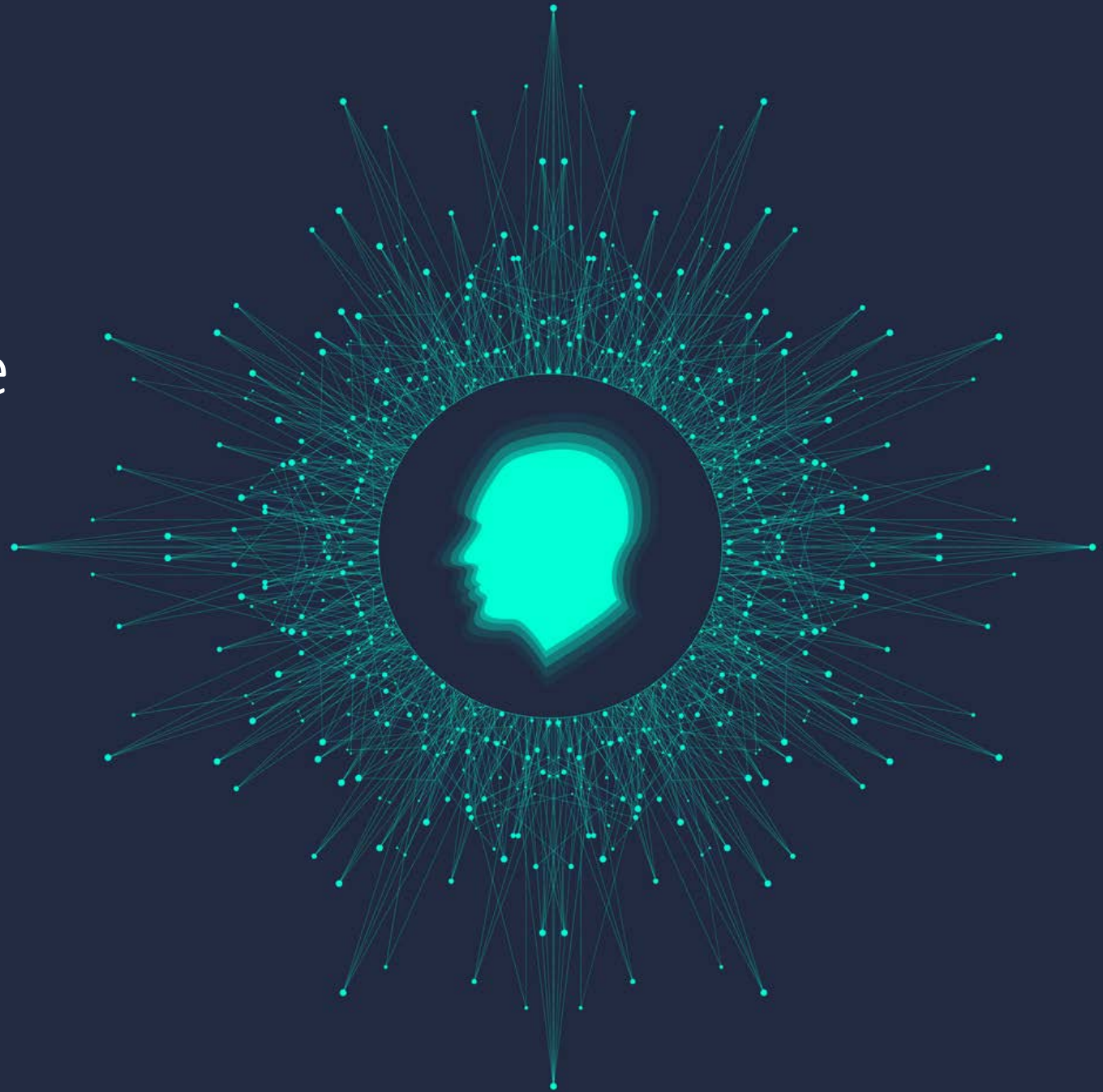


The importance of Digital Health to catalyze effective public health policies

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FUNDACIÓN
Carlos Slim



Digital Health is a global trend



**World Health
Organization**

May 2018	Resolution on Digital Health
June 2018	Classification of Digital Health Interventions
March 2019	Creation of Department of Digital Health
April 2019	Recommendations for Digital Interventions

**BROADBAND
COMMISSION**
FOR SUSTAINABLE
DEVELOPMENT



Feb 2017	Digital Health: A Call for Government Leadership and Cooperation between ICT and Health
Sept 2018	The Promise of Digital Health: Addressing NCDs to Accelerate Universal Health Coverage in LMCs

THE LANCET
Digital Health

Jan 2019	Announcement
May 2019	Vol 1. Num 1.

The fourth Industrial Revolution and its expression in Digital Health

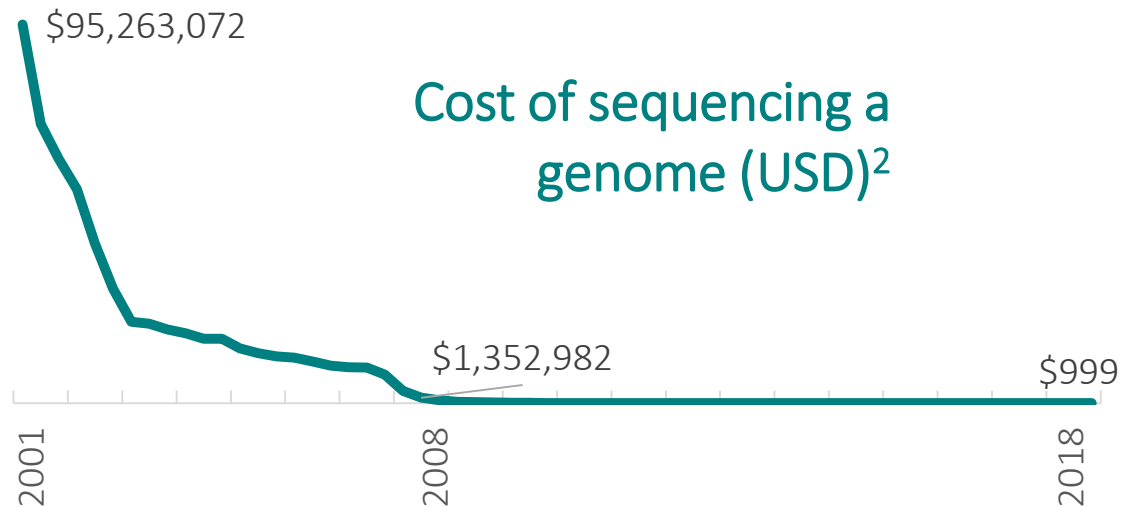
through the convergence of five trends that when combined, catalyze the design, development, deployment and scale of robust public health interventions.



Knowledge Generation | Advances of Science

Medical knowledge doubles every:¹

- 50 years in 1950
- 7 years in 1980
- 3.5 years in 2010
- 73 days by 2020



17 years

time to translate research into daily practice³

1. Densen, P. Challenges and Opportunities Facing Medical Education. Transaction of the American Clinical and Climatological Association (2011) Vol. 122.

2. DNA sequencing costs: data. (Available at <https://www.genome.gov/about-genomics/fact-sheets/DNA-Sequencing-Costs-Data>)

3. Zoë Slote Morris et al. The answer is 17 years, what is the question: understanding time lags in translational research. *J R Soc Med* 2011 vol. 104 no. 12 510 - 520



Knowledge Generation | Advances of Science

Impact in healthcare delivery:

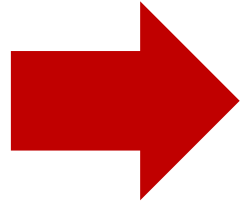
- Better knowledge of the human being, from the molecule to the environment.
- Better knowledge of risk factors and their effect in human being's health status.
- Generation and continuous improvement of clinical guidelines.
- Enabler of novel preventive, therapeutic and rehabilitation interventions.
- Incorporation of these interventions as public policies.



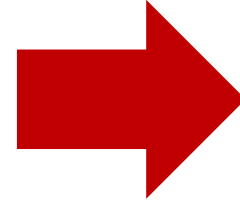
Digital Platforms | Robust operation with instant transactionality



Paper-based



Physical servers

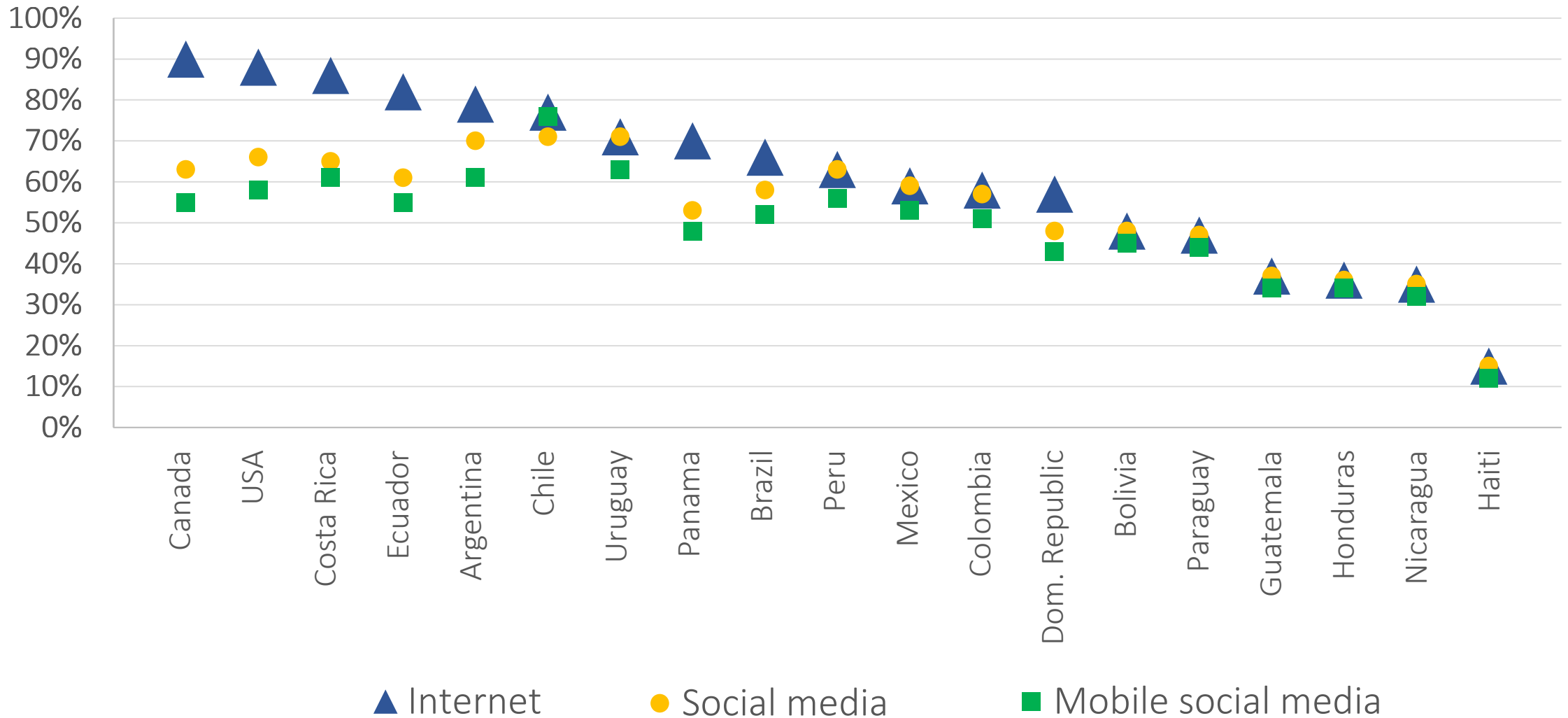


Server-less
(Secure cloud-based)

-
- Connected health information networks to enable lean health services between health providers.
 - Data does not “travel”, yet it is accessible to all the health providers connected.
 - Robust digital platforms with decision making support algorithms.
 - It enables personalized public health interventions.



Connected communities | Massive adoption of internet and social media





Point of convergence between health professionals with the person and her family

- From a passive recipient of healthcare services to an active user
- From a once-in-a-lifetime health intervention to a permanent interaction
- Strengthening of corresponsibility with an ubiquitous outreach



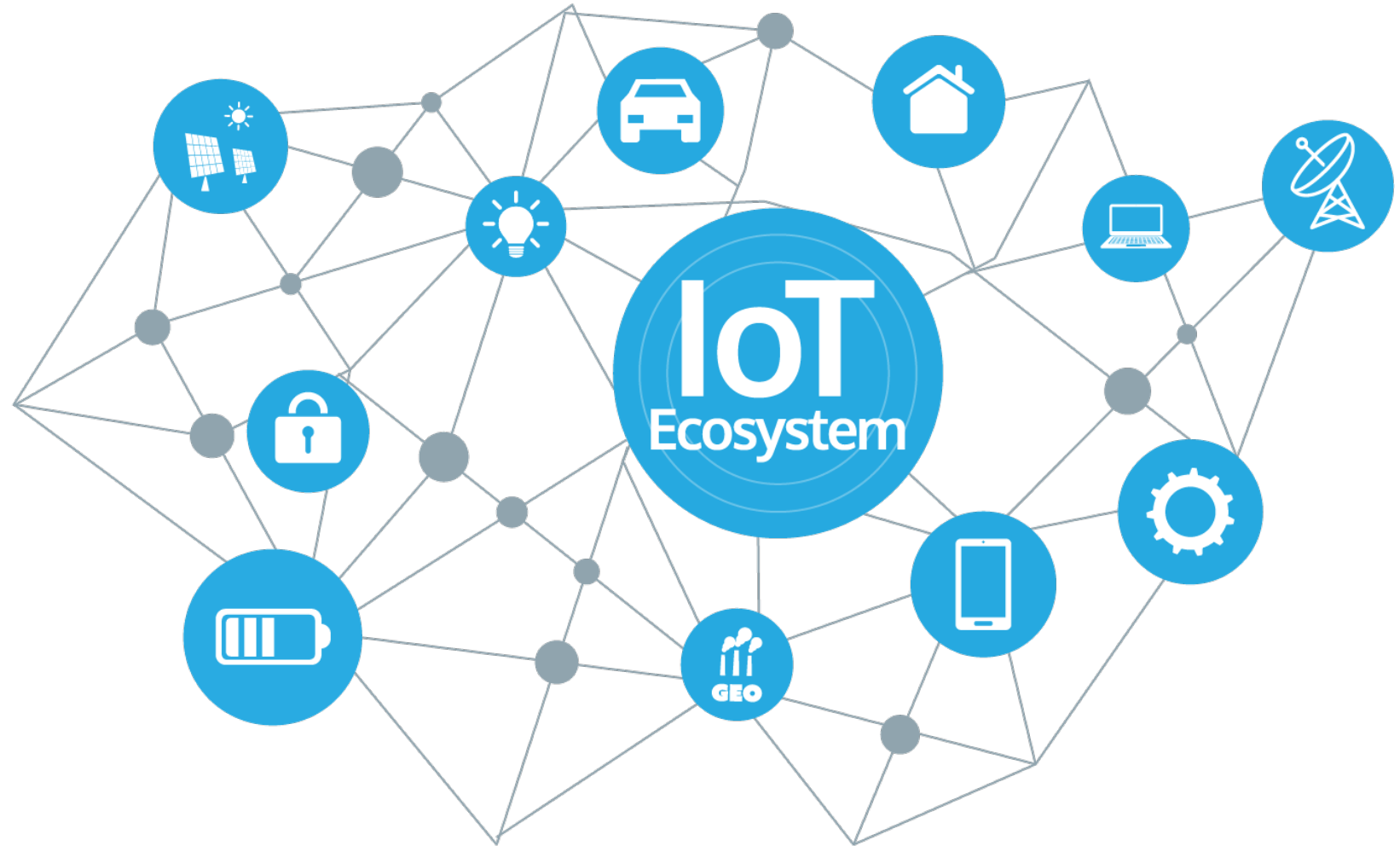


The world in the cloud | Sensors, wearables, devices and trackers

The imminent arrival of 5G

A revolution and an evolution
in the use of networks

- Massive speed (50x faster)
- Multiple devices (IoT)
- Low latency (edge computing)





The world in the cloud | Sensors, wearables, devices and trackers

26 billion¹  estimated number of sensors, devices or machines that will be interconnected worldwide

In Latin America:²

54% of private companies will increase their investment in ICT in 2019.

More than 50% of Latin America's GDP will be digitalized

380,000 billion USD to be invested between 2019 and 2022.

1. America Economia (available at <https://tecno.americaeconomia.com/articulos/como-esta-el-panorama-del-iot-en-latinoamerica>)

2. IDC Latin (available at <http://cl.idclatin.com/releases/news.aspx?id=2440>)



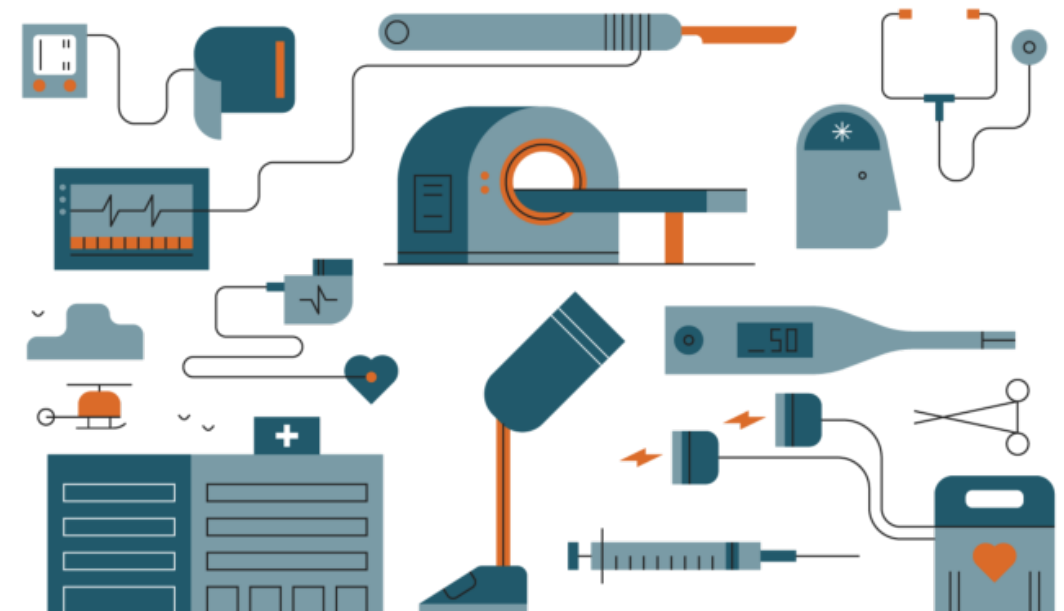
The world in the cloud | Sensors, wearables, devices and trackers

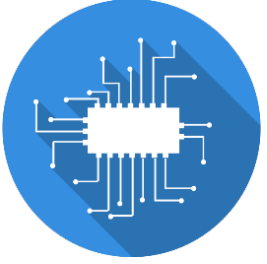
Transformation of patient care

- Remote monitoring of recently discharged patients with complications.
- Self-monitoring of risk factors at the household, work or school.
- Automatic transmission of information to expert systems to enable timely evidence-based decision making

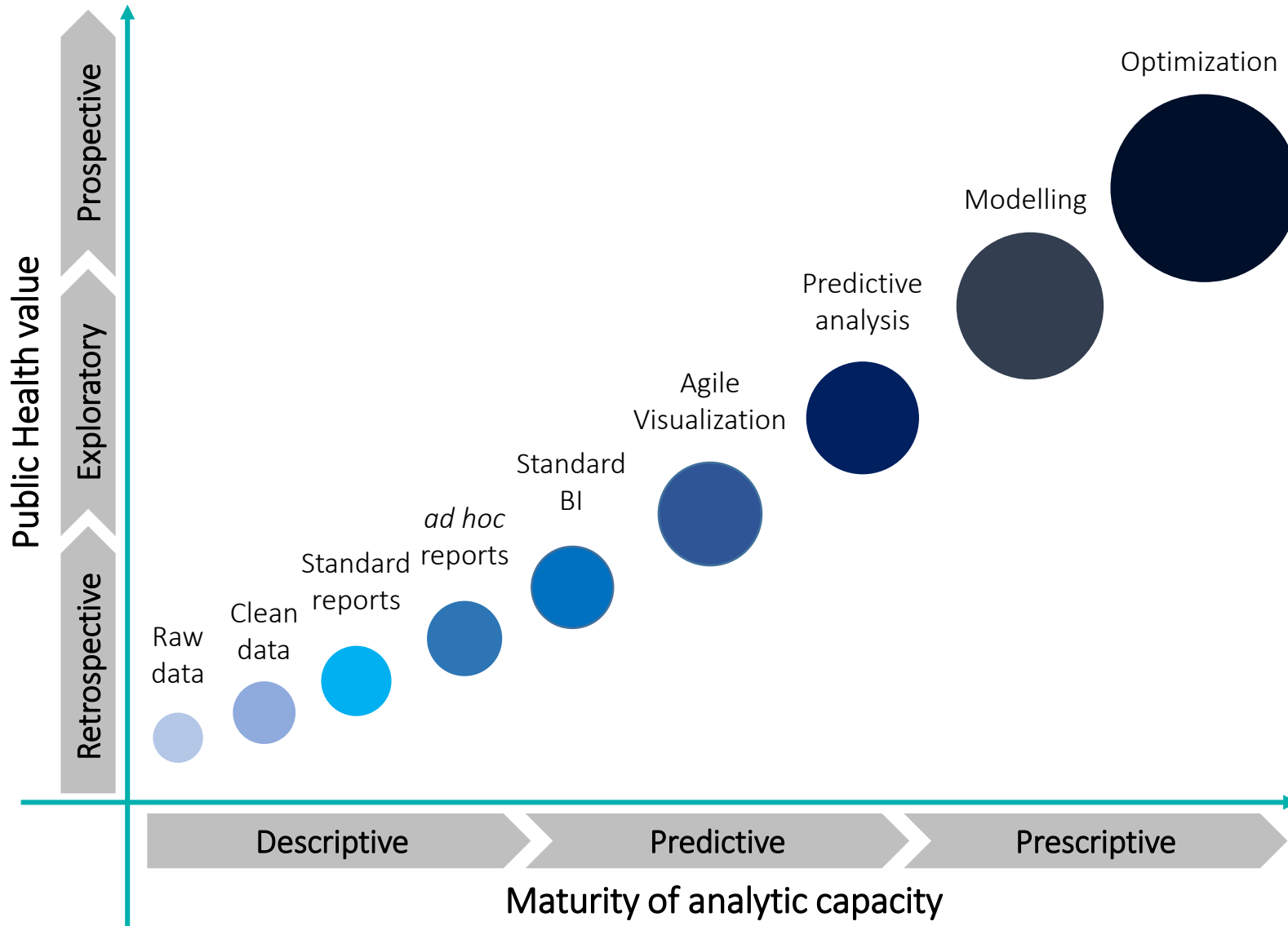
US 29 billion

Latin America's medical equipment,
device and consumable market
in 2016





Big Data | Artificial Intelligence and Data Science



Health systems strengthening

Integration of robust analytical methods with impact in the person, the patient and the health system



World Health Organization

WHO Guideline Recommendations on Digital Interventions for Health System Strengthening (<http://bit.ly/2VjnJjk>)

1.0 CLIENTS

1.1 TARGETED CLIENT COMMUNICATION	1.3 CLIENT TO CLIENT COMMUNICATION	1.6 ON-DEMAND INFORMATION SERVICES TO CLIENTS
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(s) based on health status or demographics	1.4 PERSONAL HEALTH TRACKING	1.7 CLIENT FINANCIAL TRANSACTIONS
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(s)
1.1.4 Transmit diagnostics result, or availability of result, to client(s)	1.4.2 Self monitoring of health or diagnostic data by client	1.7.2 Transmit or manage vouchers to client(s) for health services
1.2 UNTARGETED CLIENT COMMUNICATION	1.5 CITIZEN BASED REPORTING	1.7.3 Transmit or manage incentives to client(s) 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 clients	

3.0 HEALTH SYSTEM MANAGERS

3.1 HUMAN RESOURCE MANAGEMENT	3.3 PUBLIC HEALTH EVENT NOTIFICATION	3.6 EQUIPMENT AND ASSET MANAGEMENT
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 health worker(s)	3.4 CIVIL REGISTRATION AND VITAL STATISTIC	3.6.2 Track regulation and licensing of medical equipment
3.1.3 Manage certification/ registration of health worker(s)	3.4.1 Notify birth event	3.7 FACILITY MANAGEMENT
3.1.4 Record training credentials of health worker(s)	3.4.2 Register birth event	3.7.1 List health facilities and related information
3.2 SUPPLY CHAIN MANAGEMENT	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	3.5 HEALTH FINANCING	
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 health worker(s)	
	3.5.5 Transmit or manage incentives to health worker(s)	
	3.5.6 Manage budget and expenditures	

2.0 HEALTH WORKERS

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

4.0 DATA SERVICES

4.1 DATA COLLECTION, MANAGEMENT, AND USE	4.2 DATA CODING	4.3 LOCATION MAPPING
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 curate 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 or cause of mortality	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 health worker
		4.4 DATA EXCHANGE AND INTEROPERABILITY
		4.4.1 Data exchange across systems

THE LANCET

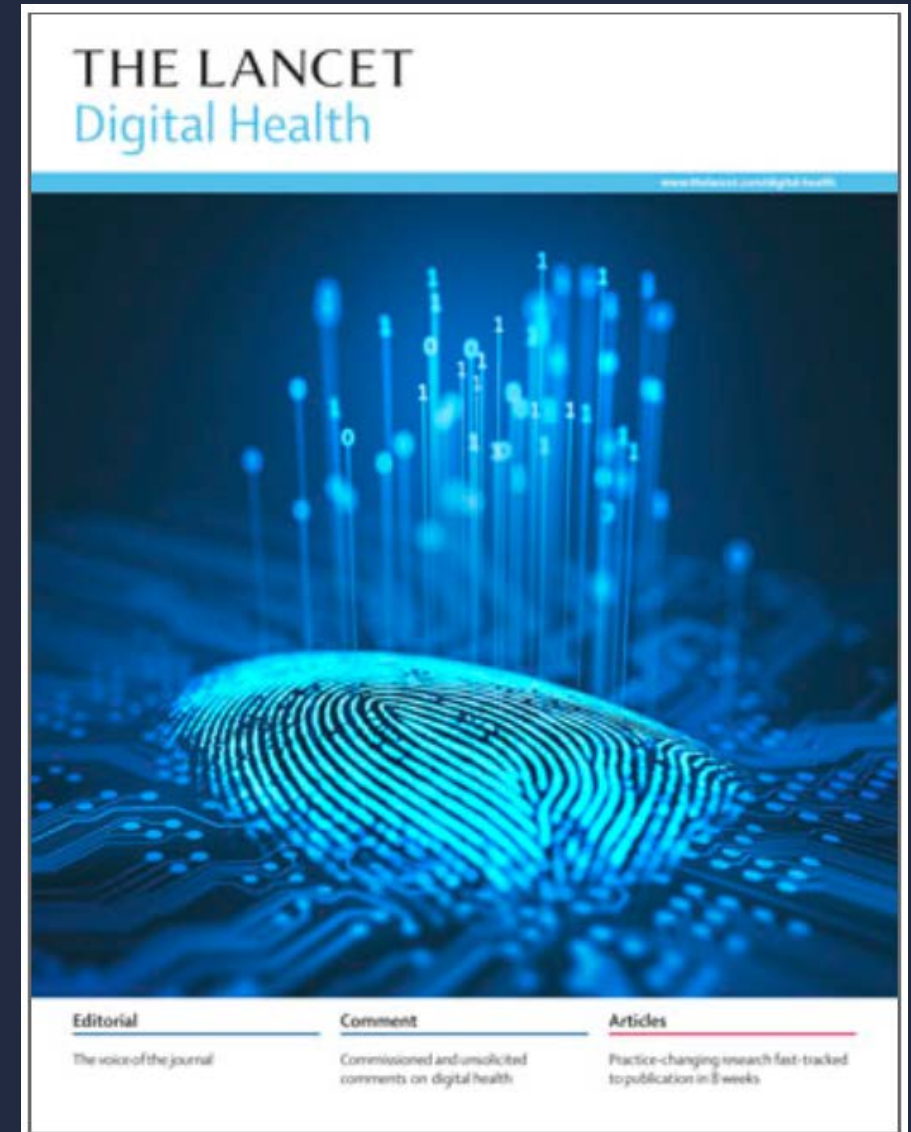
Digital Health

(<http://bit.ly/2GApEYw>)

High-quality original research, comment, and correspondence contributing to promoting digital technologies in health practice worldwide

Some of the topics will include:

- Disease diagnostics, prediction and classification
- Nanobiotechnology and biomedical sensors
- Clinical genomics
- Precision medicine
- Digital Therapeutics
- Clinical engineering
- Healthcare systems engineering
- Digital clinical trials
- Artificial intelligence and machine learning
- Biomedical analytics



Six building blocks for sustainable digital health solutions



1 **Strategy, leadership & governance**

How can digital health be managed, coordinated and measured?



2 **Policies & regulations**

How can safety, quality, and ethical requirements be met?



3 **Communication infrastructure & health platforms**

What are the foundational ICT requirements of digital health?



4 **Interoperability**

How can data be exchanged between users, devices and applications?



5 **Partnerships**

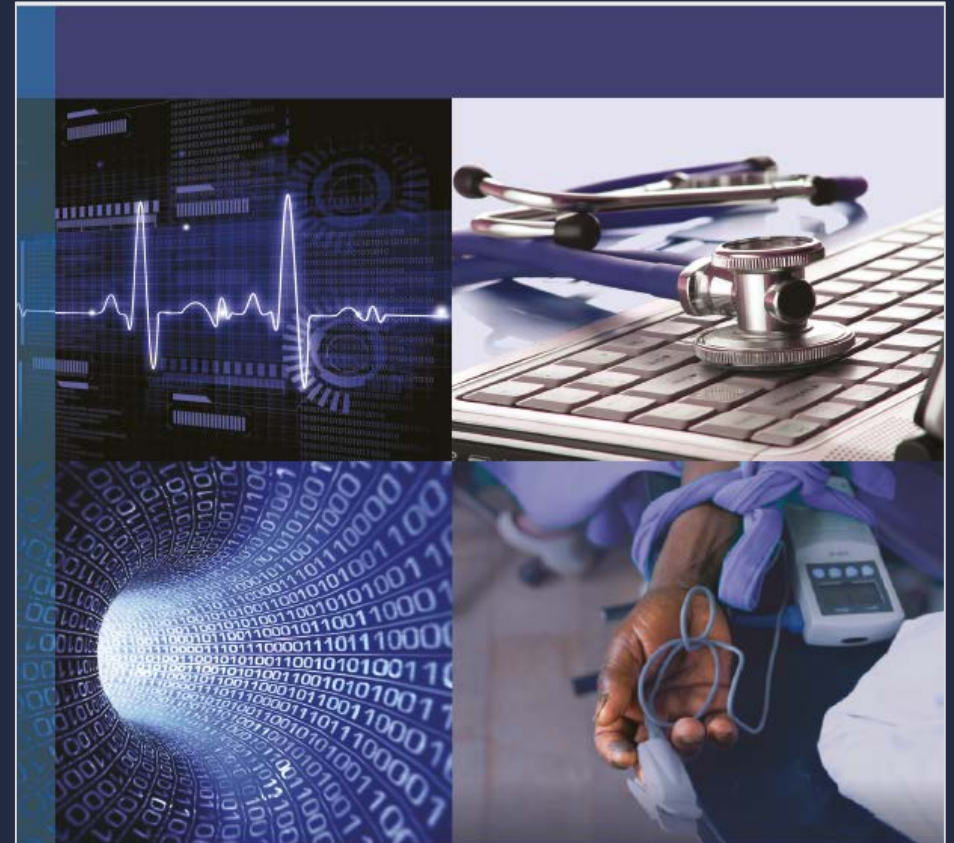
How can solutions be delivered through partnerships?



6 **Financing models**

How can solutions be sustainably financed?

(<http://bit.ly/2W1q3lQ>)



Digital Health: A Call for Government Leadership and Cooperation between ICT and Health

February 2017



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public policy interventions that rely on digital health

- Electronic Health Record
- Interoperability
- Screening for different diseases
- Community Health
- Health Promotion
- Continuous Medical Education
- Tracking of prescriptions



Digital Health catalyzes social inclusion,
enabling delivery of health services at the last mile,
at the basis of the pyramid where the most
vulnerable population resides.

Digital Health reduces the gap between scientific innovation and daily practice, enabling timely diagnosis, decision making support and the immediate application of public health interventions.

Digital Health enables patient corresponsibility, by facilitating the active participation of individuals in their healthcare management.

Therefore, Digital Health supports the reengineering of the health system, improving transparency, enabling accountability and hence securing better care.