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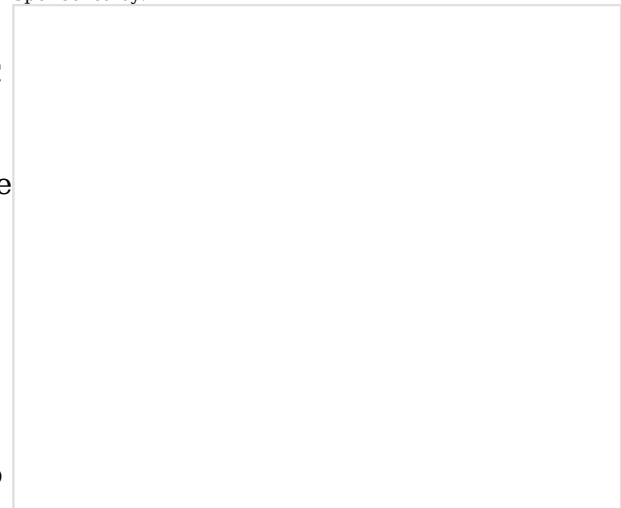
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# Technology That Matters: IRD and ICT4D

By Saba Jamaluddin, CIO Pakistan  
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Interactive Alerts is a patient data collection and monitoring system that is RFID based. This system just placed first in the global NFC forum competition for the use of near field communication. We managed to sit down with the man of the hour: Omar Allawala, who is the Director of Information Technology at [Interactive Research and Development](#). Omar has been a software engineer for almost 10 years. His industry experience includes working with Java and Open Source technologies among others. Much of his work has been conducted in the U.S where he resided until recently, when he moved back to Pakistan.

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**What are you tracking through this Interactive Alerts System you have developed here?**At present, we are tracking pneumonia, sepsis and meningitis primarily since those were the parameters of our study but other diseases may be included.

**What exactly do you all propose to achieve through the study?**We are tracking the events during the first 2 years of a child's life. Pneumonia is considered one of the leading causes of death among infants and children under the age of 5 in Pakistan. This study proposes to follow the children through the first 18 months of their life to see if they contract pneumonia during that time. We are trying to isolate a particular strain of pneumonia (streptococcus pneumonia) so as to lay a foundation for a vaccine trial which will follow this study. The child who meets our age criteria is enrolled in the study and given the RFID bracelet at a participating vaccination center. This RFID will

be used to track the child during the study period and the IDs assigned to these bracelets are automatically managed at the server end.

From this point onwards, whenever the mother takes the child to a participating general practitioners clinic, a partner hospital or a follow up visit at the vaccination center, the RFID is scanned using the Nokia 6131 phones which Nokia was generous enough to donate to us. This scan reads the patient ID and prompts the field worker or the clinician to select from a menu option and submit the data to our server application via GRPS where it's stored in a database.

When the server receives the data it also generates a SMS message and dispatches that to a mobile team standing by to respond to these events. The mobile team consists of a surveillance medical officer and a phlebotomist who then uses the information contained in the SMS to go to the clinics and provide further assistance to the patient. For instance the patient might require blood tests, x-rays or hospitalization and our team handles this and links the test IDs with the patient ID using the same phone based system. All this data can be viewed by our team in real time though a secure web interface so that we can keep track of the patient's progress. By using these phones and RFID, we are able to provide a low cost location independent solution.

**Why choose RFID? Why not use Bar Codes, which you see all over the place?** Using RFID tags in combination with RFID capable mobile phone offer immense advantages over a barcode system. With our current setup, we can issue, reissue and deactivate tags at different locations if we so choose, without requiring printer hookups. RFID tags also take up a smaller surface area, especially the button tags we use and these tags can be easily integrated in the bracelet. Since they are washable, the bracelet can remain on the child's wrist and has a lower probability of getting lost. Barcodes would have had to be printed on cards and mothers forgetting the cards at home would become a more common phenomenon.

Unlike a barcode, the RFID tag can be scanned from either side. I do not know of any phone that has the barcode reader built in, I believe there are external readers that might connect to high end phones or PDA's however my experience has been that phones read barcodes through the camera and decode the information. If the quality of the printed barcode has deteriorated or is damaged, then that can cause issues and mothers do not have that kind of time to deal with glitches when they bring their child for checkup and/or treatment.

**What if any constraints or restrictions did you face when developing the system?** The timeline from when I joined IRD to when this project was supposed to be deployed was the biggest challenge. So it required crazy work hours for a few months at a stretch to get it all working but I am glad that in the end everything came together and now we have a fully functional system that is being used in the field. Since we are a very small organization, I had to wear a lot of hats while developing the software in the sense that I had to handle many different aspects of design and development which would be handled by different teams of developers in a bigger team.

**Other Challenges?** I had no prior mobile development experience and limited web

development experience. The majority of my experience was with desktop based systems and proprietary embedded systems from my previous job. I was primarily working with C, C++ and assembly when I decided to quit my job in the US and come back. It was then that I decided to reinvent myself and focus on java based technologies. I had done java a long time ago so first I had to recap and then learn advanced technologies and frameworks such as Spring, which I used in the development. I also had no prior experience in multi-threading which I had to use for the mobile software.

The server side software also provided certain challenges especially when developing the web front end since that was a bit out of my domain but now I am comfortable with that as well. The positive was that I did not have to start completely from scratch. The NextLab at MIT, who we work extensively with, had developed the basic mobile prototype of this system. I took their work and enhanced it for our study and added the database, server component as well as extensive additions and changes in the mobile application.

It was great working with the MIT team and I will like to thank Luis Sarmenta and Adam Marcus for their effort and help.

**What about the concern over the privacy of these medical records?**We greatly value the privacy of patient data and take steps to make sure that this data is protected. The data can be viewed through the website which is secured using https and requires authentication. There is no direct access to the database so as to avoid any unauthorized changes. Only the phones in our study are able to post data to the server and they can be deactivated on the server end if we decide to no longer accept data from them if they are lost or stolen.

**Since there are many features to the sort of tracking you all are conducting, how difficult was it to write such a multi pronged piece of software?**The mobile application is built around the notion of roles and each role provides different functionality and menu options to the user so the enrollment worker will have different options than the clinician even though they use the same software. The administrator can configure the roles on the phone after properly authenticating themselves to the system. The focus during development was to make the menu options as simple as possible for the users while retaining all the functionality that we have in there now. The same phones can be moved from one role to another as and when the need arises. We were gifted these 50 phones by Nokia so we need to ensure they go a long way!

**Have you had any issues when dealing with these systems in Pakistan?**Even though the cell phone service providers cover an extensive area in Pakistan, there are certain areas where GPRS is patchy and flaky. We have also had instances where the server side network had gone down due to the roads being dug up. To account for the GPRS issues, we queue up the messages on the phone and store them locally on the device until the message can be sent. We also provide the capability that the data being submitted tries on alternate network addresses to provide redundancy.

The other issue that we faced was finding skilled Java programmers in Pakistan. In the IT sector currently, most of the people are concentrating on C# and .Net. Open Source

awareness is limited since people, sadly, are happy to use pirated copies of software here. The other issue that certain people may have is that being a non-profit organization we are not always able to compete with the commercial organizations in the salary department. Our financial obligations first are towards helping the patients so technology spending has to take a back seat. In the study, we face very few issues e.g. parents who object to having RFIDs on the kids. Some patient parents are initially reluctant, but we offer incentives like free health care, gift baskets and send them wellness reminders etc

**Tell us about the NFC Competition**IRD made it to the final 20 out of 52 submissions from 21 countries. The criterion was simple: to have a NFC based entry. We are very honored and humbled to have won amongst some tough competition. Compared with the social networking and other commercial competing entries, our application stood out due to its social implications in its purpose to help people. The hope now is that this will highlight the work we are doing here in Pakistan.

**What is next for you?**The next big challenge of developing something new and exciting. To do something innovative like this pneumonia application.

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