

# Taarifa: Improving Public Service Provision in the Developing World Through a Crowd-sourced Location Based Reporting Application

## 1 Abstract

Public service provision in the developing world is challenged by a lack of coherence and consistency in the amount of resources local authorities have in their endowment. Especially where non-planned urban settlements (e.g. slums) are present, the frequent and constant change of the urban environment poses big challenges to the effective delivery of services. In this paper we report on our experiences with Taarifa: a location-based application built through community development that allows community reporting and managing of local issues.

## 2 Introduction

The availability of geographic data in the developing world is improving with the advent of community mapping projects like Map Kibera [1], [2] and through organisations like Humanitarian Open Street Map Team (H.O.T). Previously a large barrier for NGOs, governments and business in providing services in developing world, the lack of governmental and non-governmental data is becoming an issue of the past and with this barrier rapidly dissolving further questions are arising, such as: now we have the data, what do we do next?

The Taarifa project aims to address this question, with respect to the monitoring of public service provision. Taarifa as a software platform al-

allows for the community reporting of problems, from health to waste issues, through a mobile phone interface using SMS or a HTML5 client. Once reports are collected they are entered into a workflow allowing those in charge of providing services to monitor, triage and act upon reports.

Taarifa is currently unique in this field from its initial design, inception and deployment. It was originally conceived at the Random Hacks of Kindness (RHOK) London Water Hackathon. A Hackathon is an organised meeting of developers who team up to code on a specific topic or to address a specific problem. Hackathons are very popular in the developers community. Both private and public organisations often set up hackathons to get some fresh hands working on certain issues they are facing. During the RHOK hackathon a group of core developers 'hacked' a solution in 48 hours. After continued development and design Taarifa was first deployed in cooperation with the Ugandan Ministry of Local Government in March 2012, followed by a deployment with the Zimbabwean Government in April 2012 facilitated by the World Bank.

In this paper we present a narrative and case study of the Taarifa project from its inception, design, refinement and deployment. We also discuss the future directions Taarifa might take both as a community software project and as an organisation. The global aim is to facilitate a discussion on how crowd-sourced geospatial data and open source platforms can combine to improve public and private service delivery in developing nations.

### 3 Related Work

Most papers detailing the emergent phenomena of crisis mapping are case studies of specific crises, the Haiti Earthquake // CITATIONS //, terrorist attacks [?] methodologies for crisis situation triage [3], . Though in context not all methodologies of crisis relief are wholly focused on external response as [4] demonstrates. On the side of people using reports providing situational awareness, [?] looks at how a visual 'group map' of all the reports is useful as errors can be made. The crowd sourcing of information has inherent dangers of trusting the information supplied, as //Patrick Meier's Thesis// demonstrates with respect to potential crisis situations.

Currently there are two themes missing from the literature; A study of how the reports are being used to aid decisions and an understanding of areas in a constant state of crisis. These areas, like slums and informal develop-

ments do not have an event like an earthquake or a tsunami to "showcase??" the plight.

Almost anecdotal evidence [5] [6] exists to how the crowd sourced data is used, but nothing to the experiences of using it. A possible output and definite gap in the research would be an ethnographic study of when a crisis occurs, observing and reporting the 'value chain' and how the data is used. A noteworthy omission from this section of the review is ICT4D field of study. While this is a rapidly developing field the research seems to be based more on the social science fringe compared to the more software/algorithm development side, though the gap is being bridged.

The effect of social media, indicates that on a social level it aids the transition to recovery through blogs[7, ?] and as a general community platform to generate maps [5].

## 4 Taarifa's inception at the RHOK Hackathon

The London Random Hacks of Kindness Hackathon (RHoK) occurred on Friday 21st of October, 2011, lasting for 48 hours in the facilities of University College London. Randomly assembled groups of coders with interests on humanitarian subjects and matter experts joined forces to work together with the aim of producing technology demonstrators and designs to solve problems related to water.

### 4.1 Why a hackathon

The underlying idea of any hackathon, and in particular of the RHOK Hackathon, is that by co-locating intelligent, innovative and driven computer software developers and field experts, facilitating a fast-paced production session lasting no more than a couple of days, can lead to worthwhile innovation. One condition is that all software produced has to be open source, and this naturally offers opportunity of further development by different teams in the future.

There are many kinds of hackathons: from those destined to the very young, to corporate-run hackathons in which participants are selected and paid a daily fee. Many question have arisen about the effectiveness of hackathons in producing something really useful, especially generalist hacking events. However, we argue that dedicated hackathons like the RHOK

are a practical and effective way of developing products, mostly due to their very narrow target. They can be seen as "Sprints" sessions as formalized by the Agile project management theory

*Address???*

## 4.2 A story telling of the event

The event started with an introduction by the organizers framing the exercise with problem statements and presentations by experts wanting to solve different problems. Some of these people spoke in person at the event, while others via teleconference. The problems presented all came from the RHoK website and ranged from water trading platforms to public service infrastructures and community mapping.

Figure 1: RHoK Hackathon

Taarifa started to take shape of a platform to support citizen interaction around public services for lesser developed countries. A team was assembled and collectively started to set up whiteboards and tools to construct the intended processes and a design specification for workflows through the potential system. The discussion focussed on how triaging of reports would work. At the time Taarifa's intended customer was meant to come from a ministry level, potentially working around sanitation or waste issues.

Aiming for rapid development of the platform we decided to fork the Ushahidi platform (Okolloh 2009). Ushahidi is a platform/CMS designed for the crowdsourced reporting of issues, its inception was due to the Kenyan election crisis of 2008, since has been used to report conflicts like civil wars but also the recent occupy movements. Technologically its foundations are built in PHP using the Kohana framework. Here we hit our first issue; none of our developers had worked with Kohana before. We split into two groups, one figuring out Kohana, the other designing workflow.

It became apparent that experience in the right tools was needed with some developers wishing to contribute. However, some were not able to operate at the level as some developers, which is typical of hackathons where a large team works together. As this progressed, these developers filled other roles, testing and aiding the main thrust instead of contributing code. However, their contribution was as valuable in real terms as the code generated. Installing Ushahidi also proved problematic. Issues with `mod_rewrite`

and other PHP extensions were experienced, but were eventually resolved. These potentially could have been avoided through enhanced documentation. Equipment at the hackathon was problematic: the team didn't have access to hosted server, hence one of the developers' personal servers was used.

Once the workflow was sketched out we presented back to the other team of developers. They had conducted a study into the Ushahidi plugin ecosystem. Collectively we integrated the actionable and simple groups plugins. Actionable was adapted to action reports, and place them in the triage system. Simple groups was used to curate a team of fixers. Fixers was used generically as the people fixing the reported problems, however the dynamic of how this would be fully implemented wasnt considered at this stage.

Figure 2: Workflow Of Reports Through The Taarifa System

Inheriting the interface from Ushahidi meant the load on the developers was focused towards the back-end with tasks and problems being received and triaged. The workflow started to come together, based on the idea of community reports being verified, then put on triage, assigned to a team of fixers and finally reaching conclusion or, if not appropriate, directed to dispute resolution. The visual user interface, organized in tabs to accommodate these functions, was integrated into the system. As reports were able to be triaged we focused on expanding the reporting mechanism. Ushahidi supports reporting through a web-based form, twitter and through its mobile applications (iOS, Android, Java and Windows Mobile 6). It can interface with SMS gateways like FrontlineSMS. The team intended to use SMS due to the ubiquitous nature of feature phones in Africa that realistically can only use SMS as a form of reporting. Using SMS presented problems of geolocating the messages. The OGC standard on GeoSMS was unfortunately unavailable at the time, it is possible for the mobile phone networks to triangulate the position of the sender and supply a latitude and longitude however this isnt practical over a 48 hour hackathon notwithstanding the ethical and privacy concerns.

Figure 3: Taarifa Interface

In response to this issue a 100m2 grid was created under a custom coordinate reference system having a 10 digit reference for each grid square. Then a reporter with a SMS capable phone would input the number with a hash (#) then found through a regular expression in the submitted message. Obviously questions remain when implementing this on a large scale namely ensuring local people know what their code is and creating a reference system that conforms to the human geography not just the physical.

This was accomplished on the first day of the hackathon, however we worked through the night, resting for four hours. A global team of friends carried on completing an SMS gateway. What remained at the hackathon around bug-fixing, tidying up code starting documentation and choosing a name. One team member searched the word Reporting into a translation software for the Swahili language. 'Taarifa' was the result.

### **4.3 Discussion about the results of the hackathon**

The Taarifa group at the hackathon was fortunate to be successful and be voted winners of the London hackathon. It was decided that the project was an interesting effort to address real problem, and should be kept alive. The team had worked and synchronised well. Administratively an online mailing list was created, communication through instant messaging and logos and branding. The team assessed that the integration of the mobile applications was key, though development was dispersed over the Android, iOS and Windows Mobile platforms. A decision was made to focus on a web-based HTML5 application. Using the offline functionality of HTML5 and CSS3 a mobile application was quickly prototyped.

## **5 Deployment: Uganda**

The Africa Urban and Water (AFTUW) sector of the World Bank approached the Taarifa project about a pilot with the Ugandan Ministry of Local Government (MoLG). The ministry wished to monitor local government projects based around improving community cohesion, public services and enterprise. A pilot in four districts was decided upon as part of the "Improving Systems for the Urban Poor" of AFTUW supporting two ministry led programs Community Driven Development (CDD) and Local Government Management and Service Delivery (LGMSD).

Figure 4: Taarifa In The Field

CDD is a match funding program where community members form groups around themes of entrepreneurship, farming and education. Funding is given in ratios of 2-5:1 and are aimed at directly improving the development of communities. LGMSD is a government program aimed at building capacity within government. For instance the building of council facilities and schools.

Figure 4 shows the reporting of a local government building in construction by civil servants. Traditionally the system of CDD and LGMSD was paper based. These forms were then posted from the areas to central government in Kampala. This drawbacks, first was the postal service of Uganda with idiosyncratic delivery. Second was the load placed upon the reporters. The complex nature of the questions posed by CDD and LGMSD posed difficulty to civil servants, who may not have the appropriate equipment to submit forms.

Civil servants reporting to these programs were selected for training, with AFTUW supplying Android based Hauwei Gaga mobile phones - under \$100 - as the hardware platform. Initially the custom forms of Taarifa worked well, with the participants able to submit information. However, when venturing into more remote districts the functionality of Taarifa inhibited reporting, specifically offline forms. While reporting offline is possible, it isnt possible to change forms without connectivity. This requirement since entered the Github repository; the platform used for the project management of the Taarifa platform.

Improvements were identified by the pilot and were fed back into the Taarifa community. However the pilot in the four districts was deemed successful by MoLG and AFTUW, consequently the platform was rolled out to the 111 districts of Uganda. Currently the system is directly administered by MoLG, however they are activity seeking a devolution of control to the local districts. This in itself will be a large undertaking and one which potentially requires more structure than the Taarifa project in its current form can provide.

## 6 Summary and Future

This paper has discussed how the Taarifa project was started and how it was used in Uganda. Issues identified with the deployments include problems with civil infrastructure and communications in the country. While it is realistic to adapt the Taarifa platform to be resilient with regard to poor connectivity it will presumably be an issue which will need to be addressed in future iterations.

How can the Taarifa platform deal with an environment with no connectivity? AFTUW is currently assessing and piloting the use of Taarifa in Zimbabwe and South Sudan, the adaption in these environments, with

differing infrastructure and political will, remain outstanding. Taarifa as a group is currently looking towards formalising as an organisation. As an open source movement it can go so far, however as a loose collection of interested humanitarians the project can only go so far. For example documentation is an area which is in need of improvement, not just in requirements but user guides and manuals of use. Unfortunately the code is the documentation isnt an approach that the Taarifa project wishes to take.

As an organisation, formal structures and roles can aid in shaping the project. Requirements gathered in collaboration with users of the platform at the ministerial and local level could be investigated with the funding to explore those opportunities. Taarifa is an open source platform and project and is free to download and use. However the time and equipment spent on the project is costly. The community, however, has proved successful in providing enough motivation to the members to keep working on the project.

## References

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