referto* al medico preposto. Il medico accede al portale e visiona.

Passo 3: caricamento del referto sul server remoto da parte del medico.

Passo 4: notifica *referto pronto* all'operatore. L'operatore scarica il referto.

# MANY THANKS



Suor Giulia  
Hospital of Maïgaro, Bouar



*Oh! Central Africa, cradle of the Bantu!  
Take up again your right to respect, to life!  
Long subjugated, long scorned by all,  
But, from today, breaking tyranny's hold.  
Through work, order and dignity  
You reconquer your rights, your unity,  
And to take this new step  
The voice of our ancestors call us.*

*Chorus:*

*To work! In order and dignity,  
In the respect for rights and in unity,  
Breaking poverty and tyranny,  
Holding high the flag of the Fatherland*

Matteo Morando  
Marco Trombini





Theme 2019:

*International Cooperation as Key Principle in Space Activities*

# *Telemedicine services for remote reporting and dissemination technology in Sub-Saharan Africa*

TELEMEDICINE AND SPACE

**A Brief History of NASA's Contributions to Telemedicine**

# A Brief History of NASA's Contributions to Telemedicine



# A Brief History of NASA's Contributions to Telemedicine

What do Arizona, Armenia, and space exploration have in common? All three played an important role in the development of NASA's telemedicine capabilities. And for nearly 50 years, NASA's work in telemetry, remote communications, and the life sciences has led to unprecedented advances in the fields of both space and rural medicine.

## **On Earth and in the Heavens**

- The roots of telemedicine at NASA are entwined with the agency's earliest days and the modern history of human spaceflight.
- The dominant medical question prior to Yuri Gagarin's successful spaceflight in April 1961 was whether the human body could function in space. In particular, physicians were concerned that the removal of gravity would impede circulation and respiration.
- To determine if this would indeed be a problem, both the U.S. and the Soviets performed a number of test flights using animals attached to medical monitoring systems, which sent the animal's biometric data to scientists on Earth via a telemetric link.
- Even after it was determined that spaceflight posed little risk to circulatory and respiratory health (at least as far as non-human animals were concerned), NASA still sought to understand if spaceflight would have any other physiological or psychological effects on the human body.
- The focus on possible limitations of the human body forced the agency to take a technologically focused approach to telemedicine. As Dr. Sherman Vinograd, then Chief of Medical Research in the Directorate of Space Medicine, noted "the concern of the medical scientists centered mostly on assuring man's support in space and his safe return to Earth—while predetermined engineering goals were achieved." This, continued Vinograd, meant that medical research outside of monitoring was "secondary to the engineering objectives of the mission."

# A Brief History of NASA's Contributions to Telemedicine

- The culmination of this engineering-focused approach came with the introduction of the Integrated Medical and Behavioral Laboratories and Measurement Systems (IMBLMS) program in 1964. IMBLMS was an expansion of the measurement systems debuted on the Mercury and Gemini flights.
- IMBLMS, however, was designed from the outset to do more than simply revamp existing technology from ongoing human spaceflight programs—rather NASA viewed the program, and the new and upgraded technology created as part of it, as critical for supporting its post-Apollo goal of conducting longer duration human spaceflights, especially supporting the eventual construction and occupation of an orbiting space station.
- In situations where a quick return to Earth was not possible, the ability to not only monitor biometric data, but also to engage at least rudimentary guided medical treatment by non-physicians was critical: if a medical emergency arose, astronauts would have only their crewmates to accurately diagnose them.
- But rising inflation and the subsequent funding cuts for human spaceflight programs as the Apollo program wound down, pushed NASA's ambitious plans for the IMBLMS program to margins of the agency's funding priorities during the late 1960's and early 1970's

# The New Telemedicine at NASA: STARPAHC and Beyond

- IMBLMS might have stayed a partially realized dream if not for a letter from the newly created White House Domestic Policy Council in July 1971. This new initiative explored ways to inexpensively stimulate a flagging economy by using government programs already in development. Administrators at NASA saw the Domestic Policy Council's request as an opportunity—if NASA couldn't test IMBLMS in space why not build a terrestrial analog? The result was a new program, Space Technology Applied to Rural Papago Health Care, or STARPAHC.
- While building terrestrial analogs was a fairly common practice at NASA, STARPAHC represented an important new direction for the agency, largely because the technology generated was designed from the outset to serve a broader group than just astronauts. The search for this expanded clientele was driven both by political considerations from the White House, and the need to spread the development costs across multiple parties—this forced NASA to seek a diverse range of partners including new groups like the Indian Health Service and the Papago (now Tohono O'odham) people of Southern Arizona. NASA also sought to engage long-time collaborators like the Lockheed Missiles and Space Company, which was the primary contractor for IMBLMS, as a way to ensure that existing technical knowledge involving microwave relays and other communications technologies could quickly be leveraged.
- The remote location of the Tohono O'odham reservation, and the fact that the state was one of only a handful to allow the delivery of care by paraprofessionals such as physician's assistants, ensured that the terrestrial analog would more closely resemble the situation aloft.
- NASA's participation in STARPAHC was operational from 1973 until 1977, with NASA taking an active early role in the program to design and test the technology that linked rural patients in mobile support units with physicians in Indian Health Service hospitals in Sells and Phoenix, Arizona. After NASA's role was diminished, the project did continue into the 1980s.
- The focus on interagency and interpersonal cooperation that underpinned STARPAHC imploded the technocratic focus characterizing prior NASA telemedicine efforts. As a 1974 NASA report noted, "this approach [cooperative telemedicine] has 'spin-off' potential, in that space technology employed in the basic design of a flight system may be extremely beneficial to improving the quality of health care delivery here on [E]arth." Moreover, the report continued STARPAHC was "a necessary step" for improving health care delivery for both astronauts and ordinary Americans.
- By setting this new expectation—that NASA telemedical technology would have both direct application in a terrestrial and a space setting, the agency placed a visible priority on a part of its mission outside of exploration—transferring space technology to better humankind. This dual commitment was tested less than a decade later during several earthquakes, first in Mexico City in 1985, and later in Soviet Armenia in 1988. There was also, especially in the case of the Armenian earthquake, the sheer scale of the disaster—estimated casualties were over 50,000 people and an additional 500,000 people were left homeless.
- NASA's efforts in Armenia were particularly important because they began a period in the agency's history where telemedicine became a wedge for increased international cooperation.
- Unlike many other technology transfer solutions, many of which had a more direct military application, remote medical communications had a clear humanitarian purpose that transcended strategic considerations and the still pervasive opposition to communism that characterized the waning Cold War period. The Armenian program, which operated between May and July of 1989, became known as the "Space Bridge to Armenia" and is perhaps the most cited example of how shifting social and technical goals altered the agency's telemedicine program by the 1980's.

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- The U.S. and Soviets had cautiously began a dialog on health and medicine during the Apollo-Soyuz test project in 1975; however, as the decade progressed biomedical communication channels became more institutionalized through the Joint Working Group on Space Biology and Medicine. By the time of the Armenian earthquake in 1988, there was an established track record of international medical cooperation and a basic understanding of each side's telemedical capabilities. Commitment at both the top level, and at the agency level, ensured that building a "space bridge" would be a political and technical priority.
- In addition to its social and diplomatic aims, the "Space Bridge to Armenia" was, like STARPAHC before it, an important way to test technological innovations in anticipation of the construction of a new space station. Consequently, the program generated important lessons that NASA would apply to later telemedicine efforts, including meeting technical challenges like establishing a multi-site video connection across multiple time zones; identifying personnel in both countries with appropriate technical skills; and finding the best forms of media to securely transmit complex patient information.
- The "space bridge" also addressed such concerns as understanding the effect of trauma on individual health, and engaging in a frank discussion of medical ethics and informed consent across different medical traditions. Subsequent efforts were made to establish a "Space Bridge to Moscow" during the early 1990's and a "Space Bridge to Russia" in 1996 that further refined the technology used to transmit and analyze medical information and strengthened interpersonal relationships between physicians and medical technologists in both countries. This project was at the forefront in the integration of medicine with the Internet and the World Wide Web.
- Dr. Arnauld Nicogossian, the former Associate Administrator for Life Sciences and Microgravity Sciences, and others at NASA including Charles Doarn, the former Program Executive for Aerospace Medicine and Telemedicine, saw the value of commercializing telemedicine technology as a way to encourage more rapid technical development, to promote a wider diffusion of the technology to a non-governmental audience, and finally to defray development costs for NASA. Nicogossian and Doarn's push for the commercialization of telemedical technology was in line with an agency-wide mandate to spin off the benefits of human spaceflight and other scientific and technical endeavors—a mandate that has guided NASA since the early 1960's.
- In order to better facilitate this, in 1997, the agency sponsored the creation of a Commercial Space Center named Medical Informatics and Technology Applications Consortium (MITAC) at Yale University (it later moved to Virginia Commonwealth University). Until its closure in 2007, MITAC not only pursued a range of telemedical projects and but most importantly created a variety of different terrestrial test beds for new technology in remote locations in Ecuador, Russia, and the Arctic.



# Telemedicine at NASA Today

- With NASA's sustained presence in space through programs like the International Space Station, as well as potential travel to an asteroid or other body in our solar system, telemedicine remains an important priority for NASA. The focus of current agency efforts have expanded beyond the original mandate of telemetry and remote communication to encompass new "smart medical systems" that are designed not simply to communicate and diagnose ill astronauts—but also to provide physicians on the ground with the ability to remotely provide limited treatment options. The integration of treatment and communication capabilities represents an important new direction for the future of human space flight and emergency care for remote patients on Earth.
- For this next phase of efforts to improve space medicine, NASA has built strong relationships with its partners in the academic and private sectors. One such partner, the National Space Biomedical Research Institute (NSBRI), which is a consortium of twelve of public and private universities, has taken the lead in the efforts to create smart medical systems for human spaceflight. NSBRI, which is led by Baylor College of Medicine, provides funding and academic support for researchers at a range of institutions across the United States; this diversity helps to assure that NASA can draw from a deep pool of talent, regardless of proximity to existing field centers, to support the biomedical research efforts.
- One of the most exciting contributions of NSBRI to the development of smart medical systems is the effort to create new ultrasound technologies. For example, a project completed in 2012 under the direction of Dr. Lawrence Crum at the University of Washington worked to develop a lightweight portable ultrasound device that can generate clearer pictures inside the human body than current ultrasound machines. These pictures can then be used by crewmembers and ground-based physicians to more accurately diagnose illnesses during spaceflight. Better quality images are only part of what Crum and his team developed—what makes this technology "smart" is that this new machine can direct High Intensity Focused Ultrasound waves to stop internal bleeding without having to resort to invasive procedures. This ability to identify and stop internal bleeding quickly is essential if an astronaut were injured during a spacewalk, or for situations on Earth where surgical access is limited and patients might otherwise die from traumatic injuries involving damage to internal organs or tissues.
- Another important advance in smart ultrasound technology that NASA and NSBRI are researching is occurring under the direction of Dr. Yi-Xian Qin at SUNY Stonybrook. Qin's research involves searching for ways to use an ultrasound device to help astronauts and ground-based physicians to more accurately assess the rate of bone loss (an important problem in space) and then use Low Intensity pulses either help heal bone fractures, or to proactively slow the rate of bone loss in healthy patients.
- Since NASA's founding in 1958, the agency has been a leader in efforts to find solutions to the biomedical issues that limit the boundaries of human spaceflight. From the early development of remote monitoring systems for biomedical functions that started with Project Mercury, to the improved communications tools like microwave relays and more functional internet interfaces for sharing audio, video, and still images over long distances, that were created to support the Apollo, Space Shuttle, and International Space Station programs, developing the technologies that meet the medical needs of astronauts has resulted in a tremendous flurry of innovations that have helped to reduce the risk, and extend the possible duration, of future human spaceflights. At the same time, as the STARPAHC and the Space Bridge projects have shown, the benefits of NASA's telemedical efforts go beyond the technical and also have important social and humanitarian benefits.