

Designing Human-Computer Interaction for Citizen Science Initiatives in Rural Developing Regions

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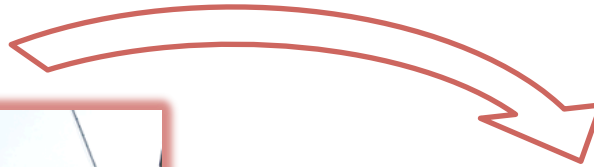
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From *Developed Urban* to *Developing Rural* Citizen Science



From cleanair.uk



From "Skydiving, LEGO and my PhD: how I applied Extreme Citizen Science in the Pantanal, Brazil" by Rafael Chiaravalotti



ECS in Rural Developing Regions

- Challenges -

Common ICT4D challenges

- Environmental constraints
- Skills constraints
- Cultural constraints

From *Constraints for Information and Communications Technologies implementation in rural Zambia*, Van Stam et al, Africom 2012

Challenges amplified in the ECS context

- Solution adaptation and participatory design
- Holistic implementation
- Human capital and engaging c

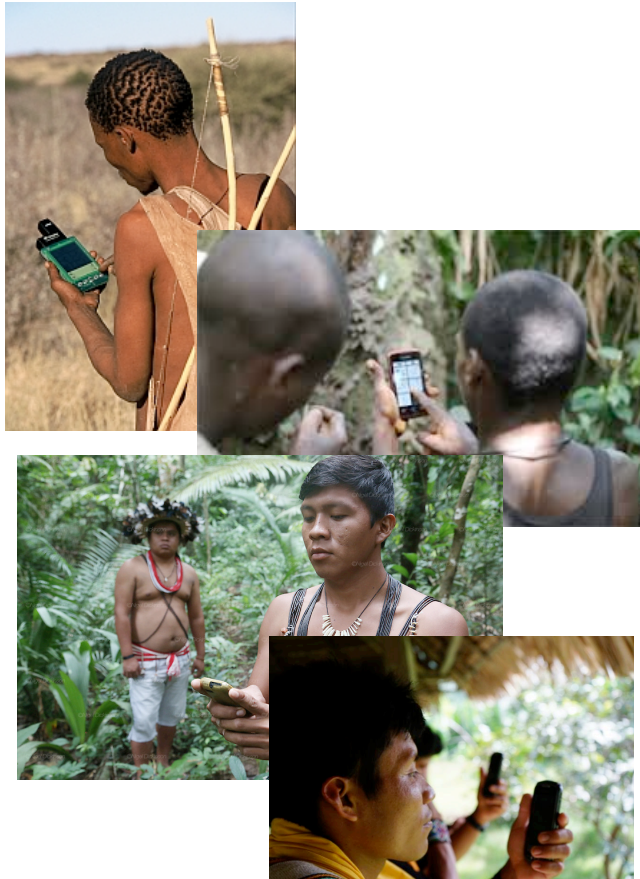


Identify key obstacles and derive
guidelines for implementing ECS in
rural developing regions...

...particular focus on
technology interaction issues



Research Methodology

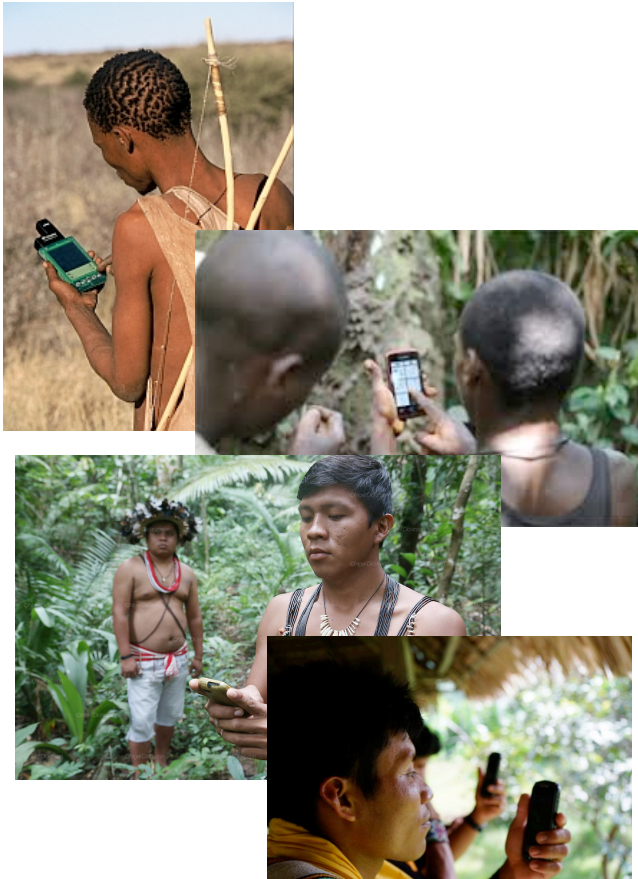


- Selected ECS-related studies in rural developing world:
 - Tackling cattle invasion in Namibia
 - Supporting wildlife trackers in southern Africa
 - Mapping fishermen resources in Pantanal, Brazil
 - Reporting illegal poaching in Cameroon
 - Supporting Ashaninka tackle illegal hunting intrusions
 - ...



Research Methodology

- Interviews:
 - Nine researchers with considerable (months, years, decades) field work experience
 - Semi-structured, one hour long, two interviewers, independent notes
 - Questions about project organisation, motivation, tech tools used, technology interaction, feedback to participants, outcomes



Findings – Project Organisation

- Mobilising the community:
 - The dialogue should take societal organisation into account:
R4: “...the community is egalitarian, so you need to talk to everyone, decisions are made by the whole community”
- Finding local champions:
 - *R6: “The training and coordination of data collectors was lead by a chief’s son”*



Findings – Technology vs Context

- Technology ecosystem requirements:
 - R3: “...smartphones are highly reliant on a whole chain of devices and equipment, such as chargers, cables, converters, etc., that we take for granted in urban areas”
- Technology built for different environments:
 - Phone software updates problem, intermittent connectivity, energy use
 - Difficult to see screen in direct sunlight, rough fingertip calluses prevent seamless touchscreen interaction



Findings – Data Collection App Interface Organisation

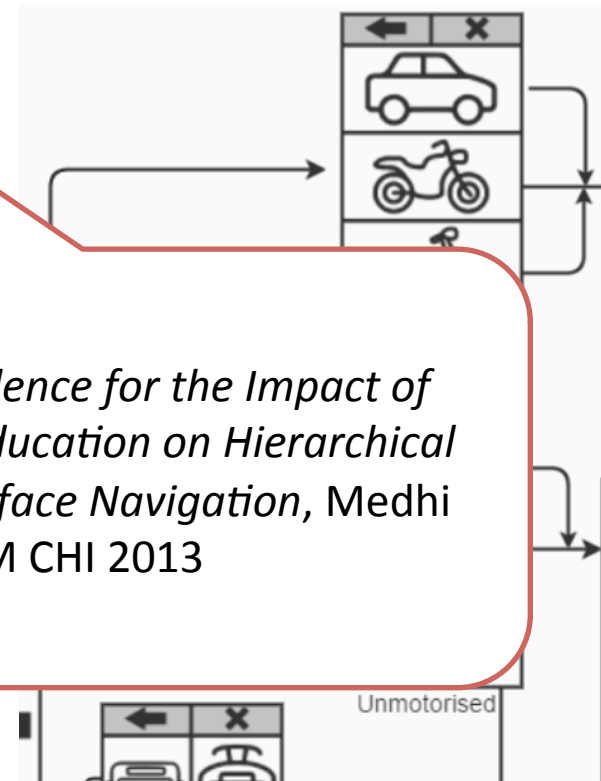
- Hierarchical icon organisation is often a problem:

- R2: *“users struggle to find the right icon, even when the concept is well understood”*

- Navigation buttons were not

- R2: *“...instead of tapping or CANCEL, they would just continue the process, in case a wrong item was selected in the previous step”*

Some Evidence for the Impact of Limited Education on Hierarchical User Interface Navigation, Medhi et al., ACM CHI 2013



From www.sapelli.org/surveying-transport-users/



...juxtapose with a study of illiterate users in urban Brazil

- Hierarchical organisation and navigational issues not observed
- Not only the provided interface, but the native Android commands were used efficiently
- Potential explanation: these users also lack formal education; however, **exposure to smartphones helps develop hierarchical navigation skills**



Findings – Data Collection App Icon Design

- Realistic icons requested:
 - R9: “... *they disliked the stylized version, so we replaced icons with photos*”
- Objects shown in the context:
 - R1: “...*if there’s a forest around a tree, draw it!*”
- Actions vs objects:
 - R6: “*Voice instructions in the local language... would explain an action, not just an object...*”

From Ashaninka project Sapelli app implementation



Findings – Getting Feedback

- Getting honest feedback is difficult
 - R3: *“Users don’t criticize the project”*
- Strong ties enable honest feedback
 - R7: *“Getting feedback about not a problem, as there is a between us [R7 and the use*
- Lack of vocabulary to comment on HCI issues

“Yours is Better!” Participant Response Bias in HCI, Dell et al., ACM CHI 2012



Findings – Maintaining Motivation

- Make data collection efforts visible:
 - R9: *“They appreciated seeing a map with the data, but they had to wait for a year for that”*
- Ensure real-world impact of data collection:
 - R6: *“...the process requires that the person who took the photo testifies in court, which many are unwilling to do, as they are afraid of the witchcraft put on them by the blamed side.”*



Opportunities and Action Items

- Design for and with the users
 - Communities want “**their**” apps, not generic solutions
 - Automatically adapt application interface to match user’s skills
- Geographical information is the common ground
 - Maps were well understood in all of the studies
 - Yet, current tools (Sapelli, Cybetracker, Open Data Kit) **lack geographic information visualisation** suitable for rural developing regions!



Thank you!

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