
This is an electronic reprint of the original article.
This reprint may differ from the original in pagination and typographic detail.

Fröhlich, Karin; Nieminen, Marko; Peters, Anicia; Pinomaa, Antti

Considerations for Co-Designing e-Government Services in Under-Served Rural Communities

Published in:

Proceedings of the 2nd African Conference for Human Computer Interaction

DOI:

[10.1145/3283458.3283476](https://doi.org/10.1145/3283458.3283476)

Published: 03/12/2018

Document Version

Peer-reviewed accepted author manuscript, also known as Final accepted manuscript or Post-print

Please cite the original version:

Fröhlich, K., Nieminen, M., Peters, A., & Pinomaa, A. (2018). Considerations for Co-Designing e-Government Services in Under-Served Rural Communities. In I. van Zyl, D. Singh Jat, H. Winschiers-Theophilus, N. Goagoses, R. Orji, E. G. Belay, & A. Peters (Eds.), *Proceedings of the 2nd African Conference for Human Computer Interaction: Thriving Communities, AfriCHI 2018* (pp. 204-207). Article 3283476 ACM. <https://doi.org/10.1145/3283458.3283476>

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

Considerations for Co-Designing e-Government Services in Under-Served Rural Communities

Karin Fröhlich¹
Computer Science
Namibia University of Science and
Technology
Namibia
nangula2013@gmail.com

Marko Nieminen²
Computer Science
Aalto University
Finland
marko.nieminen@aalto.fi

Anicia Peters³
Computer Science
Namibia University of Science and
Technology
Namibia
apeters@nust.na

Antti Pinomaa⁴
Lab. Power Systems and Electricity Market
Lappeenranta University of Technology
Finland
antti.pinomaa@lut.fi

ABSTRACT

Electronic government (e-Government) is expected to play a critical role of enabling the attainment of best practices of governance. Despite various efforts to implement e-Government, its use by the populace remains low. There are claims that e-government promotes social exclusion of those in under-served rural communities on technical, language, costs and culture grounds. As such, this study assumes a co-designing and co-creation approach in an attempt to incorporate different contextual factors resulting from cultural surroundings, capacities and skills among rural population. The aim is to promote electronic participation by rural based citizens and attain social inclusivity. Users based in under-served rural communities shall be engaged in identifying characteristics of e-Government and issues with rural ICT. The study makes use of solar powered technology (mobile phone and internet access) provided by the “Fusion Grid” project. Selected e-Government services are used to experiment the process of co-designing and co-creation of e-Government.

CCS CONCEPTS

• Insert CCS text here • Insert CCS text here • Insert CCS text here

KEYWORDS

Co-design, co-creation, e-government, rural connectivity

ACM Reference format:

Karin Fröhlich et al. 2018. Considerations for Co-Designing e-Government Services in Under-Served Communities. In *Proceedings of ACM AfriCHI conference (AfriCHI'18)*. ACM, Windhoek, Namibia, 2 pages. <https://doi.org/10.1145/1234567890>

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).
ACM AfriCHI conference, December 2018, Windhoek, Namibia
© 2018 Copyright held by the owner/author(s).
<https://doi.org/https://doi.org/10.1145/1234567890>

1 INTRODUCTION

Electronic government (e-Government) is expected to play a critical role of enabling the attainment of principles for effective governance and the sustainable developmental goals [2, 22]. The United Nations 2030 Agenda identifies effectiveness, inclusion and accountability as three key principles for effective governance [22]. These propositions paint a gloomy picture on impoverished Sub-Saharan Africa’s ability to attain principles for effective governance and sustainable developmental goals due to poor e-Government. Ifinedo [3] noted institutional, human capital and infrastructural problems as some of the key concerns impeding Sub-Saharan Africa’s e-Government initiatives. Ochara and Mawela [11] observed social exclusion from e-Government services of citizens who access the Internet via mobile phones.

In the light of challenges presented above, there are suggestions that Sub-Sahara African countries need to device affordable and less technical ICTs that can be implemented in rural areas [7]. It is important that such solutions are co-created - designed, implemented and introduced - considering the cultural surroundings, capacities and skills among rural population [3, 5]. This paper uses Namibian rural areas as its case study for a co-created-designed e-Government solution. A readiness assessment report shows Namibia is rated 2.2 out of 4 in terms of e-Government service availability [14]. Even though the majority of Namibians reside in rural areas, these areas remain underserved in terms of access to Information and Communication Technologies (ICTs) [6]. Interestingly, access to e-Government services is skewed towards Namibian urban environments. From a business point of view, ICT investments in rural areas are not considered economically viable due to the dominance of a low-income population and high cost of infrastructure deployed [6].

This poster attempts to provide framing for the design of e-Government services in under-served rural areas. In these surroundings, challenges relate to lack of infrastructure including electricity and connectivity. The research question for this poster is: “What to consider in a co-design project for e-government

infrastructure and services for rural areas”? The practical aim in our study is to prepare for future development of such services in Namibia.

2 FUSION GRID PROJECT & E-GOVERNMENT SERVICES

The social exclusion of citizens from e-Government initiatives in Africa is mainly due to the adoption of Western e-Government models that are based on established ICT infrastructure and advanced societies that are comfortable with the English language [12]. This suggests that e-Government initiatives should look beyond the technical platforms of use e.g. websites. The following issues have to be looked at holistically:

- ICT supporting infrastructure: electricity, connectivity, network access;
- Societal matters: culture, skills availability and
- Technology in use: social media, access or ownership of mobile phones and computers [5, 11,12].

To approach the e-Government services for citizens in under-served rural communities in a more holistic manner, a concept integrating the underlying infrastructural issues has been outlined in the recently started Fusion Grid project. The general challenges in rural access to information, electricity, and connectivity have provided introductory background for the Fusion Grid concept about the identified needs [21]. However, the appearance of the needs in the real surroundings in the everyday-life-settings is not revealed in the overall policy frameworks. To clarify, understand, and formulate the possible socio-material solutions, collaborative design approaches with the members of the communities are needed.

The Fusion Grid project has initial provisions for ICT supporting infrastructure with solar powered technology. These technologies aim at being less complex, simply plug and play that suits rural communities that are characterized by less skilled individuals [2, 3, 7, 16]. Fusion Grid provides a solar powered base station that delivers mobile network connectivity to the surrounding community. Accordingly, Fusion Grid proposes a platform supporting e-Government services focusing on e-learning and e-health.

Despite the highly technological characteristic of the initial Fusion Grid application, it needs to be considered as a probe or a prototype [18] for further elaboration with the end-users, the members of the community. The use of probes and tangible boundary objects support the exploration of the characteristics of future solutions in a broad user-developer population.

3 E-GOVERNMENT FOR RURAL NAMIBIA

The organisation and operations of government can be traced back to public sector reform theories such as the New Public Management (NPM), joint-up government, public value [4] and the recent open government perspective. For instance, NPM is credited for the structural adjustment programmes (SAPs) that aimed at cost cutting and improving the efficiency of public

sector. Along those lines, ICTs are seen as strategic tools for facilitating reforms in the public sector [12]. Namibia’s 5th National Development Plan (NDP5), a policy framework document that guide governmental activities for the period: 2017 to 2022, explains the country’s four key developmental pillars namely economic progression, social transformation, environmental sustainability and good governance [13]. These developmental pillars seek to meet different but inclusive goals, for instance, the economic progression aims to achieve inclusivity, sustainability and equitable growth of the Namibian society. Namibia’s e-Government is expected to play an enabling role for these key pillars to be achieved. The e-Government Strategic Action Plan aims to see Namibia become “a Leading Networked Government, providing Client-centered, Transparent, Affordable and Efficient Services to All” [13].

Studies show that e-Government services can take advantage of numerous ICTs. Ochara and Mawela [11] researched the use of mobile phones for accessing e-Government services. Given that there are many Namibian citizens with social media accounts and mobile phones, these technologies offer alternative platforms to offer e-Government solutions [5, 19]. While Namibia made efforts to update its e-Government policy, the actual implementation seems to be lagging behind something that has already been noted with reference to other Sub-Saharan African countries. Tomlinson and Rabina [20] states that: “e-Government in Namibia presents a mixed picture. On the one hand, a well-designed national policy is in place, with leadership at a high level through the Office of the Prime Minister. The availability of computers and, especially, of mobile phones is growing. On the other hand, weaknesses in implementation seem to be holding back effectiveness e-Government, with unevenness across websites serving the public”.

4 RURAL NAMIBIA

Namibia is located on the South-West of Africa and has a population of just above two million citizens that spans across 824 265 square kilometres. This population is split into more than eleven ethnic groups with unique native languages. However, English is the official language even though there are other two Indo-European languages. Furthermore, Namibia is classified as an upper-middle income country despite the presence of a huge gap between the rich and poor [9, 17]. With a population of approximately 60% of the population residing in rural areas [9, 17], Namibia portrays a population that is mainly rural based. The elderly and toddlers are the main inhabitants in rural homes for the most part of the year as young adults are working or schooling in the urban areas, but they always migrate to their rural homes on a regular basis [23]. For instance, children often migrate to different locations for their education, but they always return to their rural homes during the school holiday [23]. Similarly, the young adult who migrate to urban areas looking for employment also frequent their rural homes and participate in farming and harvesting. In addition, the young adult continuously make investments in their rural homes that eventually become their retirement homes [23].

The Namibian government has started various e-Government initiatives and promoted the growth of ICTs use since gaining independence from South Africa's apartheid rule in 1990. For example, the National ICT Policy for Education that was introduced in 1999 promoted the use of ICTs in education including those in rural areas. This policy was adjusted in 2005 and along the way, a National ICT Policy Implementation Plan was introduced before 2006. Olwal et al. [15] went on to note an overarching ICT Policy that was introduced in 2009 with the aims of guiding ICT initiatives towards an information society, in line with Namibia's vision 2030. These policies and guidelines aimed at promoting the use of ICTs and opening ICT investment opportunities to the private sector. These policy frameworks saw an increase in internet penetration from two to five citizens with internet access in 2007 per hundred to 30.8% of the total population by December 2017 [1]. The majority (87.3%) of Namibians who have Internet access makes use of their mobile phones [19]. Namibia is experiencing a high adoption of mobile phone by the populace as 119% own a mobile device according to MTC. Namibia Statistics Agency [10] went on to show that mobile phone penetration is also high in rural areas where 74.9% own a mobile phone. In 2013, of those who own a mobile phone, 31% owned a smart phone that allowed them to access the internet [19]. In the case of the rural population, the majority (31.1%) of the population's source of livelihood is farming a seasonal activity that may not be adequate to finance high costs of Internet access. Another 17% of the rural populations rely on pension [10] further making Internet costs too high for this category. In addition, the majority of rural households (85%) have limited or no access to the main electricity grid as they use firewood for cooking [10].

5 UNDER-SERVED RURAL COMMUNITIES

A big proportion, more than half of Namibia's population is based in under-served rural communities. Namibia Statistics Agency [9] presents that "most of these rural communities are in the central-north, and along the Okavango River and in Zambezi where rainfall is highest and staple crop can be grown. Elsewhere rural population are scattered in low densities on farms and in villages". These rural areas have no electricity, access to clean water, poor road network and suffer from ICT skills drain as the young population migrate to urban areas in search of job and study opportunities [2, 16]. While 28.7% of Namibia's population is poor, it is important to realize that rural dwellers are twice as much likely to be poor compared to those based in urban areas [8]. Of the thirteen regions (provinces) of Namibia, it is those regions with a big proportion of rural areas that have the poorest people namely Kavango region (55.2%), Caprivi (50%) and Oshikoto (44%) [8]. Poverty is mainly concentrated among the San (68%), Rukavango (53.7), Caprivi (44.3%), Nama (33.5%) and Oshiwambo (23.1) speaking ethnic groups [8]. The level of poverty and poor infrastructure in Namibian rural areas make these regions less attractive for business investment especially those in the ICT sector. For instance, the distribution of mobile phone network coverage by Namibia's leading mobile service provider (MTC) is

concentrated in urban settings of Namibia leaving rural areas with sparse network coverage. It should be noted that Namibia has two registered mobile service providers.

6 CO-DESIGNING ICT

Over the years, technology transfer has been centered on product universality in which users are required to adapt to the product features. Under these circumstances, the development of new ICT solutions would see an expert (researcher) gathering data from the subject –user [18]. The gathered data would then be used to inform the design of an ICT solution that is passed on to users under the premise of generalizability and universality [18, 23]. This approach has received criticism from co-design and co-creation research experts who question the usability and sustainability of resulting ICT solutions [23]. There is a growing consensus within the co-design and co-creation research community that involving users during system design and creation enhances the adoption of ICT solutions by users something that promotes usability and sustainability. According to Winschiers-Theophilus et al. [23], co-designing ICT solutions allow research and design experts to "see the world from within the community" something that allows one to "co-construct a locally meaningful system" (p. 370).

Sanders and Stappers [18] define co-creation as "any act of collective creativity, i.e. creativity that is shared by two or more people" while co-design is seen as "collective creativity as it is applied across the whole span of a design process" (p. 6). The subject of co-design and co-creation was first introduced in Europe as participatory design in 1970. Today, this practice has manifested into various situated research approaches of action research and the use of living labs [23]. Co-design and co-creation provide new roles to the researcher, design experts and system users. Sanders and Stappers [18] argued that everyone is creative and depending on the level of interest, users can be a part of the system design team as they provide their experiences. As such, the role of a researcher is to provide a conducive environment that allows users to express themselves. In addition, the researcher translates findings to the designer. On the other hand, the designer-who can also be a researcher-provide technical skills and expert knowledge as they identify suitable solutions that could be used to embed experiences of the user.

Namibia's rural areas are not new to co-design and co-creation as such conceived ICT projects have been ongoing since 2008 [23]. Of interest to this poster the thought of extending co-design and co-creation to the development of e-Government solutions for under-served rural communities. Ochara [12] argued that part of the problem of e-Government is the fact that, this idea was sold to Sub-Saharan Africa by Western nations through donor agents and influential institutions like the World Bank and the International Monetary Fund (IMF). This led to overlooking various local contextual factors that are of paramount importance to e-Government [12]. For instance, the available e-Government solutions do not factor in the digital divide among citizens. Thus, little attention is considered to the fact that there is limited

physical access to computers and internet connectivity, the government use foreign language – English - to disseminate digital content to the populace, a lack of social resources such as public library and computer centres to promote the access of ICTs and a lack of the necessary human resources with the right literacy to promote the access of e-Government [12]. Further to that, e-Government solutions are not designed to accommodate users who access the internet by use of mobile phones [11]. All these arguments motivate for an approach that allows one to “see the world from within the community”.

7 CONCLUSION: CO-DESIGNING FOR E-GOVERNMENT

Following the definition of co-creation by Sanders & Stappers [18] and the remarks from previous ICT projects with co-design approach in Namibia [23], important characteristics for collaborative design and introduction of e-Government infrastructure with Fusion Grid in Namibia needs to be co-designed considering following aspects:

- **Stakeholders.** E-government services affect broad population. In order to ensure successful outcomes in e-Government infrastructure and service design, different stakeholders need to be engaged to co-design activities. These include rural based community members, government ministries and the private sector. In Namibia, these include the Ministry of Urban and Rural Development, Ministry of Information and Communication Technology and the Office of the Prime Minister. Companies that provide mobile and fixed telecommunication services shall be engaged.
- **Government: services/needs.** Combining and aligning the characteristics of Fusion Grid to the needs of e-Government services. This part of co-creation needs to include participants from government offices, ministries, and agencies (OMAs). The Fusion Grid can act as an example of a platform that can host and deliver the intended services.
- **Community: context and practices.** Co-designing a solution for Namibian underserved rural-community shall ensure the integration of contextual factors into the project. These include collaborative exploration on cultural beliefs, habits and natural behaviors while at the same time taking into consideration the technical skills level of the community. Co-designing shall promote community ownership of the project. This is expected to nurture project champions, a move that is expected to promote the sustainability of the project.
- **Technology: challenges and opportunities.** E-Government initiatives in rural areas are often hampered by a lack of connectivity [6]. The Fusion Grid probe introduces a solar powered mobile base station for consideration and elaboration as means of connectivity and access to information. As rural areas are often difficult to access by road and are characterized by high unemployment levels [2, 16], the ease-of-maintenance and robust infrastructure are characteristics to elaborate in co-design sessions.

8 ACKNOWLEDGEMENTS

Fusion Grid: This research has been done with the Fusion Grid funded by Business Finland.

REFERENCES

- [1] Kwadwo Asenso-Okyere and Daniel Aayalew Mekonnen. 2012. The Importance of ICTs in the Provision of Information for Improving Agricultural Productivity and Rural Incomes in Africa. Working Paper. United Nations Development Programme. Retrieved June 26, from <https://www.acm.org/publications/proceedings-template>.
- [2] Sibukele Gumbo, Nobert Jere and Alfredo Terzoli. 2012. A qualitative analysis to determine the readiness of rural communities to adopt ICTs: A Siyakhula Living Lab Case Study. *Proceedings of the IST-Africa 2012* Dar es Salaam, Tanzania.
- [3] Princely Ifinedo. 2006. Towards e-government in a Sub-Saharan African Country: Impediments and Initiatives in Nigeria. *Journal of E-Government*, 3(1), 3-28.
- [4] Kanishka Karunasena and Hepu Deng. 2012. A citizen-oriented approach for evaluating the performance of e-government in Sri Lanka. *International Journal of Electronic Government Research (IJEGR)*, 8(1), 43-63.
- [5] Ines Mergel. 2012. *Social media in the public sector: A guide to participation, collaboration and transparency in the networked world*. John Wiley & Sons.
- [6] Ministry of Information and Technology 2015. 2nd National ICT Summit: Bridging the Digital Divide. Windhoek: Namibia.
- [7] Stephen .M Mutula. 2005. Peculiarities of the digital divide in sub-Saharan Africa. *Emerald Group Publishing Group. Program*, 39(2), 122-138. DOI: <https://doi.org/10.1108/00330330510595706>
- [8] Namibia Statistics Agency (2012). Poverty dynamics in Namibia: A comparative study using the 1993/94, 2003/04 and the 2009/10 NHIES surveys. Retrieved from: <https://cms.my.na/assets/documents/p19dnar71kan1lvfo14gu5rpbkq1.pdf>
- [9] Namibia Statistics Agency. 2013. Profile of Namibia. Facts, Figures, and other Fundamental Information. Retrieved from: <https://cms.my.na/assets/documents/p19dpmrdp1bqf19s2u8pisc114b1.pdf>
- [10] Namibia Statistics Agency (2016). Namibia Inter-censal Demographic Survey 2016 Report. Retrieved from: https://cms.my.na/assets/documents/NIDS_2016.pdf.
- [11] Nixon Muganda Ochara and Tendani Mawela. 2013. Enabling social sustainability of e-participation through mobile technology. *Information Technology for Development*, 21(2), 205-228. DOI: <https://doi.org/10.1080/02681102.2013.833888>
- [12] Nixon Muganda Ochara. 2008. Emergence of the E-Government Artifact in an Environment of Social Exclusion in Kenya. *The African Journal of Information Systems*, 1(1), 18-43.
- [13] Office of the Prime Minister. 2014. e-Government Strategic Action Plan for the Republic of Namibia. Retrieved June 12 from: <http://bit.ly/1Ehg13N>.
- [14] Thomas Olwal, Moshe Masonta, Luzango Mfupe and Mjumo Mzyece. 2013. Broadband ICT Policies in Southern Africa: Initiatives and Dynamic Spectrum Regulation. *Proceedings of the IST-Africa, 29 - 31 May, Nairobi, Kenya*.
- [15] Caroline Pade-Khene, Robin Plamer & Mitchell Kavhai. 2010. A baseline study of a Dwesa rural community for the Siyakhula Information and Communication Technology for Development project: understanding the reality on the ground. *Information Development*, 26(4), 265-288. DOI: <https://doi.org/10.1177%2F0266666910385374>
- [16] Republic of Namibia. 2017. Namibia's 5th National Development Plan (NDP5). Retrieved from: https://www.npc.gov.na/?wpfb_dl=294
- [17] Elizabeth B.-N Sanders and Pieter Jan Stappers. 2008. Co-creation and the New Landscapes of Design. *CoDesign*, 4(1), 5-18. DOI: <https://doi.org/10.1080/15710880701875068>
- [18] Christoph Stork, Enrico Calandro and Aalison Gillwald. 2013. Internet going mobile: internet access and use in 11 African countries. *info*, 15(5), 34-51. DOI: <https://doi.org/10.1108/info-05-2013-0026>
- [19] John Tomlinson and Debbie Rabina. 2011. e-Government in Namibia: A report. Retrieved, April 2, 2017 from http://mysite.pratt.edu/~jtomlins/619/e-government_in_namibia.pdf
- [20] Kirsten Ulsrud, Tanja Winther, Debajit Palit & Harald Rohrer. 2015. Village-level solar power in Africa: Accelerating access to electricity services through a socio-technical design in Kenya. *Energy Research & Social Science*. Volume (Jan. 2015), 34-44. DOI: <https://doi.org/10.1016/j.erss.2014.12.009>
- [21] UNDESA (2018). Benchmark Global e-Government Development -2018 UN e-Government Survey. UN Department of Economic and Social Affairs.
- [22] Heike Winschiers-Theophilus, Naska Winschiers-Goagoses, Kasper Rodil, Edwin Blake, Tariq Zaman, Gereon Koch Kapuire and Richard Kamukuejandje. 2013. Moving Away From Erindi-Roukambe: Transferability of a Rural Community-Based Co-Design. *Proceedings of the 12th International Conference on Social Implications of Computers in Developing Countries, May, Ocho Rios, Jamaica*.