A proportional interoperability framework as an appropriate growth strategy for eHealth in sub-Saharan Africa

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Introduction

The analysis of selected eHealth platforms implemented across the globe undertaken in the context of the ISAES study showed that there does not and cannot exist a generic blueprint meeting the eHealth interoperability needs of all possible application contexts. This applies all the more to sub-Saharan Africa (SSA). Core reasons are cultural differences across countries and regions, divergent health policy priorities, and concrete needs and constraints in a given context. Furthermore, successful implementations depend to a large extend on personal interactions and mutual trust, and henceforth local ownership. Trust can be gained by building on integrative, successful (eHealth) initiatives – which are often absent or only rudimentary in the African context – on any level, while local ownership can only emerge from adopting proven cooperative solutions meeting priority needs of the local community. Such an approach stimulates bottom-up thinking, which may generate heterogeneous, non-interoperable islands of operations. The standard answer to that seems to be top-down interoperability guidance by a central authority. This, however, is a fallacy: heterogeneity is a feature, not a bug that is to be overcome by a one-size-fits-all paradigm. The issue at stake is how to deal with heterogeneous interoperability. We propose a value-driven, hybrid approach with intense user involvement, that incrementally improves interoperability proportionally to what can be gained in terms of improved health services for citizens in SSA [1].

Previous studies provide some insights into the critical success factors for eH-IOp in SSA [2]-[5]. These include (i) responding to basic health system priorities, (ii) acknowledging the continent's rich diversity by addressing variety in urgent local or district needs, (iii) respecting the resource situation and absorption capacity of both medical and technical staff, (iv) implementing an appropriate governance and regulatory framework, and – most of all – (v) assuring local ownership by involving all key stakeholder

groups intensively and from the start. Organizing and promoting this productive cooperation between organizations and between people is especially critical for SSA innovation projects because these typically combine different sectors: besides the government and business, they involve not-for-profit organizations and thus combine public, commercial, and social logic [3].

Our concept of interoperability is that of an operational model of cooperation between at least two organisations; it only takes into account the necessary but sufficient conditions from 6 enabling dimensions, which we identified as social and political, regulatory, organisational, technical, semantic, and financial (see Fig. 1). The minimal demand for eH-IOp, requires (i) one mutually beneficial and agreed common use case, and (ii) its sufficient coverage by the necessary factors of the enabling dimensions.

Interoperability is only a means, and must not be confused with the goal it serves: improved health services and better health outcomes for citizens in SSA. These objectives can be pursued at international, national, district and local level, all with their own eH-IOp requirements, but nevertheless loosely coupled. We propose to facilitate this inter-level interoperability [7] by stimulating bottom-up strategic decision-making where possible, e.g., stakeholder-driven decision on appropriate improvements, and complement it with top-down architectural guidance where necessary, i.e., dimensional constraints that are tailored to the context of need. We will first discuss the specifics of (e)Health in SSA, followed by issues of its adoption, before discussing key principles for the eH-IOp framework.

(e)Health challenges and constraints in the SSA context

Particularly in resource restricted environments, the focus of initial applications must be on supporting well defined core health system

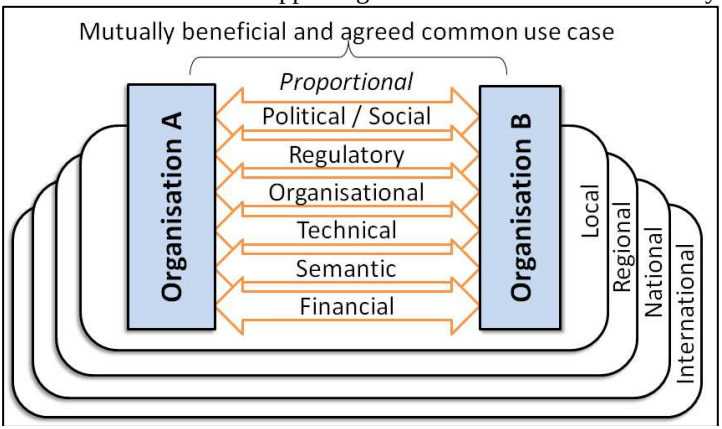

Figure 1 Enabling dimensions for eH-IOp and their levels of application

priorities, where relatively straightforward solutions will deliver early benefits to both professionals and patients. A corollary is that the scope must be commensurate to the given resource situation. Global evidence suggests that the more successful platforms can be found at the district (or small country) level, but sometimes linked to and taking advantage of cooperation at the national level. It must be sustainable within the phase of development (healthcare system, overall country) at hand. And it needs to be acknowledged that across SSA a wide variety of divergent factors impact on the respective national or district health policy priorities, concrete needs, and specific challenges to be considered, like available ICT infrastructures and eSkills, connectivity, reliable electricity supplies etc. Open source software should be considered, and systems should provide for replication technology that allows temporarily operation without network connectivity.

Issues towards adoption of eHealth in SSA

Despite the great benefits of eHealth that drive the innovation and implementation of health care in SSA [9]-[11], there are many barriers as well that hinder the adoption. Several of those barriers are related to interoperability on all six enabling dimensions. The *social and political* diversity of this vast continent, e.g., heterogeneity of the market, does not make it easy to scale-up, spread or replicate eHealth solutions that respond to local needs. To quote Prahalad, “firms will be better off if they exploit the differences between countries rather than utilizing a more homogenous strategy” [4]. Differences in culture, language, level of development, infrastructure can all be causes that block cooperation and adoption. National longer-term health system policies are lacking or ineffective, and there is often a lack of priority from political leaders as there are many urgent topics, and short term solutions are preferred. As a result, many eHealth solutions lack African ownership as few are developed in SSA itself, and many are imposed and implemented by overseas companies or NGO’s. Often there is a lack of *regulation* that could help in focusing efforts in eHealth. eHealth should fit into an organizational structure with sufficient skills and resources that is often lacking at the local or district level. On the *technical* dimension the lack of reliable infrastructure is hindering eHealth. The lack of required skills to work with and maintain eHealth solutions, an incomplete or invalid problem view and condescending assumptions are known barriers. Industry standards and technological solutions are developed by and for the “industrial countries”, and do not take into account the specifics of SSA, where, e.g., the current pressing issue in *semantic* interoperability is mainly about the many different languages. The *financial and economic* dimension is often a

problem as eHealth demands an up-front investment to get a social profit in the long term that is not easy to monetize. Forgetting cost of ownership or user's economic benefits, or an absent sustainability model are mentioned as root causes for failures [6]. Disposable income of patients is generally low and health insurances are scarce. This further challenges a (semi-) commercial driven approach.

Towards a flexible and demand-driven eH-IOp framework

The guiding principles of our framework inherently address these issues by combining an enabling structure for achieving interoperability with the notion of a flexible contextualisation for consolidating user needs. Rather than imposing interoperability through top-down rigidity, it allows for selection-based guidance that is directly tied to improve health services for citizens in SSA. Inspired by the EIF eHealth framework [8], we propose (a) the notion of partitioned principles of good administration of eHealth in the context of SSA, (b) service domains or use cases to reflect user demand, and (c) discerning various levels of interoperability in order to classify issues. The *principles* are selected from topics at all levels, e.g., technical about information exchange and distribution (openness, security, reuse, etc.), or organisational about provisioning mechanisms (access, process), and alike. The *service domains* should initially reflect the most relevant application domains of eHealth, including all necessary stakeholders. The *interoperability levels* express concerns with respect to organisational, semantic, technical, etc. interoperability in support of the use cases and are shaped by the guiding principles. This creates a toolbox of clustered concerns: profiles that resolve SSA-specific impediments to eHealth by addressing related issues from various dimensions in a coherent context. An example can be found in the guiding principle of stakeholder centricity. Based on available use cases in SSA, this may transform into medical professional centricity, as opposed to, e.g., patient centricity in Europe. This translates into a focus on multi-channel delivery to the professional, or integrated decision support. It goes without saying that profiles can be extended to respond to future impediments of eH-IOp.

Discussion and conclusion

The social embedding of the proposed framework should come from human agents as linking pin between the society and platform operation. This implies educational material, not only about its technical operation, but on all aspects of interoperability. It further implies addressing stakeholders on *all* levels, with appropriate arguments, to take ownership on this aspect. This might turn out to be quite difficult to achieve.

In SSA, eHealth interoperability is important, but not at all costs. Our approach provides for a framework that, when weighing contradicting needs, allows one to take a pragmatic, hybrid or even non-interoperable approach for one or more dimensions, as long as a sustainable, effective improvement of health services for citizens in SSA can be achieved.

Acknowledgment

This work has been carried out with support of the Satellite-enhanced Telemedicine and eHealth for sub-Saharan Africa Programme (eHSA), implemented by ESA and funded by the EU-Africa Infrastructure Trust Fund and the Luxembourg Agency for Development Cooperation.

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