

# Digital Health for Health Systems Strengthening

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**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)



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

- At least **half of the world's population does not have full coverage with essential health services.**<sup>1</sup>
- Despite progress, **large inequalities persist: e.g. basic maternal and child health services** in low- and lower-middle-income countries.<sup>1</sup>
- The **shortage of health professionals** and facilities is significant.<sup>2</sup>
- 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 .<sup>3, 4</sup>

<sup>1</sup> World Health Organization. *Tracking Universal Health Coverage: 2017 Global Monitoring Report*. World Health Organization, 2017.

<sup>2</sup> Critical threshold = 23 doctors, nurses and midwives per 10,000 inhabitants.

<sup>3</sup> Global Burden of Disease Study 2017. *The Lancet*

<sup>4</sup> UN Commission: *New investments in global health workforce will create jobs and drive economic growth*. 2016



**Emergency room in the Dhankuta health district in East Nepal**

Reference hospital for a population of 200'000

**Telemedicine**

**eHealth**

**Genomics**

**Decision support  
systems**



**Digital  
Health**

*the cost-effective  
use of ICT for health*

**Electronic medical  
records**

**Diagnostic imaging  
and biosignals**

**Artificial  
Intelligence**

**mHealth**

# 1.0 CLIENTS

<b>1.1 TARGETED CLIENT COMMUNICATION</b>	<b>1.3 CLIENT TO CLIENT COMMUNICATION</b>	<b>1.6 ON-DEMAND INFORMATION SERVICES TO CLIENTS</b>
1.1.1 Transmit health event alerts to specific population/group(s)	1.3.1 Peer group for clients	1.6.1 Client look-up of health information
1.1.2 Transmit targeted health information to client based on health status or demographics	<b>1.4 PERSONAL HEALTH TRACKING</b>	<b>1.7 CLIENT FINANCIAL TRANSACTIONS</b>
1.1.3 Transmit targeted alerts and reminders to client(s)	1.4.1 Access by client to own medical records	1.7.1 Transmit or manage out-of-pocket payments by client
1.1.4 Transmit diagnostics result, or availability of result, to clients	1.4.2 Self-monitoring of health or diagnostic data by client	1.7.2 Transmit or manage vouchers to client for health services
<b>1.2 UNTARGETED CLIENT COMMUNICATION</b>	<b>1.5 CITIZEN-BASED REPORTING</b>	1.7.3 Transmit or manage incentives to clients for health services
1.2.1 Transmit untargeted health information to an undefined population	1.5.1 Reporting of health system feedback by clients	
1.2.2 Transmit untargeted health event alerts to undefined group	1.5.2 Reporting of public health events by client	

# Application Scope

Classification of digital health interventions

# 3.0 HEALTH SYSTEM MANAGERS

<b>3.1 HUMAN RESOURCE MANAGEMENT</b>	<b>3.3 PUBLIC HEALTH EVENT NOTIFICATION</b>	<b>3.6 EQUIPMENT AND ASSET MANAGEMENT</b>
3.1.1 List health workforce cadres and related identification information	3.3.1 Notification of public health events from point of diagnosis	3.6.1 Monitor status of health equipment
3.1.2 Monitor performance of healthcare provider(s)	<b>3.4 CIVIL REGISTRATION AND VITAL STATISTICS</b>	3.6.2 Track regulation and licensing of medical equipment
3.1.3 Manage certification/registration of healthcare provider(s)	3.4.1 Notify birth event	<b>3.7 FACILITY MANAGEMENT</b>
3.1.4 Record training credentials of healthcare provider(s)	3.4.2 Register birth event	3.7.1 List health facilities and related information
<b>3.2 SUPPLY CHAIN MANAGEMENT</b>	3.4.3 Certify birth event	3.7.2 Assess health facilities
3.2.1 Manage inventory and distribution of health commodities	3.4.4 Notify death event	
3.2.2 Notify stock levels of health commodities	3.4.5 Register death event	
3.2.3 Monitor cold-chain sensitive commodities	3.4.6 Certify death event	
3.2.4 Register licensed drugs and health commodities	<b>3.5 HEALTH FINANCING</b>	
3.2.5 Manage procurement of commodities	3.5.1 Register and verify client insurance membership	
3.2.6 Report counterfeit or substandard drugs by clients	3.5.2 Track insurance billing and claims submission	
	3.5.3 Track and manage insurance reimbursement	
	3.5.4 Transmit routine payroll payment to healthcare provider(s)	
	3.5.5 Transmit or manage incentives to healthcare provider(s)	
	3.5.6 Manage budget and expenditures	

# 2.0 HEALTHCARE PROVIDERS

<b>2.1 CLIENT IDENTIFICATION AND REGISTRATION</b>	<b>2.5 HEALTHCARE PROVIDER COMMUNICATION</b>	<b>2.8 HEALTHCARE PROVIDER TRAINING</b>
2.1.1 Verify client unique identity	2.5.1 Communication from healthcare provider to supervisor	2.8.1 Provide training content to healthcare provider(s)
2.1.2 Enrol client for health services/clinical care plan	2.5.2 Communication and performance feedback to healthcare provider	2.8.2 Assess capacity of healthcare provider
<b>2.2 CLIENT HEALTH RECORDS</b>	2.5.3 Transmit routine notes and workflow notifications to healthcare provider(s)	<b>2.9 PRESCRIPTION AND MEDICATION MANAGEMENT</b>
2.2.1 Longitudinal tracking of client's health status and services received	2.5.4 Transmit non-routine health event alerts to healthcare providers	2.9.1 Transmit or track prescription orders
2.2.2 Manage client's structured clinical records	2.5.5 Peer group for healthcare providers	2.9.2 Track client's medication consumption
2.2.3 Manage client's unstructured clinical records	<b>2.6 REFERRAL COORDINATION</b>	2.9.3 Report adverse drug effects
2.2.4 Routine health indicator data collection and management	2.6.1 Coordinate emergency response and transport	<b>2.10 LABORATORY AND DIAGNOSTICS IMAGING MANAGEMENT</b>
<b>2.3 HEALTHCARE PROVIDER DECISION SUPPORT</b>	2.6.2 Manage referrals between points of service within health sector	2.10.1 Transmit diagnostic result to healthcare provider
2.3.1 Provide prompts and alerts based according to protocol	2.6.3 Manage referrals between health and other sectors	2.10.2 Transmit and track diagnostic orders
2.3.2 Provide checklist according to protocol	<b>2.7 HEALTH WORKER ACTIVITY PLANNING AND SCHEDULING</b>	2.10.3 Capture diagnostic results from digital devices
2.3.3 Screen clients by risk or other health status	2.7.1 Identify clients in need of services	2.10.4 Track biological specimens
<b>2.4 TELEMEDICINE</b>	2.7.2 Schedule healthcare provider's activities	
2.4.1 Consultations between remote client and healthcare provider		
2.4.2 Remote monitoring of client health or diagnostic data by provider		
2.4.3 Transmission of medical data to healthcare provider		
2.4.4 Consultations for case management between healthcare providers		

# 4.0 DATA SERVICES

<b>4.1 DATA COLLECTION, MANAGEMENT, AND USE</b>	<b>4.2 DATA CODING</b>	<b>4.3 LOCATION MAPPING</b>
4.1.1 Non-routine data collection and management	4.2.1 Parse unstructured data into structured data	4.3.1 Map location of health facilities/structures
4.1.2 Data storage and aggregation	4.2.2 Merge, de-duplicate, and create coded datasets or terminologies	4.3.2 Map location of health events
4.1.3 Data synthesis and visualization	4.2.3 Classify disease codes	4.3.3 Map location of clients and households
4.1.4 Automated analysis of data to generate new information or predictions on future events		4.3.4 Map location of healthcare provider(s)
		<b>4.4 DATA EXCHANGE AND INTEROPERABILITY</b>
		4.4.1 Data exchange across systems

**Ghana: digital skills for pharmacists to manage hypertension**



**SMS – based intervention to determine the legitimacy of medicine**

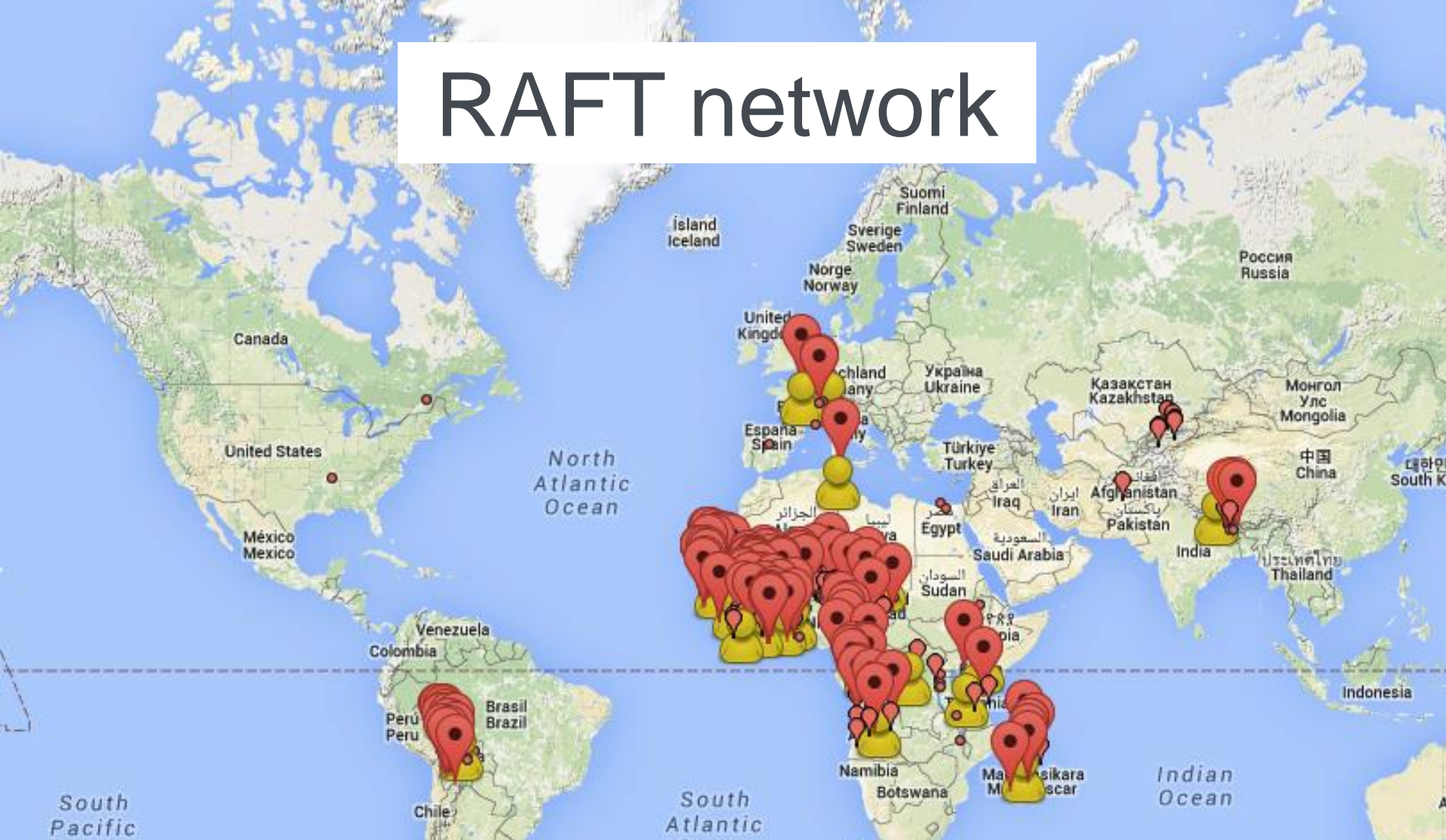




## Digitalized medical protocols



# RAFT network



Centre d'Expertise et de Recherche en Neurosciences et Génétique - CERG

Présentation

**Autheur:** Amineche TISSANE  
**Publié:** 01/02/2015  
**Titre:** Mésé

Il s'agit d'un patient qui est à sa troisième admission dans l'unité de diagnostic et d'évaluation névrosologique (UNEN) pour troubles agés après 60 ans, forme chronique avec complications.

La première admission remonte au 2007 à l'âge de 60 ans.

Au cours de l'investigation, l'examen clinique et paraclinique, ainsi qu'un bilan psychologique, souffre d'un trouble de l'attention et de la mémoire à court terme.

La deuxième admission remonte au 2011 à l'âge de 66 ans pour troubles agés.

La troisième admission remonte au 2013 à l'âge de 68 ans pour troubles agés.

Suite à des multiples hospitalisations pour troubles agés, la présence de la pathologie cognitive nous oriente vers une forme chronique avec complications.

Dr TISSANE Amineche et Dr DANI Oussama (CERG) (Névrologues)

Mots-clés: troubles agés, formes chroniques

Envoyé Dr DANI Oussama

Le patient fera objet de consultations et investigations tant que le cadre de sa pathologie n'est pas défini. Cette note sera adressée au médecin, mais toujours le mail adressé au Centre d'Expertise et de Recherche en Neurosciences et Génétique.

Mots-clés: troubles agés, formes chroniques



Suppurations Intra-Craniennes

Dr Mamez Cadi BA, Neurochirurgien  
Membre du Collège des Agrégés  
Service de Neurochirurgie  
Centre Hospitalier National de Yako  
Dakar, Sénégal



Picture: A. Geissbuhler

2.4 TELEMEDICINE	
2.4.1	Consultations between remote client and healthcare provider
2.4.2	Remote monitoring of client health or diagnostic data by provider
2.4.3	Transmission of medical data to healthcare provider
2.4.4	Consultations for case management between healthcare providers

### Tele-ultrasonography from a district hospital in Kolokani (Mali)

The images can be reviewed by a radiologist (300 km away)

Unnecessary evacuations can be avoided

Task shifting



**Health professionals in remote area  
(Mbouda Cameroon)**

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



**Ultrasonography in the Sabadou-  
Baranama health center in Guinea**

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

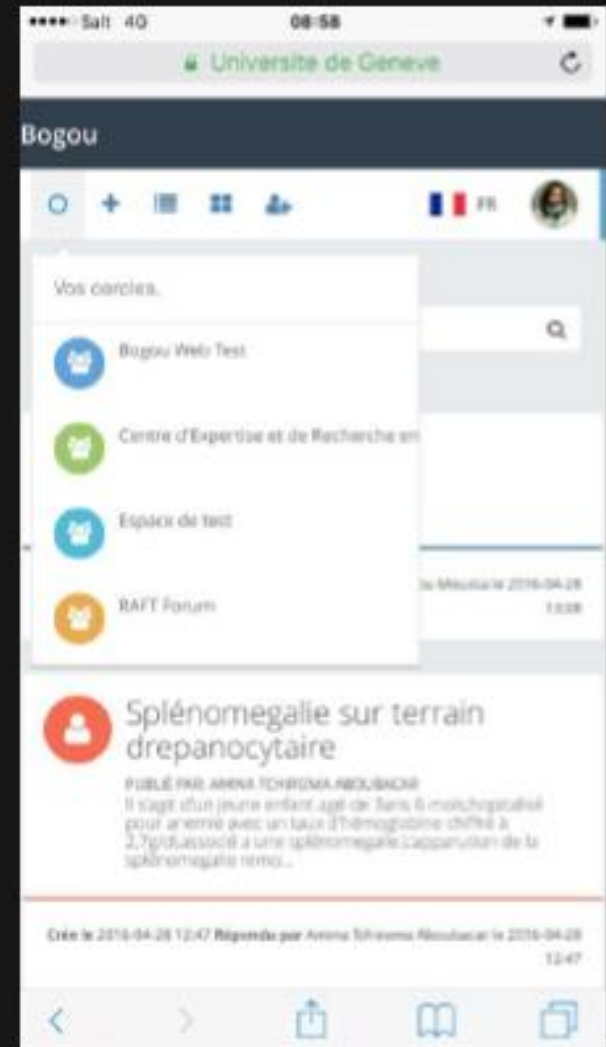


# RAFT Tools

## Multi languages



## Protected circles



## List of cases within a circle

## Discussion thread

## Photo taken from mobile phone attached to the case

Salt 4G 09:00 Université de Genève

Bogou

FR

### Cardiopathie sur Grossesse

PUBLIÉ PAR CONSTANT WOL WOL

Patiente venue pour épigastralgie, dyspnée à l'effort et palpitation sur grossesse de 37 SA d'aménorrhée. L'examen physique ne révèle aucun bruit surajouté sauf une tachycardie à 110...

Créé le 2015-05-21 12:49 Répondre par Haoua Teberé le 2015-06-05 18:37

### Avortement à répétition

PUBLIÉ PAR ITTOUIN DISSIA

Bjr à tous, je partage avec vous le cas de cette femme de 28 ans qui consulte pour avortement à répétition et dont les images échographiques de l'utérus que voici. Merci

Créé le 2015-05-20 13:08 Répondre par Haoua Teberé le 2015-06-05 17:53

### apparition de lésions dermatologiques diffuses

PUBLIÉ PAR LEOPOLD BRAME DIDUF

lésions papuleuses prurigineuses-érythémateuses diffuses dans tt le corps nummulaires par endroit prédominant sur le visage les lésions au cou les examens complémentaires effectués...

Créé le 2015-05-18 13:44 Répondre par Haoua Teberé le 2015-05-18 14:08

Salt 4G 09:02 Université de Genève

Bogou

FR

### Fil de discussion

Jean-Marc Naef

Voilà le premier test ...

© 2016-07-06 13:10

Mirana Randriambelonoro

HUG  
Hôpital  
Universitaire  
de Genève

© 2016-07-06 18:25

Mirana Randriambelonoro

Ma réponse

Salt 4G 09:04 Université de Genève

Bogou

FR

M3.jpg



Ma réponse



## Speaker

Image improves sense of live participation  
Sound is most important

## Current slide

Synchronized with the sound

## Instant messaging

Used for asking questions

Makes participants visible



- DIABETE ET JEUNE RELIGIEUX EXEMPLE DU RA
- INTRODUCTION (1)
- INTRODUCTION (2)
- INTRODUCTION (3)
- Page 4
- QU'EST-CE QUE LE RAMADAN?
- Page 6
- QU'EST-CE QUE LE RAMADAN?
- QU'EST-CE QUE LE RAMADAN?
- LE DIABETE SUCRE
- LE RAMADAN ET LE DIABETE
- LE RAMADAN ET LE DIABETE
- LE RAMADAN ET LE DIABETE
- LE RAMADAN ET LE DIABETE
- LE RAMADAN ET LE DIABETE
- Page 14
- LE RAMADAN ET LE DIABETE
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- LE RAMADAN ET LE DIABETE
- Page 18
- LE RAMADAN ET LE DIABETE
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- LE RAMADAN ET LE DIABETE
- EPIDAR: EPIDEMIOLOGY OF DIABETES and Ramadan
- EPIDAR: EPIDEMIOLOGY OF DIABETES and Ramadan
- EPIDAR: RECOMMENDATIONS (1)
- EPIDAR: RECOMMENDATIONS (2)
- EPIDAR: RECOMMENDATIONS (3)

## Pathophysiology of Fasting in normal individuals



## List of slides

For rapid navigation

POURQUOI DURANT AÏDÉE

▼ CAB-TOWAD, 21 May - 11:30  
Félicitations pour ce brillant exposé!  
Jen

▼ ZAKARIY KOWAWA, 21 mai - 11:37  
salam AMADOU, Chef de clinique et maître de conférences à la COSMOPHON  
JE SUIS EN LIGNE  
SUJET TRES IMPORTANT

▼ Abdoullah Aoubacar, 21 mai - 11:36  
quelles sont les recommandations pour un patient DT2 SOUS SULFAMIDES pour éviter la déshydratation en cette période en le Ramadan VAUENR dans une période très chaude

▼ Gwladys Loimakh ELENSA BOWGO, 21 mai - 11:43  
Nous sommes en direct de Pointe-Noire

▼ AGIM CHARBAV, 21 mai - 11:28  
BONJOUR  
AGIM EST CONNEXÉE DEPUIS LE CHIRIDIEN DANS LE TOPIKI

▼ romoajaytairah@protonmail.com, 21 mai - 11:37  
FAUT IL PREFERER LES INCRETINES AUX SULFAMIDES DURANT LE RAMADAN

HOPITAL PRINCIPAL DAKAR

▼ CAB-TOWAD, 21 May - 11:24  
bonjour,  
En ligne depuis le CAB-TOWAD:

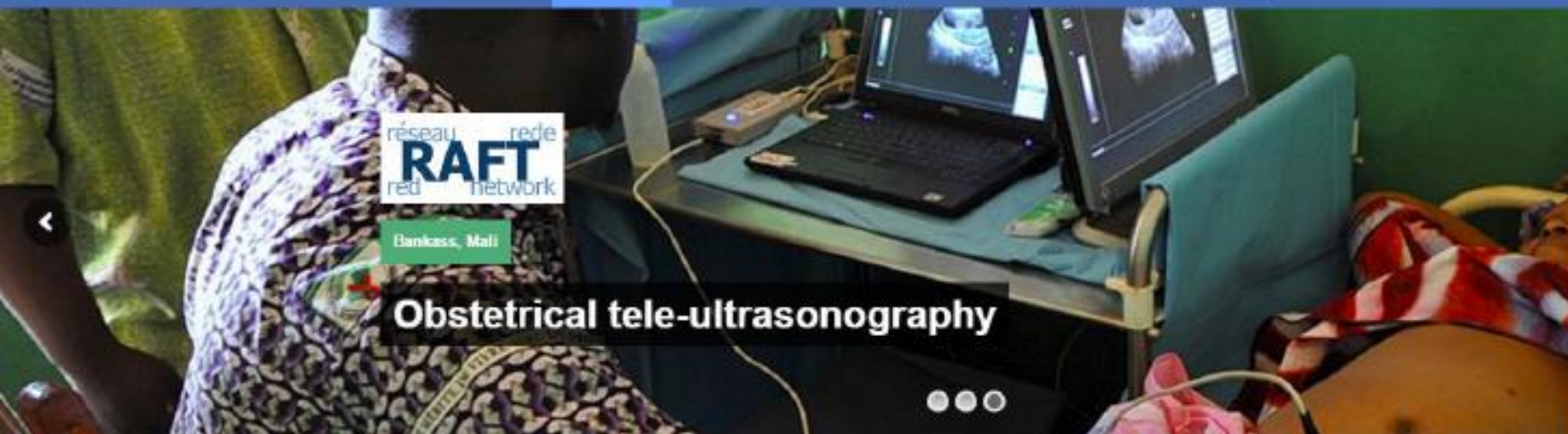
▼ Mohamed Lemine Sidi, 21 mai - 11:22  
bonne nuit cher W le capitaine OUMG

▼ Nelson Dine de Drazzville, 21 mai - 11:17  
Bonjour à tous, nous sommes connectés depuis la maison de Drazzville

▼ gobilissie@gmail.com, 21 mai - 11:15  
Bonjour From Mauritania

Nous sommes à partir de site Centre Hospitalier National de NOUAKHOUT, il y a un panel de prof et de doc qui suivent votre cours.

Ajouter un message



## 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

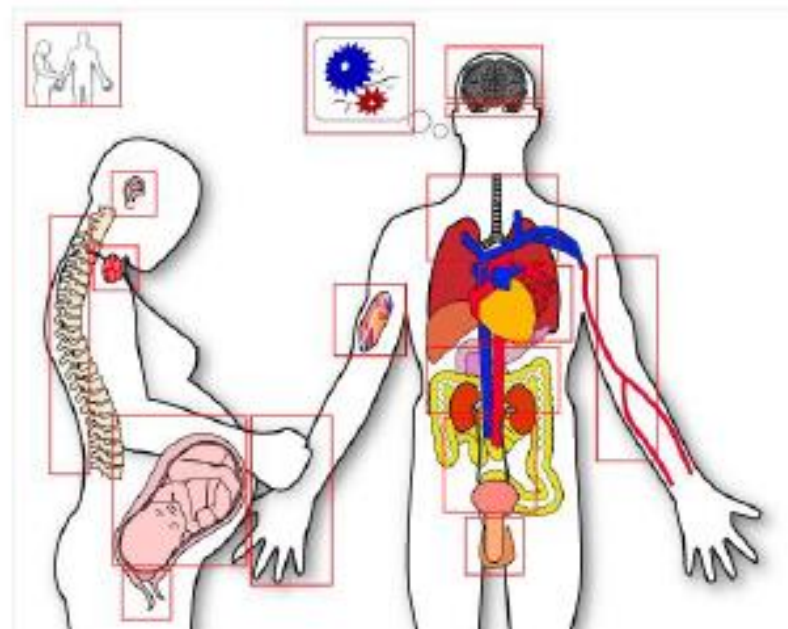
Malaria

Reproductive Health (OMS-Geneva)

Patient Safety (OMS-Geneva and HUG)

Tuberculosis

HIV and AIDS



What is the status of global digital health?

# What is the status of digital health implementation ?



digital health



Search

[Advanced](#) [Create alert](#) [Create RSS](#)

[User Guide](#)

Save

Email

Send to

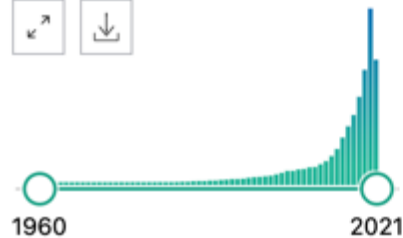
Sorted by: Best match

Display options

MY NCBI FILTERS

36,636 results

RESULTS BY YEAR



TEXT AVAILABILITY

[The impact of \*\*digital health\*\* interventions on \*\*health\*\*-related outcomes in the workplace: A systematic review.](#)

1  
Cite Howarth A, Quesada J, Silva J, Judycki S, Mills PR.

Share

[Digit Health](#). 2018 May 10;4:2055207618770861. doi: 10.1177/2055207618770861. eCollection 2018 Jan-Dec.

PMID: 29942631 [Free PMC article.](#) [Review.](#)

However, little is known about the impact of **digital**-only interventions on **health**-related outcomes in employee groups. The aim of this systematic review was to assess the impact of pure **digital health** interventions in the workplace on **health**-rel ...

# What is the status of global digital health ?

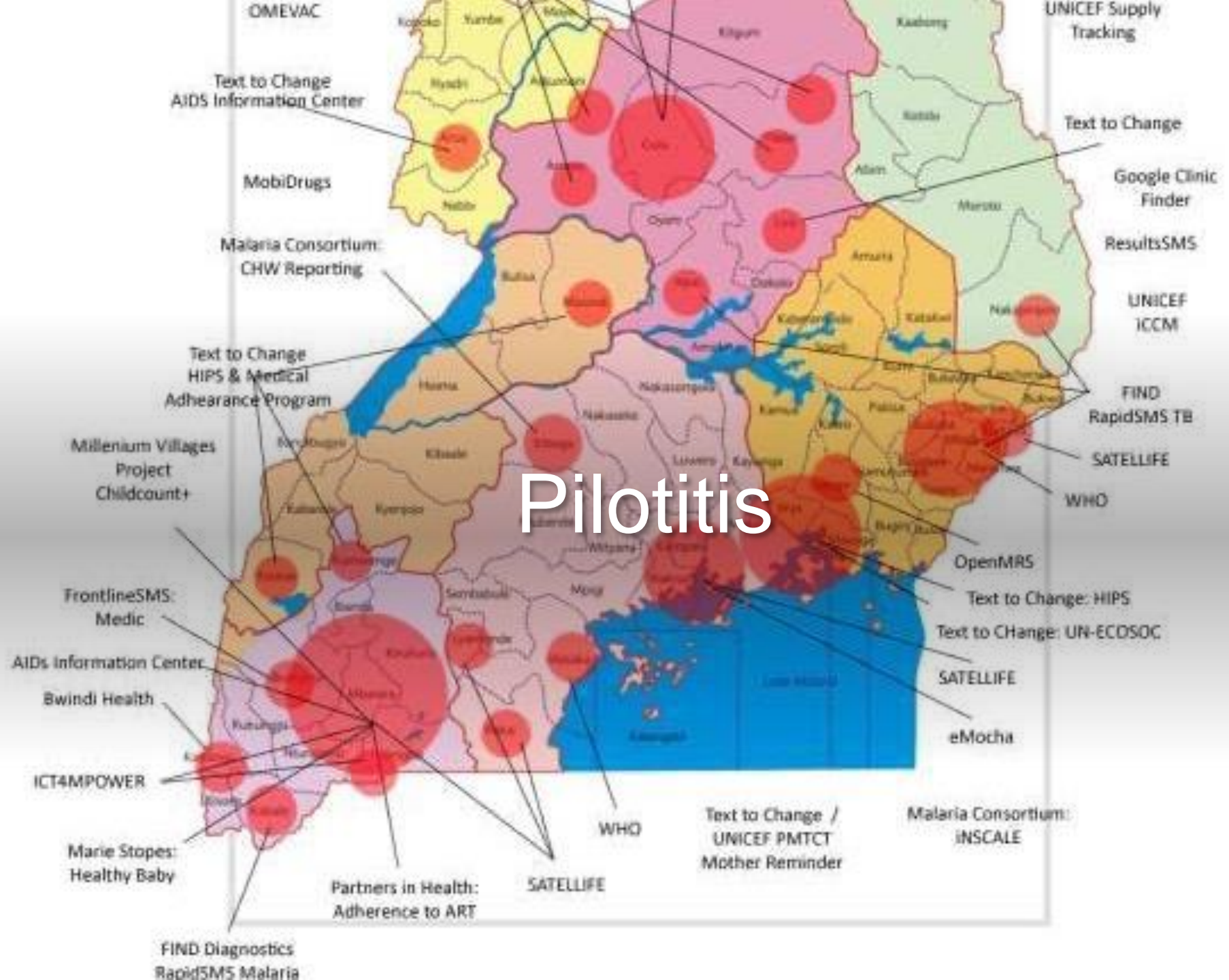


OBSERVATOIRE DE LA E-SANTÉ



DANS LES PAYS DU SUD

# Challenges





**Increasingly voluminous and cluttered landscape:** <sup>1</sup> published articles, guidelines, experience, projects, apps (mHealth: 3 00 000 apps, 200 added daily)



**Parado**

X

<sup>1</sup> Mathews, S. C., McShea, M. J., Hanley, C. L., Ravitz, A., Labrique, A. B., & Cohen, A. B. (2019). Digital health: a path to validation. *NPJ digital medicine*, 2(1), 1-9.



# Challenges, barriers, risks

## Approach

- Interviews
- Surveys from initiatives already funded by SDC
- Desk research and conferences  
etc



# Digital transformation in Healthcare is complex and **very challenging** !



# 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

Challenges do not only represent a barrier, but also have **risks associated** !





Geneva Hub for  
**Global Digital Health**

**Partners**



**UNIVERSITÉ  
DE GENÈVE**



**World Health  
Organization**



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

**Swiss Agency for Development  
and Cooperation SDC**

## Catalyser

tools and processes facilitating governance,  
promoting policies awareness and uptake



## Collaboration enhancer

communities of practice, co-creation, hackathons

## Insights finder

people, knowledge, tools



## Knowledge exchange promoter

case books, GDHUB talks / podcast



Geneva Hub for  
Global Digital Health



Unlocking the full potential of digital health for efficient, equitable, and high-quality health promotion and care.

### 1. functionalities

- visualisation
- access to relevant information
- planning & decision making
- streamlined grant applications
- animated communities of practice
- targeted training
- match-making

increased collaboration, resource efficiency, and scale of digital health

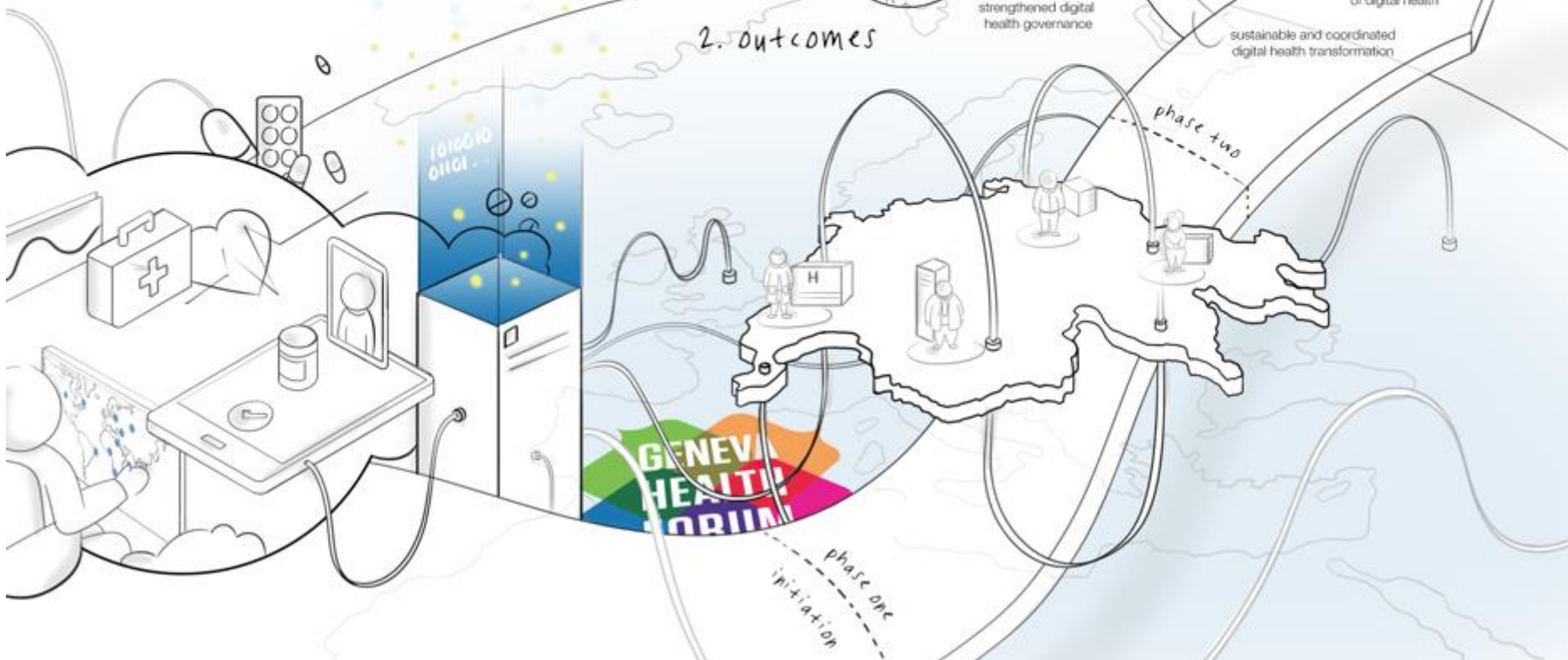
### 3. goals

actionable knowledge & information

### 2. outcomes

strengthened digital health governance

unlocking the full potential of digital health  
sustainable and coordinated digital health transformation



# Upcoming activities

- GDHUB talks (11th of October)
- GDHack (26th of November)

→ Interested?

Go to <https://gdhub.org/> and subscribe to newsletter



# Questions?

Contact: [Caroline.Perrin@unige.ch](mailto:Caroline.Perrin@unige.ch)