A Mobile Content Authoring Literature Review

CODIE B. ROELF, UNIVERSITY OF CAPE TOWN

Mobile content creation is used widely in the western world, mainly for social media. However, in the developing and third world, it is a great tool for development. This literature review presents such tools, and how they compare to the goals and specifications of a project suggested by the Praekelt Foundation. This discusses the idea of using version control to allow for users to collaborate when creating content and the option of receiving incentives for content created.

1. INTRODUCTION

As social media increases its presence in the online community, the need and/or want to tell one's story, or any story, is proving to not only be entertaining, but more importantly developmental.

> "Message boards, Instant Messaging and Webblogs all demonstrate unique artefacts that allow children to share and discuss ideas and feelings, ask and answer each other's questions, or showcase projects, all of which promote a prosocial attitude [Huffaker et al. 2004]".

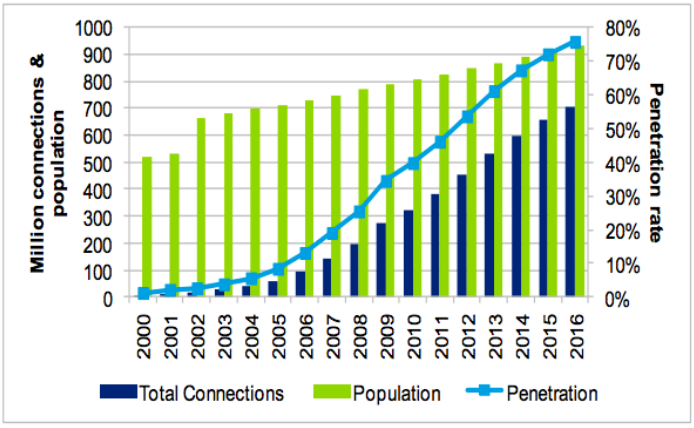
With the increase of mobile phone usage in the 'developing world', Sub-Saharan Africa more specifically, [GSMA et al. 2012], the opportunity is there to combine the increase in mobile phone usage and the ability to create content in order to aid development. However, this opportunity does not come without its challenges: low bandwidth in developing areas, [GSMA et al. 2012], and difficulty to collaborate being the most prevalent ones.

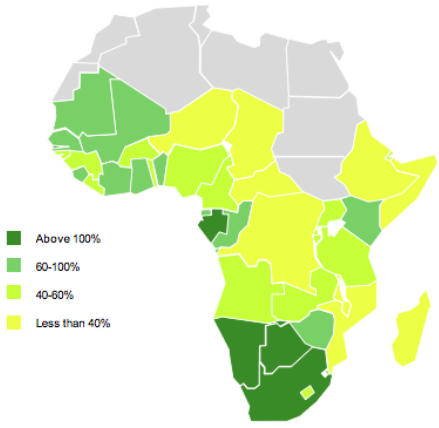
Praekelt is a foundation that focuses on decentralising information that aids in development. They have developed several websites for low-end feature phone that have made a note worthy impact on their users. The aim of this research project is to explore what content creation and authoring looks like on a mobile device, and how best to allow users to create content collaboratively by allowing them to share their stories. This paper presents past and current work relating to this research project.

2. MOBILE PLATFORM

2.1. Mobiles in Africa

There has been an undeniable growth of mobile phone usage, specifically in Sub-Saharan Africa [GSMA et al. 2012], but also more generally in the developing and the third world.





The bulk of these phones being low end feature phones [Erricson AB, 2014].

Device access/ ownership*	2006	2009	2013	2016 estimates
Radio	89%	86%	84%	85%
TV	50%	59%	76%	77%
Computer	5%	10%	19%**	25%
Mobile Phone	28%	81%	88%	90%
Smartphones	n/a	n/a	6%	20%

Following the global trend, the most prevalent operating system on these phones is android [Sheikh et al. 2013].If one were to create a native app, android would therefore be the operating system to reach the majority of mobile users in this region. Webapps are, however, more prevalent globally as it foregoes the worry of different operating systems[Power et al. 2011], but because of the low bandwidth in these regions, web applications need to take this into consideration. [GSMA et al.2012].

Mobile phones are the driving force behind the Sub-Saharan African economies.

> "In addition, there are numerous examples that indicate that it is the mobile phone that is now getting particular attention in terms of encouragement of its use and access especially in Africa in addition to it being seen as a potential tool for social and economic development and growth. [Wakunuma et al. 2011]".

More people in Africa have access to a mobile phone than a desktop or laptop computer. [Balancing Act, 2014].
It is said to be easier to author content on a desktop or laptop computer than on a mobile phone. However, since more people in Africa have access to a mobile phone than to a desktop or laptop computer, it could limit content authoring.

2.2. Feature Phones Abilities

Desktop and Laptop Computers, as well as Smart Phones are greater in terms of capability than a feature phone.

> "Feature phones can be seen as the middle ground in the current mobile world, offering more capabilities than the basic send/receive cell phone and fewer freedoms than the progressive smartphones. [Quirck, 2009]".

Given that a 'feature' phones has less or weaker features than a smart phone, the abilities are rather limited. These limitations affect the creation and authoring of content. So even though the growth in mobile phone usage in Sub-Saharan Africa is rapid, feature phones are not exactly the answer that mobile content authoring

needs. However, there are basic features that can be used in order to author more than just text based content.

Story Bank,

> "A repository - Story Bank - to allow a community to create and share audio-visual stories [Jones et al. 2007]",

uses a central location where users can add stories on a desktop computer. However, due to low computer literacy levels, they created a tool for 'cameraphone story authoring and access' where users could author and share stories via bluetooth. Their research found that their was no need to extend access to Story Bank via a desktop computer where conventional computer interfaces are disabling. Due to the majority of Praekelt's users being in Sub-Saharan Africa, and as state above most users in Africa own mobile phones rather than a computer, it could prove to be more limiting to use a desktop instead of a mobile phone, even though desktop or laptop computers have greater features and a wider range of abilities.

The basic feature relied on in storytelling is the ability to type out text. This is more efficient with a smart phone due to the 'Qwerty' keyboard. However, as feature phones have an alpha numeric keyboard, authoring content such as text would take longer, which sets a limitation on the length of text versus time taken to write the text [Nuovo et al. 2003].

Feature phones have the ability to take pictures, store them and share them via Bluetooth. A different Story Bank project was carried out in India which allowed users to create and share local audio-visual stories using customised camera phones.

> "The findings show that the system was usable by a cross-section of the community and valued for its ability to express a mixture of development and community information in an accessible form [Frohlich et al. 2009]".

Another key feature is the ability to connect to the internet. However, as stated above (see page 2), many Sub-Saharan African regions have low bandwidth so the limited ability to connect to the internet is limited once again by the bandwidth. A research project aimed at characterising technology used Kenya had this to say about limited bandwidth,

> "Our participants consistently told us how the scarcity of Internet bandwidth affected their ICT use. Even in environments where a given location (such as an office) had good local connectivity, available bandwidth to international websites (such as free mail providers) is limited by undersea fiber capacity [Wyche et al. 2010]".

The limited bandwidth means that even though feature phones have the ability to record video, using video for storytelling is not necessarily a viable option due to the wait time it would take do upload or stream videos, even compressed ones.

However, what [Nuovo et al. 2003] and [Wyche et al. 2010] do not take into account is the users abilities. Nuevo accurately highlights the limitations on an alpha-numeric keyboard. However, as [Jones et al. 2007] has pointed out, users have low computer literacy levels,, which I argue extends to smartphones as well. Users may be more comfortable using a feature phone's alpha-numeric keyboard due to past experience

with it, and may be able to author content more efficiently on a feature phone than a smartphone or even computer.

A feature that feature phones have that most desktop computers need an extra microphone for, is the ability to voice record.

> "Analogous to the rise of Web 2.0 for Internet-enabled users, this new generation of voice-services enables communities to create, share, and consume audio content using low-end mobile phones [Vashistha et al. 2012]".

There have been many ICT4D projects that use interactive voice systems (IVRs). IVRs have been used for citizen journalism [Thies et al. 2012], agricultural discussion forums [Chittamuru et al. 2010], community dialogue [Agarwal et al. 2009] and many others [Vashistha et al. 2012]. However, these projects have mostly been aimed at the developing world and not necessarily the third world. Limitations on bandwidth have to be taken into consideration as well here.

One of the specifications for this research project is that users need to be able to create content collaboratively. This is something that has not been explored greatly by the two Story Banks and the above mentioned papers. The bluetooth feature, as mentioned before, can be used t share content. However, this could be even more useful when collaboratively creating content. Images, text, and voice recording could be shared between collaborators. The only downside to Bluetooth is that it is heavy on a feature phone's battery life, and in regions where electricity is scarce, it may not always be possible to charge your phone when and wherever you want.

The battery life of a feature phone is a feature in itself.

> "Smart phones have much poorer battery lives than basic phones, and come with higher costs of use. [Molap et al. 2015]".

In environments like the one mentioned above, a large battery life is vital.

3. MOBILE CONTENT CREATION

3.1. Purpose

One might ask why there is a need to author content on mobile in the capacity that Praekelt has specified, the answer to this is that the decentralisation of information, even seemingly 'common knowledge', empowers people and in most cases leads to some form of development.

> "Decentralization has been regarded as the major institutional framework for the phenomenal industrial growth in the last two decades in China. [Bardhan. 2002]".

Whether the information being shared is social for social development, educational for educational development or even just as a means for receiving an incentive, the potential is there for development.

3.2. Scalability

The main difficulty for Praekelt currently is having a system that scales globally in developing and rural regions.

> "We have failed scaling some of these initiatives from a technical perspective because the application design was a centralised one. The people most needing the information were physically furthest removed from our data centres, increasing latency, increasing chances of timeouts and ruining the experience. [De Haan, 2015]".

There are certain guidelines one needs to take into account when creating a tool for rural areas.

> "• The network is completely unreliable, both from a hosting and from an end user perspective.
>
> • Systems should be completely autonomous.
>
> • Systems should be able to fail partially.
>
> • Systems should be completely decentralised.
>
> • All content should be versioned and adhere to a schema [De Haan, 2015]".

The IVR Junction project [Vashistha et al. 2012], have used cloud storage such as Dropbox and Skydrive, which are both free of cost, to store a portion of their content, as well as an SQL database server. However, Dropbox and Skydrive are good to share information and not necessarily good for collaboration. This is where Git comes in.

> "GitHub is a popular Web-based social code sharing service that utilises the Git distributed version control system. It has become an essential tool in technology areas that require collaboration, such as software development and technical writing. It is also seeing widespread adoption in other areas, transforming how people collaborate over a shared repository [Victoria et al. 2015]".

Praekelt is well experienced with GitHub and has existing architectures and systems that rely on GitHub. For this project it is therefore best to use GitHub as it has proven to work well for collaboration and complies with the current architecture and systems at Praekelt.

3.3. Incentive

Praekelt has stated that mobile content creation work well if people are reimbursed for their contributions. Beyond the social development, it gives users a monetary motivation to create and collaborate on content. This encourages users to create content more than once. The down side to this is that users could create 'rubbish' content for the monetary incentive.

4. CONCLUSIONS

The idea of mobile content authoring is not a new one. As presented paper, many organisations and foundations have dedicated projects to mobile content creation for Information and Communication Technology for Development. In rural and developing areas, this is achieved by means of a feature phone using text, images and voice recordings. Low bandwidth restricts the type of content shared such as video, for example.

However, what is novel about this Praekelt project is the idea of using GitHub to store and retrieve stories from a central repository that allows for collaboration, and receiving ongoing monetary incentive for content. While this solution is not a silver

bullet, it certainly has the potential to allow for development to take place, which ultimately is the goal of Praekelt Foundation and this research project.

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