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Cloud computing, capabilities and intercultural ethics: Implications for Africa

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ABSTRACT

This paper evaluates the potential benefits, drawbacks and ethical risks of cloud computing for African countries in the context of information communication technologies for development (ICT4D). The paper argues that the capability approach, incorporating development ethics, provides a useful framework for considering the ethics of cloud computing in Africa. Coupled with global and intercultural ethics perspectives, both provide a rich human-centred view of the technology's benefits, drawbacks and ethical risks. Focussing on the transformational benefits and features of cloud computing for small and medium enterprises (SMEs) and the health sector, the paper highlights potential ethical risks that are cause for concern. The paper concludes that while cloud computing has considerable potential for advancing development through the enhancement of capabilities, there remain huge challenges in its efficient, effective and ethical use. As a result, ethical risks related to equity, ownership, dependency, privacy, trust and security that reflect 'unfreedoms' and 'capability deprivations' may consequently have an impact on the technology's potential as an information communication technology for development.

1. Introduction

Cloud computing has transformed information and communication technologies (ICT) capabilities through new forms of hosting and delivering ICT services over the Internet. It presents African countries with the opportunity of leapfrogging infrastructural and provisioning problems by eliminating the costs of expensive hardware, enabling them to take advantage of hardware, software, data and platform services provided by service providers who own the technological infrastructure. Advancements in cloud computing offer cost-effective opportunities for handling data that enhances critical areas such as economic productivity, employment, natural disaster and resource management and public service delivery. However, socio-technical transitioning is often difficult to achieve due to various financial, political, economic, social and infrastructural factors.

Despite huge expenditure and investment in ICT in many African nations, financing and affordability remain a barrier to accessing the full benefits of cloud computing. More investment is required to finance the technological enablers and broader infrastructural capacities needed. Widely acknowledged capacity challenges include technological infrastructural issues (Estache, 2006; Foster & Briceño-Garmendia, 2010; Kizza, 2009; Williams, Mayer, & Minges, 2011), which are exacerbated by limited broadband availability, computational capacities of mobile devices and power supplies (ITU, 2012a,b; ITU, 2015; Nkosi & Mekuria, 2010; UNCTAD, 2013a,b).

Other key challenges relate to the wider social and political contexts in which ICTs are introduced (Alzouma, 2005). Social

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challenges include illiteracy, lack of content and inequalities. The global political economy of ICTs has been characterised by processes of 'digital colonisation', involving ICT production and use initially in the global north, with culturally and economically hegemonic ideas being later 'exported' to African countries. Digital colonisation implies a dominant culture enforcing power and influence over minority cultures, and also takes the form of data sovereignty and disregard for digital data ownership and privacy.

Health and business represent two interesting areas in which cloud computing can bring considerable benefits, and this has been discussed in the literature (for example see Greengard, 2010; Senanu, Ikhu-Omoregbe, & Ayo Charles, 2010). Greengard (2010) points out that cloud computing offers the potential for small and large business entrepreneurs in developing countries to overcome barriers occurring as a result of infrastructure difficulties. Kshetri, (2010) argues that e-commerce and e-business are some of the major application areas of cloud computing in developing countries including Africa. With regards to the health sector, Nkosi and Mekuria (2010) argue that cloud computing can be useful in the provision of health monitoring. They argue that the technology can overcome problems associated with mobile health monitoring systems that, although being considered for use in health monitoring, fall short of computational and algorithm capacity. Therefore, cloud computing, they argue, can promote health service delivery to marginalised rural communities (p.633). Applied as an e-health solution, cloud computing overcomes challenges of data storage, difficulties in hospital-to-hospital collaboration, insecure information exchange and lack of accountability (Senanu et al., 2010). Cloud computing delivers a single application through the browser to thousands of clients or stakeholders using scalable multitenant architecture that helps minimize cost, manage healthcare resources effectively. Greengard (2010) argues that cloud computing also has the potential to level the playing field for businesses in developing countries by breaking down the barriers of entry, providing opportunities for creating new businesses and new business models as well as opening up new markets. Yet questions remain over potential value conflicts and the appropriateness of traditional notions of ethics for the new complexities that new ICT paradigms present in the health and business sectors. (Reidl, Wagner, & Rauhala, n.d.; Stahl, Eden, Jirotka, & Coeckelbergh, 2014).

The use of ICT to achieve health outcomes was reflected in the Millennium Development Goals (MDGs) on healthcare (p.1)) and remains a prominent feature of the Sustainable Development Goals (SDGs). Task 18 of the MDGs stipulates that 'In cooperation with the private sector, make available the benefits of new technologies, especially information and communications'. ICTs are also a powerful catalyst for realising SDG 3's aim to ensure healthy lives and wellbeing. While Cloud Computing can make important contributions to development (Buyya, Yeo, & Venugopal, 2008), it also presents unique capability and ethical challenges.

We argue that the ethical dimensions of cloud computing in Africa have been overlooked (Dahiru, Bass, & Allison, 2014) and governance systems remain weak (ITU, 2012a,b). This paper therefore aims to explore the potential benefits, drawbacks and ethical risks of cloud computing from a capability and intercultural ethics perspective. Security risks, cybercrime and espionage are some of the risks that have been noted (Kshetri, 2010). Cloud computing poses potential ethical risks and drawbacks associated with privacy and data security. It raises many concerns including security, management and control, disaster recovery and business continuity, supplier management, regulations and legislations, and the lack of standards and guidelines (Carroll, Van Der Merwe, & Kotze, 2011). Internationally, the legal implications of cloud computing have been highlighted (Székely, Dániel Szabó, & Vissy, 2011). Privacy, trust and security concerns have been discussed elsewhere in the literature (Habib, Hauke, Ries, & Mühlhäuser, 2012; Huang & Nicol, 2013; Marinos & Briscoe, 2009). There has been less attention, however, paid to these ethical dimensions and issues in the African context. The topic of information ethics in an African context represents a significant knowledge gap (Capurro, 2007b). Specifically, ethics in relation to ICTs for development is still under-researched (Mthoko & Pade-Khene, 2013). Consequently, this paper considers the possible benefits, drawbacks and ethical risks of cloud computing for Africa as a potential technology for development.

The paper starts by discussing cloud computing in Africa, introducing the capability approach and highlighting its concern with development ethics. Intercultural ethics perspectives are then presented, and the methodology applied to the analysis is explained. The following section discusses the potential benefits of cloud computing followed by an assessment of the possible drawbacks of the technology. The implications of the ethical assessment for Africa are then set out, followed by the key conclusions.

2. Cloud computing and the African context

Historically, Africa has been beset with economic, technological and infrastructural challenges. Expenditure on science and technology during periods under structural adjustment programmes continued to be low (Enos, 2003), with little efforts directed towards technological learning (Wangwe & Semboja, 2003). The adoption of cloud computing as an IT strategy in Africa is relatively new, and there is still the need to establish political and regulatory frameworks and appropriate training programmes as cloud computing is more popularised (ITU, 2012a,b). Unlike in the global North, SMEs in Africa have been less concerned with challenges like security, privacy and data loss while showing great optimism for the opportunities cloud computing presents them (Dahiru et al., 2014). Conversely, health delivery organisations have been more reticent in using cloud computing technology in part due to their stringent confidentiality and security requirements (Samuel, Omisore, Ojokoh, & Atajeromavwo, 2013).

Cloud computing may be regarded as 'a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (for example networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction' (Mell & Grance, 2011, p. 2). In very general terms, it embodies hardware and software infrastructure that allows users with minimal software and hardware to store, retrieve and process data and information easily and efficiently to meet their technological needs (Dikaiakos, Katsaros, Mehra, Pallis, & Vakali, 2009). In the African context, technology enablers for cloud computing that include the development of parallel programming paradigms and open source software, cloud access to high performance computing, Green IT, investment in low-cost access-cum-computing devices and hi-speed networks are in their infancy or non-existent (Dwivedi & Mustafee, 2010).

In a number of African countries there are evident cloud computing projects underway largely as a result of partnerships between

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