From Telemedicine to Digital Health: How Far Do We Come From? How Far Shall We Let It Go?

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Where do we come from?
18th century semaphore tower

Telegraph, the “Victorian Internet”

TEK-1 biotelemetry devices – transmitted & receiver, Russia, 1960s

Tele- ECG device AEKS-1, 1970’s, Russia

ECG machine, W. Einthoven, 1905

ECG auto-transmission by telephone, Canada, 1976-1979

ECG Radio telemetry transmitter by Dimond et al., USA, 1961
Human evolution, healthcare and communication technology were, are and always will be closely connected.
Cave drawings, smoke signals

Egyptian hieroglyphs

Persian postal service

Chinese used paper & ink

Asia used black printing

Printing press, Gutenberg

Modern postal service

Commercial success of telephone & telegraph

Commercial success of radio

300 centuries B.C.

30th century B.C.

6th century B.C.

2nd century B.C.

2nd century A.D.

5th century

15th century

17/18th centuries

19th century

20th century

1990s

WWW

21st century

The Global Summit Telemedicine & Digital Health, São Paulo, Brazil, April 3-6, 2019
History of Internet

https://www.pinterest.com/pin/153052087314097859/
The terminology followed the development of technology

- **Telemedicine** - the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities.

- **Telehealth** - the means by which technologies and related services concerned with health and well-being are accessed by people or provided for them irrespective of their location.

- **Telecare** - the support and assistance provided at a distance using information and communication technology.

- **eHealth** - the use of modern information and communication technologies to meet the needs of citizens, patients, healthcare professionals, healthcare providers, as well as policy makers.

- **Digital health** - an on-going revolution that combines technology with personal health and genetic information to better improve the efficiency and delivery of healthcare, and make medicine more personalized and precise (www.wearabletechnologylife.com)
Universal health coverage - ensuring that all people have access to needed health services (including prevention, promotion, treatment, rehabilitation and palliation) of sufficient quality to be effective while also ensuring that the use of these services does not expose the user the financial hardship.

eHealth ecosystem - a socio-technical system composed of healthcare organizations, service provider professionals, customers, citizens, and patients, industrial companies providing their products and services, technology-mediated platforms for communication, and infrastructures that in collaboration provide value and services.

The terminology followed the development of technology
More on history …

- [https://www.isfteh.org/media/category/telemedicine_ehealth_history](https://www.isfteh.org/media/category/telemedicine_ehealth_history)
- [http://blog.evisit.com/history-telemedicine-infographic](http://blog.evisit.com/history-telemedicine-infographic)
- [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC226126/pdf/mlab00098-0087.pdf](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC226126/pdf/mlab00098-0087.pdf)
- [https://www.timetoast.com/timelines/the-history-of-telemedicine](https://www.timetoast.com/timelines/the-history-of-telemedicine)
Where are we?
Nowadays telemedicine & digital health are everywhere, influencing the entire healthcare system, providing healthcare everywhere and reaching those that are in need on land, at sea or in the air.

- VR and treatment of phobias
- Supporting wound care
- Virtual education
- Telerehabilitation of articulation disorders of children

Reaching under-served and isolated areas

Solutions for remote areas

Web and SMS-servers for safe motherhood program and in-house training of personnel

Ophthalmologic mobile clinic
Facilitating the main aspects of healthcare

- Prevention
- Treatment of diseases
- Healthy lifestyle & education

Care for elderly
Motion monitoring, nutrition notes, energy balance
Homecare medical suitcase
Early and non-invasive detection of lower limb ischemic disease
Teledentistry
The digital world as per today

**DIGITAL AROUND THE WORLD IN 2019**

**TOTAL POPULATION**

- BILLION: 7.676
- URBANISATION: 56%

**UNIQUE MOBILE USERS**

- BILLION: 5.112
- PENETRATION: 67%

**INTERNET USERS**

- BILLION: 4.388
- PENETRATION: 57%

**ACTIVE SOCIAL MEDIA USERS**

- BILLION: 3.484
- PENETRATION: 45%

**MOBILE SOCIAL MEDIA USERS**

- BILLION: 3.256
- PENETRATION: 42%

*Sources: Population, United Nations; U.S. Census Bureau; Mobile, GSMA Intelligence; Internet, Internet World Stats; World Bank; CIA World Factbook; UNESCO; Local government bodies and regulatory authorities; Eurostat; MediaTrends; World Bank; World Health Organization; World Economic Forum; OECD; UNCTAD; World Bank; ITU; World Bank; UNESCO*

*Hootsuite we are social*
Problems to address

- Ethics and legal issues
- Reimbursement, license
- Interoperability
- Technology
- ...

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How far shall we let it go?
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International Space Station

Artificial intelligence

Telemedicine monitoring & telemedicine stomatology within frameworks of the “Moon-2015” project

Nano medicine
How far can/should it still go?
- No way back!
- Constant broadening of the applications field

No limit, but OPTIMALISE is “key”, not MAXIMALISE
Optimalisation

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Distant consultation

Ultrasound patrol

Wearable

Mobile pharma

Pulse oximeter & integrated spirometer

- Affordable
- Quality-focused
- Safe
- User friendly
- Benefit the patient/citizen
- ...
Digital landscapes for health

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The diagram illustrates the evolution from present to future in digital landscapes for health, highlighting key technologies and concepts such as mHealth, eHealth, Interoperability, Medical Imaging, Big Data, and Organisational aspects. The visual representation is adapted from Nuvion.
The dangers

- Technology
  - Down
  - Over-dependence - health problems incl. Internet & mobile phone addiction; losing creativity ...
  - Problems not easy to solve – interoperability ...

- Imperfect international regulations & ethics
  - International Health Regulations are the international legal instrument that is binding on 196 countries across the globe.
  - Help to prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide

- Globalization, global and national health treats

...
A pragmatic approach to implementation

- Glocal approach
- Education & capacity building
- Need for plan B
- Focus on human aspects
- International cooperation
- …
International cooperation and coordination is the only way forward in order to make the benefits of science, information and technology, available to all.

A major international forum helps bringing experts and stakeholders together.
The Global Summit Telemedicine & Digital Health, São Paulo, Brazil, April 3–6, 2019

NGO in official relations with WHO

www.isfteh.org

Worldwide Membership
(101 countries as per March 2019)

 Exists to facilitate the international dissemination of knowledge and experience in Telemedicine and eHealth and to provide access to recognized experts in the field worldwide

Non governmental and non for profit society

Primarily an umbrella for national Telemedicine and eHealth organizations, also including associate, institutional, corporate, individual, nurse and students memberships
Communication Tools

- Website [www.isfteh.org](http://www.isfteh.org)
- Knowledge resources
- ISfTeH Newsletter (quarterly)
- Member Announcements
- ISfTeH e-Journal
Additional knowledge resources

- More info
  - [https://www.isfteh.org/media/category/reports](https://www.isfteh.org/media/category/reports)
  - [https://www.isfteh.org/media/category/knowledge_resources](https://www.isfteh.org/media/category/knowledge_resources)
  - [https://www.isfteh.org/media/category/national_ehealth_strategies](https://www.isfteh.org/media/category/national_ehealth_strategies)
  - ...
Conclusions

- Globalization and new technologies forced healthcare to enter in a period of rapid change
- As health of the population is a pillar of sustainable development, health issues should be addressed by interdisciplinary and inter-sector actions
- Innovative solutions must continue to be explored
- Are we ready to widely implement them, to work together and learned from each other?
- Yet, we must master technology and not let technology take over, always bearing in mind the well being of patients/citizens
The future depends on our activities today!
Obrigado! Thank You!