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The double-edged sword of mobilizing citizens via mobile phone in developing countries

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Abbreviations:

ICT Information and Communications Technology and Digital Media
SMS Short Message Service
USSD Unstructured Supplementary Service Data

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ABSTRACT

New innovations in mobile technology provide an unparalleled opportunity for researchers and organizations to scale communications with citizens in the developing world, but bring new challenges in terms of how to generate and retain engaged users. We report on a number of technical dimensions based on our experience building a bi-directional multi-channel mobile phone platform to engage citizens in South Africa's 2014 presidential election. Specifically, we deployed the "VIP:Voice" platform at national scale to conduct opinion polling, to allow citizens to report on political activity, and to engage citizen monitors for polling stations on election day. Our platform operated across multiple device types, from flip-phones to Twitter, and consequently provides critical lessons on the most effective means of gathering and disseminating a rich variety of data depending on the user's device type. We compare different means of obtaining location in the absence of GPS, and show how different formats for soliciting and entering data generated very differential response rates. Our paper illustrates a number of concrete ways in which platform development driven by smartphone logic does not translate easily for users of more basic mobile phones, including whether questions are presented passively in a menu or pushed to a user's phone, and the format in which user data are entered. This paper is intended to provide actionable guidance for researchers and organizations deploying ICT platforms to interact with citizen users at a national or cross-national scale in international development.

1. Introduction

The adoption and expansion of information and communications technology and digital media (ICT) has radically changed the scale at which researchers, activists, and organizations harness technology across sectors in international development (e.g., Aker et al., 2012; Blumenstock et al., 2015b). However, stakeholders and platform developers confront important trade-offs in using mobile and digital tools to improve program design, implementation, and evaluation. One critical issue confronting researchers is scaling development interventions to reach as wide a population as possible (Heeks, 2008; Sachs and McArthur, 2005; Tomlinson et al., 2013), while maintaining a stable user base that provides high quality data. A second area of focus involves weighing deploying ICT platforms on a single mobile or digital channel and therefore tightly controlling the medium of communication while limiting use, compared to multiple channels, which expands the potential sample of users but decreases control over the system.

In this paper, we address these issues by reporting on several

central features of "VIP:Voice," a multi-channel ICT platform that we designed and deployed during South Africa's 2014 national election. We highlight how the platform's cross-channel engineering performed in providing robust data from a diverse population of citizen users. We built VIP:Voice to reach, recruit, and engage South Africans in several modes of political participation, including sharing their opinions about political topics, reporting election-related events, and monitoring voting districts (colloquially known as polling stations, the term we use here) on election day. Users could interact with the platform through five ICT channels: USSD/SMS, Mxit (a widely used South African Facebook competitor), Mobi (mobile web), Google Talk (GTalk), and Twitter. The platform included embedded randomization protocols to study experimentally the effects of incentives and message content on uptake, registration, and usage.

We first document the advantages of using such a system for low-cost scalability and broad representativity, as well as fine-grained analysis across and within users' message-level interactions. Second, we discuss the challenges the platform confronted regarding programming

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randomization into messaging content, eliciting geospatial information from users, and retaining participation. Data were sent over multiple channels compatible with a broad set of devices, including standard and smart phones, tablets, and computers. This diversity of technological channels allows us to provide some important lessons learned in terms of implementing complex spatial and non-spatial randomized messaging treatments using an open-source bi-directional technology application for sending and receiving information from end-users.

The paper's findings demonstrate that multi-channel platforms provide researchers an exciting opportunity to scale their research. VIP:Voice's cross-channel design allowed it to reach a much larger and broader cross-section of the South African population than it would have using any one channel. On the downside, we find eliciting geospatial information proved extremely difficult, standardizing messaging across platforms with different character limits required significant development time and effort, and that ICT platforms present some logistical challenges when we attempt to build complex randomization protocols into the dispatching of messages from the system to users. As reported in [Ferree et al. \(2017\)](#), we discuss the high rate of attrition from the platform, as well as implications of this reality for such platforms moving forward. We encourage future work to understand how to make cross-channel interventions and experiences more comparable. Many of the opportunities and challenges we faced with VIP:Voice and report here are important for not only development engineering, but also robust program implementation and evaluation.

Our study makes several contributions to the design and evaluation of ICT platforms in international development. First, we provide insights to those studying the dynamics of “digital inclusion” in developing contexts ([Madon et al., 2009](#); [Walsham and Sahay, 2006](#); [Warschauer, 2003](#)), and how initial engineering decisions define the population from which potential users are sampled. While developing countries have experienced an explosion of ICT innovations and user bases over the last decade, previous studies note that across technologies, income, and socio-demographic features, certain types of users may be systematically over or under-represented in these platforms ([DiMaggio et al., 2001](#); [Thompson, 2008](#)). Subsequently, these diverse populations may interact with technology in distinct ways, producing important differences in digital participation among those who are “included.” While many previous projects target ICT users identified by program pre-registration, such as health-workers or farmers, we built our platform for no pre-defined user base; this design allowed us to recruit *any* South African with a phone to join the platform. Participation over cheaper and easy to access channels (i.e., SMS/ USSD) generated users representative of South Africa's more excluded populations, but at the cost of certain technical difficulties and design limitations. Conversely, participation over digital channels on social media brought in users more typically included in digital platforms at the benefit of fewer technical difficulties and design limitations. Thus, our results highlight an important tension between technical design considerations and population/user recruitment; we use a cost-effectiveness analysis to demonstrate clearly how marginal recruitment costs and representativity play off against each other across channels in our context. Our overall platform is substantially more representative of the nation than it would have been if it had been implemented over any single channel.

Second, our results provide insights at the intersection of applied social science research methodology and computer science research on ICT platform design and development. Research in this area has addressed problems of citizen welfare across development sectors like agriculture ([Aker, 2011](#)), banking and mobile money ([Shaikh and Karjalaoto, 2015](#)), education ([McEwan, 2015](#)), and health ([Källander et al., 2013](#); [Rajput et al., 2012](#)). Our study more narrowly falls within recent technological innovations in corruption and political accountability ([Bussell, 2010](#); [Grossman et al., 2014](#); [Humphreys and Weinstein, 2012](#)), a part of larger concerns with citizen monitoring, reporting, and participation in governance and elections ([Bailard,](#)

[2012](#); [Bailard and Livingston, 2014](#); [Paluck et al., 2010](#)). While previous research using ICT platforms in these spaces has noted the problem of uptake and attrition over time ([Findley et al., 2013](#); [Grossman et al., 2014](#)), we explicitly demonstrate the challenges of gaining and maintaining participation for research endeavors with little or no face-to-face contact with the study sample. Our context is potentially special, however, in that we are attempting to build and deploy a national platform quickly for a specific event (the election), and experiences with participation may differ when the interaction with users is not time-bound (e.g., [Chicoine and Guzman, 2017](#); [Dhaliwal and Hanna, 2017](#)). These challenges include attrition as the result of asking for locational information as we show here, and, as shown in [Ferree et al., \(2017\)](#), attrition as a result of the system not consistently provide registrants material or financial benefits (although incentives were offered at different stages of the project to a sub-set of users). The governance sector therefore presents a “hard case” to evaluate the effectiveness of this approach: compared to areas where users may receive a direct and immediate benefit from engaging with an ICT platform on multiple reporting activities, governance interventions deliver fewer immediate private benefits.

Lastly, we contribute specific technical and research design insights to the creation, roll-out, and evaluation of development engineering platforms ([Brunette et al., 2013](#); [Hartung et al., 2010](#); [Okolloh, 2009](#)). Technologists have laid out minimum requirements for development engineering platforms; [Hartung et al., \(2010\)](#) argue “information services must be composed by non-programmers, deployed by resource-constrained organizations, used by minimally-trained users, and remain robust despite intermittent power and connectivity” (1). However, there may be other important requirements driven by the project's social and research goals. Specifically, we show the development and engineering process must also pay attention to population representativeness of study samples, geographic information collection, and messaging/text comparability. While these issues are no doubt salient to social scientists, they are not automatically at the forefront of decisions over platform design by applied computer scientists, who are, understandably, focused on technical features. Our experience underscores the necessity of integrating more fully from the outset the insights and contributions of computer scientists with social scientists and development practitioners. These partnerships can generate linkages that will contribute better research designs and program implementation to improve and scale platforms.

This paper proceeds as follows. In Materials and Methods ([Section 2](#)), we lay out the design ([Section 2.1](#)) and implementation ([Section 2.2](#)) of VIP:Voice around a citizen mobilization campaign during the 2014 South African elections. In Results ([Section 3](#)), we first discuss cross-channel comparability of responses and response rates ([Section 3.1](#)), and then look at the relative successes of different methods to elicit geospatial information from users of phones without GPS ([Section 3.2](#)). In [Section 3.3](#) we describe several technical issues researchers interested in carrying out similar experiments would likely face. Finally, we describe the relative costs effectiveness of development and implementation across channels, with an eye to generating a representative sample across the platform as a whole ([Section 3.4](#)). We conclude by offering a set of recommendations for researchers and practitioners interested in deploying multi-channel ICT platforms.

2. Material and Methods

This section describes the design features of our ICT platform, VIP:Voice, and how it engaged South African citizens during the 2014 national election campaign.

2.1. Platform Design: VIP:Voice

We launched VIP:Voice to reach, recruit, and engage users around South Africa's 2014 general election, while simultaneously running

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