Water Papers

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WATER HACKATHON

Lessons Learned

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DISCLAIMER

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EXECUTIVE SUMMARY

The global revolution in low cost information and communication technologies can help address some of the developing world's oldest challenges in water and sanitation. More people today have access to a mobile phone than to a toilet. Convergence of widespread mobile phone ownership with new mobile commerce and location aware services offer new platforms for reach, transparency and participation in achieving water security.

OBJECTIVES

The 2011 Water Hackathon was a first-of-its-kind gathering of software developers with the aim of increasing awareness of water sector challenges facing developing countries amongst technical communities in-country and globally. Water Hackathon had four interim objectives: (i) creation of a network of atypical partners engaged in finding solutions to water-related challenges, (ii) preparation of a list of challenges facing the water sector, (iii) development of new applications designed to address these challenges, and (iv) adoption of new applications and codes in World Bank projects.

Water Hackathon adopted many of the methods for engagement of technologists from the software community. The team also sought to adapt—or re-engineer—the methodology to suit a traditional development sector. In this context, Water Hackathon should be seen both as a process as well as a series of events intended to build a lasting community around water innovation needs.

OUTCOMES

Water Hackathon took place simultaneously in ten cities around the world. From Lima to Cairo to Bangalore, over 500 local technology specialists competed to build prototype solutions to water-sector challenges defined by governments, utilities, civil society groups, World Bank experts, and directly by citizens.

By embracing a competition model common in Silicon Valley, and through partnership with tech organizations, universities and community leaders, the World Bank was able to leverage its brand to draw attention to development water problems. Overall, more than 60 prototype solutions were built in response to the 113 water sector challenges defined.

The team observed that in order for hackathon outputs to lead to meaningful outcomes for beneficiaries, there is a need for more iterative learning, transparency and sharing of experiences and tools as a means to improve water and sanitation services.

PROCESS

The hackathon event was preceded by an iterative process of consultation, definition and refinement. These processes identified significant challenges in the water sector judged amenable to technology solutions. They were then reframed in a way that allowed computer programmers—often unfamiliar with the water sector—to understand and address them directly.

Strong partnerships with local technology leaders allowed the World Bank to reach this community, and the response was enthusiastic. The iterative process of defining pressing problems also brought to the surface existing and nascent innovations and innovators within the water community. This deepened their engagement and strengthened their ties, both to one another and to the hackathon community.

FOLLOW-UP

The process also emphasized the importance of follow-up activities after the hackathon. Winning teams were rewarded with business incubation support and offered further opportunities to engage with their water counterparts. In some cases, this led to financing start-ups and the recruitment of local developers by various governments. These outcomes reinforce the conviction that in order to achieve lasting impact, a hackathon should be part of a process, not just a one-off event, with deep preparation in both expert and local communities, as well as follow-up.

LESSONS

The openness of the approach attracted considerable attention from within the water community and also from print and online media, including blogs and social networks, which traditionally do not feature water content. “This was the new Egypt at work,” said one participant in Cairo.

Water Hackathon offered a low-cost, high-reward opportunity to open up water sector challenges to the talent and creativity of the ICT design and development community. This approach also required a change in mindset for the World Bank, calling for greater openness, experimentation and tolerance of failure. Other development sectors willing to take this risk may find useful the lessons learned in the process, which are detailed in this paper.

Introduction

With the number of mobile subscriptions exceeding five billion, more people today have access to a mobile phone than to a toilet.

The surge in mobile phones in developing countries—some percent of urban Africans are near a GSM signal—is transforming the way people live. Farmers in Niger use mobile phones to find out which market is offering the best price for certain goods. People in Kenya can pay their water bills using mobile money. In India, the mobile phone is used in citizen election monitoring and in equipping voters, via text message, with information on candidates' incomes and criminal backgrounds (Devarajan 2012).

The lack of safe drinking water and adequate sanitation is the world's single largest cause of illnesses, responsible for two million deaths a year. The sustainable management of water resources has acquired a new urgency considering that the global population is expected to reach nine billion by 2050. Water is also the primary medium through which climate change will impact people, economies, and ecosystems. In many poor countries, water resource variability is already posing a challenge to development efforts. Poor governance and political interference remain key constraints to addressing these issues. New non-traditional ideas, the better use of open data, and innovative tools are needed to respond to this global water crisis, in an effort to change the governance of these systems and improve trust in water services.

The global convergence of increasing mobile network coverage, mobile commerce and smart technologies offer new pathways to achieving water security based on low-cost, scalable and accessible information architecture (Hope et al. 2011). From leak detection to smart water metering to database management, software is already embedded in the delivery of water services. Use of Geographic Information Systems (GIS) are also widespread in hydro modeling. More recently, mobile phones are increasingly being used for individual reporting of hydrological events, such as floods or droughts, or for crowdsourcing[1] approaches using networks.

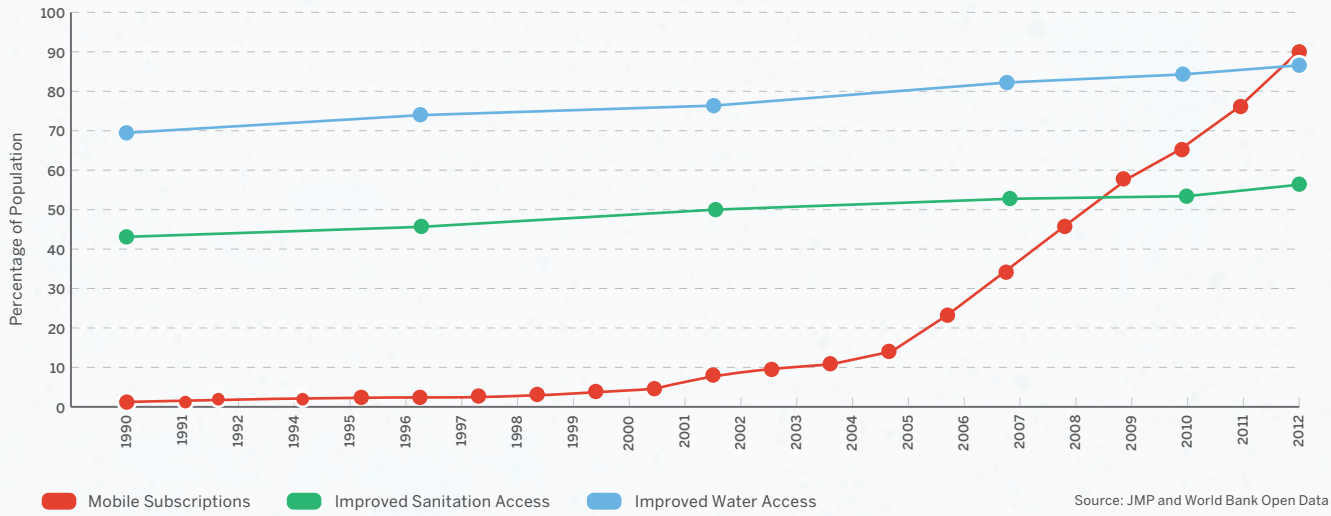
[1] Crowdsourcing is the act of outsourcing tasks to an undefined, large group of people or community (a "crowd"), through an open call.

Are we taking full advantage of increasingly ubiquitous mobile phones and internet access to transform water management and services when it comes to inclusiveness, citizen participation, and transparency? Are we using open data to its fullest practical advantage?

In search of answers, the World Bank water practice embarked on a year-long process of introspection and outreach that culminated in the first ever water hackathon.

Bangalore Water Hackathon

ACCESS TO AN IMPROVED WATER SOURCE AND SANITATION COMPARED TO MOBILE SUBSCRIPTIONS IN DEVELOPING COUNTRIES



Source: JMP and World Bank Open Data

What is a "Hackathon"?

A hack-a-thon event (also known as an apps challenge, hack day, hackfest or codefest) is an intensive marathon competition of brainstorming and computer programming that draws together the talent and creativity of software developers and designers.

Kampala Water Hackathon

These events typically last from several days to a week in length, and can be commercial or civic in nature. The barrier to entry in the creation of open source mobile and web applications is low, enabling innovation and the creation of operable prototypes within tight time constraints.

Since their inception, the main purpose of hackathons has been to bring together programmers in order that they might share their skills for common projects. What began as rather informal get-togethers among programmers have evolved to become increasingly well-organized events aimed at motivating programmers to share their skills and fulfill a social purpose. Organized hackathons may even offer incentives, such as prizes.

It is important to understand the root of such events, since they are based on open collaboration within a distinct culture. The success of a hackathon therefore depends in no small measure on the event's perceived authenticity, which first must be ensured by embracing the language of hackers. The term "hacker" itself is often misinterpreted by the public when it comes to programmers.[2] There is regularly a need to define "hacking" and to explain what hackathon organizers understand by the term.

> An increasing number of hackathon events aim to pair technology expertise with real world problems.

Hackathons are common in Silicon alley, where companies such as Linkedin and Facebook credit them with some of their best innovations (Coutu 2011). However, there have been few public sector-led hacking competitions. Recognizing the potential for the co-creation of knowledge, an increasing number of hackathon events aim to direct technology expertise toward addressing real world problems. One prominent example is Random Hacks of Kindness (RHoK), which organizes biannual hacking events focused on developing technical solutions in response to humanitarian challenges.

[2] See http://en.wikipedia.org/wiki/Hacker (programmer subculture) Ethics

What is the RHoK Model?

The World Bank engaged with the hackathon methodology before designing Water Hackathon, most notably through the Random Hacks of Kindness (RHoK) model, which was driven in its onset (2009-2011) by the disaster risk management community.

The RHoK approach was inspired by the steady rise in technical volunteerism of software developers willing to dedicate time to coding, mapping, and web design in response to global humanitarian crises. Random Hacks of Kindness sought to provide an avenue for volunteer developers to contribute their skills to help communities prepare for risks before crises occurred, rather simply in response to disasters.

RHoK events offer an opportunity for subject matter experts and technologists to work together on addressing civic challenges. Through global partnerships (Google, Microsoft, ahoo , NASA, HP and the World Bank) and the support of 1 0 local partner organizations, RHoK aims to attract enthusiastic programmers and designers to engage on a voluntary basis in locally organized events held around the world.

The combination of sector expertise and "hacking" skills—which include expertise in computer programming, web design, mapping, database management, social media, and online campaigns — has led to numerous unique software solutions.[3] For example, one winning solution to emerge from RHoK allows first responders to crowdsource useful information about earthquake impacts in real time. The mobile application was piloted in Chile after the 2010 earthquake.

RHoK projects are open source. The RHoK model allows participants the most freedom possible in selecting a license, balanced with the freedom of others to use and adapt developed technologies according to their needs. Projects must be licensed under an Open Source Initiative (OSI) approved license.[5] Projects must also have their code posted on a publicly available code repository.

EXAMPLES OF HACKING FOR HUMANITY

The following are some examples of hackathons and application development competitions to support improved public services:

Random Hacks of Kindness (multiple cities):
http://www.rhok.org/

New York City Big Apps Competition:
http://nycbigapps.com/

Valley Transportation Authority (VTA) Transit App Contest:
http://www.vta.org/appcontest/

Apps for Californians Competition:
http://www.ca.gov/appsforcalifornians/

World Bank Apps for Development:
http://appsfordevelopment.challengepost.com/

Apps for Climate Action Contest:
http://www.livesmartbc.ca/A CA/

Reinvent NYC.gov (New York City):
http://socialmediaweek.org/blog/tag/hackathon/

Crisis Camp Haiti:
http://crisiscamphaitiwdc.eventbrite.com/

International Space Apps Challenge:
http://open.nasa.gov/appschallenge/

Hacking Autism:
http://www.hackingautism.org/

[3] See http://dl.dropbox.com/u/6 7 33 /RHoK Success Stories.pptx for full list of deployed apps to emerge from RHoK

See http://epic.cs.colorado.edu/ page id 11

[5] See http://www.opensource.org/licenses/category

What is different about Water Hackathon?

Nairobi Water Hackathon

Many early hackathon events in the humanitarian sector included "crisis camps" and often took the form of self-organizing groups convening during weekends in response to immediate crisis events.

These were successful at attracting high-quality technical volunteers. While the outcomes of such events had an impact in the response phase of disasters, the value of rapid but short-lived technical volunteerism to the longer-term goals of disaster risk management—in prevention and sustainable recovery—were less clear. Most projects suffered a lack of sector expert engagement, a narrow focus on short-term needs and limited follow-through on the part of the volunteers that created the application.

While the water and sanitation sectors have much in common with disaster risk management, it was also clear that the incentive mechanisms would have to be adapted. Water and sanitation would not be able to count on the powerful motivator of a major crisis to attract technical volunteers and would, therefore, have to build a case for itself. On the other hand, a non-crisis driven sector can afford to pick a fixed date and invest in lengthy preparatory screenings and community building. Water Hackathon, therefore, sought to adopt a process inspired by the RHoK model but chose to identify and brand itself primarily as an activity led by the water community. It also emphasized incentives aimed at leveraging more appropriate applications and more sustainable outcomes. The principal design features have been to prioritize: (i) locally identified problems; (ii) deep subject matter expert involvement throughout the process; (iii) local community building by leveraging existing networks and recognized local champions; (iv) targeting incentives towards technical entrepreneurs more likely to engage in the medium term, rather than volunteers for the short term; (v) positioning of problem statement owners as clients with some degree of follow-up commitment; and (vi) investment in post-event measures, such as naming of water ambassadors.

Water Hackathon aimed to build on the RHoK model, implementing several modifications based on RHoK's experience:

1. The team would make a concerted effort to source problems from World Bank staff, local government, and local communities directly.
2. The team would encourage sector specialists to participate in hackathon events and pre-events.
3. The team would embed follow-up measures to support and showcase winning teams.

NEED TO HAVE VS. NICE TO HAVE

These modifications were designed with two outcomes in mind:

1. To increase the likelihood that the hackathon would produce "need to have" prototype apps for World Bank staff and their counterparts rather than "nice to have" technology solutions that might be useful for outreach or for water advocacy more broadly.
2. To increase the likelihood that those "need to have" prototypes apps would have access to resources to help them scale up and deploy in the field quickly and cheaply.

London Water Hackathon

Water Hackathon represented a radically open approach to problem solving, unusual to most in the water sector in and outside of the World Bank. Accordingly, water professionals, as much as their technology counterparts, needed to be convinced of the merit of participating. The team quickly learned that many water problems are multifaceted and do not lend themselves to simple technology descriptions, and thereby requiring considerable translation by ICT experts. More often than not, convincing water professionals of ICT's potential and translating water sector issues for technology experts was best facilitated by local knowledge of the constraints and context of the problems. These efforts were aided greatly by the fact that the department and vice presidency were able to jointly share risks and accountability (the water and ICT teams are both part of TWI), ensuring cross-sectoral collaboration and a decentralized World Bank presence.

Project Objectives

Cairo Water Hackathon

Water Hackathon began with a modest development objective — to increase awareness among technical communities, in-country and globally, of the water-related challenges faced by developing countries. From the outset, the organizing team (composed of technology and water experts from the World Bank's Water Anchor, Water and Sanitation Program, and ICT Sector Unit) recognized that reaching the global tech community would require going beyond the traditional boundaries of the World Bank.

In order for promote this cross-sectoral collaboration, the team sought to attract non-traditional solutions to development water problems. The team, however, was always more concerned about building a community than about generating applications. In doing so, the team needed to remove barriers for collaboration between water professionals and local technologists.

PROJECT COMPONENTS:

1. Convene a network of non-traditional partners committed to finding solutions to water-related challenges
2. Establish a list of challenges facing the water sector
3. Develop new software applications and appropriate technologies designed to address these challenges
. Promote the adoption and deployment of new applications and appropriate technologies in water projects, including those of the World Bank and its counterparts

THE SCOPE:

The scope of the activity was deliberately broad in order to capture the greatest number of problem definitions (see Annex 2), including but not limited to challenges relating to water supply and sanitation, flood and water resource management, and agricultural water management.

Project Outputs

The project had three phases of outputs:

PHASE 1
April — October 2011

Preparation of a list of challenges facing the water sector	113 Problems (Full list Annex 2)
Design and management of on-line platform for collaboration	waterhackathon.org
Establishment of partnerships with actors in the water community	25 Partners
Identification of three main stages for the event	Bangalore, Cairo and Nairobi

PHASE 2
July — October 2011

Refinement of the list of challenges facing the water sector	rhok.org/problems
Establishment of partnership with the ICT community	0 Partners
Organization and execution of a hackathon event	10 hackathons held simultaneously in Bangalore, Cairo, Kampala, Lagos, Lima, London, Nairobi, Tel Aviv, Toronto, and Washington DC
Development of new applications and codes designed to address water challenges	62 prototypes developed[7]. 67 percent of participants were still working on their project three months after the hackathon.

PHASE 3
November — February 2012

Dissemination of the best ranking applications and codes developed	Water Ambassadors enlisted, post-event meet-ups, government-hosted workshops, multiple blog posts and articles
Organization of learning events for Bank water staff	TWI department meeting

[7] Since October, various participants of hackathons organized independent of the World Bank have worked on the problems published online.

Benefits

OUTCOME	BENEFICIARY	EXAMPLE
Direct benefits		
Network of non-traditional partners focussed on water challenges	Water clients	25 water sector partners and 0 ICT partners collaborated across 10 events - included new connections with partners such as Bug Labs, Nokia, and Akvo
A discrete listing of innovation needs and potential sponsors	Innovators	113 problem statements described by experts and associated with potential sponsors or host projects
Appropriate applications developed	Water clients	62 protypes were created at the hackathon including water testing, citizen feedback, and water use optimization
Real world deployment of new technologies	Water clients and citizens	Three months after the event, 67% of participants continued to work on their prototypes, five deployed in projects
Indirect benefits		
Creation of new communities	Water clients and citizens	12 start-ups were founded to address diverse needs of the water sector, 10 Water Ambassadors selected to follow-up with participants and report biweekly on development of prototypes
New public release of water data	Water clients and citizens	The Open Peruvian Water Map prototype makes official data available to the public and, for the first time, consolidates all available water resources data in a central and open form
Awareness of water challenges	Water clients and citizens	Broad media coverage - eg. Wired magazine article on water hackathon and water innovation needs, waterhack twitter trending
Demonstrated culture for risk and innovation	World Bank Group, water clients	Government of India water specialists encouraged to put forward new ideas for innovation
Changed public perception of risk apetite of World Bank	World Bank Group	Innovators and development partners more likely to approach the Bank with new ideas - eg. National Geographic
Learning and awareness of ICT opportunities	World Bank Group, water clients	Numerous bank and government staff participating in hacking events and internal learning events
Improved synergies across departments disciplines	World Bank Group	World Bank Group staff collaboration across Water, Sanitation, ICT, Communications, Innovation and Country units
Synthesis of local talent and demystified R D tasks	Procurement professionals	Hackathon functioned as precursor to support the design of Requests for Proposals, identifying potential consultants and illustrating the breadth of potential technical approaches that could apply

Lessons learned from Water Hackathon

Water Hackathon can be seen through the event-centric lens, with output measured by number of submitted problem statements, participants, and prototypes developed, and it can also be viewed as a process.

In the event regard, Water Hackathon activities exceeded expectations, with nearly 1000 registered hackers at ten locations worldwide, and some 62 new prototypes developed. It is little wonder that public attention—and considerable media attention—should focus on the event itself. However, an overemphasis on outputs conceals many of the meaningful outcomes that can result from designing a hackathon as a process that supports the creation of connected water and technology communities.

The process approach places equal emphasis on the collection of problems from those best equipped to define them, the execution of a fun and open hackathon hosted by tech community partners best equipped to organize them, and follow-up activities that offer opportunities for further collaboration.

An overemphasis on outputs conceals many of the meaningful outcomes that can result from designing a hackathon as a process.

Lima Water Hackathon

CHECKLIST FOR SECTOR-LED HACKATHON

Must have | Optimal but optional | For Bank Staff

PROBLEM DEFINITION
begin 1 - 4 months prior to the hackathon date

- [ ] **Problem collection**
  Identify suitable development problems through active preparation and consultation with those invested in the sector, including government, private services providers, NGOs, citizens and World Bank staff.

- [ ] **Partnerships**
  Engage a local tech partner that will be better equipped to host a hackathon and can lend authenticity to the event.

- [ ] **Communication**
  With the help of tech partners and in-country staff, identify the best outreach channels (blogs, press release, etc.) in order to attract quality participants and shape a communications strategy around impacts to real world problems to attract volunteers seeking to make a difference.

- [ ] **Pre-events**
  Facilitate communication between software developers and sector experts over a longer period (1-3 months) prior to hackathon event, e.g. through meet-ups, tech camps, and clinics.

- [ ] **Problem translation**
  Reframe development problems into succinct technical specifications recognizable to software developers. Support from tech partners at pre-events is helpful.

- [ ] **Brown Bag Lunch**
  Host a BBL early on to inform staff of the hackathon, key dates and how to participate. Once on board, staff are the key link to problem owners in government.

HACKATHON EVENT
begin 1 - 2 months prior to the hackathon date

- [ ] **Code repository**
  Post participant-developed solutions to a common web platform. Clearly indicate in advance guidelines for licensing (eg. OSI approved license posted in a publicly available code repository such as GitHub or Google Code.)

- [ ] **Venue**
  Choose a creative, non-traditional, open space for the event, preferably provided by a partner or sponsor. If it is difficult to reach, group transportation should be arranged.

- [ ] **Facilitator**
  Recruit facilitators to be responsible for opening and closing the event, communicating hackathon rules to participants, guiding judges through the selection process, and providing general logistical support during the event.

- [ ] **Sponsorship**
  Sponsorship from the local business community could take many forms, including venue provision, prizes and refreshments. Organizers should consider how much discretion over licensing they wish to maintain when aligning with partners.

CHECKLIST FOR SECTOR-LED HACKATHON (CONTINUED)

Must have | Optimal but optional | For Bank Staff

HACKATHON EVENT (Continued)

begin 1 - 2 months prior to the hackathon date

- [ ] **Judges**

  Invite a distinguished group of leaders from the development sector and from the tech community to act as judges. Judges use criteria, developed by organizers, to evaluate the applications developed at the event.

- [ ] **Prizes**

  Prizes could be a bonus for participants although participants tend to be motivated, in large part, by the opportunity to contribute to real-world solutions.

- [ ] **Share Knowledge**

  Prepare and share briefing notes with Bank Management in advance of the event. This will prevent misunderstandings and provide an opportunity for input and participation.

FOLLOW-UP

begin immediately following hackathon date

- [ ] **Ambassadors**

  Recruit "Ambassadors" at event locations to support follow-up. They write blogposts documenting the progress of applications and facilitate communication among the new community of participants.

- [ ] **Get Feedback**

  Send out an on-line survey to participants for feedback on what worked and what didn't. This is useful for documenting success and learning from mistakes.

- [ ] **Post-events**

  Follow-up events enable programmers to further engage with their development sector counterparts. This can lead to financing for start-ups and other employment opportunities.

- [ ] **Incubation**

  Make the effort to collaborate with incubation facilities that offer access to office space, internet access, and mentorship from experienced start-ups.

Problem Definition

In order for software programmers and designers to build meaningful prototypes, they needed to understand the challenges facing those already invested in the sector.

The natural first step for any sector-focused hackathons is cataloguing these problems. For Water Hackathon, several groups were targeted, including water experts at the World Bank and in academia, water service providers (utilities and local government), non-governmental organizations (NGOs), and finally, end users of water services.

PROBLEM COLLECTION

Extracting Development Problems from the Source

LESSON: Identifying suitable problem definitions for a Hackathon will require active preparation and consultation. It is necessary to interview people, so they can explain their challenges with a water project and provide or suggest data when relevant. One is generally unable to rely on a spontaneous submission of suitable problems.

The participation of experts from the field was critical to Water Hackathon's success, but many are unfamiliar with how ICT can help address seemingly intractable issues. To bring these front-line engineers, project managers, and community organizations into the process, the team began asking a simple question: "what information do you wish you had"

At the outset, World Bank water experts were very reluctant to participate. On the one hand, many were not yet convinced that ICT could add value to their projects. Engagement in the hackathon would thus be an exploratory venture, perceived as too time consuming in a task manager's already tight agenda. For this category, the team collected examples of technological applications that had led to increased transparency and accountability at the project level (see Annex 6).

On the other hand, where task managers had a commitment to integrating ICT and had clearly formulated problems, reluctance was borne of reputational risk for the Bank. The fact that hackers were likely to be young individuals without the backing of professional software development firms raised the concern that engaging hackers could be a futile endeavor, as winners would either not have the qualifications to be hired on behalf of clients or, if hired, would be too difficult to administer in view of World Bank procurement and web governance requirements. For this category of skeptics, management endorsement of the hackathon process was critical to driving up participation among staff.

Once on board, staff became the key link to service providers and government. Better than any external expert, the professionals within these organizations understand the problems they face on a daily basis delivering water services. Securing their ownership of a problem was critical, not least because they are the natural clients of a good solution.

Once on board, staff became the key link to service providers and government.

In many countries, the government had access to sectoral data that may be unavailable to the general public. The team witnessed a strong correlation between having a proactive government partner and running a successful hackathon. For example, in Peru, the Lima hackathon resulted in the release for the first time of national hydrological data from the Ministry of Agriculture. This process of securing problem ownership by public sector counterparts relied heavily on the credibility and dedication of World Bank colleagues in the field.

Click to watch video:
Can a Webcam Monitor Waterflows
http://youtu.be/aWy_b_epa_s

Sometimes the converse question would help too, namely "what information do you have, that you wish others had access too". This question worked well with owners of national hydrology data, like Peru's Ministry of Agriculture, or owners of international meteorological data, like NASA. Often this data was already in the public domain but its location and importance obscured.

FROM PROBLEM TO PILOT

The origin on Maji Voice

The winning Maji- oice application was developed at the Nairobi Water Hackathon in response to a challenge issued by the Kenyan national Water Services Regulatory Board (WASREB) to develop a new mobile-to-web customer feedback system. 1 months prior to the hackathon, the regulator, in partnership with the Water and Sanitation Program, piloted a sector feedback mechanism through local, community-based watchdogs, referred to as Water Action Groups (WAGs). Three important lessons from the WAG pilot informed the hackathon problem statement. First, that structured citizen engagement on the demand side as formalized through the WAGs initiative improved turnaround times of outstanding service challenges, especially those faced by poorer populations relying on kiosks. Secondly, it unveiled glaring weaknesses in accountability of the resolution of utility complaints recording and resolution processes, in spite of the considerable gains realized by sector reforms and the Water Act of 2002. Thirdly and importantly with respect to the hackathon was the lesson that, from the enormous amount of feedback generated by WAGs in four cities alone, the mechanism could not be scaled up nationwide as planned unless a smarter means of handling the bulky data generated was found. The regulator and WSP concluded that an electronic feedback system could further accelerate refom and improve sector efficiency by:

- Enabling automated consolidation of bulky citizen feedback data, data analysis and reporting
- Providing a demand-side tool to facilitate access to information and inform dialogue around service improvements between consumer representatives and their service providers
- Assuring accountability in resolving consumer cases, tracking progress of responses in real-time, and improving the effectiveness of the oversight functions between front line staff, utility management, water boards and WASREB

World Bank staff worked with the regulator to write up a simplified definition of the problem and the sought-after features. WASREB showed its commitment by sending a representative to the Nairobi Hackathon event to explain the challenge to the technology experts present. Multiple hacker teams then competed to build and demonstrate an efficient prototype solution. The winning Maji- oice application managed to include all key features that function well, even on basic Nokia handsets.

In the spirit of treating the Hackathon as a process, the winning team received a six-month business incubation sponsorship and was asked to participate in a tender to develop the system to maturity. The intention was to give the best Hackathon teams a path to build on the outcomes of the actual Hackathon event. The Maji- oice team eventually managed to obtain endorsement by WASREB and its partners to develop the initial prototype. The development is currently ongoing.

Click to watch video:
The Cartel Problem in Mathare
http://vimeo.com/2752 05

Leveraging the World Bank's convening power and that of civil society partners, the team was able to collect problems directly from end users. For residents in Mathare, that problem was the cartels that charged ten times what the average Kenyan pays for clean water. For a farming company in Egypt, the problem was inefficiencies in irrigation that left them short of water in the dry season. While not all of these problems lent themselves to ICT solutions, those that did ranked among the most compelling. The involvement of end users also shed light on the barriers to ICT use, such as illiteracy, network access, electricity for charging, and education levels.

This process of sensitizing water stakeholders to the potential of ICT to increase transparency, participation and accountability itself has value. Many water professionals are curious about how they might leverage the rapid growth in access to ICT tools in their work. However, just as water professionals have developed their own vernacular, so too have technologists, preventing all but the most enthusiastic water professional from getting involved.

See blog by Daraja on barriers for Maji Matone http://blog.daraja.org/2012/02/so-what-have-we-learnt-summarising.html

PROBLEM TRANSLATION

Reframing development problems for techies

LESSON: It is important to reframe water problems so that the technology entry point is clear. The goal is to allow programmers and designers to relate to the water community; this appears to work best when issues are presented in the form of human interest stories that are at once vivid, intriguing, and moving. Adding a section to the problem statement that tells a story and describes the challenges related to water helps technology experts to better understand what is at stake.

Problems require some degree of translation from development terminology into succinct technical specifications recognizable to software developers. A popular format includes: i) the crisis statement (why does this particular problem matter and deserve immediate attention); ii) the problem specification itself (what is needed); and iii) an impact statement (what actions will be taken if such a problem is solved, and what impact will it have).

CRISIS STATEMENTS

While the human development consequences of poor latrine hygiene seem obvious to a sanitation engineer, they may not constitute the most compelling call to arms for a software developer. Crisis statements should therefore seek to distill into one sentence the "why does this matter" aspects of a particular issue, highlighting the impact on poverty, health or well-being.

OWNERSHIP LEADS TO SUSTAINABILITY

The story of YacuPortal

In Peru, the participation of the Government was a key element for identifying potential challenges and implementing prototypes such that they might achieve the greatest possible impact. Participating institutions included the National Water Authority (ANA), the Drinking Water and Sewerage Service of Lima (SEDAPAL), the National Program for Rural Sanitation (PRONASAR), the National Superintendency of Sanitation (SUNASS), and the Ministry of Housing, among others.

One of the challenges identified was how to strengthen the limited capacities of workers from rural municipalities when it comes to water resources management and facilitate access to key information. The proposal was named "–acuPortal" and described a content management tool with easy access and functionality that would serve as a mechanism of communication between all government professionals and, in particular, as a capacity-building system for municipal authorities working in rural sanitation,. This application will gather, for example, all existing legislation or updated literature regarding the use of water. The leadership of the challenge was entirely assumed by a government official from PRONASAR who expressed her commitment to the further development of this initiative.

Another prototype from the competition—the final winner, in fact—focused on addressing the lack of access to current and accurate information on all rivers, lakes and watersheds existing in Peru. This initiative is currently under development and is expected to soon be adopted by government institutions, as detailed in this section.

PROBLEM SPECIFICATIONS

Often requiring input from both subject matter experts and technical intermediaries, this section allows computer programmers—often unfamiliar with the water sector—to understand where their entry points lie. This process of vetting problems was aided greatly by technology partners, as well as by in-house ICT staff. Examples include the elimination of redundant or sector-specific terminology and a sharper focus on technical needs, such as platforms, technologies, software languages, interfaces, standards, compatibilities, users, licensing, scope and costs. Problem specifications should avoid prescribing assumed solutions and define only needs. For instance, many in the water community seeking mobile data capture tools would at first ask for an "SMS feedback system," unaware that several standards in fact exist to facilitate mobile reporting. Only after consultation with ICT staff did they learn that USSD (which many people think of as SMS) may be more appropriate technically, but that costs, scale and open/proprietary licensing would need to be specified as well.

IMPACT STATEMENTS

This final section can serve to orient programmers towards the sustainability of their applications. The incentive appeals most to those seeking to turn their contribution into a startup or pilot and motivates follow-on engagement. Additionally, impact statements offer an opportunity to highlight where the greatest impact lies and to orient non-subject matter experts to focus on the low-hanging opportunities.

The complexity of development problems is traditionally underemphasized at hacking events, leading many technologists to build solutions to problems they themselves perceive as critical, rather than focusing on those identified as critical by sector experts. A published set of technical water problems, identified by communities, defined and vetted by experts and linked to clients provides for a powerful road map and represents a comparative advantage of the World Bank. Such a wish list can guide any technologist, however unfamiliar with the water sector, as to how he or she can make an impact on real-world needs.

There is no guarantee that even a well-defined problem will be solved at the hackathon. Many intriguing and well-defined problems were not addressed at Water Hackathon. This is one of the risks involved in taking an open approach, and it should be communicated clearly to problem definers. That being said, the problem-formulation exercise itself has value. Once pooled together and posted on the RHoK platform, problems may well attract the attention of others. For example, a water purification problem defined by a Columbia University PhD candidate was not solved at Water Hackathon, but its online publication attracted hacker teams at two subsequent hackathon events.

PRE-EVENTS

The more you mingle, the better

LESSON: Facilitate communication between programmers and water experts over a longer period prior to the actual hackathon. Invite the tech community and sector experts to select potential ideas. Working on relatively small projects, which have some ownership, is better than merely offering lists of problems. Additionally, such projects need a deadline (countdown) and clearly designated responsibilities.

Pre-events are an important process component to consider in promoting effective stakeholder engagement and problem definition. Pre-events encourage iterative discussions around atypical problems, such as how to crowdsource weather data via mobiles or how to visualize irrigation data in real time. As such, they serve to surface and refine ideas that may have previously been thought too risky to consider or inappropriate. These events can also build on the digital literacy of sector specialists while improving technologists' knowledge of sector challenges.

A key success factor of any hackathon is to organize such events and the process around them hand-in-hand with the tech community. Transparency is an essential value within such communities, which rely mostly on distant communication. Pre-events offer a chance to incorporate the community's input with respect to problem selection and hackathon event design. Those locations that hosted pre-events in advance of the hackathon were also often able to address data gaps and build ownership around a potential solution.

There are 3 types of pre-events:

MEET-UPS

A meet-up is an informal meeting to brainstorm and exchange ideas. The relaxed atmosphere encourages an open discussion on which water problems are most pressing and which best lend themselves to technical solutions. These meetings also provide a chance to bridge the technical language barriers between hackers and water specialists.

DC Water Hackathon

Meet-ups in Lima

In Lima, three preparatory meet-ups prior to the Hackathon served to identify nine water challenges as well as to build the foundation for strategic alliances among institutions in various sectors, especially those that potentially could provide sustainability to the proposed solutions. Around 23 institutions from different sectors (government, hackers, civil society) were represented in these sessions, and through a live Internet broadcast, people from different cities across Peru could also join in this process.

The first meet-up allowed the water specialists to meet the leading team and become familiar with the event's guidelines, and also allowed the leading team to become familiar with the specialists' perspective. During this meeting, sector specialists discussed their perspectives on water-related problems (cleanliness, water utilities performance, etc.), while hackers took a different approach (addressing problems from the point of view of non-specialists or users of the service). During this session it was hard to understand the respective technical language of both hackers and water specialists. Accordingly, the use of simple language was encouraged, allowing each group to understand the other more clearly.

The second and third meet-ups focused on brainstorming around potential solutions, refining the challenges, and determining the owner of the challenge and a team to support it. During these meet-ups, it was very important to seek strategic alliances with large coverage programs in key areas that could ensure the sustainability and impact of the proposed solutions. For example, during the second meet-up, the One Laptop per Child Program (sponsored by the Ministry of Education) became a partner, offering the use of half a million O L computers distributed among the children of Peru to disseminate potential solutions. Also, the use of social networks (Facebook, Twitter) helped in promoting the event and its outcomes.

Click to watch: The Lima Meet-up
http://youtu.be/tI0Hel_z_K0

Meet-ups in Bangalore and Delhi

Click to watch: The Dehli Meet-up
http://youtu.be/U_pNEnblAx_

Before the Bangalore Water Hackathon, two brainstorming events were held jointly by India Water Portal, the Indian Institute of Human Settlements and the Water and Sanitation Program (in New Delhi and Bangalore). Over 100 sector professionals participated, including senior central government officials, non-governmental organizations, water utilities and other bilateral and multilateral agencies, such as DFID and UNICEF.

More than 0 problem statements were submitted and the organizing team shortlisted a final 1 statements by forming a selection team that included government representatives. Many of the problem definitions revolved around consumer complaint redressal, monitoring and progress tracking. For example, the problem of tracking and rating public toilets in India garnered a lot of enthusiastic participation from software developers, as many could relate to this issue personally. For the actual event, recognizing that the software developers would require more information from sector

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professionals, each problem definition had an owner and, additionally, several sector professionals were available on site to explain the issues to the participating hackers.

These pre-events ensured the support of nine partners and institutes, as the organizing team sent frequent mailers announcing the event and solicited feedback from professionals on the problem statements, holding several one-on-one meetings to invite governments, the private sector and development partners to join in as partners in the event. The main purpose of these efforts was to see to it that other agencies also had a stake in ensuring that the prototypes developed at the hackathon would be taken forward for actual implementation. The event created a good deal of excitement throughout the country, and almost everyone contacted ultimately supported the event, providing in kind or financial support.

Cairo Water Hackathon

TECH CAMPS

A tech camp is a slightly more formal brainstorming meeting, usually led by a facilitator, the goal of which is stated up front (eg. refinement of a list of water challenges). The tech camp's format can involve a presentation by the facilitator and key discussants to provide an overview of major water challenges in the country and applicable technology solutions, followed by break-out groups devoted to different problems, usually moderated by experts. As with a meet-up, a tech camp can help to bridge the language and knowledge barriers between hackers and water stakeholders.

Cairo Tech Camp

The Cairo Water Hackathon team and its partners convened a wide range of stakeholders at a tech camp in Cairo two weeks prior to the hackathon to discuss priority challenges around water in Egypt and refine them into specific problem statements that could be addressed through technology. Stakeholders included the Ministry of Water Resources and Irrigation (MWRI), the Ministry of Communication and Information Technologies (MCIT), the Holding Company for Water and Waste (HCWW), non-governmental organizations, academia, members of low-income communities and members of the Egyptian technology community.

The team considered this camp an essential step in the hackathon process; they perceived a significant knowledge gap between the water and technology communities. The water community—in particular the more traditional, government counterpart—seemed to lack a full understanding of innovative technological approaches to water resource management and how to define water-related challenges in problem statements that could be addressed at the hackathon.

The tech camp attracted over 0 participants, with 5 percent hailing from the water and development sector. It was convened with the objective of prioritizing the top ten challenges related to water and sanitation in Egypt and refining these in specific problem statements that ICT tools can address. The format of the tech camp was centered on presentations by the facilitator and key discussants that provided an overview of major water challenges in the country and introduced applicable technology solutions. These were followed by break-out groups devoted to irrigation, water conservation, conveyance, and purification, moderated by water experts who defined and translated water problems for the technology community. The tech camp helped the Task Team, together with the tech camp facilitator and World Bank water specialists in Cairo, to draft a more substantive list of problems and refine and prioritize them for the hackathon, as well as build water specialists' and technologists' understanding of technology solutions for water problems.

CLINICS

Clinics offer a more formal option for promoting problem refinement and ownership. Unlike a meet-up or tech camp, sector participants are required to come prepared with project-related problems and questions. Technical specialists lead small group discussions related to specific technological tools (mobile, mapping, etc.), offering advice and assistance to problem owners looking to reframe their problems for a technical audience. These sprint sessions can help to demystify what is achievable at a hackathon.

Hacking for Dummies Clinic in Washington DC

Click to watch: The DC Clinic http://youtu.be/PUBRsMMoTO

As part of the preparatory steps for a main hackathon event, the team organized a "Water Hacking for Dummies" workshop at World Bank headquarters. This lunchtime event was designed to help problem owners (World Bank Project Managers - TTLs) to get their problems as well defined as possible before the start of the hackathon. The team invited three highly experienced technologists: Tom Lee of Sunlight Labs, Andrew Turner of GEOI , and Jon Gosier of Metalayer. They served as thought partners for the TTLs in their areas of expertise (crowdsourcing, mapping and data, respectively) and helped them think though the problems to ensure that they were not only clear, but also that the potential solutions from the hackathons would be of value. This conversation was facilitated by World Bank staff with significant hackathon experience and resulted in higher quality problem statements that were immediately added to the Water Hackathon website.

A secondary aim of the event was also to entice TTLs who had yet to come forward with problem statements to engage in the Water Hackathon. The team hoped to achieve this by using the technologists present to demystify the hackathon process and help TTLs understand the kind of solutions possible from such events. The team received highly positive feedback from people who attended the session and are extremely grateful of the time Tom, Andrew and Jon made available.

COMMUNICATION

Communicating the crisis

LESSON: In-country staff can help identify the best outreach channels to attract quality participants. Directing efforts towards clearly identified real needs is often what participants and volunteers are seeking: the chance to make a difference.

Water Hackathon needed to make the case for water issues. For the design and development community, RHoK events traditionally provided a way to contribute to relief efforts following earthquakes and flood events. Little effort was needed to persuade participants of the importance of issues being "hacked." However, traditional development sectors, such as water and sanitation, would need to include a communication strategy to raise awareness about water and the scale and complexity of water challenges.

The communication strategy played a critical role in supporting the objectives of the Water Hackathon, especially in raising the profile of real world water issues to new audiences. By promoting the hackathon through traditional channels as well as social media, the team was able to link the importance of water issues with the excitement and creativity of new technology.

The team used a blog to highlight the community as often as possible in order to keep the focus on people and their ideas. For example, it was important to publish blog posts regularly that highlight stories from the field and describe the ways in which technology can make a difference. In addition to the main website waterhackathon.org the team used multiple existing World Bank web platforms, such as

worldbank.org/water, wsp.org and youtube.com/watersanitation.

A Twitter hashtag, waterhack was created, promoted, and widely used to enable participants around the world to collaborate in near real time, and to promote the hackathon broadly. WSPWorldBank and Randomhacks tweeted regularly leading up to and throughout the hackathon.

Traditional news media also proved beneficial, with articles appearing in Wired magazine, The New ork Times, AFP, The Guardian, The Financial Express (India), the Hindustan Times, SME Advisor, Scoop.it, The Daily News (Egypt), and more.

SPOTLIGHT ON OPEN DATA PARTNER NASA

NASA's commitment to open data has expanded the audience for the vast body of knowledge captured in nearly 100 years of U.S. aeronautics and space data collection. Developers, technologists, entrepreneurs, citizen scientists and many others can contribute directly to the exploration of space and Earth by helping to create new ways of looking at this data. NASA's interest in Water Hackathon lay primarily in providing open data to resource developers and water experts as they created solutions to one of the most vital challenges currently facing humanity.

Climate is clearly impacting water availability; what is more complex is the extent and nature of that relationship. As Bradley Doorn, program manager for Agriculture, Carbon, and Water applications in the Applied Science Program of NASA's Earth Science Division, says: "It is really important that we put it in the equation to better and more accurately assess long- and short-term trends to plan what water we're going to have in the future. While many of the short-term issues we face are more due to water resource management issues than climate change, solutions must include a better understanding of how climate change is affecting our water cycle." NASA's scientific research in these areas, paired with the World Bank's experience with on-the-ground needs and development programs, was an excellent fit. This can help us to better understand supply and demand issues in water - How much will we allocate to agriculture to grow food, not only for sustenance but also as a means of growing our economies How much will we allocate to energy Where do the consumptive needs of big cities fall into this equation There are all these demands on the cycle of water.

NASA's remote sensing data, available free of charge to the public, provide critical parameters for the water supply. Working together with international institutions such as the World Bank, along with the engagement of citizen developers, enables NASA to extend the contribution of that data to real-world solutions more quickly and effectively.

PARTNERSHIP

Local partners, global network

LESSON: Partnerships with a local tech partner is critical, as they far better equipped to host a hackathon that is fun and open. Global networks can help raise the profile of the hackathon to a broader audience. Large international tech partners can lend credibility to a sector led hackathon, but participation depends to a much of greater extent on the authenticity of local partners.

Hackathons are inherently local events. So while a hackathon hosted simultaneously in multiple locations requires a global network, its success depends just as much on local partners. This was the case for Water Hackathon, which enlisted the support of some 56 local and international organizations (Annex 3).

Each city location had its own unique partnership supporting it. Accordingly, the team took pains to foster an open environment that encouraged local partners to become involved and bring their own strengths and resources to bear in support of Water Hackathon. These partners helped to engage the local technology community in the pre-event planning and refinement of problem definitions.

The global network was made up of both international and local organizations, including developer and hacker networks, government agencies, academic institutions and multinational companies as well as many water and sanitation-focused NGOs who participated. These partners contributed funding, space, expertise, in-kind sponsorship of food and prizes, local PR and media coverage, and the incubation of winning solutions. The strong local partnerships supporting each event also increased local ownership and credibility for the event, while also providing broader avenues for sustainability of successful projects following the event.

Hackathons are inherently local events, but the global network allowed collaboration across sectors and timezones.

Hackathon Event

From October 21 to 24, 2011, teams of volunteer programmers, designers and water specialists competed to rapidly develop prototype technical tools to address locally defined water problems.

With the dedicated support of 65 collaborating local organizations and partners in Bangalore, Cairo, Kampala, Lagos, Lima, London, Nairobi, Tel Aviv, Toronto, and Washington DC, over 500 hackers convened to work simultaneously at the marathon event. All Water Hackathon event locations were demand-driven; necessary prerequisites were the demonstrated capacity to host a successful hackathon and the participation of a willing water partner. Over 62 prototype applications were developed in just three days, tackling over half of the 113 locally defined water problems raised for consideration.

LESSON: Each Water Hackathon organizer learned to embrace the unpredictability of the hackathon event model. This open spirit is at the heart of what attracts volunteers to participate and fosters the creative, cross-fertilizing atmosphere associated with hackathons. For example, locating the event in more informal, unconventional sites, such as innovation or technology hubs, can attract expertise and maintain the spirit of energy, creativity, and openness.

TECH FACILITATOR

A facilitator was recruited as host at each water hackathon location. Facilitators were responsible for opening and closing the event, communicating hackathon rules, guiding judges through the selection process and making sure logistics ran smoothly. Hackers were invited to work on whatever problem interested them, but in cases where groups failed to form, facilitators would act as matchmakers, pairing hackers and water specialists. Facilitators were often aided by a team of volunteers, all of whom played an active role in organizing the actual event.

Tel Aviv Water Hackathon

VENUE

The hackathons were deliberately located in creative open spaces, such as the computer lab at University College London, or in local tech hangouts, such as iHub in Nairobi. Locating the event in more informal, non-traditional sites represented a real draw for many participants and helped to generate a spirit of energy, creativity, and openness. For this reason, holding hackathons in World Bank offices was out of the question. When a venue was difficult to reach—the American University in Cairo, for instance—group transport was arranged.

Locating the event in more informal, non-traditional sites represented a real draw for many participants and helped to generate a spirit of energy, creativity, and openness.

Caffeine, snacks, comfortable chairs, headphones, background music and powerstrips were in ample supply at all sites. Most importantly, organizers tried to secure the highest speed Internet connection possible and ensured that Wi-Fi SSID and password were easy to access.

SPONSORSHIP

Hackathons should not come across as a branding exercise. For example, no logos were featured on the Water Hackathon t-shirts distributed to all participants. However, World Bank staff and organizing partners did work at each individual site to reach out to the local business community and identify appropriate overlaps. By far, the most

common form of sponsorship was to provide a hackathon venue, though some locations managed to garner additional support. For example, in Cairo this support was worth thousands of dollars. Pepsi Egypt offered cash prizes for the top three solutions and covered catering for the two-day event. Local agribusiness Farm Frites contributed food and cash prizes for irrigation solutions, while mobile startup TA Telecom offered cash and incubation to the best mobile startup. Many sponsors, including Farm Frites and Pepsi, contributed their own problems for hacking. Their contributions were met with creative solutions from participants; some teams continue to collaborate with these corporate sponsors.

Water Hackathon chose deliberately not to align global coordination with any private sector partner in order to retain full discretion of licensing of the code (open source) and ensure that no solutions were platform specific (i.e. only compatible with Android).

PRIZES

Local sponsorship of prizes was sought for each hackathon site. In some cases, international technology sponsors, such as GPS manufacturer Trimble, were able to offer gadgets and gear as prizes to be awarded at a specific location. However, while participating hackers were thrilled to receive prizes and rewards for their work, prizes were not the motivating factor that drove participation. According to survey results, the key motivation was to the opportunity to make a contribution to solving real-world problems and the recognition they might receive as winners.

PARTICIPANT DEMOGRAPHICS

813,959 volunteer programming hours

82% 18% gender

73% under age of 30

922 people registered

507 attended (60% of registrants)

67% participants were working on their project 3 months after the event

BIG-NAME SPEAKERS SET THE TONE IN BANGALORE

As participation in hackathons is voluntary, extensive outreach efforts must be made to involve the software community, especially in large countries and since water management may not be a familiar subject to many. Thus the India team collaborated with an online media agency/website to regularly broadcast information about the upcoming hackathon.

Additionally, for the kick-off and launch event, the team invited a number of high-profile guests to encourage the hackers and at the same time provide context to the water hackathon in the global tech scenario.

The India event saw the participation of:

1. Senior Indian government officials at the Joint Secretary level, a high-profile position within the huge India government system. This demonstrated the interest of the Government in applying emerging technologies to these low-tech but pervasive problems.
2. Mr. Sam Pitroda, Adviser to the Prime Minister of India on Public Information Infrastructure and Innovations. In his special address, Mr. Pitroda highlighted the need to prioritize water and pledged his support to form a National Innovations Council for Water.
3. Washington and India: Keynote address by Mr. Jeff Martin, CEO of Mpowering and Tribal Technologies. In his keynote address, Mr. Martin spoke of his company's experience using mobile phones to reward children for attending school and how this concept could be customized for water and sanitation applications. Participants used this concept in their prototypes.

The participation of these speakers encouraged the participants to dedicate a weekend of their time to the hackathon and also set the tone for both the event and follow-up activities.

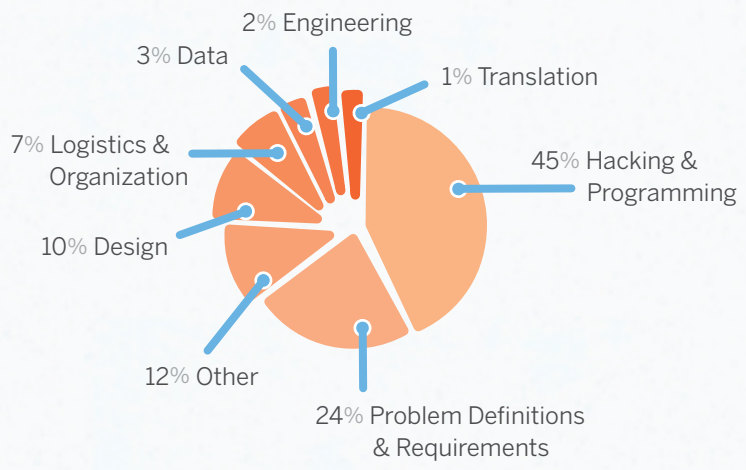
JUDGES

All hacking teams were asked to briefly present their prototypes on the last day of the hackathon. Many teams opted for a PowerPoint presentation, but this was not a requirement. A distinguished group of leaders from the water and tech sector were invited to act as judges. Each judge was given a list of criteria—emphasizing progress made and sustainability—with which to evaluate the solutions. The opportunity to "pitch" proposals to these distinguished judges was a good motivator for participants.

CODE REPOSITORY AND INTELLECTUAL PROPERTY

Water Hackathon had very few rules, but attempts were made to strongly enforce the ones it did establish. In order to be eligible for a prize, solutions had to be posted to the RHoK.org web platform and licensed under an OSI-approved license[10]. Any code developed over the course of the hackathan also had to be posted in a publicly available code repository. GitHub and Google Code were popular choices.

SKILLS OR EXPERTISE OFFERED



Types of Problems

The problems submitted to Water Hackathon covered a wide range of issues and technological innovations, from the need to make water quality data more accessible to the promotion of water conservation through games. The 113 problems identified can roughly be classified by subsector: water quality, water supply, sanitation, floods, droughts, agricultural water management and water resources. The highest proportion of problems (35 percent) were related to environment/water resources issues, with water supply a close second (27 percent). Many wining hacks addressed these two issues, but there were also several that targeted agricultural water management.

Types of Prototypes

Popular among winning hacks were some variation on mobile reporting systems for water infrastructure malfunction, supported by a variety of other mobile communication components between service providers and customers. Overall, 62 tools were developed, roughly categorized by subsector as: mobile, database, crowdsourcing, mapping and game. Responses to many problems included more than one tool, though mobile and database tools each represented about one-third of the problems. For example, many tools designed to map data relied on crowdsourcing to obtain the data in question. The same was true for some of the tools aimed at building a database of information.

[10] While participants were free to choose any license, teams were encouraged to use one listed under the category "Licenses that are popular and widely used or with strong communities."

Lagos

43 participants · 4 projects · Co-Creation Hub Nigeria

Water Hackathon Lagos came together through the commitment of its participants and organizers. On a limited budget, and with little lead-time, the Co-Creation Hub Nigeria hosted members of the technology and water community for a series of events. At a meet-up prior to the hackathon, developers met with local water experts to learn about their pressing problems and brainstorm potential solutions. Together they identified ten critical issues, ranging from greywater recycling to borehole sharing. These experts and developers came back together for Water Hackathon Lagos, where they prioritized four solutions: a website for public water information, a problem-reporting application for urban water infrastructure, a game for water education, and a water quality and reporting tool. The winning hack, Mairuwa, allowed people to report broken pipes. All winners were offered incubation at ccHub, while judges from Nokia and Google offered additional mentoring and support for solutions as they moved closer to launch. The government-operator Lagos State Water Corporation was initially skeptical that the local developer community could help solve their problems; however, they were impressed by the end results and pledged further cooperation.

Tel Aviv

30 participants
5 projects
Tel Aviv University
youtu.be/xaGhGx6Bzoo

Cairo

75 participants
12 projects
American University in Cairo
youtu.be/3liyoSkuhRI

Nairobi

70 participants
12 projects
iHub
youtu.be/WEOJzbpfPx8

Kampala

73 participants · 7 projects · Makerere University

What began as one of the most difficult hackathons to organize turned out to be among the most inspirational. Despite not holding a pre-event with water stakeholders, Water Hackathon Kampala attracted 73 hackers to Makerere University. Teams were quickly formed and all seven projects had immediate social media presence, inviting the support of friends. To understand and appreciate the task at hand, participants quickly dashed to the Internet to research, map out project objectives and define discreet tasks. For many, the problems seemed vague, but at regular checkpoints mentors from MTN, Google, Mountbatten, Ugo, the World Bank, UNICEF and Uganda's water services provider, National Water and Sewerage Corporation, were able to help out. As one mentor put it, "All we could do as mentors was to smile in amusement at what talent we have in this country that is yet to be discovered." This talent pool produced numerous prototypes, including Water Crusader, an interactive game centered on water and sanitation issues.

Bangalore

120 participants · 22 projects · IIIT Bangalore

Water Hackathon Bangalore was held at one of India's most respected IT universities, IIIT Bangalore. The event attracted the largest number of participants—more than 120—who were picked up by minibus on the morning of the event. Everyone came eager to solve their country's water problems. Shortly after arriving, 22 teams were formed. The morning session started out with talks by some of the partners (see full list in Annex 4) and then the hackers (who immediately began calling themselves "Whackers") got busy on the 14 featured problems that were collected at two pre-hackathon problem defining events held in Delhi and Bangalore by the Water and Sanitation Program and the India Water Portal. Many prototypes were built over the weekend, including an app that allows users to locate and rate public restrooms across India. The team that went on to win included the youngest hacker present at the event, a 14-year-old whose enthusiasm was contagious and who produced the best video introducing the event. The World Bank and WSP appointed an Ambassador to keep track of the apps after the close of the event and the organizers continued to seek potential partners and agencies to support further development.

youtu.be/GWXt1jgH7_w

Follow-Up

Hackathon events offer new ways of collaborating and a space in which prototype tools can be built in a short amount of time.

Hackathons are not, however, meant to support the ongoing efforts of those teams that want to take their prototype through to product development. Several follow-up options are available to help curate the most promising tools to emerge from the hackathon and provide opportunities for programmers to engage with their water counterparts.

LESSON: Ownership and sustainability of new prototypes can only be achieved when the (predominantly free and open source) software solution is demand-oriented. It is important to direct effort toward documenting and supporting promising teams as well as the broader community. While surveys can rely on distant communication, the local presence of community representatives and technology partners is needed to remain engaged with teams.

WATER AMBASSADORS

Water Ambassadors were recruited at various Water Hackathon locations to support follow-up. They were asked to write blog posts documenting the progress of hackathon solutions and help facilitate communication among the community of water and tech participants. Since Ambassadors needed to possess excellent communication skills, participants were asked to nominate the person they felt was best qualified to act as a community representative.

Reflections from the London Ambassador

My experience working as the London Ambassador has been highly rewarding and engaging. I set out to follow up on the prototypes developed at the London Hackathon and other ICT applications to water and sanitation outside of the Hackathon. Although I was initially disappointed by low engagement from London participants when I followed-up with them (suggesting they decided to develop their prototypes further), I was excited to learn that London's wining team, Taarifa, was still actively developing its prototype. My request to follow their development was met with an invitation to contribute to building the tool by providing the practitioner perspective, which I have enjoyed doing.

The most rewarding aspect has been the opportunity to investigate and report more broadly on other ICT innovations in the water sector by interviewing key actors. This has been a perfect segue from my own research on the effectiveness of mobile tools for water services and has enabled me to develop a great network among those working in this field. As a result, I've been able to actively connect people working in this arena and spread the word about different innovations, at the same time highlighting the need for greater collective learning among implementers, researchers and donors in an effort to understand how ICT tools can be most effectively designed and applied. I'm now looking to organize a learning event to address this. Beyond this, I've taught myself how to conduct and edit video interviews and try my hand at some journalistic research.

Reflections from the Nairobi Ambassador

My experience as Nairobi Ambassador has been quite the eye-opener. Having three years' experience as an environmental auditor, the knowledge on issues that plague the country with regard to water management were apparent, but the deep interaction with the sector as Water Ambassador has opened my eyes to the endless opportunities that are there for the taking. These opportunities can only be enhanced by Kenya's focus on becoming a silicon hub for Africa in mobile solutions. Water and ICT has a niche to which developers must wake up. My strategy was built on the understanding developers gained at the hackthaon and improved awareness of the potential of designing software for the sector.

Having two roles — as an ambassador and being on the project team responsible for designing the mobile-web complaint system for Kenya — has allowed me to see that more ICT solutions are needed to empower the water sector. In fact, software deployment is not the key solution, rather it is stakeholder buy-in and human interaction with the water system that matters. Solutions are a dime a dozen, but if one cannot create a win-win venture to benefit the people then nobody will adopt the system. This has been my role in designing value propositions that create win-win ventures with all sector players. A daunting task, but all the more fulfilling.

INCUBATION

Effort was made to collaborate with incubation facilities in order to streamline support for the most promising prototypes to emerge from Water Hackathon. Incubation typically involved a combination of access to office space, internet access, and ongoing mentorship from experienced startups.

Incubation in Cairo

Two of the tech sponsors of the Cairo Water Hackathon, Nokia MLabs and TA Telecom, offered incubation possibilities as awards for hackathon participants. These incubation possibilities included access to networked and well-equipped facilities/labs as well as access to mentors who could provide guidance on product development and marketing. Each of the three winning teams received a three-month voucher for Nokia mLabs and one of the teams, Abou Erdaan, received the Best Wireless Award, which included two months of incubation and 2000 for expenses from TA Telecom. While all the winning teams continued to develop their products further, many decided against using these vouchers. Team Run Time, for example, has significantly expanded their application but, due to other commitments by team members, chose to delay incubation with Nokia mLabs.

Incubation in Tel Aviv

IBM, one of the main sponsors of WaterHackathon Tel Aviv, was responsible for rewarding the winning teams. The winning team received three months-worth of access to resources and mentoring from IBM to actualize its solution, while the second- and third- place teams received two and one month respectively. The first- and second- place teams are in the process of developing their ideas using the resources offered by IBM, while the third-place team decided to utilize the prize at a later stage. IBM has assigned an IT architect to examine the suggested solutions, mentor and advise the teams regarding technical issues and recommend relevant IBM products and services that could be integrated with the product.

FOLLOW-UP EVENTS

Follow-up events offer further opportunities for programmers to engage with their water counterparts. In some cases, this has led to financing startups and the recruitment of local developers by government.

PROTOTYPES

The Catalyst for a New Conversation in India

The Department of Information Technology, the Ministry of Urban Development and the Water and Sanitation Program of the World Bank organized a follow-up event to the Bangalore Water Hackathon in February 2012, in which the six winning teams were invited to present their apps to a wider audience in a workshop held in one of the premier conference venues of the Government of India.

The purpose of the follow-up event was to focus on implementation, continuity and ownership. So while the original hackathon was 0 percent hacker, 10 percent establishment, the follow-up event was 10 percent hacker, 0 percent establishment. This approach seems to have worked very well in terms of deepening roots. At the same time, the platform was used to showcase some existing applications for mobile technology in the development sector already in use in India, especially in water and sanitation.

The event attracted more than 100 participants from mobile companies (Nokia, Samsung, odafone and On mobile) and government, including the participation of the Secretary of the Ministry of Urban Development. The Secretary pointed out that, although the Government allocates more resources to urban development and public services than before, satisfaction among the public has decreased. "Citizens should not allow decision makers to tell a lie and get away with it. Applications for monitoring expenditure are needed," he said. India's developer community appears eager to contribute.

Implications for Procurement

TASK MANAGER FINDS VALUE IN DEFINING A PROBLEM ALONGSIDE TOR

One Task Manager of the World Bank's Water and Sanitation Program embraced the hackathon process as a means to develop a citizen feedback mobile-to-web solution in Kenya. As a Steering Committee member for a Water Services Regulatory Board (WASREB) social accountability initiative, commitment had been built internally to embrace technology as a condition for scaling up countrywide the lessons learned from an 1 -month pilot.

Standard World Bank Terms of Reference, Scheme of Works, and Request for Proposals were prepared for the development of the WASREB-managed citizen mobile-to-web feedback application. By the time of the Hackathon in November 2011, an invitation for Expressions of Interest by international firms was to be launched pending clearance from the World Bank procurement specialist.

World Bank WSP colleagues then persuaded the Task Manager to explore solutions to the problem through the Nairobi Water Hackathon. With modest expectations and without discontinuing the original RFP procurement process, the Task Manager negotiated this turn of events with the WASREB Steering Committee. The argument was that at best a positive result could shorten the procurement timeframe, but at worst it could illuminate the software development limitations in the local context without losing the chance to pick up the well-progressed procurement for an international ICT firm.

During the -hours of the Hackathon in Nairobi, members of the Steering Committee watched as 10 out of 12 teams, not only demonstrated their competence to construct the feedback application but added creative features to enhance the consumer, utility and sector oversight agency experience. The competition was stiff, and although a clear winner was identified by the judges, the capacity of all local Kenyan hacker teams to provide a reliable ICT application for WASREB's purposes was beyond doubt. The Hackathon rendered meaningless the effort to secure international firms with requirements for international travel, accommodation and back-up support. Three months later the winning Hackathon team was working quietly and efficiently with the WASREB Steering Committee as local consultants. The team undertook a baseline survey on existing practice within 10 diverse water utilities, engaged in multiple stakeholder consultations and applied user feedback to inform the Beta version of the application. It is likely that the citizen mobile-to-web application will be operational in selected service areas in Kenya by the end of June 2012.

Nairobi Water Hackathon

The lesson learned is that the hackathons can provide a means for identifying and developing local talent and engaging the youth meaningfully in the development process. From a procurement perspective, in addition to time savings, Water Hackathon demystified the task and reduced the administrative and financial scope of the contract significantly, with visible advantages for the World Bank WSP and the client, WASREB.

NEXT STEPS

1. A hackathon focused exclusively on sanitation is planned for late 2012. It will build on the momentum created by Water Hackathon and extend it to new countries that may not have participated in Water Hackathon.
2. The water practice will develop a Project Concept Note for a "Water Hackathon 2.0".

From Meet-ups to Start-ups

During the hackathon, five different types of tools emerged to address water problems across various sectors. This key can be used to define the purpose of each start-up formed during the hackathon events.

JUGAAD SENSORS
Bangalore

Jugaad Sensors' prototype used the concept of "frugal engineering" to develop a portable and cheap water testing kit connected to an Android device. A not-for-profit organization in Bangalore is sponsoring the winning team to take forward the prototype by providing funding.

More info at metamap.in

S3V2K
Bangalore

"S3V2K" is in the final stages of being presented to a very large water utility that wants to use its winning idea of customer complaint and redressal for outreach to its citizens. In India, adoption and scale-up by the government requires a bit of perseverance and patience, and this Water Hackathon team is exhibiting exactly these qualities.

ABU ERDAN
Cairo

Abu Erdan is a GPS-enabled smart phone app for crop planning, monitoring and irrigation optimization. This solution was developed in response to a problem submitted by Farm Frites Egypt, Egypt's largest potato grower in the retail and fast food sector. The team behind Abou Erdaan formed an enterprise shortly after the hackathon and invested in equipment, all without relying on the incubation vouchers from TA Telecom. They continued to develop their hack into a marketable product and submitted their idea to the Google Business Competition, where they were shortlisted as one of the top 50 contestants. They remain in touch with Farm Frites about the development of their product and have received enquires from small- and medium-size agribusinesses. The team is facing delays with customs for the import of the necessary hardware to scale-up their product sales.

More info at abuerdan.com

SALT AND ROCKS
Cairo

Team Salt and Rocks created an application that plans, monitors and regulates the water distribution system, connecting the Ministry of Agriculture, farmers and the telecommunications sector. They continue to develop their business plan and fine-tune their code for the application. They have also been in contact with Nokia mLabs. However, as they did not wish to develop the application for Nokia, they are likely to remain an independent start-up after their incubation voucher expires.

More info at water.amahdy.net

TAARIFA
London

Taarifa is a tool that enables citizens to report water and sanitation infrastructure problems via SMS and the Web, allowing the service provider to track repairs and send updates to reporters. The developer team includes technologists and sector specialists with a range of expertise. After winning first place at the London Water Hackathon, interest from the World Bank to pilot the tool in Uganda, and interest from the growing group of hackers to further develop the tool, led to a follow-up hackathon in February 2012 to address bugs and add features. To increase its potential impact, the tool was redesigned for use on all phones, instead of on Android systems exclusively.

The potential piloting of Taarifa was met with enthusiasm when demonstrated to the Ugandan Ministry of Local Government in February 2012. The developers have continued to refine the tool based on feedback from the Ministry and are adding features such as offline use and easier creation of new menus for adaptation to a range of reporting/surveying needs beyond water and sanitation. The tool's strength and improved design reflects the team's commitment to open-source development, engaging developers from around the world to contribute and collaborate.

More info at taarifa.org

IRRIDION
Tel Aviv

Irridion Dynamic is tool to optimize usage of non-potable water. The group's main focus is to build a prototype that allows for the real-time management of salinity levels of sensitive agricultural crops by fusing potable and non-potable water. The Irridion Dynamics group have defined the first draft of the SDD (Software Design Document) of the system. During their last meeting, the SDD was reviewed and mapped to relevant IBM products.

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

MAJIVOICE
Nairobi

MajiVoice is a platform for two-way communications between citizens and water providers using affordable, accessible and user-friendly technologies. Through MajiVoice, water consumers can use a mobile phone or website to share their concerns with providers about service delivery and receive timely feedback on how those issues are being addressed. The platform also enables utilities to provide SMS broadcast to consumers on priority issues, such as changes in anticipated rationing schedules, or important notifications on times, dates and venues of public consultations and events, thereby strengthening their public relations and linkages with the client. MajiVoice further enables communication between utility field- and office-based staff, as it will be tailored to the work flow of each utility, smoothing communication and activity between various departments and enhancing management by results.

MajiVoice is currently being developed by the winning team of the Nairobi Water Hackathon for Kenya's Water Services Regulatory Board (WASREB) to strengthen dialogue between citizens and water service providers and to ensure timely and transparent resolution of consumer concerns. The aim is to improve efficiency, accountability, responsiveness and transparency of urban water service providers in Kenya. All these ultimately lead to improved service delivery.

More info at majivoice.com

OPEN PERUVIAN WATER MAP
Lima

Open Peruvian Water Map was developed to address the need for open access to updated information on surface water resources in Peru. The map includes all water resources—rivers, watersheds, lakes, snow peaks, etc.—which are now available through Map Box. This solution will also allow citizens to report water-related events (pollution, social conflicts, floods, etc.).

This tool makes official data available in a public, user-friendly and collaborative way, creating for the first time in Peruvian history a digital map that consolidates all available water resources data in a central and open form. The tool is still being developed; the developers meet periodically to improve the prototype and they are looking for new strategic partners to implement it. The objective is to develop a tool that can be adopted by the National Water Authority (ANA).

More info at escuelab.org

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

WATER VOICES
Toronto

Water Voices is focused on helping improve First Nation access to water and sanitation in Canada. There are three inter-related project components that comprehensively engage, promote, and improve access:

1. Front line community engagement. The messaging platform uses SMS messages from community members that have water challenges, geocodes their location, puts it on a map, and tweets it out to Canadian politicians and the media.
2. Comprehensive database. The database that powers the messaging platform centralizes information on various aspects of water quality, infrastructure, and socio-economic indicators.
3. –outh Engagement. Starting summer 2012, the team will be working with Eabametoong First Nation to provide a module on water quality to middle school students, involving portable microbiology test kits to track, test, and publish water quality.

The team is also working on integrating voice to the SMS infrastructure in order service those communities that do not have wireless access.

More info at watervoices.ca

MAZZI TRENDZ
Kampala

Mazzi Trendz is a service that enables daily water users to keep track of their water usage patterns over time. Users supply the system with meter readings, which can be added via phone or online. The application then performs the required analysis in order to return organized information on how one has been using water over a given period of time. The service also enables water users to specify how much they would like to spend on water over a given period of time, and should they exceed that specified amount, the system provides them with tips on cutting water usage. Mazzi Trendz is built for the Android platform and, with time, will be available on other platforms, such as Nokia.

More info at mazzi-app.appspot.com

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

MAP THE CRAP
Kampala

Map the Crap is a tool that helps users accurately locate and report on the status of their pit latrine. This information is useful to pit latrine emptiers, who can waste a great deal of time and resources trying to empty sewage pits and septic tanks in the same neighborhood in an uncoordinated way. This application was designed to provide a platform that enables the visualization of latrines and rubbish dump areas that need servicing in order to enable pit latrine emptiers as well as garbage collectors to work effectively, saving time and promoting a healthy environment. The team has plans to meet the Kampala Capital City Authority, which has expressed interest in integrating Map the Crap onto their portal.

More info at appcircus.com/apps/map-the-crap

MWATER
RHoK Montreal

mWater is a technology startup that offers a crowdsourced, ICT-based water monitoring solution for communities that lack water monitoring capacity. The organization drew its inspiration from the successful bacteria-counting Android app developed at a RHoK event in Montreal. The problem that seeded this innovative tool was initially published online for the Water Hackathon, but it was only later that a group of civic hackers in Montreal with the right combination of skills managed to build the initial prototype. The group is working with UN Habitat in Tanzania in summer 2012 to validate water testing technologies and will field a beta version of the Android app that will assist in reading results.

mWater is developing three products: low-cost test kits that use off-the-shelf components, an Android mobile app that reads water test results from a variety of tests and uploads them, and a social network that allows community members to find test results or post information about the safety of their water sources. mWater is a semi-finalist for the Echoing Green social enterprise fellowship and is seeking investors to expand services to new locations in low- and middle-income countries.

More info at mwater.co

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Problem Definitions

The problems submitted to WaterHackathon covered a wide range of issues and technological innovations, from the need to make water quality data more accessible to the promotion of water conservation through games.

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Atlanta			Legal Compliance monitoring in Latin America	Create a database system for the constitutional court of Costa Rica (and Colombia) to help them keep track of court orders (i.e. fix someone's broken water system) and make them accessible to those who they support and who must provide the service	
Baltimore			Social Networking Climate Game	To use a social networking game (e.g. Farmville) to teach people about climate change and mitigation and adaptation strategies	
Bangalore			Mathematical Distribution of the Water Distribution System	Create an analytical model for developing optimized distribution systems	
Bangalore			Monitoring and Incentivizing Use of Community Toilets in Indian Cities	Create a mobile application to track household use of community toilets to both incentivize use and provide information on use of the facilities and effectiveness of incentives to induce behavior change	
Bangalore			Data Repository and Information Dissemination	Create a web application to assimilate water quality data from various sources, do some analysis, and present the information geographically for users to reference	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Bangalore			Water Tankers in Urban India-Enhancing Accountability and Accessibility	Develop a system to track water tanker delivery and alert users to its schedule so that they do not have to spend their day waiting for it	
Bangalore			Status of Application for Subsidy	Create a system to track the application for toilet construction subsidies so that households are informed of the status of their request by SMS and can send in a mobile photo when the construction has been completed	
Bangalore			Farmer Weather Alert System	Create a mobile application that sends farmers forecast info, and contact info for advice on planting, fertilizers, irrigation, etc	
Bangalore			Inconsistent and Unpredictable Water Supply to Slums	A mobile application that sends a text message to residents to give them sufficient notice of and information about the impending water supply (timing and duration)	
Bangalore			Disease/Sickness Reporting System	A mobile reporting application on sickness to provide information to water or sanitation providers	
Bangalore			Water Lottery: Linking Water Meters to Mobile Phones	Digital metering data is sent to mobiles so users can track consumption; they are entered in a lottery to win an award for lowest water consumption	

Sector

Sanitation, Agricultural Water Management, Flood, Supply, Water Resource Management, Drought, Water Quality

Tools

Crowd Sourcing, Data Aggregation, Mapping, Games, Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Bangalore			Donate a toilet, donate a tap	An application that enables an individual to donate money (from bank account, mobile money) for a toilet/ tap. Donors would be informed about the toilet tap they have paid for to connect the directly to the impact	
Bangalore			Mobile Phone as a Policy Watch Application	Create a way for people to track policy implementation; eg. Rainwater Harvesting in Bangalore	
Bangalore			Service Delivery in the water and Sanitation Sector	An SMS-based water delivery service that will track user informatation to make future orders easier	WH
Bangalore			Locating and rating of Public Restrooms in Indian Cities	Create a mobile application that uses GPS to find and list the nearest available restrooms categorized by gender preference	WH
Bangalore			Decentralized Data collection through SMS	Create a mobile application that allows anyone to collect data	
Bangalore			Customer complaint redressal	Create a mobile application that lets users report on water infrastructure problems and receive a report back	WH
Bangalore			App to monitor biodiversity	Create an SMS-based biodiversity monitoring system that allows users to send in SMS reports of bird sightings according to location	
Bangalore			Peer Water Exchange	An SMS-based system designed for collection of field data for tracking of water and sanitation projects and milestones, built on a concept from the Peer Water Exchange	

Sector

Sanitation, Agricultural Water Management, Flood, Supply, Water Resource Management, Drought, Water Quality

Tools

Crowd Sourcing, Data Aggregation, Mapping, Games, Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Bangalore			Water Shortage voting reports from SMS to locate and supply on demand basis	To allow utilities to send information to users about available water supplies after users report on their local water supply conditions during a water shortage	
Bangalore			Jugaad Sensors	Low-cost portable test for water quality and measurement. Test can also be connected to an Android device to geolocate testing coordinates	
Cairo			Data Analysis of Demographics for Conservation Awareness Campaign	To allow the utility to collect data about users (legal and non-legal connections) and create a channel to communicate alerts, updates, and conservation messages to users	
Cairo			Water Gauge Monitoring in Industrial Line Production	To reduce water usage in industry with digital meters to detect water overuse in real time	3rd
Cairo			Water Saving: Efficient Agriculture Data Management	Build a mobile application that will collect and download pivot station data about crop development, soil moisture, etc	2nd
Cairo			Early Warning Remote System for Water Table Management	Deploy a system of remote sensors in local groundwater wells in order to measure and manage water table levels; can alert when it has dropped to a level where the salt concentration exceeds threshold	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Cairo			Alerts for water-related emergencies	Create a platform to disseminate information about low water quality/quantity to communities—often those who receive water that can cause disease	
Cairo			Tracking tool for community sewage disposal system in Egypt	Information dissemination for households to coordinate the disposal of their sewage	
Cairo			Awareness Raising about water purification in urban areas (Ezbet Khairallaha)	Use ICT to increase awareness of household water treatment methods and health issues in urban areas	
Cairo			Irrigation Scheduling	Use a mobile application to help farmers use the "checkbook method" (soil water balance) to schedule appropriate irrigation	1st
Cairo			Farm level Irrigation Modernization in Egypt's Nile Delta	Create interactive software to aid farmer consultations and construction supervision on an irrigation project, linked to simple web-based GIS program. Would show farmers proposed improvements and record views on it	
Cairo			Inadequate billing and collections	Create an automated system that sends customers SMS messages when their bills are due	
Cairo			Tool for more equitable water distribution in Egypt	Sensors to show and report water usage among upstream and downstream usage to enable more equitable use	

Sector

Sanitation · Agricultural Water Management · Flood · Supply · Water Resource Management · Drought · Water Quality

Tools

Crowd Sourcing · Data Aggregation · Mapping · Games · Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Calgary			Apps for water	To have water apps developed from recently launched open web platform to aggregate and connect water and environmental data, making it available to users through an API	
Cape Town			Ceasefire in the toilet war? Can a community-driven mobile phone application restore dignity in Cape Town?	Create a mobile platform for citizens to report broken/vandalised community toilets to janitors and the city	
Cape Town			E-billing and e-filing for small town water-app with NGO and commerical potential	Create a mobile app that delivers water bills via SMS and allows them to be paid by SMS. Integrate this data from many small schemes to send to regulator	
Cape Town			Map the Crap App	Mobile application that helps pit emptiers plan their routes to improve their business and reduce unsafe dumping	
Geneva			Ecosystem Services must be taken into policy circles	Using filed data from Tanzania to develop a static (and possibly dynamic) representation of the feedback loops and delivery of ecosystem services to society	
Jerusalem			Provide real-time alerts to households about in efficient use of water	Create a system that senses abnormal water usage and reports it to the utility, which then can alert homeowners by phone or SMS	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Kampala			MET-water App	Combine meteorological data with water data to provide an early warning system for rapidly changing conditions	
Kampala			Water Bubble Bath Game for Water Education	Create a mobile game that sends players messages with water conservation tips	WH
Kampala			Water Aggregator App to determine water available in Uganda	Create an application that can aggregate data to tell a community how much water is available and how long it will last	
Kampala			Water usage and billing visualizations app	Build an app that lets you take a picture of or scan your water bill and can translate this into trend data about your water use	
Kampala			DEWS (Disaster, Environment, Water and Sanitation)	An app that crowdsources water-related problems from around a community and visualizes them on a map, giving communities a voice	
Kampala			WASH Reporter	A crowd-funding and geo-visualisation app that helps communities report WASH problems and fundraise for them using Mobile Money and other payment systems	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Lagos			Water purification mobile application	A mobile application that can be used to check the purification level of water by taking a photo and uploading the image to a server that can assess the purity	
Lagos			Water Resource Reporting	Create better system to detect and inform utility of service problems	WH
Lagos			Water Companion	A companion website for the water corporation with which to educate and inform communities about water issues	WH
Lima			Strengthen municipal capacities of water resources management and the regulations in the water sector	Capacity-building system for municipal authorities working in rural sanitation through a content management tool with easy access and functionality (–acu Portal)	
Lima			Improve proper education on water issues (Water Culture) through rich content materials such as Infographics, multimedia, OLPCs, etc.	Bilingual multimedia module (website, mobile applications, comics) in Spanish and Quechua aimed at children. They will learn water concepts, problems and how to help to solve them through games. (Cooltura del Agua)	WH
Lima			Poor water quality (water quality detection)	Multiple devices with a protocol for measuring different aspects of quality, chlorination, presence of metals in water	

Sector

Sanitation · Agricultural Water Management · Flood · Supply · Water Resource Management · Drought · Water Quality

Tools

Crowd Sourcing · Data Aggregation · Mapping · Games · Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Lima			Risk for natural disasters-landslides	Create an early flood/landslide warning system: river sensors detect high levels and send messages by SMS	
Lima			Inefficient Irrigation water use	Develop a low-cost monitoring and control system for drip irrigation	
Lima			Poor access or do not know where to find information	Create an open data platform for the government to provide water resource data to users	WH
Lima			Desertification and Loss of Water in the desert landscapes on the coast	Fog capture as a source of water. Create more fog catchers and a tutorial to help replicate the model: Lomas de Atikipa experience	
Lima			Poor understanding of basic concepts or needs of water conservation	Offer strategy for conservation of water resources, including basic watershed info	
Lima			Make more efficient the use of water in toilets	Low-cost device to save water in the use of toilets (Cada Gota Cuenta)	
London			Water Monitor: Refining Water use to improve the quality of aquatic ecosystems	Provide users with advice on conservation actions based on seasonal changes or emergency situations (e.g. combined sewer overflow events) and connect users with their local watersheds	

Sector

Sanitation · Agricultural Water Management · Flood · Supply · Water Resource Management · Drought · Water Quality

Tools

Crowd Sourcing · Data Aggregation · Mapping · Games · Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
London			How to incentivize water use efficiency? A social network water footprint game (Waterville?)	Create a social network game that allows users to compare water usage, encouraging conservation efforts	
London			How to chose among water supply-demand options?	An open-source supply-demand planning tool that picks the least-cost schedule of supply-demand measures that allows to meet demand into the future. Optimisation tools likely needed	
London			Online water trading map-based portal	A platform that allows water rights or abstraction licence holders to buy and sell, informed by recommendations based on connectivity through mapping. Current water brokerage sites don't have the mapping	
London			Waterwise Stop the drop' App Game	Influence water use behaviour through a game about using 120l water per day for a 4-person family	
London			Systems for reporting water problems and providing feedback	Build a dashboard that can interface with Ushahidi reports of water and drainage problems in Tanzania and Zanzibar. The dashboard would enable providers to respond to users about the status of problem fixes as they are managed	WH
Madurai, India			Water Calculator	Make a mobile water calculator to show the amount of water used (for home, farm, industry, etc.)	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Milwaukee			Polluted Stormwater Runoff	Create a tool that can help people understand the seriousness of storm water pollution and feel empowered to help reduce it	
Milwaukee			Unnecessary water use during storms constributes to sewer overflows and basement backups	Create a mobile tool to educate people about reducing their household water use during storms to prevent CSO and to alert people when they should take action to do this and be on alert for basement backups	
Milwaukee			Build Community knowledge and ownership of local waterway restoration project	Create a tool that enables easy updating of restoration projects to the general public and allows them to submit responses and potentially photos	
Milwaukee			Live water quality tracking	Create a way for people to quickly check on the water quality where they live	
Milwaukee			Virtual Aquaponics system	Create a visual aquaponics system (system that grows fish and plants together) that lets users model outputs by changing different variables	
Milwaukee			Dashboard visualizing water data from Watertech of America	Develop a dashboard visualizing water data from the complex water sensor equipment used by Watertech of America, in order to compel industrial plant managers to be more water efficient	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Nairobi			Drought Monitoring	Gather precipitation data from crowd-sourcing to help with an early drought warning system	
Nairobi			Making Nairobi Water Quality Data More Accessible	Provide a web-based, geographic interface to allow users to access the water quality testing data that is already regularly collected, but inaccessible	
Nairobi			A mobile-to-web complaint system for Kenyan Water Sector	To develop a digital complaint system for water services that allows users to send complaints by SMS or USSD to an online system that registers and tracks the complaint, providing the user with a reference number and updates	1st
Nairobi			Self-reading water meters via text messages	For Nairobi water utility: use an SMS or USSD application to submit self meter readings instead of problematic staff collection	
Nairobi			Global Flood Prediction	Create a tool that connects governments, NGOs and researchers to the data they need—in an accessible format--to make better predictions about flooding, and use ICT to warn people	
Netherlands			Innovative Water Footprint Visualization	Create an online/mobile visualization of recent water footprint data for countries (click on country to see usage footprint)	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
New York			Bacteriacounting app for low-cost water kit	Develop a mobile app that can take photos of bacteria growing plates and count the number of colonies, saving time and enabling the rapid transmission of these photos- OR an Ushahidi modification to receive and send photos	
Rockville, US			World and regional Water price index	Create a price index for real residential water prices based on the IBNET water tariff database	
San Francisco			Mapping water/sewage mix ups	An SMS reporting system for water/sewage mix-ups with locations and reporting system to track outbreaks of diarrhea; user receives SMS back with suggestions to safegaurd against possible health risks	
Tel Aviv			Monitoring system of the water counter for the efficiency, transparency and savings in consumption	Develop meters that show customers how much water they have used per week, by day/night and relative to others in their area.	
Tel Aviv			Happy Bird Mobile App	Use crowdsourcing to create a baseline migratory bird survey to help analyze potential environmental impacts	
Tel Aviv			Gaining anayzed information in worldwide farming	Transfer weather and water info collected in developed countries to farmers in developing countries so they can cut their water usage	WH
Tel Aviv			Water Treatment and Biogas at the local level	Build cost-effective and simple systems to treat wastewater and create biogas for energy needs in small farming communities	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Tel Aviv			Optimization of the operation of water and sewage systems	Create an online decision support tool that analyses software data, sensor data, basic parameters, cost data, regulation parameters	
Tel Aviv			Service Delivery in the Water and Sanitation Sector	Create an SMS system for customers who order water deliveries so that orders will be tracked more efficiently, and locations can be determined by GPS	
Tel Aviv			Floods early warning systems	Incorporate on-the-ground, local reports on flooding to early warning flood systems	WH
Tel Aviv			Integrated Algorithms for hydrogeophysics	Create an algorithm that uses different physical properties that can be detected in contaminated water to better characterize groundwater plumes without sampling wells	
Tel Aviv			Improve efficiency and interface of climate models	1-improve computation time, memory consumption and storage space used by climate models, 2-improve model interface and accesibility by creating outputs that don't require advanced software to read	
Tel Aviv			The challenges of water quality in drip irrigation in Israel 2011	Use sensors to create an online system that shows farmers the ACTUAL water quality parameters, as the water (typically from tertiary treatment) often does not meet the water quality standards advertised	WH

Sector

Sanitation · Agricultural Water Management · Flood · Supply · Water Resource Management · Drought · Water Quality

Tools

Crowd Sourcing · Data Aggregation · Mapping · Games · Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Toronto			www.watervoices.ca	Messaging platform designed for members of Canadian communities experiencing potable water, sanitation, or other water quality challenges. The goal is to encourage governments and First Nation community leaders to work together towards solutions. The tool works by receiving SMS messages from community members that have water challenges it then geocodes their location, puts it on a map and tweets it out to Canadian politicians and the media	
Vancouver			Making Water Saving Technology Transparent and Accessible	Helps people learn how they can save the most water and evaluate their "water savings" to be prepared with clear water ahead of a disaster	
Vancouver			Instilling a water contingency ethic	Allow regional water managers to communicate about "contingency supplies" in real time to be prepared for an emergency	
Vancouver			The problem of water leakage	Database to show best practices in leakage reduction for utilities	
Vancouver			Responding to Information on Water Demand	Provide people with seasonal information about water availability and demand so they understand the costs of their use and will change their behaviors	

Sector

Sanitation · Agricultural Water Management · Flood · Supply · Water Resource Management · Drought · Water Quality

Tools

Crowd Sourcing · Data Aggregation · Mapping · Games · Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Washington DC			Water Access Map of the World	Create the mobile and web applications for crowd sourced data to bring water access information to a GIS platform that can be accessed by anyone	2nd
Washington DC			Real Time Climate Data Comparison Platform	To bring together satellite and ground meteorological data and create a tool that will produce a geospatial representation of both types of data; to generate an "averaged" geospatial map from the combination of MSI and ground data	
Washington DC			Webcam water flow monitor	Use webcams as an affordable alternative to sensors for monitoring flows (by providing images that can be analysed by using pattern recognition software	
Washington DC			Education and Obtaining Data about WASH through computer games	Design an educational game that is also a survey tool to gather data on player's behaviours, knowledge, preferences, and priorities regarding water, sanitation, and hygiene	
Washington DC			Really simple Citizen-Generated Performance Metrics	Create a simple polling tool to get citizen feedback before and after urban improvements. The tool should have a dashboard to easily create and analyze polls and target residents of specific areas	
Washington DC			E-billing Solution for cutting edge provider in Botswana	Create a system to send bill amounts by SMS, allow customers to check bill, and confirm payment receipt	1st

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Washington DC			Rainwater Toxicity Mapping	Create a program that lets users see what pollutant influences there may be in rainwater in their geographic location	
Washington DC			Rural Sanitation Aggregator (mobile groupon)	Create a mobile platform to aggregate information service provider offers or deals and send to rural households in same locality; might incentivize service providers to go to hard-to-reach places by aggregating households	
Washington DC			Gender Sensitization and water decision making	Create a mobile application aimed toward raising men's awareness of the many uses of water and thus the need to protect the resource	
Washington DC			Real Time Climate Data Comparison Platform: second challenge	Working from the previous challenge (accomplished), which was to create a tool that will combine MSI data with ground information to produce a geospatial represenation. The second challenge is to generate an "averaged" geospatial map from the combination of MSI and the ground data	
Washington DC			Overflow App for Android-based Huawei IDEOS smartphone ´Tanzania	Adapt an existing Android application (Ushahidi or FLOW) to allow citizens and urban planning students of Tandale, TZ, to report overflowing roadside drains and culverts	3rd

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Washington DC			Android/iPhone-based photo database and mapping app for development	Create a tool that lets users photograph useful information of water infrastrucutre and upload it to a database using the phone's GPS information	
Washington DC			Data Scraping for Dartmouth Flood Data	Create a data mining and scraping library for flood-related data available at Dartmouth Flood Observatory Riverwatch. The algorithm will automatically let user select the location where water and flood data are available	
Washington DC			Improved weather data collection and transmition	Create an SMS system for people at weather monitoring stations to send data to central location (current method is by calling)	
Washington DC			Web-based interface for tabulating Daily Global Climate Dataset	Web-based tool to allow users to tabulate and generate outputs in an MS Excel file from the Japanese Daily Global Gridded Climate Dataset for daily max temp, min temp, and precipitation globally at half degree resolution from 1948-2006	
Unknown			Where does my Water Come from?	Create a Google Earth add-on that identifies catchment boundaries for any point clicked. Could provide info to users in developed countries for education and awareness and be a useful tool for water managers in developing countries	

Sector

Sanitation, Agricultural Water Management, Flood, Supply, Water Resource Management, Drought, Water Quality

Tools

Crowd Sourcing, Data Aggregation, Mapping, Games, Mobile

Annex 2 - Problems

LOCATION	SECTOR	TOOL	PROJECT	OBJECTIVE	WINNER
Unkown			Awareness Creation on Water and Sanitation Issues	Create ICT apps/games for children to play/learn about water/sanitation issues	
Unkown			Policies/programs beneficial to the citizens in his/her area	Create an application that informs rural citizens about the different policies and programs in their region	
Unkown			The Catalyst Map	To create a map action platform to coordinate the organizations working toward the 3 pillars of sustainability identified by the UN: environmental, social, and economic sustainability	
Unkown			Water purity test	Tool for refugee camp to know if water has been sufficiently purified	

Sector

Sanitation | Agricultural Water Management | Flood | Supply | Water Resource Management | Drought | Water Quality

Tools

Crowd Sourcing | Data Aggregation | Mapping | Games | Mobile

Useful Documents

All documents related to the organization of Water Hackathon are available upon request from whelpdesk waterhackathon.org. Useful documents include:

Hackathon Event Planning Guide

Partnership Package

Timeline

Media Kit

Communication Guidelines

Judging Criteria

Participant Survey

Terms of Reference for Hackathon Facilitator

Terms of Reference for Community Event Facilitator

Terms of Reference for Global Coordination

Terms of Reference for Water Ambassador

Letter of Cooperation

Local Partners

BANGALORE

Indian Institute of Human Settlement

India Water Portal

Hewlett Packard

International Instutite of Information Technology Bangalore

Mobile Monday Bangalore

MediaNama

HasGeek

Broadvision

Department of Information Technology, Government of India

Ministry of Urban Development, Government of India

Ministry of Drinking Water and Sanitation, Government of India

NJS Consultants

Onmobile

Ista Hotels

PepsiCo

CAIRO

PepsiCo

FarmFrites

Nokia

TA Telecom

El Gouna

Diwan

ISIS

Arabnet

The American University in Cairo

Technology Innovation and Entrepreneurship Center

Desert Development Center

Mobile Monday Cairo Chapter

KAMPALA

Makerere University

MTN

Ugo

National Water Sewerage Corporation

Google

Mountbatten

UNICEF

LAGOS

CCHub

Lagos State Water Corporation

Nigerian Water and Sanitation Association

LIMA

Escuelab

National Water Authority (ANA)

Water Utility of Lima: SEDAPAL

National Program for Rural Sanitation (PRONASAR)

National Superintendency of Sanitation (SUNASS)

Ministry of Housing and Sanitation

LONDON

University College London

UCL Environment Institute

UCL Grand Challenges

Google

IBM

CIWEM

Akvo

NAIROBI

iHub

NaiLab

Google SSA

ID Modeling

Nairobi Water Sewerage Company

WASREB

Ericson

Trimble

TORONTO

University of Toronto

TEL AVIV

StarTAU (Tel Aviv University Entrepreneurship Centre)

Intel

IBM

Israel New Tech (National Energy and Water Program)

Israel Foreign Trade Administration

WASHINGTON DC

Insomniac Design

WASH Initiative

RHoK

ESRI

Intel

Cost Breakdown

STAFF TIME (DAYS)

1 (WSP), 60 (ICT), 136 (TWIWA)

COST BREAKDOWN BY SOURCE (costs do not include staff time)

Total WSP	30, 27
Total WPP	70,000
Total CMU	2,500
Total ICT	17,500
Total WBI	2,500
Sponsors	5 ,175
Total	$222,102

COST BREAKDOWN BY LOCATION (costs do not include staff time)

Location	Total Budget	World Bank	Known Sponsorship
Bangalore	32377	WSP: 1 ,377	Cash and in-kind sponsorships valued at 1 ,000.
Cairo	6 ,000	WPP: 2,000; CMU: 0,000	Cash and in-kind sponsorships valued at 22,000.
Kampala	3,100	WBI: 2,500	In-kind venue sponsorship, value unknown. Cash sponsorships of 600.
Lagos	5,03	WPP: 5,03	In-kind venue and post-event incubation sponsorship, value unknown.
Lima	7, 00	WPP: 2,500; CMU: 2,500; WSP: 2,500	In-kind venue sponsorship, value unknown. Cash sponsorship of of 300.
London	2,000	—	In-kind venue and prize sponsorships, value unknown. Cash sponsorships of 2,000.
Nairobi	,117	WPP: 067; ICT: 5,000; WSP: 50	In-kind prize and post-event incubation sponsorship, value unknown.
Tel Aviv	20,000	—	In-kind venue and hack incubation sponsorships valued at 13,500. Cash sponsorships of 6,500.
Toronto	275	—	In-kind venue and swag sponsorships, value unknown. Cash sponsorships of 275.
Washington DC	13,000	WPP: 2,000; WSP: ,500; ICT: 2500	In-kind venue sponsorship, value unknown.
Global	65,3 5	WPP: 553 5; ICT: 10,000	
	$222,102	$162,987	$59,175

Funding Sources for World Bank staff

KOREA TRUST FUND TO SUPPORT TRANSITIONS (KST)

Ms. Roisin De Burca
Senior Operations Officer
Tel: 1 202 458-4007

rdeburca· worldbank.org
go.worldbank.org/5UM7K0PUD0

The two main objectives of the KST are: (i) to support measures to improve governance and institutional performance in East Asian countries and Pacific Islands, and other member countries emerging from, or at risk of sliding into crisis or arrears; and (ii) to support the reconstruction and development of East Asia and the Pacific Islands and other member countries, which are prone to, currently in, or are emerging from conflict.

WATER AND SANITATION PROGRAM (WSP)

Ms. Jaehyang So
Manager
Tel: 1 202 473-7654

so· worldbank.org
wsp.org

The WSP is a multidonor global partnership administered by the World Bank with the mission of helping poor people in developing countries gain access to affordable, safe, and sustainable water and sanitation services. The WSP has supported many of the advances made in the water and sanitation sector over the last three decades.

WATER PARTNERSHIP PROGRAM (WPP)

Mr. Matthijs Schuring
Program Coordinator
Tel: 1 202 473-3441

mschuring· worldbank.org
worldbank.org/water/wpp

The WPP's goal is to enhance the Bank's efforts in reducing poverty through two overarching objectives: (i) sponsorship and mainstreaming of pragmatic and principled approaches for water resources management and development; and (ii) improvement of the quality and effectiveness of water service delivery.

INNOVATION FUND

innovation· worldbank.org
innovation.worldbank.org

Sponsored by the Knowledge and Learning Council, the Innovation Fund supports planning or piloting innovative new products, practices or approaches. Administered by the World Bank Institute Innovation Practice (WBIIN), Innovation Fund supports front line teams with innovative ideas for improved development outcomes.

Sample of existing water apps

ICOMMS Water quality monitoring application

Cape Town, South Africa

This tool is specifically designed to address the challenge of water quality monitoring in rural settings by accelerating the process of data transfer and analysis. To serve in low-technology settings, the mobile reporting can be done on non-smart phones, via GRPS, and if necessary for more simple phones, via SMS. To assure accurate and complete entry, the mobile system checks inputs against possible values and makes sure compulsory questions are answered before moving to the next question. Once data is sent and received, it is analyzed by a web-interface and sends users back an SMS to confirm the data has been received, and alert them to any drinking water safety risks.

The ICOMMS team has been using and refining the tool for four years and recently shared their learning experiences about mapping data at the Atlanta 2012 ICT4D conference. All software is open source and is readily available on their website.

Organization	The ICOMMS (information for community oriented municipal services) research group at the University of Cape Town, in collaboration with others from the Aquatest partnership
Platforms Used	Mobile application (feature and android), data transfer via GRPS mobile channel, web-based reporting interface, SMS response system
Objective	To create a rapid communication system to send simple water quality test results from rural locations to centralized water managers and send back necessary quality alerts to rural communities.
Data Collection Method	Local representatives enter water quality test results into the mobile application or simple menu (on non-smart phones). These are sent to centralized water management systems via GRPS (or saved until a connection is available).
Type of Data Collected	Water quality indicators (e.g. conductivity, pH, turbidity).
Data Use(s)	Water quality tests are analyzed by a web-based interface, which alerts water managers to problems and sends SMS notifications back to local representatives. Data is also presented and recorded geographically.

☞ icomms.org/index.php?page=wqreporter

FLOW (FIELD LEVEL OPERATIONS WATCH)

Water point mapping and monitoring tool

Developed in Denver, Colorado & Amsterdam; Netherlands version used globally

AKVO FLOW was developed initially by Water for People in 2010 and is now being used in 17 countries. Through a new partnership between AKVO and Water for People, the tool is being refined and expanded to be used by more implementing agencies and governments to monitor water services.

One key feature of the tool is the simplicity of the Android application for quickly training enumerators or local monitors to use it. Another key feature is the customizability of the questions that can be input into the application to use it for surveying a variety of indicators. The World Bank has used this tool in Liberia (and currently in Sierra Leone) to map the location and functionality of more that 10,000 water points.

Organization

Water For People / AKVO

Platforms Used

Android application, web interface

Objective

The objective is to more effectively collect, analyze and display geographically-referenced monitoring and evaluation data.

Data Collection Method

Data is collected by surveyors or designated monitors via an android application and sent via GRPS (or saved offline until there is a connection) to a centralized web-interface for performance analysis.

Type of Data Collected

The android application has a customizable menu so that different information about the water point hours of service, quality of service, and management can be recorded, along with geographical location.

Data Use(s)

The data is analyzed by the web-based system to provide level of service ratings on water points, which is shown geographically. This can inform local water managers and through the option of publicly published results increase transparency of water projects. It can also be used to collect baseline data of waterpoint location and functionality to inform governments where resources are most needed to repair and build infrastructure.

☞ waterforpeople.org/flow-mapping
☞ akvo.org/blog/?cat=30

CREEK WATCH

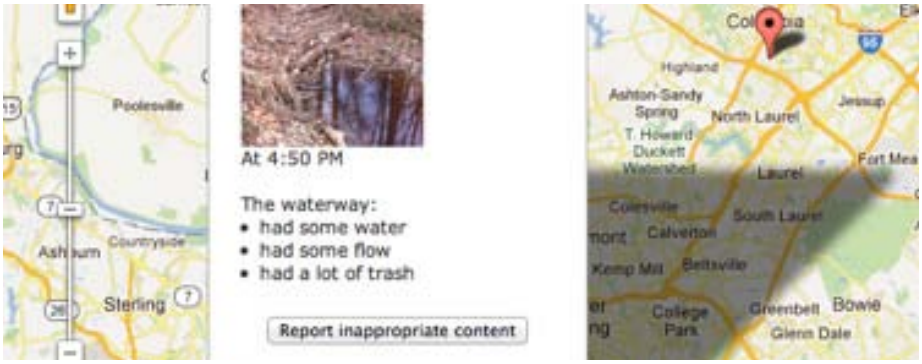
Crowd-sourcing data about waterway conditions

Worldwide, California-based

Creek Watch is a mobile application that allows volunteers to collect information about the condition of creeks that is aggregated for use by local watershed managers. It was developed by IBM as part of the Smarter Planet Initiative, in 2010 and now has over 4000 users in 20 countries (Chen et al., 2010).

This method of "crowd-sourcing" is a relatively simple tool that is a popular feature of many mobile innovations, and the hackathon was no exception. As a crowd-sourcing technology, a key design feature is ease of use, so that anyone can report without significant effort (Chen et al., 2010). For this reason, individuals report on simple features of the creek:

1. The amount of water: empty, some, or full.
2. The rate of flow: still, moving slowly, or moving fast.
3. The amount of trash: none, some (a few pieces), or a lot (10 or more pieces).
4. A picture of the waterway.



The Google map view of reports. From creekwatch.org

Organization	Creek Watch, IMB
Platforms Used	iphone application, Google maps
Objective	Enable citizens to supply information about local waterways to water managers.
Data Collection Method	Data is submitted voluntarily by anyone who has downloaded the application to their iphone.
Type of Data Collected	Photo of waterway with GIS location; amount of water and flow in creek (approximated qualitatively), amount of trash in creek
Data Use(s)	Data is aggregated to share with local water control boards to help them track pollution and manage waterways.

☞ flow-mapping.org

AQUA REPUBLICA

A virtual river basin management game

Being Developed in Denmark (expected by end of 2012)

This game is currently under development by UN-DHI, to be completed by the end of 2012. The game seeks to encourage "meaningful play" by creating a realistic scenario of water resources management decisions within a river basin. In this way it provides a fun and engaging learning platform for those interested in sustainable development and water management. Players' progress is gauged and tracked to lead them to greater proficiency in management.

The game can be played alone or with others, and includes demands from multiple stakeholders. The initial scenario is a river basin with a small urban area (some businesses and light industry), some farms and a power station. The player must try to build a prosperous society in a sustainably-managed environment. The game is based on actual hydrological processes, through the integration of real-time computational hydrological models.

Organization	UNEP - DHI Centre for Water and Environment
Platforms Used	Downloadable computer software program
Objective	To utilize the concept of "meaningful play" through a game that raises awareness about the challenge of water resources management for sustainable development.
Game premise	It is a serious game with realistic simplification of real world watershed/river basin processes (e.g. hydrological processes and development) in which the player must make management trade-offs to achieve the most favorable outcome.
Data Use(s)	The data in this case is given to the game player as he or she is challenged to manage water resources between competing societal and environmental demands.
Target Audience	The game is targeted to entry-level water managers and policy makers, as well as students and staff at universities and schools, and others interested in learning about sustainable development.

☞ icomms.org/index.php?page=wqreporter

NEXT DROP

SMS water delivery notification system

Hubli-Dharward, Karnataka, India

In many cities where water supplies are irregular and only flow once a day or less frequently, women and children may have to spend hours waiting at home or at communal water sources to ensure they collect what little supply is available. The NextDrop tool was launched to address this in 2010 and continues to be refined and expanded. Through simple use of mobile voice and SMS communication, the service creates a chain of information from the valve openers to water users, and back to utility engineers. Thus, users are both alerted to incoming supply, and can report back if there is a problem. NextDrop strives to make this a valuable service, so users must pay a small fee to receive these notifications.

Organization	NextDrop
Platforms Used	Mobile Voice, SMS broadcasting, crowdsourcing for citizen feedback loop, Google Maps
Objective	To spare water users the trouble of waiting long hours for intermittent water supplies to be turned on by alerting them to incoming supplies via SMS.
Data Collection Method	Data is first collected from valvemen when they call in to an interactive voice response (IVR) system to acknowledge that valves have been opened.
Data Use(s)	The system sends subscribers SMS notifications to alert them 30-60 minutes before they will receive water. The reports of valve openings are also sent to the utility engineers through a Google map platform which allows them to track the status of valve openings in real-time. This also enables them to see non-compliance with the schedule so they can identify and resolve issues.
Data Verification	Residents are called, or can send in SMS messages for verification, which is reported to utility engineers.

☞ nextdrop.org

HYDROPLATFORM

Open-source water resource management modeling

London-based, used globally

Hydroplatform is an open-source modeling program for water resources. It is designed to be an easy tool for data management and visualization so that modelers can focus on development, and work collaboratively instead of through separate commercial software programs. It is set up as an intuitive graphical user interface, and can function with network models in other fields (e.g. transport and energy).

Organization	University College London
Platforms Used	Open-source software
Objective	The tool makes water resource management models easier to build, use, and share; take care of data management and visualization; enable collaborative model development
Data Collection Method	The tool helps water resource modelers to enter, verify, manage, and visualize model data.
Type of Data Collected	The platform enables the integration of large and diverse data from climate to hydrological data and can be integrated with other models.
Data Use(s)	Hydroplatform enables modeling of water resources to be easily managed and collaboratively developed across a single open-source program.

☞ hydroplatform.org/index.php

MOBILE WATER PAYMENTS

Application of mobile money to water services

Key countries of deployment include Kenya, Tanzania, Uganda and Zambia

Making traditional cash water payments in many developing countries can be a timely (and costly) activity in which travel to and waiting at a physical pay point is required. In these settings, limited access to formal savings mechanisms can also make paying lump-sum water bills a challenge, particularly for low-income households. Mobile water payments are a means to address these obstacles, which otherwise can undermine the ability of the utility to collect the payments for cost recovery and re-invest into improving and expanding water services.

Mobile water payment options have been deployed across several countries in Africa by utilities of all sizes from less than 1,000 connections to national providers, as in Uganda. In rural settings, the Grundfos LIFELINK system is attracting increasing interest. It uses mobile money to pay for water an electronic tap unit, which draws water through a solar-powered borehole pump.

Organization

Offered by a range of mobile network operators in conjunction with water utilities (e.g. Safaricom and Airtel in Kenya; Vodacom and Airtel in Tanzania; MTN and Airtel in Uganda)

Platforms Used

SMS, mobile money

Objective

The objective is to enable water users to pay their bills in a more convenient and affordable way, thereby encouraging more timely bill payment while giving utilities a more cost-effective way to collect bills. This can ultimately enable utilities to recover and re-invest more revenue into improving and expanding services.

Data Collection Method

Water users can pay their water bill through their mobile operator's mobile money service (e.g. Safaricom's M-PESA).

Type of Data Collected

Depending on the level of integration between the mobile money service and the service provider's billing system, customers may be able to receive bills via SMS, reminders about payments, and check their balance.

Data Use(s)

Mobile payments can provide utilities with a simplified, digital record of payments, which can reduce administrative costs. It can also be a more transferable form of payment data for sharing with regulators.

☞ oxwater.co.uk/#/mobile-water-payments/4559323117
☞ nairobiwater.co.ke

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