



# The irrationality of Digital Medicine: *VR, IoT and AI in Practice*

Shimo Henry Shimo  
CEO/Founder  
Medika Digital Health  
Mwanza, United Republic of Tanzania  
[henryshimo@gmail.com](mailto:henryshimo@gmail.com)

Inna Bondareva  
CEO/Founder  
TARGETTA LLC  
Moscow, Russian Federation  
[Inna.targetta@gmail.com](mailto:Inna.targetta@gmail.com)

*Abstract*— Artificial Intelligence (AI) has potential to change the tasks that are currently being done by Human being. The Internet of Things (IoT) has potential to increase Medical Device connectivity, enabling more immediate information sharing and coordination between doctors and patients. Virtual reality (VR) has potential to enhance medical training. Digital Health technologies have the power to expand coverage of healthcare (access), enhance services (quality) and reduce/optimize resources (cost). Affordability, infrastructure, and human capability limits overall impacts of Digital Health technologies and must be addressed. Therefore, capacity building through strategic alliances and partnerships remains crucial in harnessing the promises of Digital Health Technologies. This paper summaries challenges in the implementation of Digital health Solutions among African health systems and enumerate the possible ways of addressing the identified challenges.

*Keywords*— Artificial Intelligence (AI), Internet of Things (IoT), Virtual Reality (VR) Digital, Health, Remote Patient Monitoring RPM), Robotic Process Automation (RPA)

## I. INTRODUCTION

Nowhere is better positioned to benefit from the digital revolution in healthcare than Africa, where technology can help tackle the rising burden of disease and major obstacles in infrastructure and the environment [1,2].

Digital technology holds enormous potential to bridge the gaps in healthcare provision by directing limited medical resources where they are most needed [3,4].

We use the term “digital health technologies” as an umbrella concept which subsumes Artificial Intelligence (AI) or Internet of Things (IoT) or Virtual Reality (VR), among others [5].

Digital health can be defined as an improvement in the way healthcare provision is conceived and delivered by healthcare providers using information and communication technologies to monitor and improve the wellbeing and health of patients and to empower patients in the management of their health and that of their families [6].

## II. PURPOSE

The purpose of the study was to focus on the Digital healthcare technologies VR, IoT and RPM among others. Examine the challenges in the implementation of Digital health Technologies among African health systems and enumerate the possible ways of addressing the identified challenges [4].

## III. METHODOLOGY

This study employs an interdisciplinary methodology based on a comprehensive (but non-systematic) literature review and analysis of existing scientific articles, white papers, recent guidelines and

regulations, governance proposals, Digital Health studies, and online publications [7].

#### IV. IMPACT OF DIGITAL HEALTH TECHNOLOGIES

##### A. Artificial Intelligence (AI)

Artificial intelligence (AI) is a modern approach based on computer science that develops programs and algorithms to make devices intelligent and efficient for performing tasks that usually require skilled human intelligence [8]. The use of artificial intelligence in healthcare has the potential to assist healthcare providers in many aspects [9].

AI extends robotic process automation (RPA) in storage and dispensing of drugs in hospital pharmacy [10]. One of the many benefits of the RPA is the speed at which it can process prescription requests while minimizing errors and reduce Pharmacist's workload to make them focus more on patient care [11,12].

The applications of AI in the clinical setting are enormous and ranges from the automation of diagnostic processes to therapeutic decision making and clinical research.

AI plays a major role in tasks such as automating image analysis (e.g., radiology, ophthalmology, dermatology, and pathology) and signal processing (e.g., electrocardiogram) [13,14,15,16].

##### B. Internet of Things (IoT)

Internet of Things connects living and non-living through internet. The IoT provides a seamless platform to facilitate interactions between humans and a variety of physical and virtual things [17,18].

IoT facilitated Remote Patient Monitoring (RPM) system has enormous benefits to streamlining and enhancing health care delivery to proactively predict health issues and diagnose, treat, and monitor patients both in and out of the hospital [19].

Patients with hypertension, heart failure, and atrial fibrillation have experienced significant benefits from remote monitoring. Remote monitoring of blood pressure, weight, and symptoms, along with home ECG recording has been found to be superior to usual in-clinic follow up [20].

##### C. Virtual Reality (VR)

VR is based on creating a computer representation of objects, spaces, and events. It is, therefore, a

simulation of real situations, a high-quality user interface with real-time simulation and interaction through multiple sensory channels [21]

VR can be used in immersive learning, medical students can experience a surgical room through a 360 degree video, VR also be used in surgical skill training. In Virtual Consultation VR can help medical doctors to improve their social skills [22,23].

VR has also been used in the area of psychotherapy in the treatment of certain phobia, the same idea has also been applied to treatment for post traumatic stress disorder [24].

#### V. CHALLENGE AND PERSPECTIVE

With the lowest worldwide healthcare spending's, doctors shortages, dominance of rural areas, and poor infrastructure, African countries take advantage of digitalization to ensure universal access to medical services [25,26].

The Covid 19 pandemic seems to have given an important push towards the integration of Digital Technologies in practice however, the readiness to adopt is lower [27]. Affordability, infrastructure, and human capability limits overall impacts of Digital Health technologies and must be addressed [28, 29,30].

#### VI. DISCUSSION

*Medika* a digital health Startup established in May 2022 to help healthcare companies leverage digital health technologies and be the leader in the industry. Our approach, focused effort, and bold action to these challenges can drive systemic change that will improve adoption to Digital health technologies.

Firstly, we are creating awareness through evidence-based approach, Demos and publications. Capacity-building is needed for local support team to understand, maintain, and fully utilize digital health systems. We have Online training sessions in co-operation with *Targetta-Moscow* and *Pacific Medical University, Vladivostock*.

Lastly, we are encouraging strategic alliance, partnerships, and investments through which Digital health technologies company, Mobile Operators, learning institutions, Hospitals, IT & Telecommunication companies, Insurance, Banking & Finance, Professional associations, medical supply

company and government can work together to create more value [31,32]

## VII. CONCLUSION

This review highlights the key potential of Digital Health technologies, key challenges inherent in implementation and the approach that can drive positive change and improve adoption to Digital Health technologies.

However, these technologies come with its own challenges. For instance, explainability/interpretability, ethical and privacy challenges are seen in AI, thus further work to improve the interpretability will be essential for the adoption and safety [33,34].

Moreover, Digital health governance and evaluation measures should be put in place to make sure these technologies adhere to ethical standard, protect patient data and lead to better patient outcome [35].

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