Co-creation a tool to create inclusive e-services in developing countries: A case of open data hackathon in Namibia

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ABSTRACT
With the increasing adoption of digital technologies in many developing countries, it has become evident that countries in Africa have enabling environments and infrastructures to deploy state of the art ICT solutions to ease the burden of service delivery. Namibia amongst other African countries is pioneering e-governance. Additionally, e-services are becoming an integral component of governance in Namibia. However, more still needs to be done to ensure that e-services are inclusive, thus meeting the needs of intended users. In this paper, we highlight how government, developers, academia, corporate, and citizens can leverage on co-creation to design a wide range of e-services. Moreover, as a proof of concept, this paper refers to solutions developed during the 3rd Open & Big data innovation hackathon that was held at the Namibia Business Innovation Institute (NBII) in Windhoek, Namibia.

Author Keywords
Co-creation; co-design, e-services; hackathon, open data, citizen participation;

ACM Classification Keywords
Design

INTRODUCTION
Over the last decade, we have seen a paradigm shift in how governments carryout their day to day operations. Today, many governments are shifting from conventional ways of providing services through government offices, and taking their services online, in their efforts to become more effective and efficient. It's not only happening in the government; private companies are also increasingly making their services available online because of the large audience. No doubt, digital services have become the new 'Gold mine' for many enterprises, providing the fastest growth and proliferating the notion of business with 'no borders'.

For many years, developing countries has been lagging when it comes to delivering e-services to their citizens. Resulting in citizens travelling long distances from villages into major cities and towns to access basic services such as health care, education and identification documents.

However, the advent of digital technologies together with the increase in mobile coverage and broadband [1] services present unique opportunities for African countries to embark on their e-service journeys. Therefore, bringing public services such as schools and health care closer to the people.

In this paper, we practically show how governments in developing countries can leverage on co-creation and co-design to harness the widely-distributed intellect among inhabitants of their countries to develop useful, inclusive and people centric digital services aimed at improving the quality of life, bringing services closer to the people and improving the quality of public service delivery.

This paper is structured as follows, the subsequent section review different literature. Section 3, discusses the research methodology and methods applied. Thereafter, results of the study are outlined and discussed. In the last section, conclusions are drawn.

STATE OF THE ART
Conventionally, the responsibility of providing public services has been for too long confined to government

alone, making it hard for the government to deliver services faster and on time for citizens.

The idea that two heads are better than one is ancient, it has long been practiced in business as they seek to uncover what they don't know. Since 2006, after a publication in the WIRED magazine titled 'the rise of the crowdsourcing', crowdsourcing increasingly became mainstream in business. As [2] outlined in his book titled 'Wisdom of the crowd', crowdsourcing enabled businesses to gather collective opinions from many individuals rather trusting one opinion of an expert. Thus, generating more value for business.

Though, crowdsourcing and co-creation has been regarded as two different concepts, they are quite similar. [3] best defines crowdsourcing as an approach were an organization takes a task or job that's usually performed by an employee and subcontracts it to other individuals outside the company in a form of an open call using the Internet. On the other hand, co-creation is defined as a collaborative activity between a business and customers with the intentions of creating value [4].

The major difference here is, co-creation is more long term because it focuses expanding value together by finding new modes of engaging customers. Whereas crowdsourcing focuses on finding the right person to perform a task or job, thus save the business time and cost by finding the right expert(s).

In their work [4] proposed co-creation as forum to review market experience, thus challenging the conventional model of demand and supply. They claim that when the experience and the value in it is co-created, the focus shift to attributes of total experience, making the demand contextual. Thus, avoiding traditional estimation of the demand. Moreover, they state that the demand should be directly linked to customer experience and desires.

Although, there are not so many examples available to date on how co-creation can be used to deliver better and faster e-services in developing countries. Many examples exists of how co-creation activities such as hackathons are used as platforms to solve challenges facing cities [5,6] [8] Highlights the importance of citizen participation in the co-designing and co-creation of smart cities. In their work [7] proposed how the city Windhoek can use open data through co-creation activities to solve challenges such as transportation and land management.

Today, developing countries are facing many challenges such as high unemployment, fast growing youth population and issues made imminent by the digital revolution. To overcome these challenges, developing nations need to leverage on the distributed talent and knowledge of its young population to co-create and co-design solutions that enhances service delivery through e-services. Thus, solve service delivery problems and create employment opportunities.

Realizing the importance of e-governance in modern governance, Namibia adopted e-government strategic plan for public service of Namibia (2014-2018) with the intentions of transforming the country's knowledge based economy and technology driven nation [9]. With this strategic plan, government intents on creating an online one-stop shop for all government services. Though a noble idea with intentions to benefit citizens, implementation with the will prove futile if citizens do no participate in the designs of such services.

Moreover, after almost three years of the strategic plan, none of the mentioned online service is available for citizens to use. However, government can look to co-creation to develop proof of concepts and solutions faster. Thus, ensure timely implementation of their e-governance plans.

In this paper, we illustrate how developing countries like Namibia can leverage on co-creation techniques to achieve their e-governance strategies and objectives. In the following section, the methodology used in the study is explained.

METHODOLOGY

The methods used during the study involved active participation of key stakeholders that attended the 3rd Open & Big Data innovation hackathon. The stakeholder comprises of the academics from the Namibia University of Science and Technology (NUST), lawmakers, government representatives, the private companies such as Telecom Namibia, Green Enterprise Solutions, designers, developers, and citizens. Keynote presentations and discussions were the highlight for the first day of the three-day hackathon event. The aim of this was to engage and give the participants an introduction of what to expect in the following days. In addition to this, the presentations touched on how to leverage on open and big data to solve societal issues, and most importantly how to develop self-sustaining solutions.

During second day of the event, co-creation as a method was used to co-design e-services using open data. The method was chosen because of its ability to encourage user participation throughout the design process, ensuring that designed solutions meet the needs of the intended users. Additionally, co-creation also encourages collaboration among different entities; authority, citizens and private sector [10,11]. Hence, it's of significant importance that citizens are involved in the design of public services, if such process is to be successful.

A hackathon was organized, bringing together different stakeholders, including researchers, citizens, developers and designers; in the mobile lab at the Namibia Business Innovation Institute (NBII) to discuss challenges facing public service in Namibia, and share ideas on how these challenges can be overcome using open data. The design process was structured as follows:

Ideation
During the brainstorming session, different challenges were discussed and a lot of ideas generated ranging from health care, education and road safety.

Problem contextualizing
During this phase, the group members started gathering more information about the possible solutions to the identified problems, they tried to understand what part of the problem their solution is supposed to solve. They also did research on similar existing solutions to gain an understanding of them and how to better develop their solution.

Prototype design
During this phase, the different teams tried out different design alternatives on how best to implement their solutions. Papers and cardboards were used to sketch the UI designs and conceptualize the intended solutions. After getting the designs, they started coding their applications using a programming language of their choice, and using tools such as Android studio, Eclipse, NetBeans and alike.

User testing and demonstration
During this phase, the different teams tested their prototype app with the potential users to ensure that all functionalities were working properly as intended. The developers in the teams carried out the tests with the non-technical, designers and potential users. The teams were then allowed to incorporate changes from the user feedback before presenting their solutions to the judges.

The hackathon approach enabled participants to be part of the design process, thus influence the design of the e-services. Moreover, practically demonstrates how co-creation can be exploited and used to design better and inclusive public services.

Six (6) prototypes were designed, mainly:

1) School finder – A mobile application allowing users to search and find schools in Namibia.
2) Emergency App – An application designed to report emergency cases to the relevant authorities, for example the police, firefighters, or ambulance service.
3) E-Traffic – a web based application aimed at combating traffic offenses by automating
4) E-Shopping – A cross platform application that allows users to see items on special in the different outlets. Thus, inform users where certain items.
5) Workaz - Is a web based tool for registering, managing and finding semi-skilled citizens who are rated and recommended for hire, to perform jobs such as cleaning, gardening and other casual jobs.
6) Import/Export App - a web applications which monitors the Namibian economy of the country's import and export product data. This information gives an indication of how the different product areas are doing in the market, how much are we producing as a country and how much are we exporting/importing.

In the next sub sections, school finder the winning solution according to judges is explained in detail.

RESULTS
Co-design approach proved to be the correct approach to tackle challenges affecting diverse stakeholders because of its ability to empower diverse stakeholder to contribute and air their views. Therefore, enriching the design process.

Therefore, as a result the hackathon's six prototypes were developed as highlighted above. However, in the context of this paper we will only focus mainly on the winning application school finder. An application designed because there is currently not a centralized location where Namibians can browse for both public and private schools all over the country. Currently the school finder enables users to browse and filter schools listed on the school finder database. The schools can be viewed on a map (currently only on Google Maps) or browsed through on a list.

The filters include:

- Keyword search
- Location (city/town)
- Public and / or private schools
- Available positions for learners

The School finder application is designed with novice users in mind, hence the simple design, which allows users to move between different screens. Figure 1 illustrate how a user can filter schools to make it easier for users to find the specific school or group of schools that meet their needs.

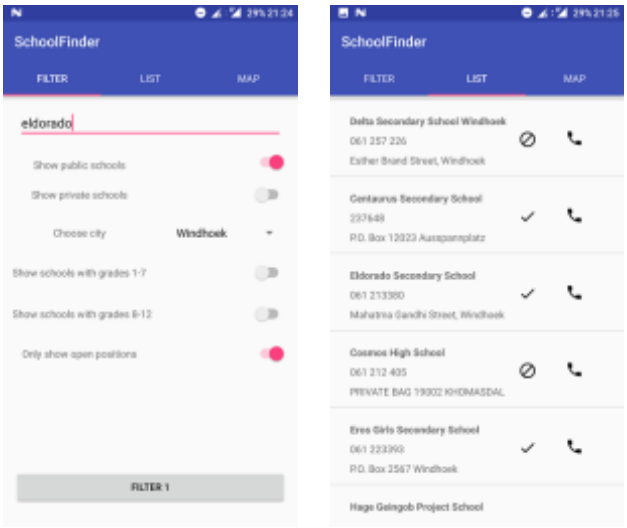

Figure 1. Filtering schools and viewing the filtered schools in a list view.

The data for the schools is pulled from a Firebase database, which was manually populated, thus the current data might

not be completely accurate. The data for available spaces was randomized.

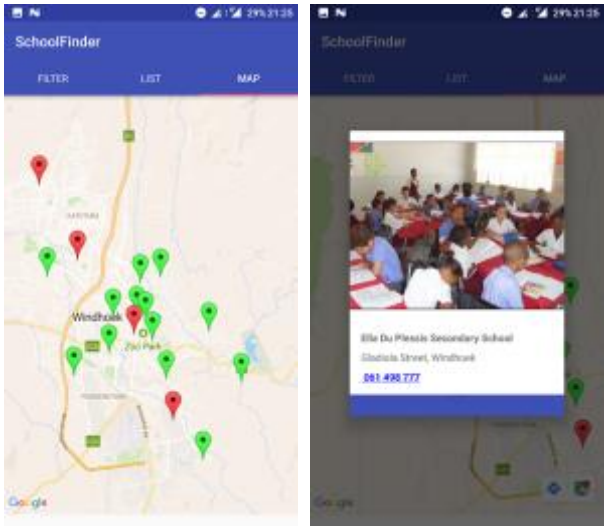

Figure 2. Google Maps displaying school markers.

In figure 2, schools near the user are depicted as markers, the red markers illustrate schools that do not have spaces available. While the green markers represent schools with available spaces.

A web control panel is under development, but it is currently not finalized. In the control panel the schools will be able to edit their information, for example spaces for learners and curriculum.

Though the 24 hours spent during the hackathon are not enough to develop a complete solution. No doubt, co-creation has become the 'de facto' approach to design and deliver services that meet the needs of the intended users. Therefore, it's high time that governments adopt co-creation and co-design to design inclusive and better services for citizens.

CONCLUSION

In this digital era, the creation of inclusive public services has seized to be just the responsibility of government. Through co-creation activities such as hackathons, diverse stakeholders can work together to design solutions faster and cheaper. Moreover, harness on the collective intellect of the different stakeholders to create inclusive solutions. As part of the future work, we'll be looking forward to adding new functionalities that enable users to not only view if a school has an open space but also to view in which grade the open space is. Additionally, we are discussions with the Ministry of Basic Education about carrying out a pilot implementation of the school finder application. Collectively we can design better solutions, thus it's high time that we take co-creation to governance.

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