From innovation to implementation: Empowering Health Systems through Digital Health

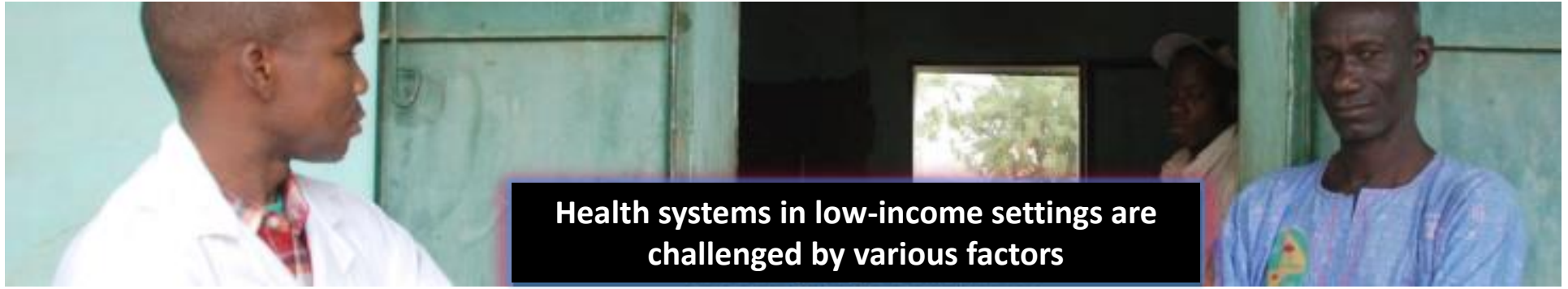
QoL Summer School 2024:
Digital innovations for a Happier, Healthier Aging: A transdisciplinary training

gdhub
Geneva Digital Health Hub

réseau rede
RAFT
red network

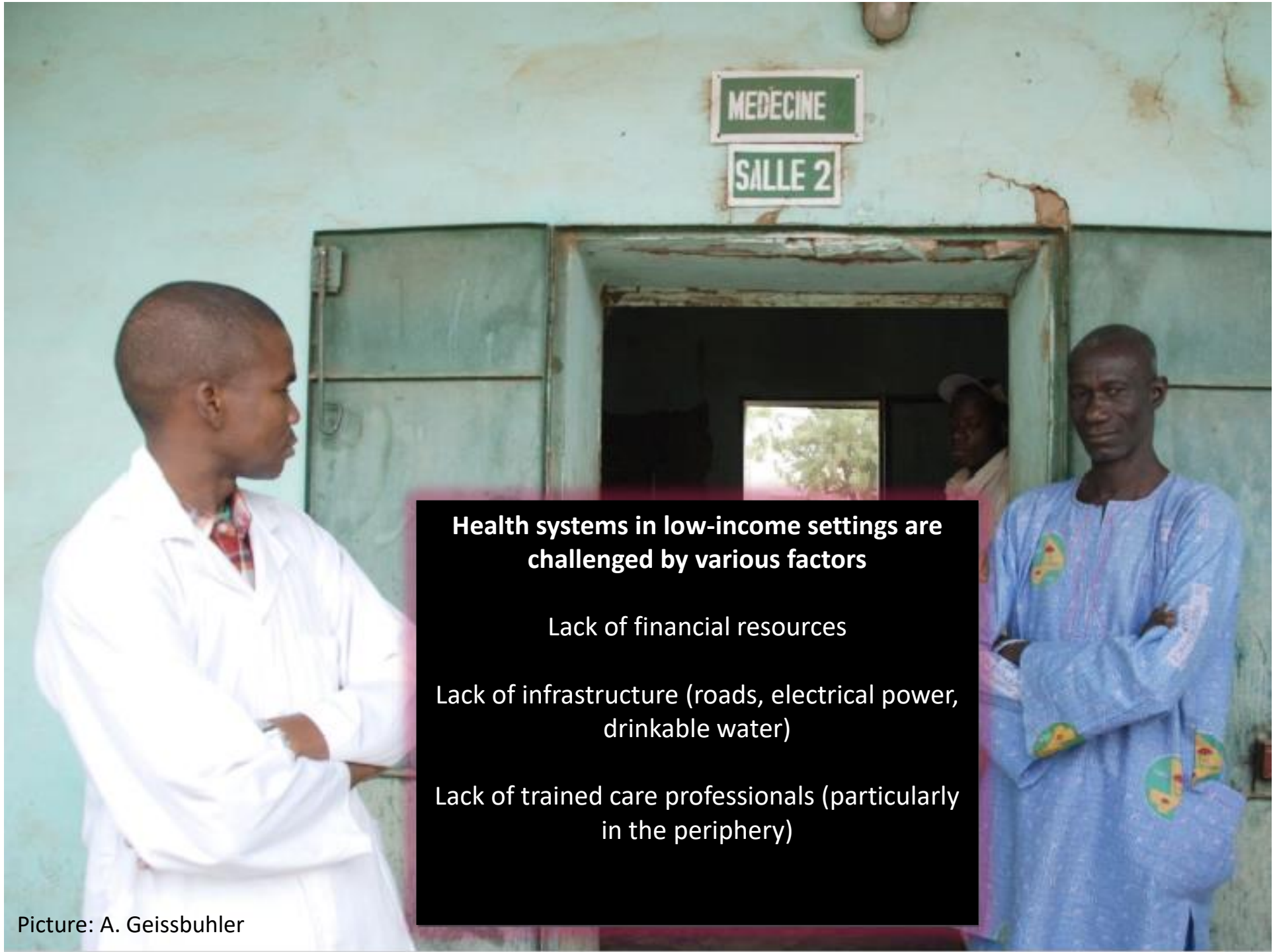
Dr. Mirana Randriambelonoro
July 05th, 2024

UNIVERSITÉ DE GENÈVE



- At least **half of the world's population does not have full coverage with essential health services.**[1]
- Despite progress, **large inequalities persist: e.g. basic maternal and child health services** in low- and lower-middle-income countries.[1]
- The **shortage of health professionals** and facilities is significant.[2]
- Rising incidence of **non-communicable diseases (NCDs)** and a **globally growing geriatric population** are estimated to generate a demand for 40 million additional health workers globally, and a shortfall of 18 million health workers by 2030 .[3, 4]

[1] World Health Organization. *Tracking Universal Health Coverage: 2017 Global Monitoring Report*. World Health Organization, 2017.
[2] Critical threshold = 23 doctors, nurses and midwives per 10,000 inhabitants.
[3] Global Burden of Disease Study 2017. The Lancet
[4] UN Commission: New investments in global health workforce will create jobs and drive economic growth. 2016



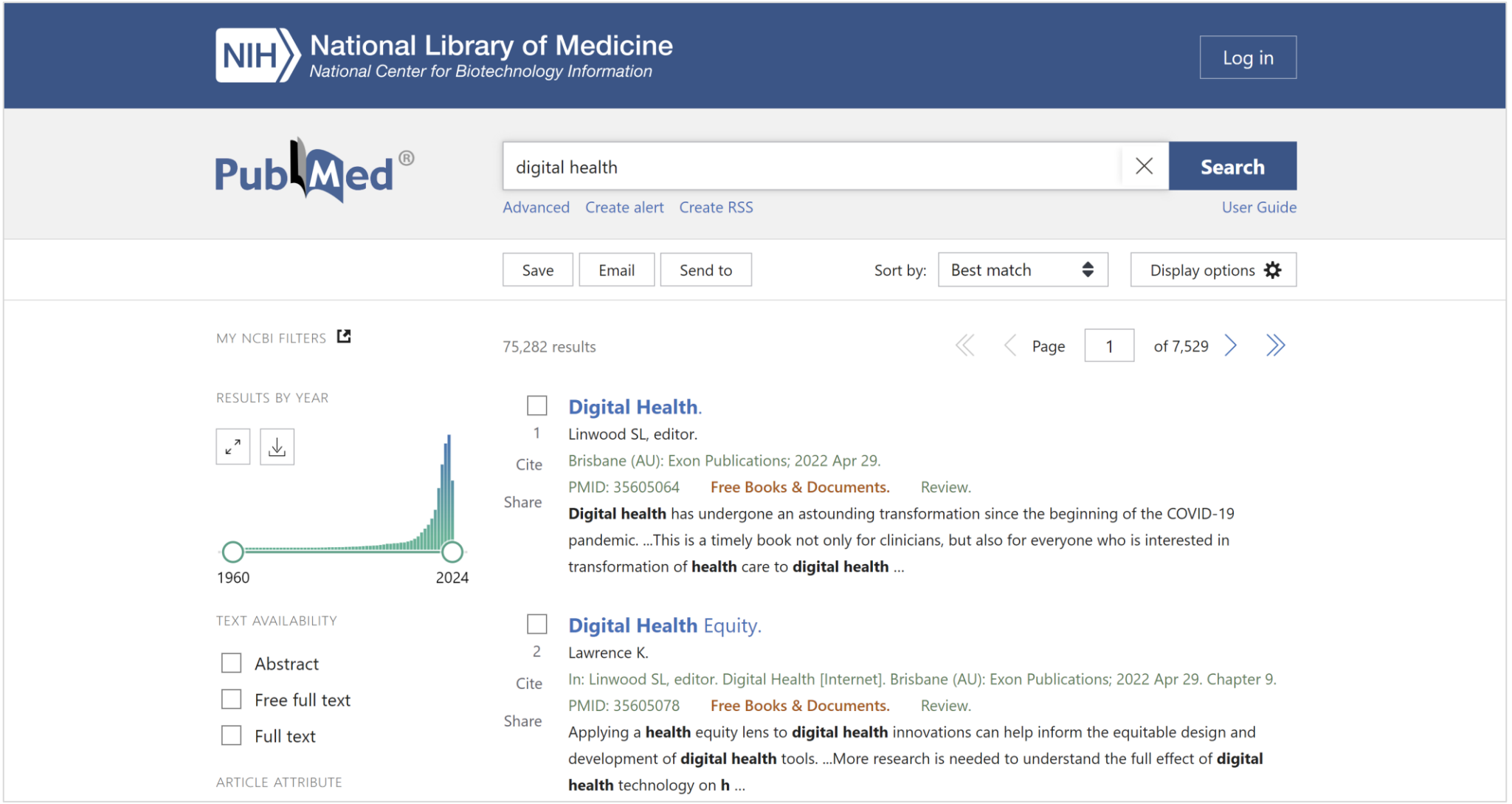
Health systems in low-income settings are challenged by various factors

Lack of financial resources

Lack of infrastructure (roads, electrical power, drinkable water)

Lack of trained care professionals (particularly in the periphery)

Picture: A. Geissbuhler



Publication trend: digital health

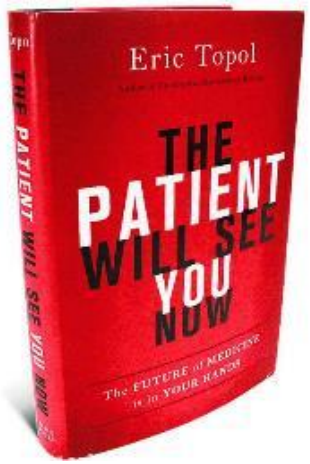
Innovation in health is an imperative

new processes

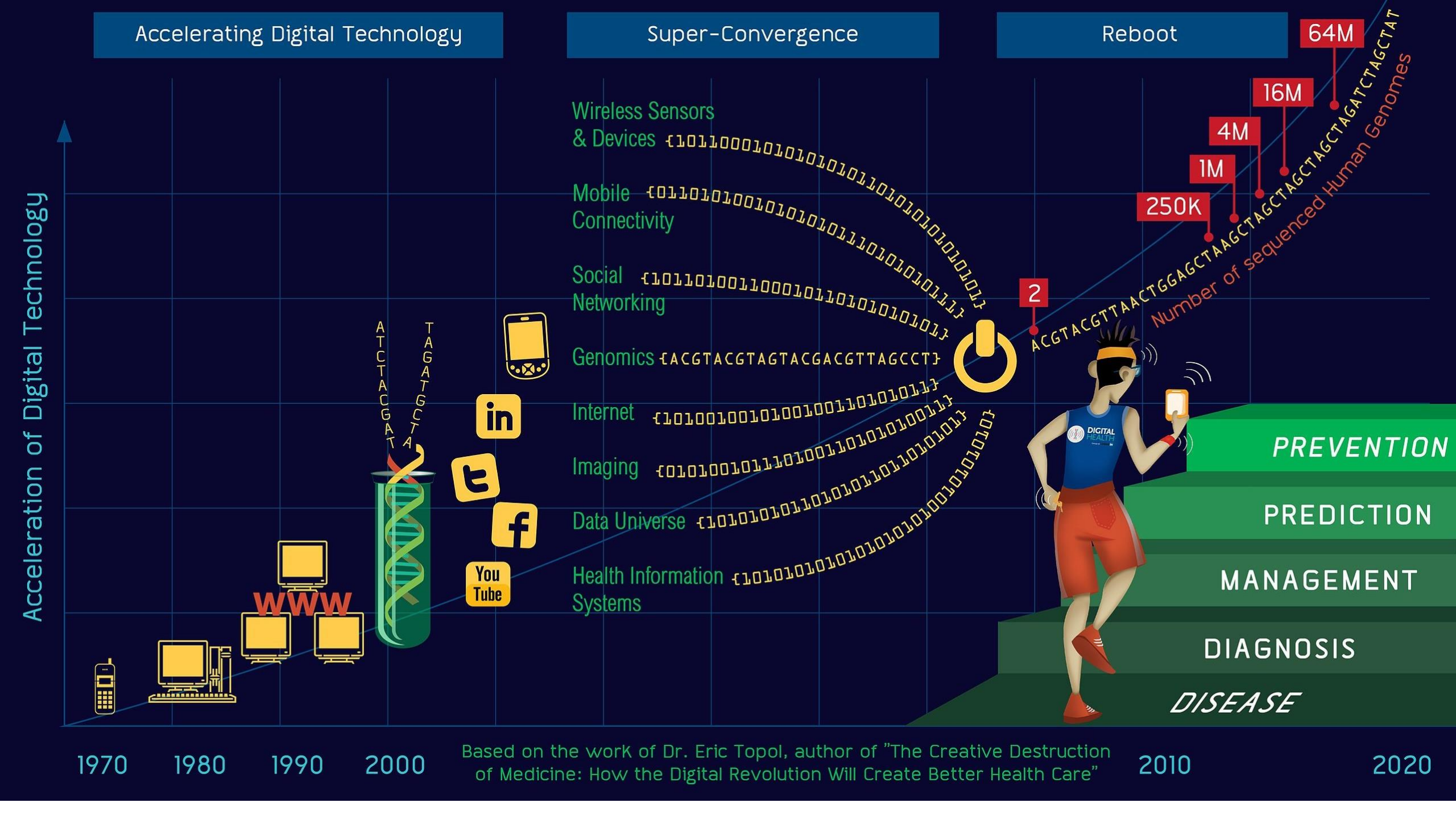
new professions in the digital age

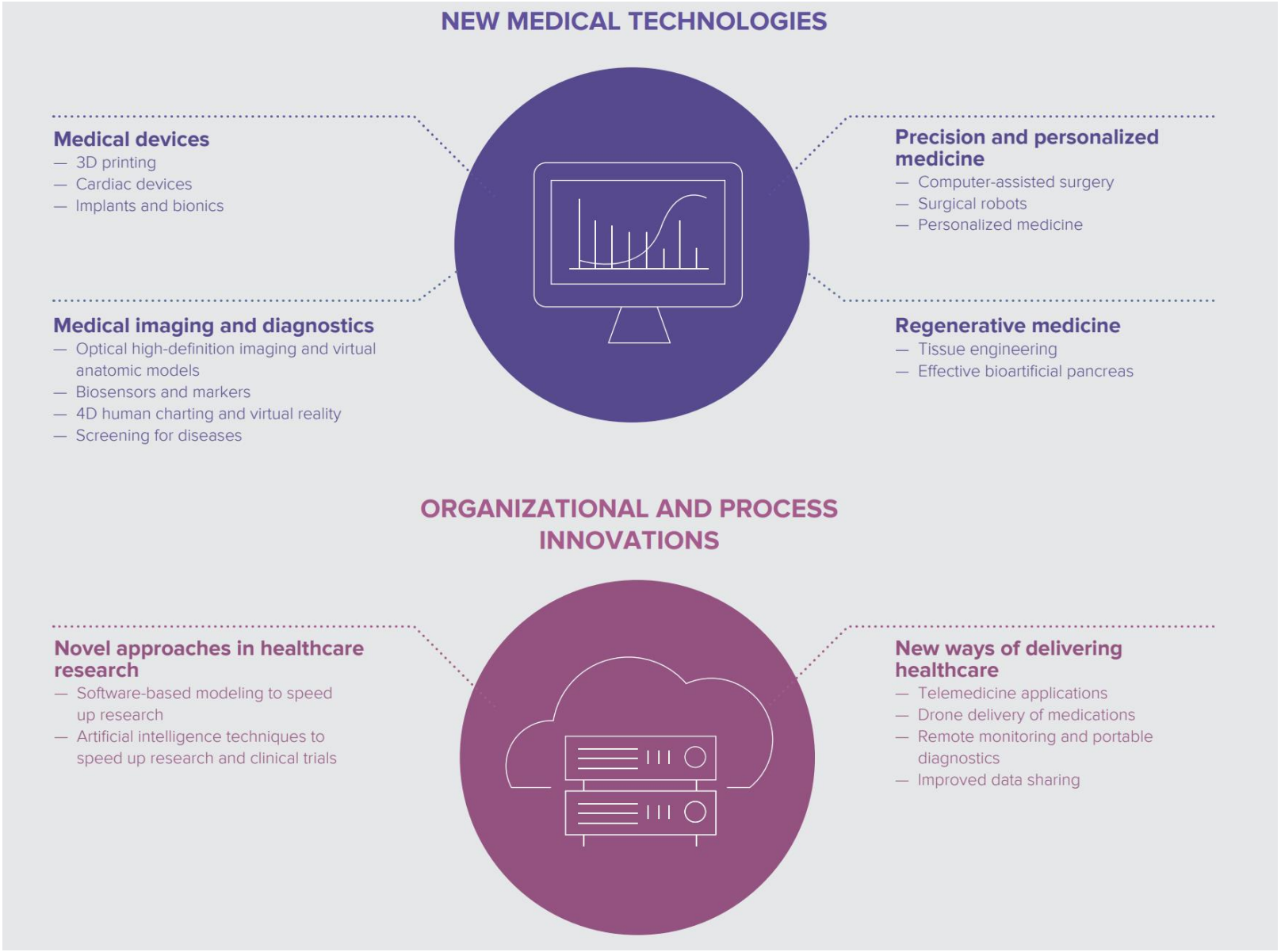
HEALTHCARE
Wearable Technology Therapist

HEALTHCARE
Healthcare Navigator



new expectations from patients and their families


Accelerating Digital Technology
Super-Convergence
Reboot
Acceleration of Digital Technology
Wireless Sensors & Devices
Mobile Connectivity
Social Networking
Genomics
Internet
Imaging
Data Universe
Health Information Systems
{ACGTACGTAGTACGACGTTAGCCT}
2
ACGTACGTTAACTGGAGCTAAGCTAGCTAGCTAGCTAGATCTAGCTAT
Number of sequenced Human Genomes
250K
1M
4M
16M
64M
ATCTACGAT
TAGATGCTA
WWW
You Tube
PREVENTION
PREDICTION
MANAGEMENT
DIAGNOSIS
DISEASE
1970
1980
1990
2000
2010
2020
Based on the work of Dr. Eric Topol, author of "The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care"



Promising fields for medical innovation and technologies

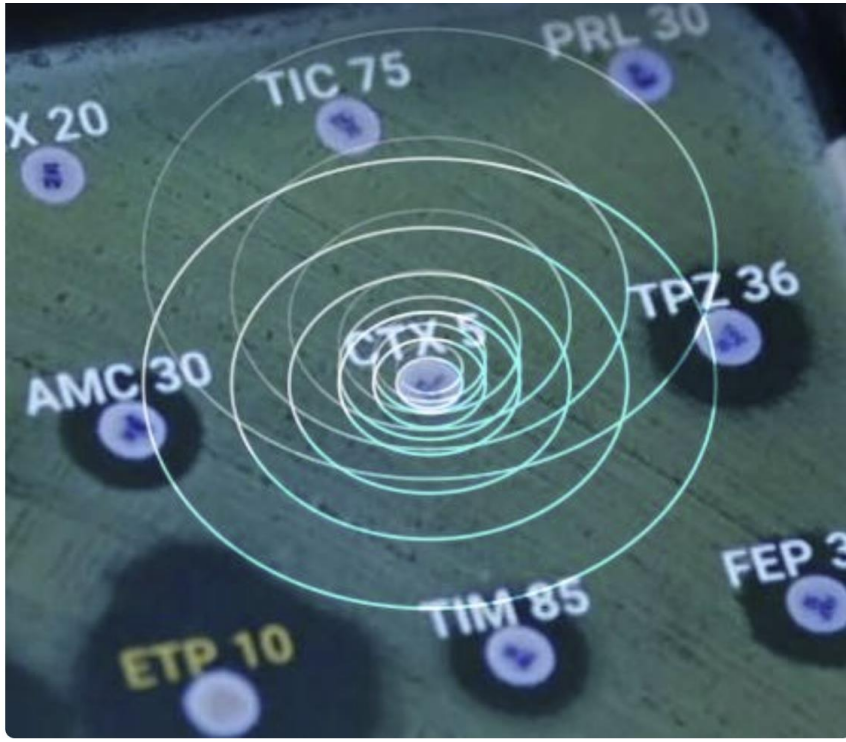
Ghana: digital skills for pharmacists to manage hypertension

SMS – based intervention to determine the legitimacy of medicine

ANTIBIOGO

DIAGNOSTIC TOOL

A free diagnostic aid application to counter antibiotic resistance.



QUICK ACCESS

IN BRIEF | VIDEO | NEWS | IN DETAIL | PARTNERS | CONTRIBUTE

The project

IN BRIEF

Antibiogo is a diagnostic aid medical device that aims to help doctors prescribe the most effective antibiotics to their patients. It is available as a free, open source and offline Android application. It allows non-expert laboratory technicians to measure and interpret antibiograms. It provides accurate results that can also be used for monitoring purposes and updating empirical treatments based on actual etiology.

STATUS OF THE PROJECT

PROBLEM ANALYSIS — DEVELOPMENT — EVALUATION — DEPLOYMENT

OUR PARTNERS

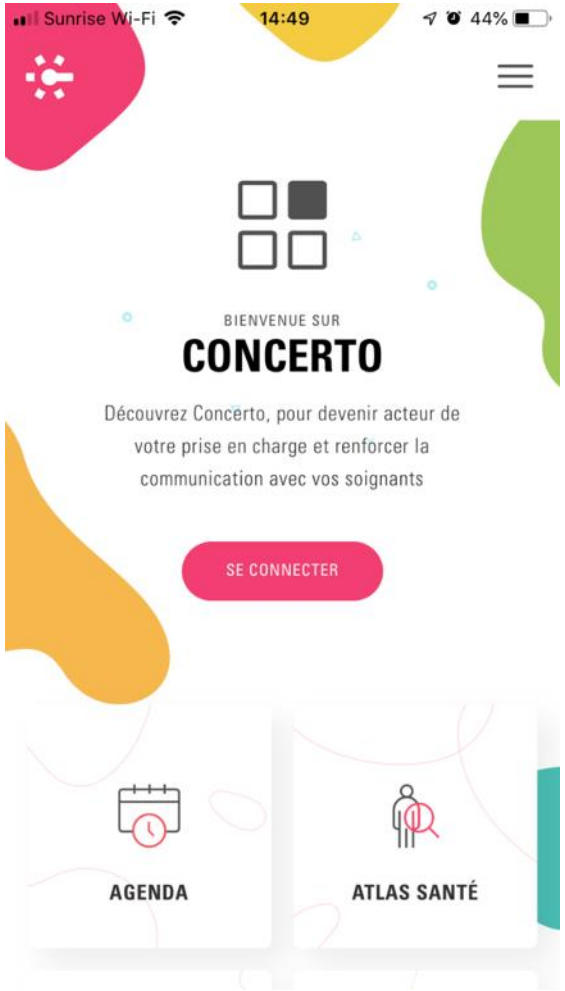
i2a
Institut Pasteur de Dakar
Google.org
EPFL (École polytechnique fédérale de Lausanne)
l'hôpital Henri Mondor
CEA Genoscope
LAMME Evry

Paramètres cookies

Digitalized medical protocols

Serious games: Kids e-transplant

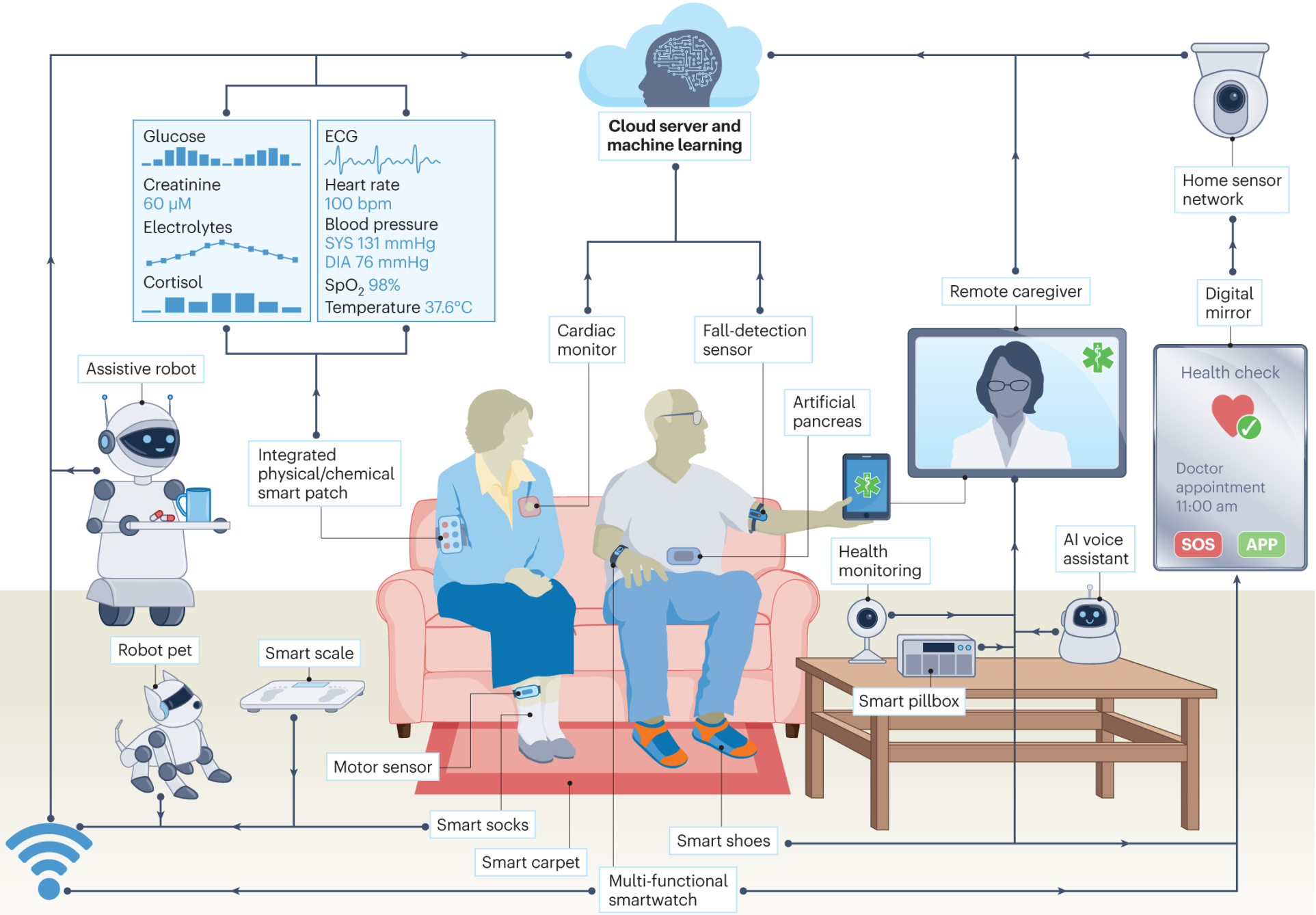
HUG examples: Concerto



Gamification of physical rehabilitation

Randriambelonoro, M., Perrin, C., Blocquet, A., Kozak, D., Fernandez, J.T., Marfaing, T., et al. (2021). **Computer-aided physical rehabilitation of older people: a pilot non-inferiority randomized clinical trial.**

Type	Multicenter non-inferiority randomized clinical trial
Participants	57 elderly patients with musculoskeletal issues
Duration	6 weeks (3 weeks hospital – 3 weeks home)
Intervention	Gamified rehabilitation equipment & wearable tracker
Research question	How efficient is the gamified rehabilitation compared to the standard rehabilitation treatment?
Objectives	Explore clinical efficacy
Outcomes	Insights into efficacy and the benefits of the intervention / complexities associated with adopting new technologies in clinical practice



The future of geriatric healthcare in the home setting

Chen, C., Ding, S. & Wang, J. Digital health for aging populations. *Nat Med* **29**, 1623–1630 (2023). https://doi.org/10.1038/s41591-023-02391-8

The Promise of Digital Health: transform healthcare

Empowerment

Patients

Health providers

Governments

Access

Greater access to care

Cost

Reduced cost

Quality

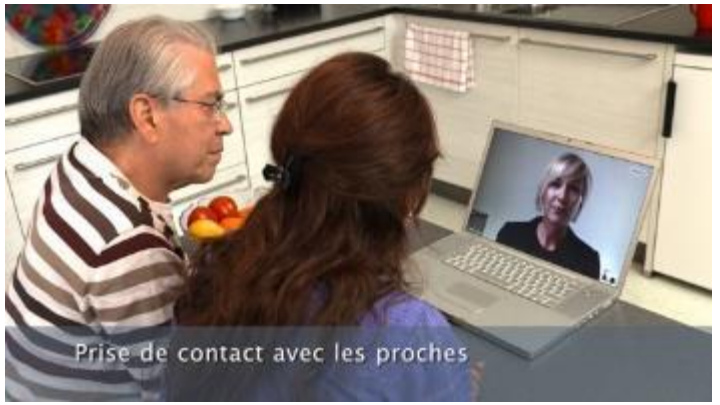
Better quality care

Outcomes

Improved outcomes through better diagnosis and treatment

Implementing digital health is challenging…

The vision of an innovative hospital… As of 2014…



Challenge

Implementing digital health in low resources settings

réseau rede
RAFT
red network
Supporting care professionals where they are most needed
Labrador Sea
United Kingdom
Denmark
Ireland
Belarus
Poland
Germany
Ukraine
Austria
France
Romania
Kazakhstan
Italy
Spain
Uzbekistan
Greece
Turkey
Turkmenistan
Portugal
Afghanistan
Iran
Morocco
Pakistan
Algeria
Libya
Egypt
Saudi Arabia
India
Cuba
Puerto Rico
Oman
Sudan
Yemen
Caribbean Sea
Gulf of Aden
Arabian Sea
Bay of Bengal
Venezuela
Guyana
Suriname
Colombia
Ethiopia
Laccadive Sea
Somalia
Ecuador
Brazil
Peru
Angola
Zambia
Namibia
Zimbabwe
Botswana
Paraguay
Chile
Indian Ocean

Emergency room in the Dhankuta health district in East Nepal

Reference hospital for a population of 200’000

Dr Kamga, public health and medical informatics expert
Dr Etoa, general practitioner, trained in tele-ultrasonography
HOPITAL DE DISTRICT DE NGOUMOU
ECHOGRAPHIE
DISPONIBLE ICI

Tele-ultrasonography from the district hospital of Kolokani (Mali)

The images are reviewed by a radiologist (300 km away)

The patient can be managed locally

Ultrasonography in the Sabadou-Baranama health center in Guinea

Shea butter replaces the imaging gel
The activity of the health center surges

Tele-ultrasonography in Tuiquina, on the bolivian Altiplano

Mobilization of the population

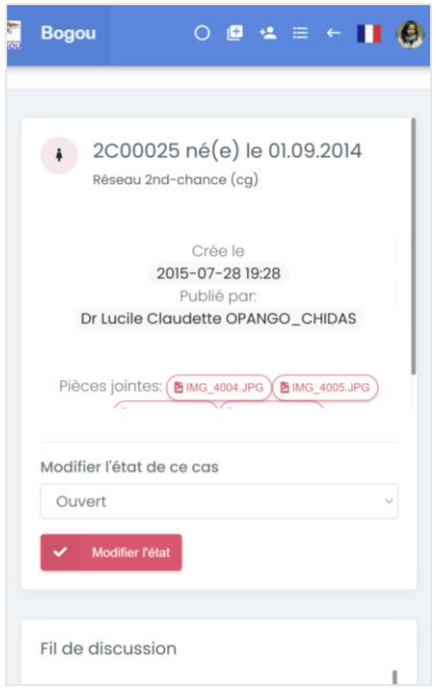
Increase the reputation and usage of the health center

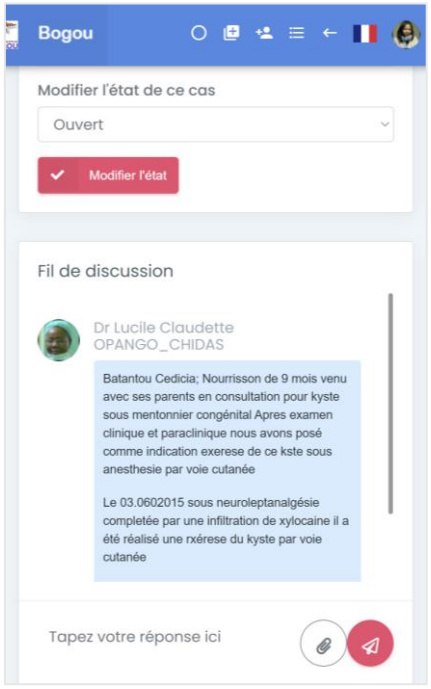
National programme in 300 hospitals launched to extend the pilot project

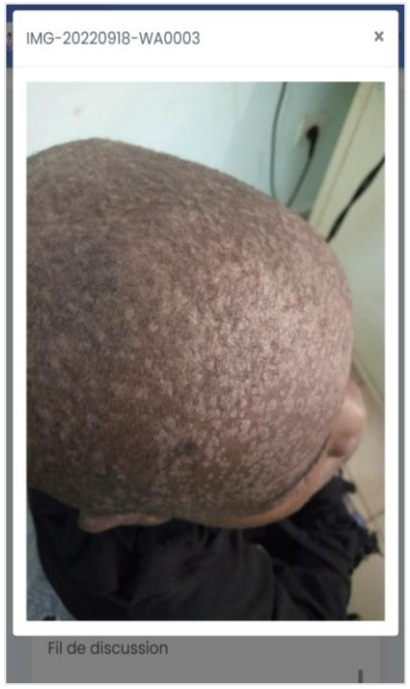
Expertise center in the country

Dr Aguilar answers teleradiology requests from the La Paz university hospital

Tele-expertise: Bogou



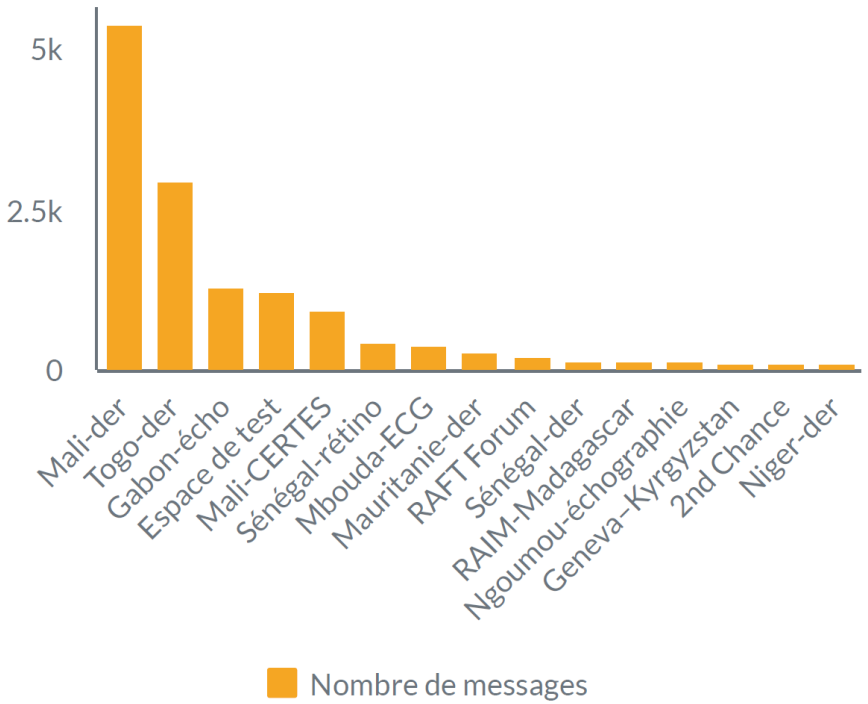




APERCU

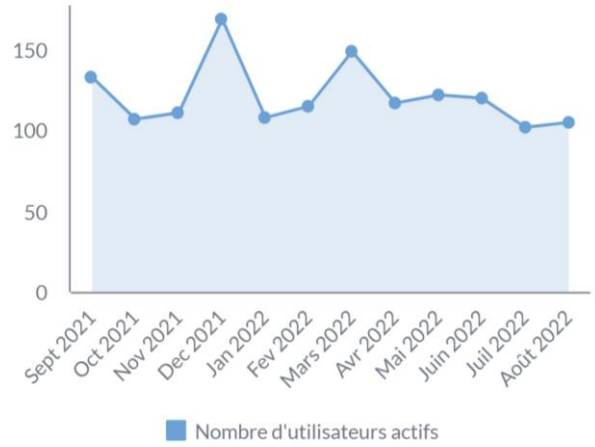
NOMBRE DE CAS TOTAL	NOMBRE DE MESSAGES	NOMBRE DE DOCUMENTS	NOMBRE DE CERCLES	NOMBRE D'UTILISATEURS
14253	65510	23513	76	781
CAS 37.4% ⬆	MESSAGES 44.6% ⬆	DOCUMENTS 42.8% ⬆	CERCLES	UTILISATEURS

NOMBRE DE MESSAGES PAR CERCLE

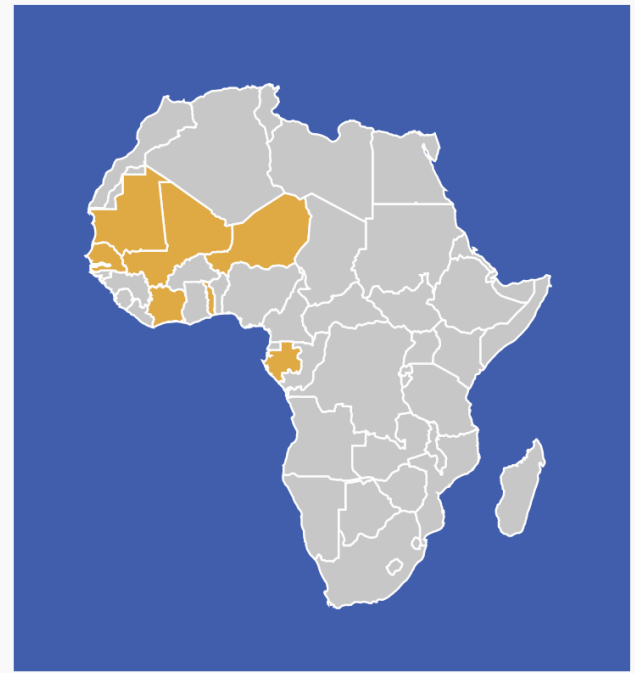


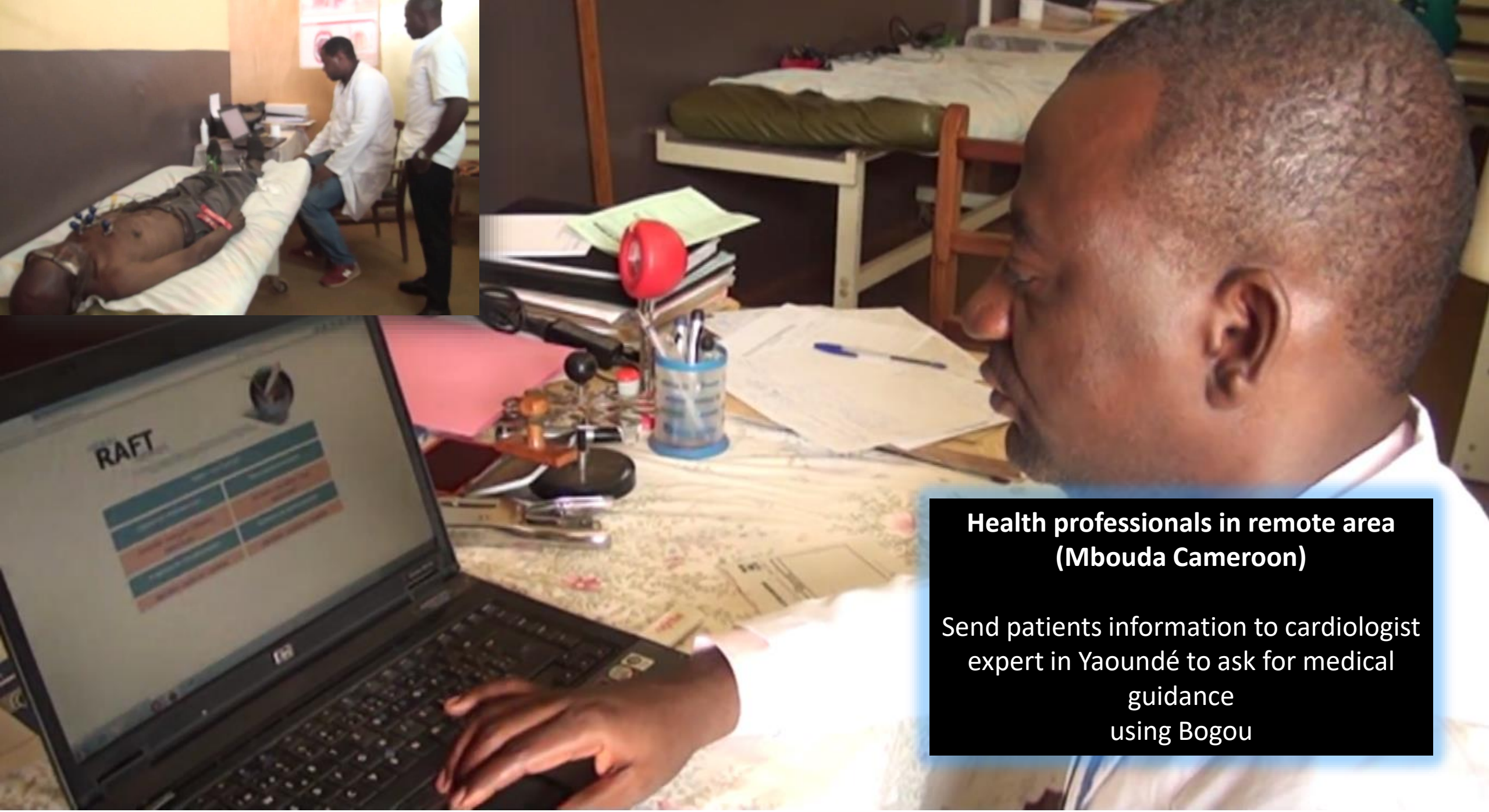
NOMBRE D'UTILISATEURS ACTIFS: 09/2021 à 09/2022

NOMBRE D'UTILISATEURS ACTIFS PAR MOIS



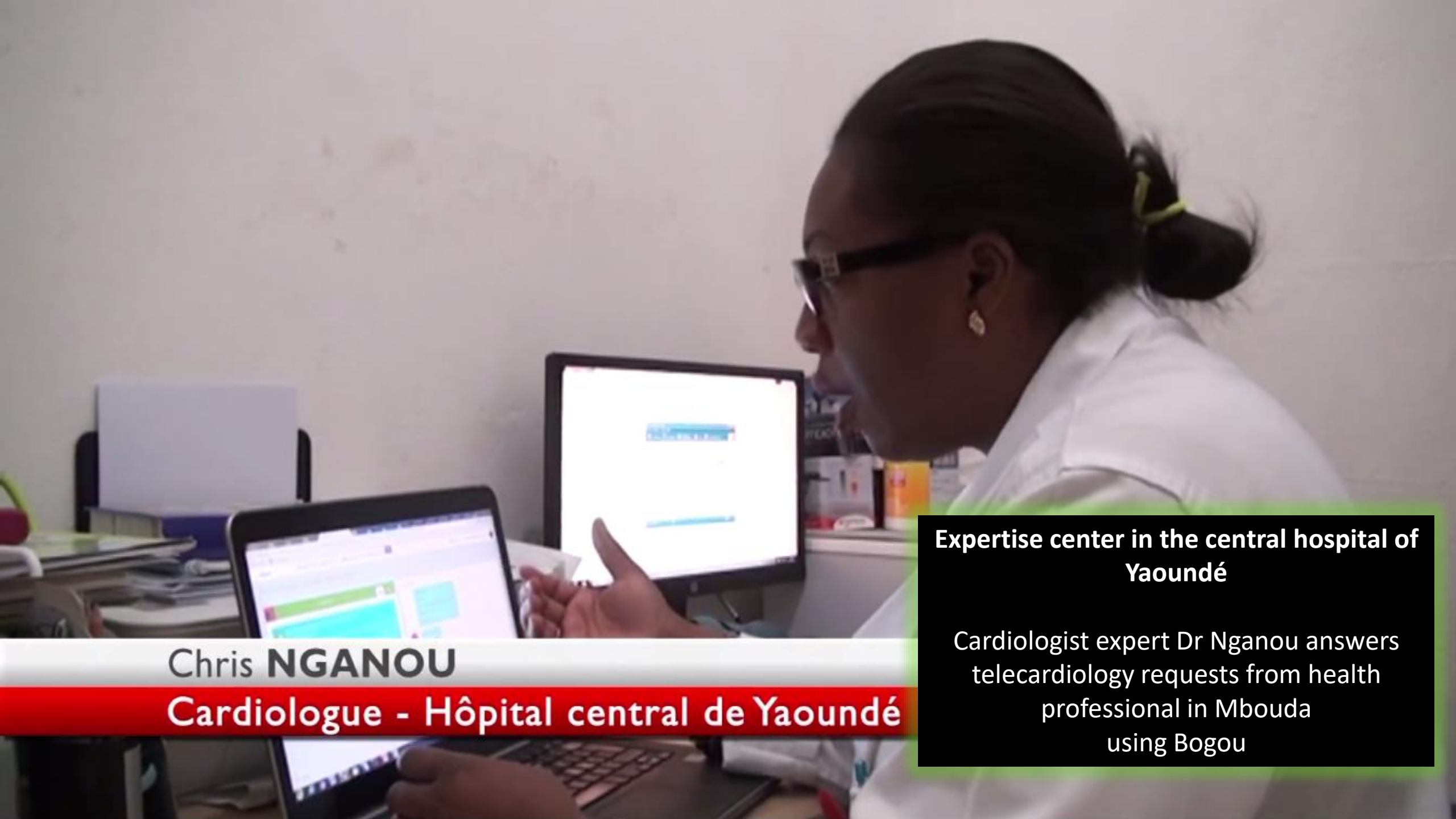
CERCLES ACTIFS EN AFRIQUE (2022)





Health professionals in remote area (Mbouda Cameroon)

Send patients information to cardiologist expert in Yaoundé to ask for medical guidance
using Bogou



Expertise center in the central hospital of Yaoundé

Cardiologist expert Dr Nganou answers telecardiology requests from health professional in Mbouda
using Bogou

DUDAL

Test SIH 2

Pause ... Pause ... Pause

Enregistrer | Terminer

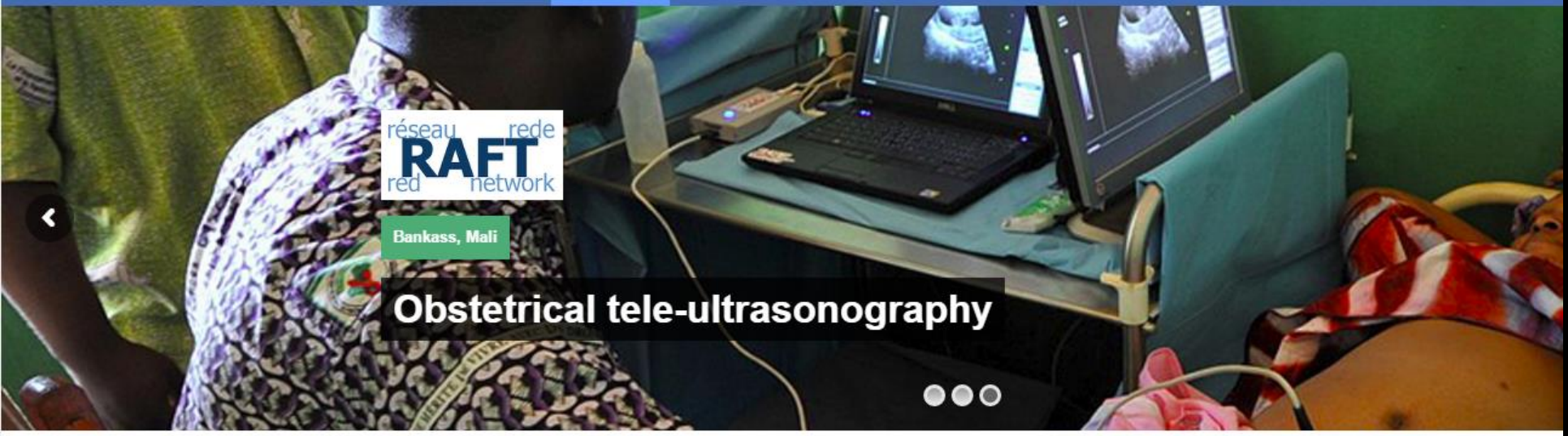
Liste des questions

Dr M Niang (41.221.177.89)
23 nov. 2020 - 13h50 UTC
Bonjour TEST

Dr Dramane Traore (41.73.107.239)
27 juin 2020 - 15h07 UTC

Posez une question

Envoyer



Courses by categories

Choose a category from the list or on the diagram below:

Programs and priority areas:

Diabetes (e-diabète project from the UNFM)

Pediatrics (pediatry project from the UNFM)

Specialist medical training (Jinou project)

Hospital management

Nutrition

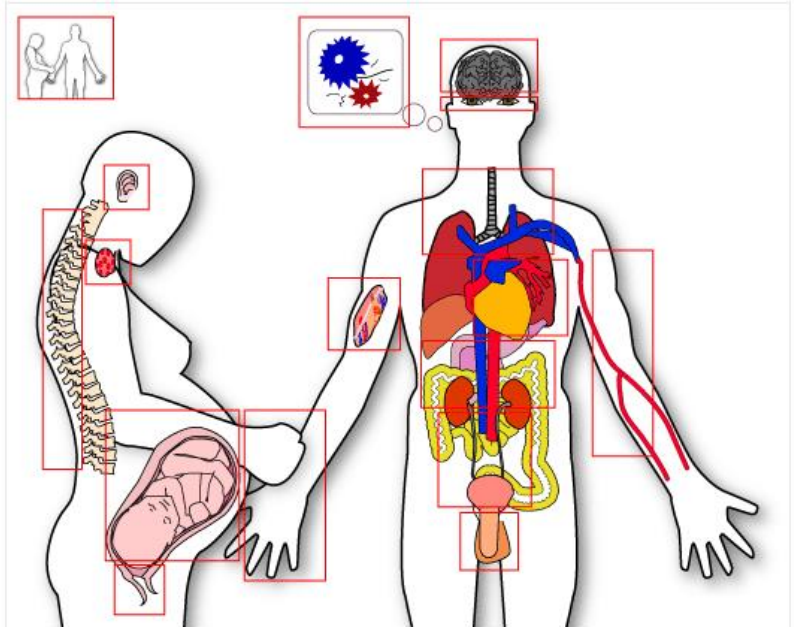
Malaria

Reproductive Health (OMS-Geneva)

Patient Safety (OMS-Geneva and HUG)

Tuberculosis

HIV and AIDS



Training by local experts

Dr Massaquoi webcasts a course from Monrovia (Liberia)

1200+ courses in French
150+ in English
40+ in Spanish
100+ in Portuguese
Starting in Russian and Arabic

Challenge: how to be attractive without per-diems

Medical education reform in Kyrgyzstan

Problem-based learning
Continuing education to retain young talents in remote hospitals

South-South cooperation

Professor Touré, from Mali, trains doctors and midwives in Mauritania

Centers of excellence

Prof. Bagayoko, MD, PhD, with three of his graduating students at the University of Bamako, Mali

Lessons learnt

Table 2. Lessons learned: top-down approach versus bottom-up approach

Country	Approach	Lessons learned
Mali	Bottom-up approach	This approach ensured the motivation and the engagement of healthcare professionals. Today, they have created a center of expertise in e-health and telemedicine. However, hospital, university, and government support was necessary.
Mauritania	Top-down approach	This approach facilitated the long-term sustainability of the system. However, they faced the challenge of getting the healthcare professionals on board.
Bolivia	Bottom-up and then top-down approach	This approach ensured both the buy-in of the different stakeholders as well as the growth of the network.

Build to last

Institutional anchoring
Low operational costs
Multiple partnerships
Train local experts
Demonstrate impact

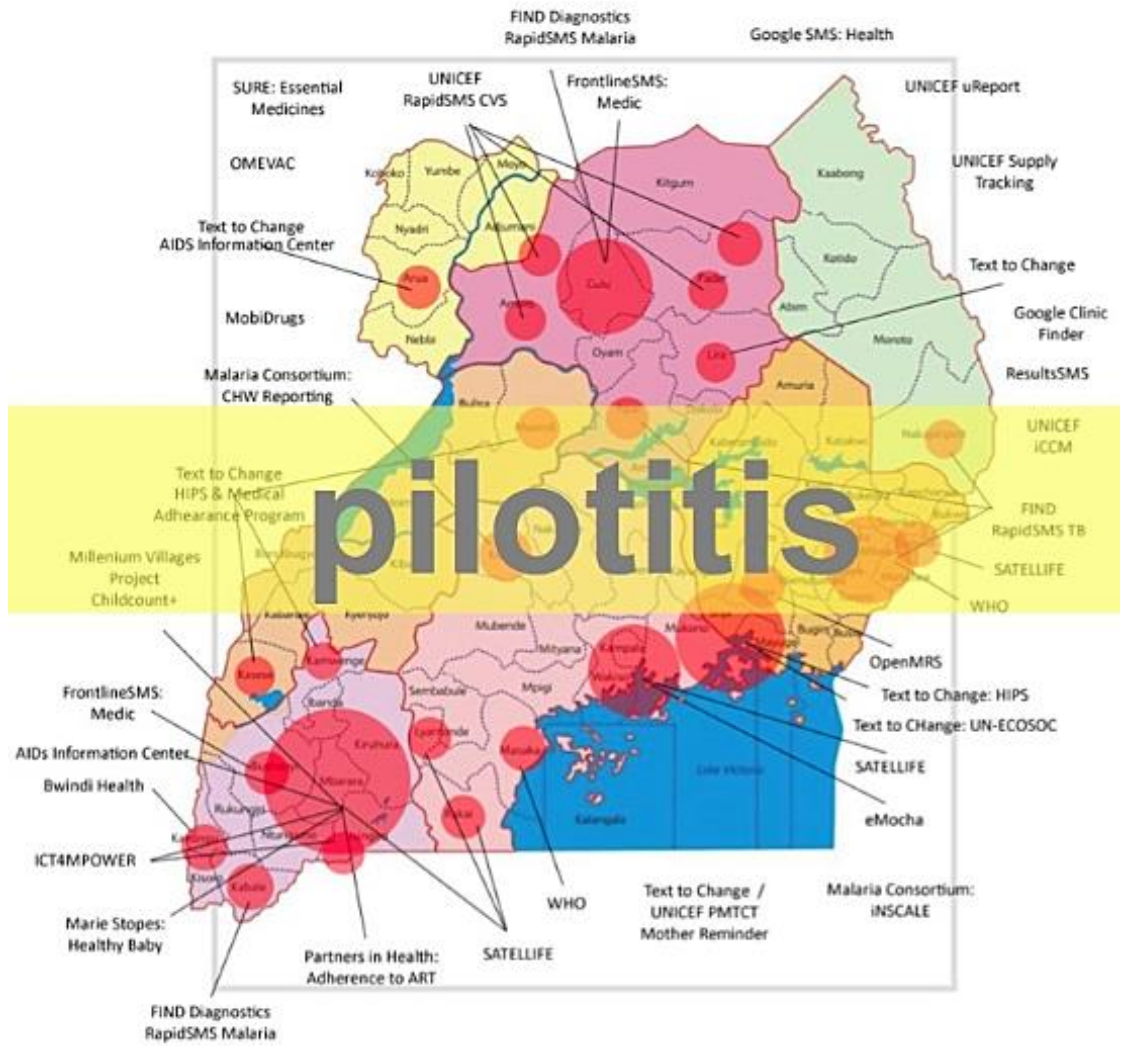
PIAGET

Pilots always work and never scale

Uganda pilots in 2012

https://www.ictworks.org/ugandan-mhealth-moratorium-good-thing

Huang, F., Blaschke, S. & Lucas, H. Beyond pilotitis: taking digital health interventions to the national level in China and Uganda. *Global Health* **13,** 49 (2017). https://doi.org/10.1186/s12992-017-0275-z



Digital transformation in Healthcare is complex and very challenging !

Fragmentation
and a Landscape defined by pilotitis

Lack of best practices
and access to up-to-date data on past and recent implementations

High failure rate
in digital health projects

Scarcity
of qualified resources that understand both healthcare and IT Domains

Cybersecurity, Data privacy, Trust
concerns and issues

Ethics and Equity
concerns and issues

gdhub

Geneva Digital Health Hub

Partners

UNIVERSITÉ DE GENÈVE

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

World Health Organization

GENEVA HEALTH FORUM

HUG Hôpitaux Universitaires Genève

gdhub

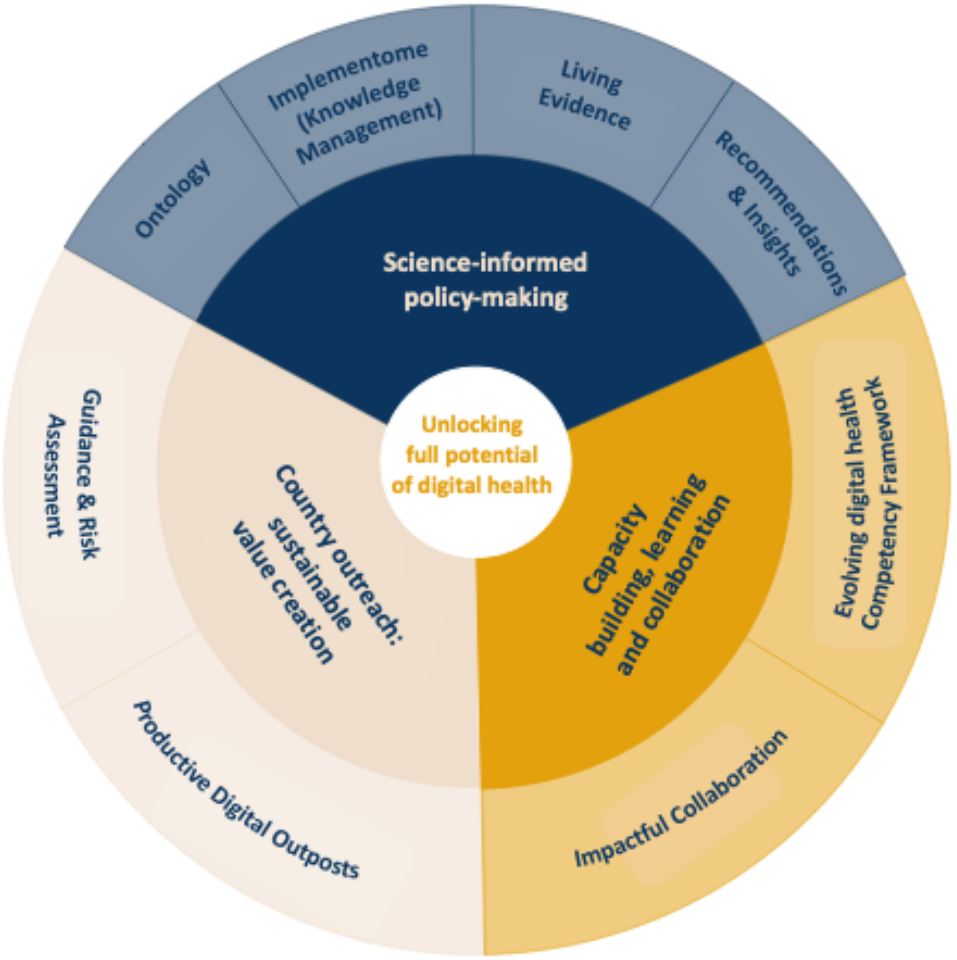
Geneva Digital Health Hub

gdhub's vision is **to unlock the full potential of digital health** for effective, equitable and impactful health systems by:

Enabling science-based policies and decisions that facilitate the development of global policies and standards for the responsible implementation of digital health based on advanced knowledge management approaches.

Promoting sustainable value creation through strengthened national and subnational digital health ecosystems that incorporate global standards and best practices, including ESG.

Fostering active learning and collaboration to enhance institutional capacity and cooperation to support the responsible development and implementation of digital health and reduce fragmentation of efforts.



Partners

UNIVERSITÉ DE GENÈVE

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

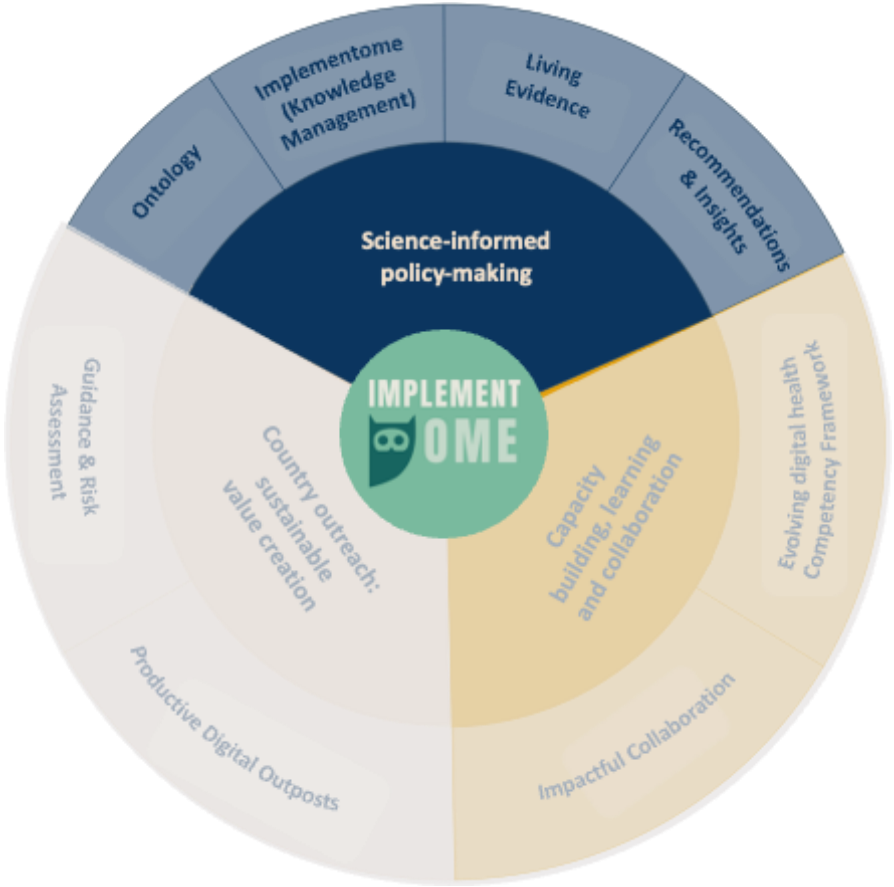
World Health Organization

GENEVA HEALTH FORUM

HUG Hôpitaux Universitaires Genève

Science-based policy-making

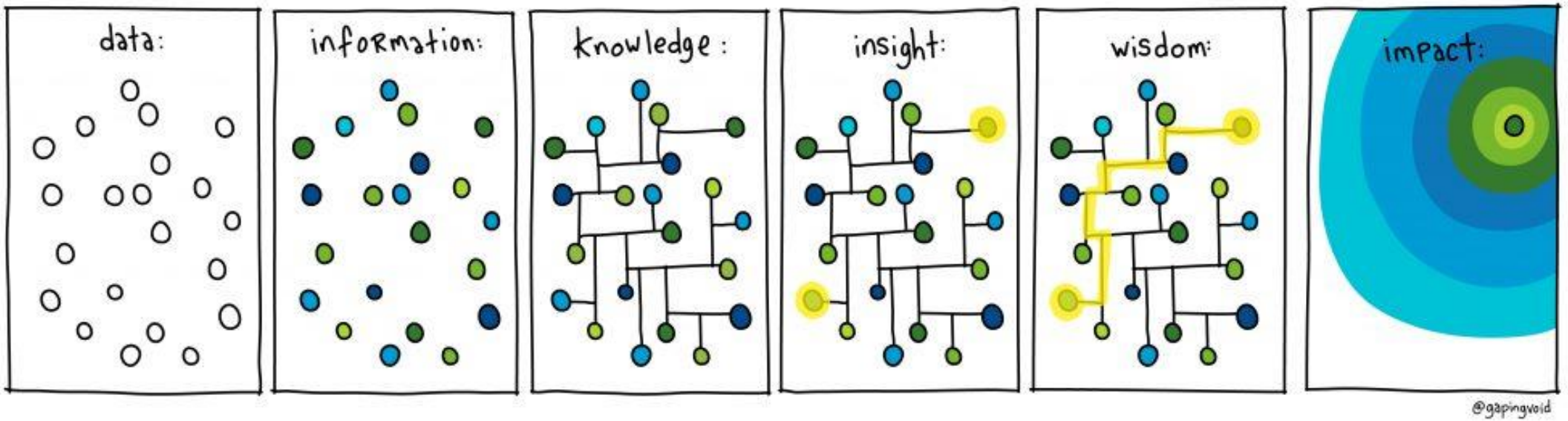
- Implementome
- Implementation Report
- Living Evidence Portal
- Regulatory Recommendations



Knowledge Management:
The key to sustainable solutions

Digital transformation in healthcare is a challenge, and knowledge management is the key to sustainable solutions. The Implementome enables science-based decision-making. Its mission is to connect knowledge and stakeholders for effective coordination, governance, collaboration, and ultimately impact in the field of digital health.

Implementomics

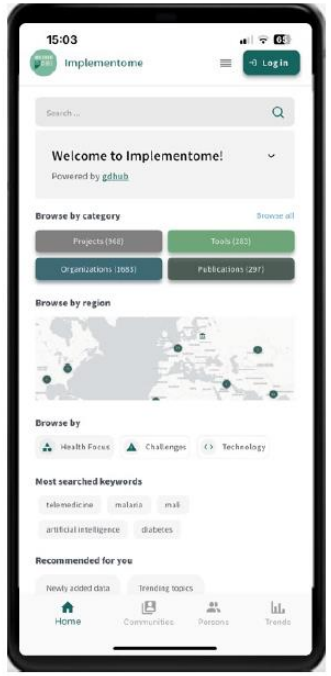


"Implementomics", i.e. the ability to capture, organize and exploit multidimensional knowledge related to implementation issues.

Learn. Share. Connect. Be impactful

SCAN ME

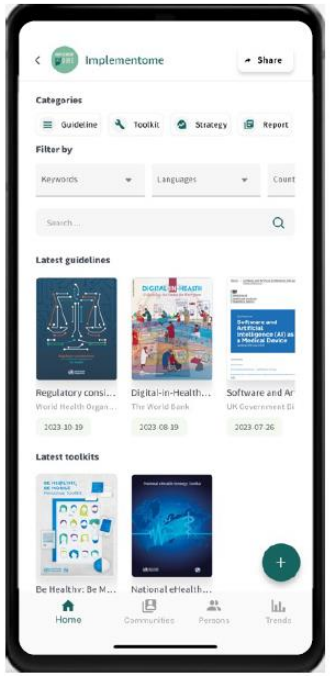
IMPLEMENTOME: an interconnected knowledge system that allows users to navigate multiple dimensions through metadata-annotated projects, people, information, and communities of practice.



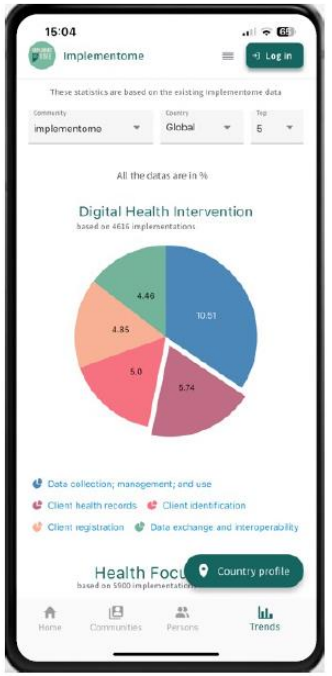
HOME

COMMUNITIES

MAP



PUBLICATIONS



TRENDS

implementome

3

Ask any digital health question

Get an answer based on real implementation data

Enter a question, topic or keyword

Example questions

Digital Health Atlas

A mapping of digital health projects based on real world implementation

+1400 PROJECTS

Living Evidence

A digital health scientific evidence updated in real-time

+106K PUBLICATIONS

Communities

A community of digital peers to learn, share and collaborate

+580 MEMBERS

May 29, 2024

Are there any projects in the decision support field that have gone to scale and had a major impact?

09:20

There are several projects on decision support that have demonstrated scalability and significant impact. Here are some notable examples:

IeDA: The main goal of IeDA is to sustain high-quality healthcare, particularly focusing on the care quality for newborns, children under 5, and pregnant women. It utilizes a cutting-edge mobile application on digital tablets to empower healthcare workers for accurate diagnostic and treatment processes. It has been operational since 2010, and has reached over 20 millions beneficiaries.

MSFeCare: The MSFeCARE project has made a significant impact in the field of pediatric primary healthcare in low-resource settings. It utilizes an electronic Decision Support System (eDSS) designed to manage childhood illnesses based on the Integrated Management of Childhood Illness (IMCI) guidelines. This system has been instrumental in improving diagnostic accuracy and treatment efficacy, enhancing the quality of care provided to over 200K children under 5 years old.

DYNAMIC Project: Operating in Tanzania and Rwanda, this project uses an advanced electronic clinical decision support system integrated with diagnostic tests to enhance pediatric healthcare. It has already impacted nearly 1 million children, showing strong potential for further scaling in low-resource settings.

These projects leverage technology and strategic partnerships to extend their reach and effectiveness, demonstrating how digital health solutions can be scaled to improve health outcomes in various regions.

09:20

View additional publication consulted

09:20

Sources

Projects

CHILD HEALTH

IeDA - Integrated e-Diagnostic Approach

Decision support | Tablets

CHILD HEALTH

MSFeCARE

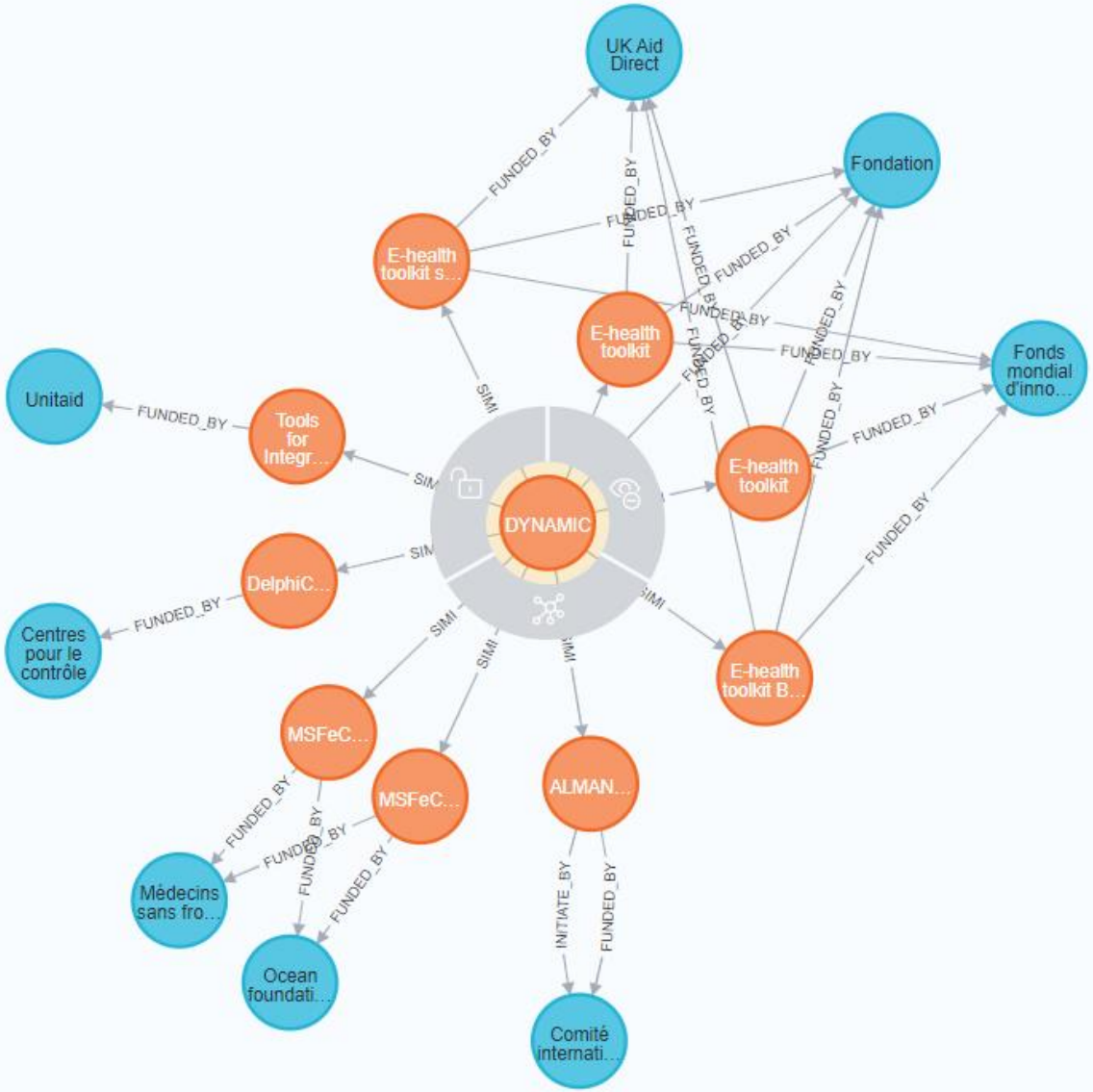
IMCI guidelines | Primary healthcare

CHILD HEALTH

Dynamic

implementome

Beyond the obvious: discovering valuable insights



iCHECK-DH: Standardization of digital health reports

1 Guideline Development Group

A guideline development group of 18 experts from different fields of digital health was established to support the development of the guidelines and checklist.

2 Guideline Development Process

The process included several rounds of collaborative development and refinement, as well as pilot testing of the guidelines and checklist.

3 Fostering digital health knowledge

Create a set of accessible and actionable information that benefits everyone, from researchers to practitioners, policymakers and end-users.

iCHECK-DH: Guidelines and Checklist for the Reporting on Digital Health Implementations

Caroline Perrin Franck [1,2]; Awa Babington-Ashaye [1,2]; Damien Dietrich [2]; Georges Bediang [3]; Philippe Veltsos [4]; Pramendra Prasad Gupta [5]; Claudia Juech [6]; Rigveda Kadam [7]; Maxime Collin [8]; Lucy Setian [9]; Jordi Serrano Pons [10]; S Yunkap Kwankam [11]; Béatrice Garrette [8]; Solenne Barbe [8]; Cheick Oumar Bagayoko [12,13]; Garrett Mehl [14]; Christian Lovis [1,15]; Antoine Geissbuhler [1,2,15]

- Abstract
- Introduction
- Methodology
- Explanation-and-Elaboration-of-iCHECK-DH
- Conclusion
- References
- Abbreviations
- Copyright

Related Article

This is a corrected version. See correction statement in: https://www.jmir.org/2023/1/e49027

Abstract

Background:
Implementation of digital health technologies has grown rapidly, but many remain limited to pilot studies due to challenges, such as a lack of evidence or barriers to implementation. Overcoming these challenges requires learning from previous implementations and systematically documenting implementation processes to better understand the real-world impact of a technology and identify effective strategies for future implementation.

Objective:
A group of global experts, facilitated by the Geneva Digital Health Hub, developed the Guidelines and Checklist for the Reporting on Digital Health Implementations (iCHECK-DH, pronounced "I checked") to improve the completeness of reporting on digital health implementations.

Methods:
A guideline development group was convened to define key considerations and criteria for reporting on digital health implementations. To ensure the practicality and effectiveness of the checklist, it was pilot-tested by applying it to several real-world digital health implementations, and adjustments were made based on the feedback received. The guiding principle for the development of iCHECK-DH was to identify the minimum set of information needed to comprehensively define a digital health implementation, to support the identification of key factors for success and failure, and to enable others to replicate it in different settings.

Results:
The result was a 20-item checklist with detailed explanations and examples in this paper. The authors anticipate that widespread adoption will standardize the quality of reporting and, indirectly, improve implementation standards and best practices.

Conclusions:
Guidelines for reporting on digital health implementations are important to ensure the accuracy, completeness, and consistency of reported information. This allows for meaningful comparison and evaluation of results, transparency, and accountability and informs stakeholder decision-making. i-CHECK-DH facilitates standardization of the way information is collected and reported, improving systematic documentation and knowledge transfer that can lead to the development of more effective digital health interventions and better health outcomes.

J Med Internet Res 2023;25:e46694

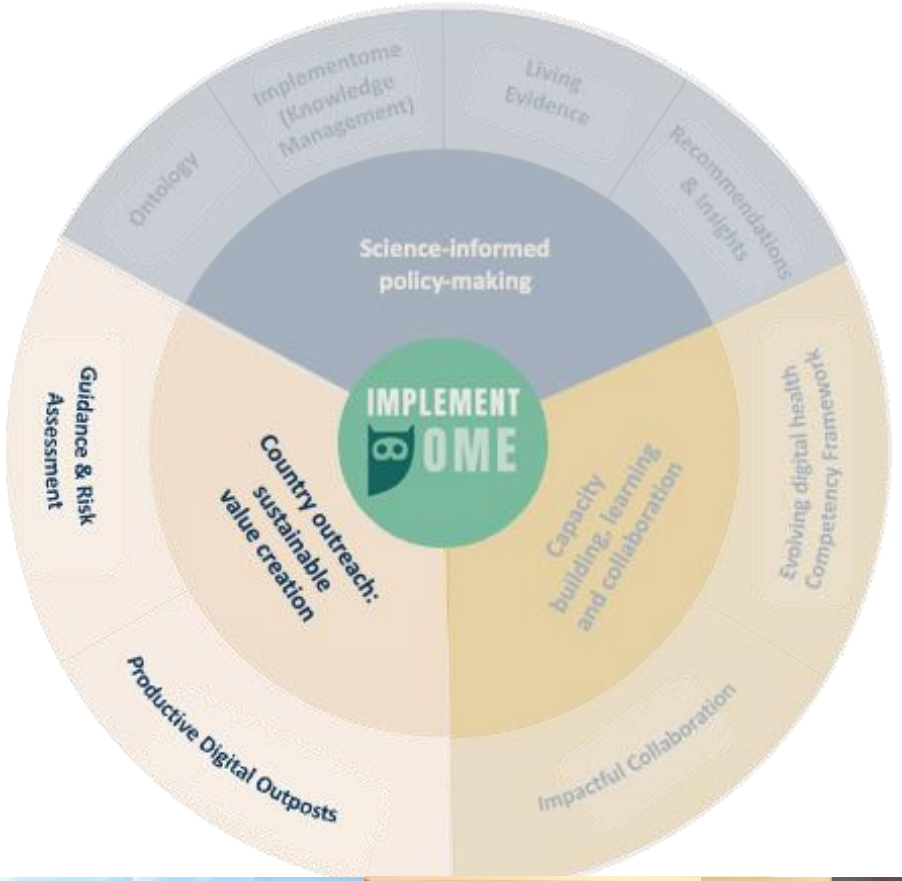
doi:10.2196/46694

Implementation report

- New type of publication
- Peer-reviewed
- Indexed in Pubmed

Country Outposts: Sustainable Value Creation

- Digital Outposts
- Assessing the role of telemedicine in equitable access to care
- Scaling up telemedicine activities (tablet-based approach)



Digital Outposts

#HACKATHON4HEALTHCARE
29-30 JULY, 2022, The Entrance Cafe, Pulchowk
#HACKATHON4HEALTHCARE
29-30 JULY, 2022
The Entrance Cafe, Pulchowk
gdhub
Geneva Digital Health Hub
SHISHUCARE
Sixty Thousand only
60,000/-
WINNER

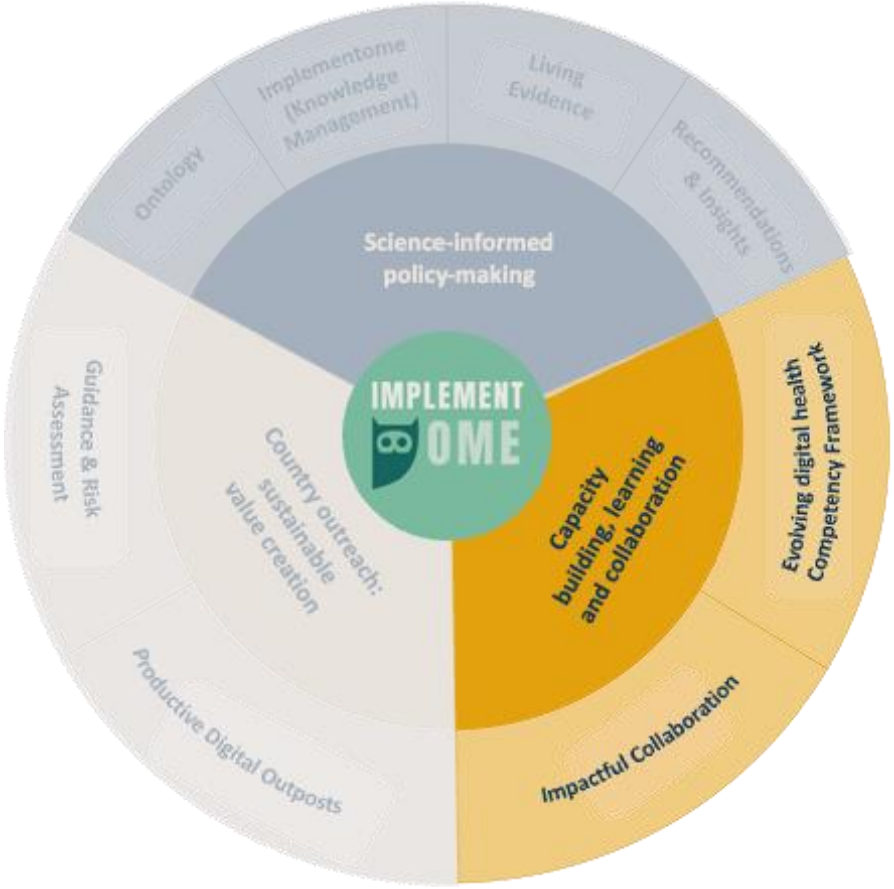
First Medical Hackathon Organized by
Academic Health Institute in Nepal
#HACKATHON4HEALTHCARE

o-Organised wi
dhub

RKISH
RLINES
B.P. KOIRALA INSTITUTE OF HEALTH SCIENCES
1993
gdhub
eva Digital Health

Capacity building and collaboration

- Communities of Practice
- Implementation assistance and matchmaking
- Collective innovation process



Communities of Practice

- CDSS
- Global Telehealth Community of Practice
- Space & Global Health Network
- Digital Health Africa
- Graph network

Funding opportunities
Courses opportunities
Research/Business/Collab opp

Communities
Geneva Digital Health Day
Digital Health Africa
Global Telehealth Community
Space and Global Health
Clinical Decision Support Syst
Europe-India Digital Health W
Meet, your digital health colle
gdhub dream team
The GRAPH Network
Space and Global Health Hack
Nepal EHR
SEE MORE

Members

Go Live

Explore | Top | Near You | Newest | Hosts | Ambassadors | Online Now

Top Members | 25

Members Near You | 25

Need Help?

Hackathons

Unleashing the power of collective action for global digital health

Outcomes of the first GDHack!

Space and Global Health Hackathon 2024

Geneva Digital Health Day

30 May 2024

Campus Biotech, Geneva & Online

+350 ATTENDEES

+70 SPEAKERS

+250 ONLINE

+50 SESSIONS

7 WORKSHOPS

GDHD will come back in 2025

#GDHD

gdhub Geneva Digital Health Hub

GIDH GLOBAL INITIATIVE ON DIGITAL HEALTH

Geneva Health Forum

UNIVERSITÉ DE GENÈVE

campus biotech

AI FOR LIFE BY ARTEFACT

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Conclusion

- Digital health has great potential to empower health systems
- But to ensure that solutions are sustainable, we need to learn.
- To err is evolution

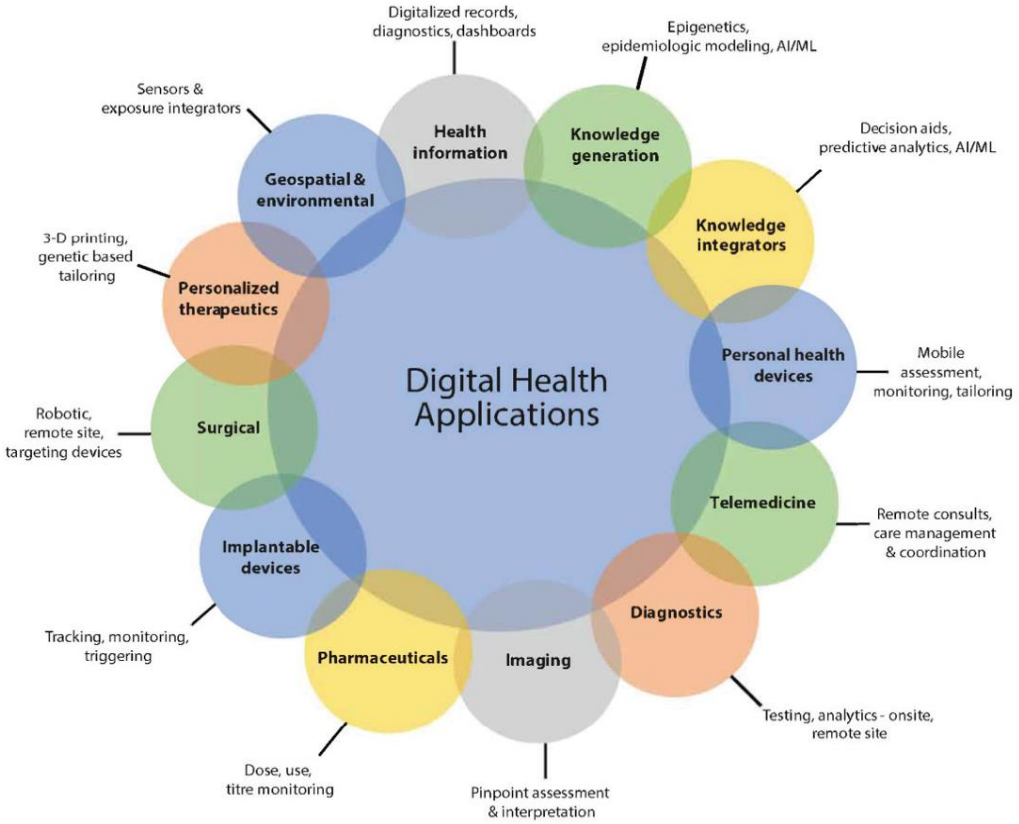


FIGURE 1 | Evolving Applications of Digital Technology in Health and Health Care
SOURCE: National Academy of Medicine. 2019. *Digital Health Action Collaborative, NAM Leadership Consortium: Collaboration for a Value & Science-Driven Health System.*

From innovation to implementation: Empowering Health Systems through Digital Health

gdhub
Geneva Digital Health Hub

réseau rede
RAFT
red network

QoL Summer School 2024:
Digital innovations for a Happier, Healthier Aging: A transdisciplinary training

Dr. Mirana Randriambelonoro
Contact: mirana.randriambelonoro@unige.ch

UNIVERSITÉ DE GENÈVE