Opportunity Detection Kit

Manual

Capability Driven Design

An Approach for Understanding Users' Lives in Design for Development

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The Opportunity Detection Kit

The Opportunity Detection Kit (ODK) is a toolkit that supports the designer to conduct step 3 of the Capability Driven Design (CDD) approach: obtaining deep insight by means of semi-structured individual interviews (see figure below). The kit consists of techniques and tools which guide the design team when conducting semi-structured interviews and aid the design team to obtain rigorous and comprehensive insight in an efficient way. When using ODK, the content of the CDD approach should be kept in mind: the thinking framework should be understood, and the prerequisites and guidelines followed. The themes & questions are part of the ODK itself: for each theme a question card is developed which holds a pictogram on one side and the theme with questions on the other.
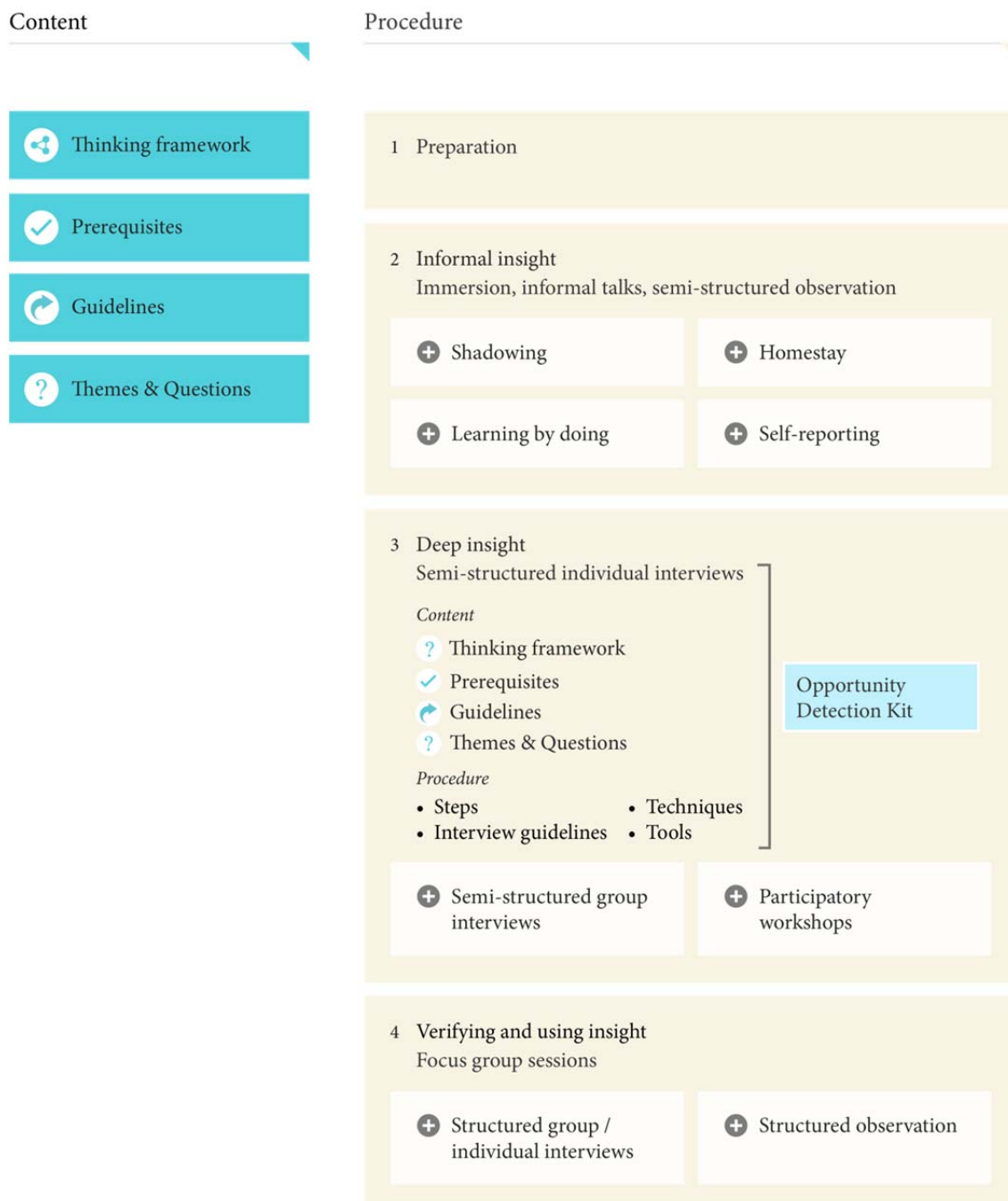
The Opportunity Detection kit as part of the Capability Driven Design approach

OPPORTUNITY DETECTION KIT MANUAL

What is ODK? What benefits does it offer?
The ODK is a toolkit that comprises one of the essential methods within the CDD approach, semi-structured interviews, using the backbone of CDD and proposing several techniques and tools. The techniques and tools can be used during the interview to start the conversation, stimulate participants to open up, make the activity fun, simple and participatory, address all the themes, provide an overview of the conversation topics discussed and provide the design team a basis to fall back.

How to use the ODK?
During the first few interviews, all themes should be addressed, but that the facilitator should follow-up on the unexpected and on issues that the participant finds interesting. During the latter ODK interviews, after iterative data analysis of the first interviews, the facilitator can go deeper and obtain more specific insight in emotions and feelings regarding to themes that seem of most interest.

Combination with product-related questions
During the ODK interviews, 'generic' product questions can be posed. Product questions can be added when certain themes are discussed that are obviously related to the product or service to be developed. For example, when a solar charging station for mobile phones needs to be developed, questions about mobile phones ('Products'), connectivity ('Mobility', 'Significant Relationships', 'Family' or 'Services') and energy ('Services') can be posed. Example questions could be: 'Do you own a mobile phone' and 'What do you use your phone for?' and 'How do you charge your mobile phone?'. More specific questions, for example about aesthetic preferences for the charging station, are not adequate to pose during the ODK interviews, they will make the interview too long and focused on the product, while it is meant for a comprehensive insight.

Techniques and Tools of the Opportunity Detection Kit

The ODK comprises several techniques and tools: reminder cards, pictograms, question cards, drawing and mapping tools, timelines to draw on and a sorting exercise. All these techniques and tools support the designer during the semi-structured ODK interview and are explained here.
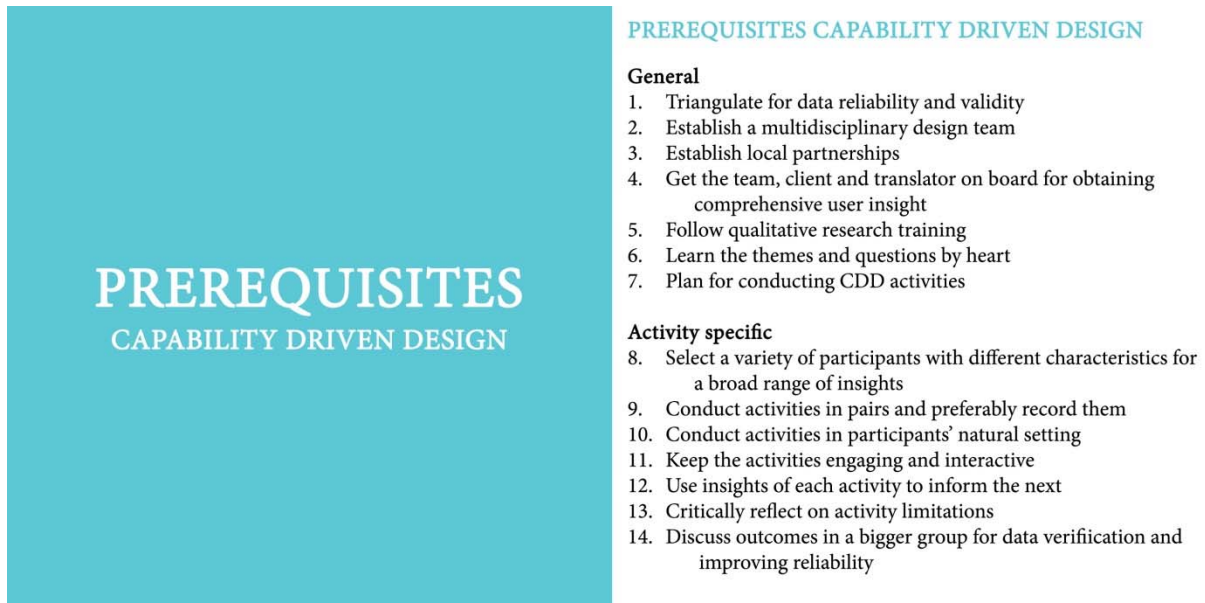
Question cards
The question cards are presented above (in figure 22). For each interview, the design team can choose one pictogram or choose to contextualise the visualisation. Then, one set of pictograms can be printed to provide visual feedback to the participant about the theme being discussed and the interview progress, and one set of pictograms can be printed with the questions on the back, to guide the facilitator. The design team should cluster the selected question cards in sets of four, to keep a better overview.

Reminder cards
To further assist the design team in following the prerequisites and steps and remembering the most important behaviour and attitude to stick to, reminder cards have been developed, which are explained below.

Prerequisite reminder card

This card shortly states the prerequisites of the CDD approach (see figure 30).

PREREQUISITES CAPABILITY DRIVEN DESIGN

General
1. Triangulate for data reliability and validity
2. Establish a multidisciplinary design team
3. Establish local partnerships
4. Get the team, client and translator on board for obtaining comprehensive user insight
5. Follow qualitative research training
6. Learn the themes and questions by heart
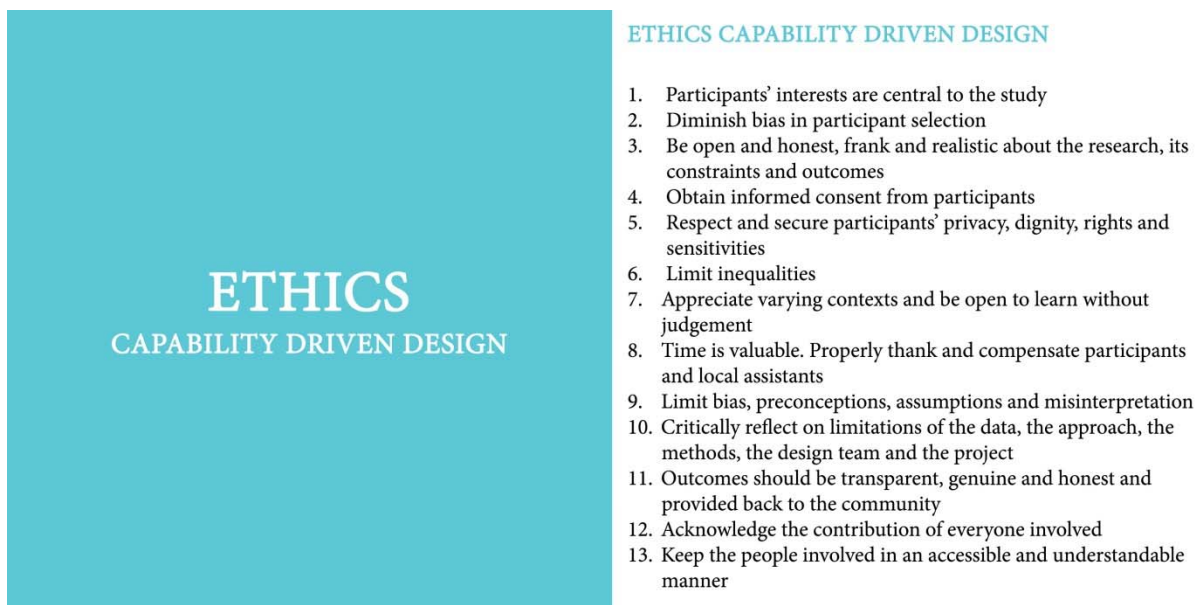7. Plan for conducting CDD activities

Activity specific
8. Select a variety of participants with different characteristics for a broad range of insights
9. Conduct activities in pairs and preferably record them
10. Conduct activities in participants' natural setting
11. Keep the activities engaging and interactive
12. Use insights of each activity to inform the next
13. Critically reflect on activity limitations
14. Discuss outcomes in a bigger group for data verifiication and improving reliability

Figure 1: Prerequisite reminder card

Ethics reminder card: ethical guidelines for Capability Driven Design
This card shortly states the most important ethical guidelines of the CDD approach (see figure 31).

ETHICS CAPABILITY DRIVEN DESIGN

1. Participants' interests are central to the study
2. Diminish bias in participant selection
3. Be open and honest, frank and realistic about the research, its constraints and outcomes
4. Obtain informed consent from participants
5. Respect and secure participants' privacy, dignity, rights and sensitivities
6. Limit inequalities
7. Appreciate varying contexts and be open to learn without judgement
8. Time is valuable. Properly thank and compensate participants and local assistants
9. Limit bias, preconceptions, assumptions and misinterpretation
10. Critically reflect on limitations of the data, the approach, the methods, the design team and the project
11. Outcomes should be transparent, genuine and honest and provided back to the community
12. Acknowledge the contribution of everyone involved
13. Keep the people involved in an accessible and understandable manner

Figure 2: Ethics reminder card

Facilitator reminder card: tips and tricks for facilitating ODK interviews
This card comprises the most important rules towards interviewing will be placed down on a card that will be added. Designers are free to add to this card. The standard 'rules' presented on the card can be seen in figure 32.
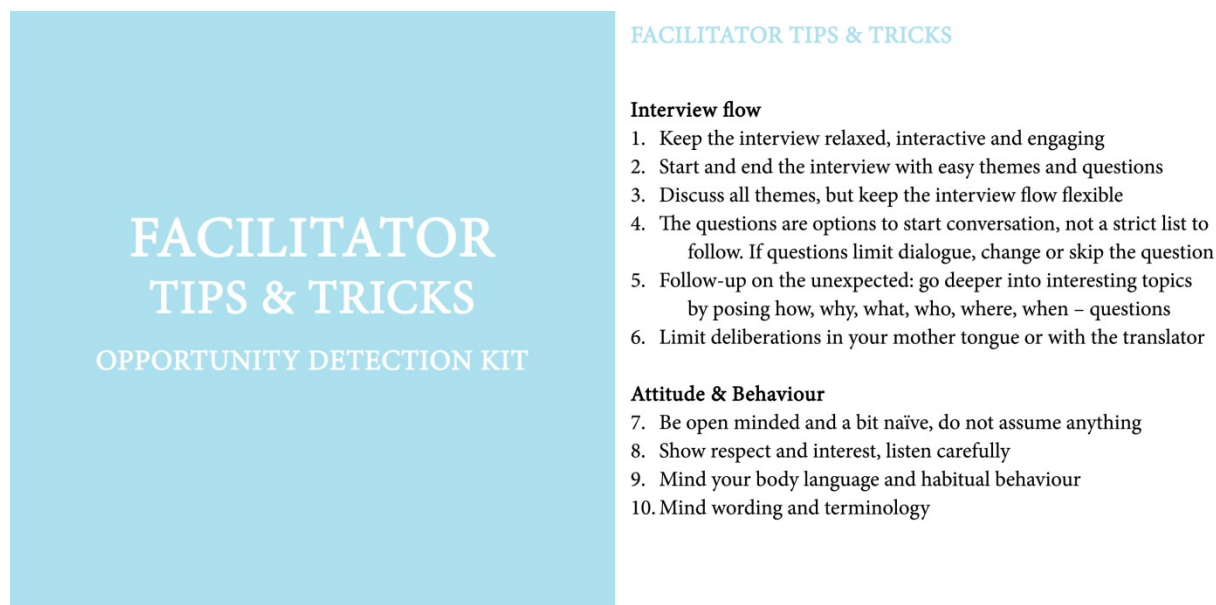
FACILITATOR TIPS & TRICKS

Interview flow
1. Keep the interview relaxed, interactive and engaging
2. Start and end the interview with easy themes and questions
3. Discuss all themes, but keep the interview flow flexible
4. The questions are options to start conversation, not a strict list to follow. If questions limit dialogue, change or skip the question
5. Follow-up on the unexpected: go deeper into interesting topics by posing how, why, what, who, where, when – questions
6. Limit deliberations in your mother tongue or with the translator

Attitude & Behaviour
7. Be open minded and a bit naïve, do not assume anything
8. Show respect and interest, listen carefully
9. Mind your body language and habitual behaviour
10. Mind wording and terminology

Figure 3: Facilitator reminder card

Note-taker reminder card: things to pay attention to when documenting ODK interviews
This card summarizes the things the note-taker should pay attention to and document during an interview (see figure 33). Designers are free to add to this card.
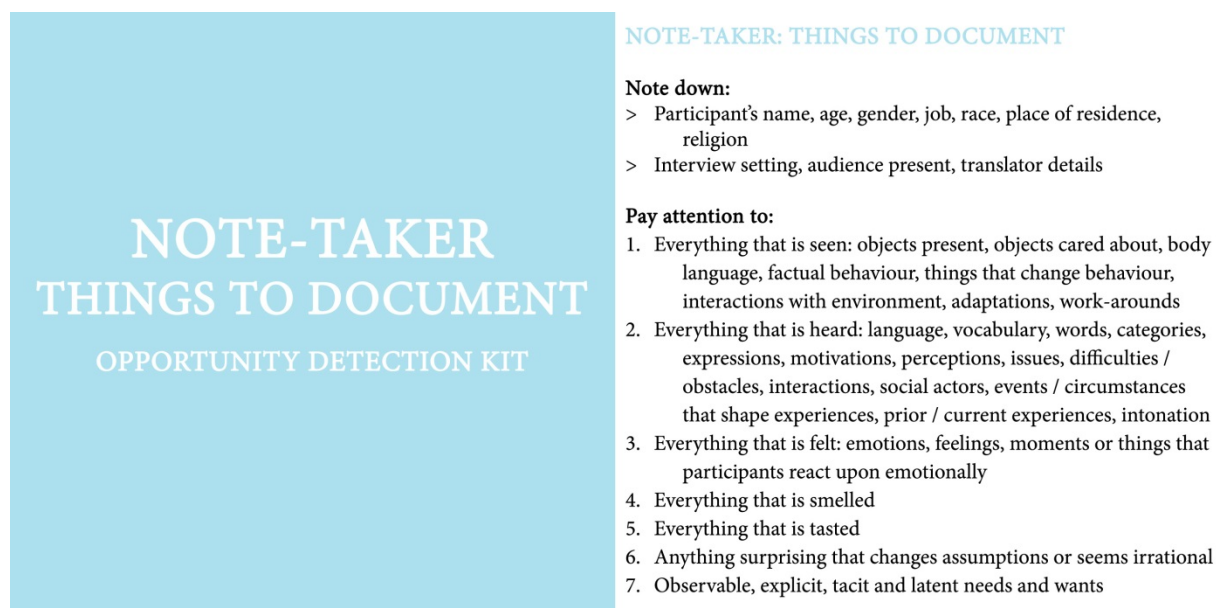
NOTE-TAKER: THINGS TO DOCUMENT

Note down:
> Participant's name, age, gender, job, race, place of residence, religion
> Interview setting, audience present, translator details

Pay attention to:
1. Everything that is seen: objects present, objects cared about, body language, factual behaviour, things that change behaviour, interactions with environment, adaptations, work-arounds
2. Everything that is heard: language, vocabulary, words, categories, expressions, motivations, perceptions, issues, difficulties / obstacles, interactions, social actors, events / circumstances that shape experiences, prior / current experiences, intonation
3. Everything that is felt: emotions, feelings, moments or things that participants react upon emotionally
4. Everything that is smelled
5. Everything that is tasted
6. Anything surprising that changes assumptions or seems irrational
7. Observable, explicit, tacit and latent needs and wants

Figure 4: Note-taker reminder card

Steps reminder card: steps to follow when conducting ODK interviews
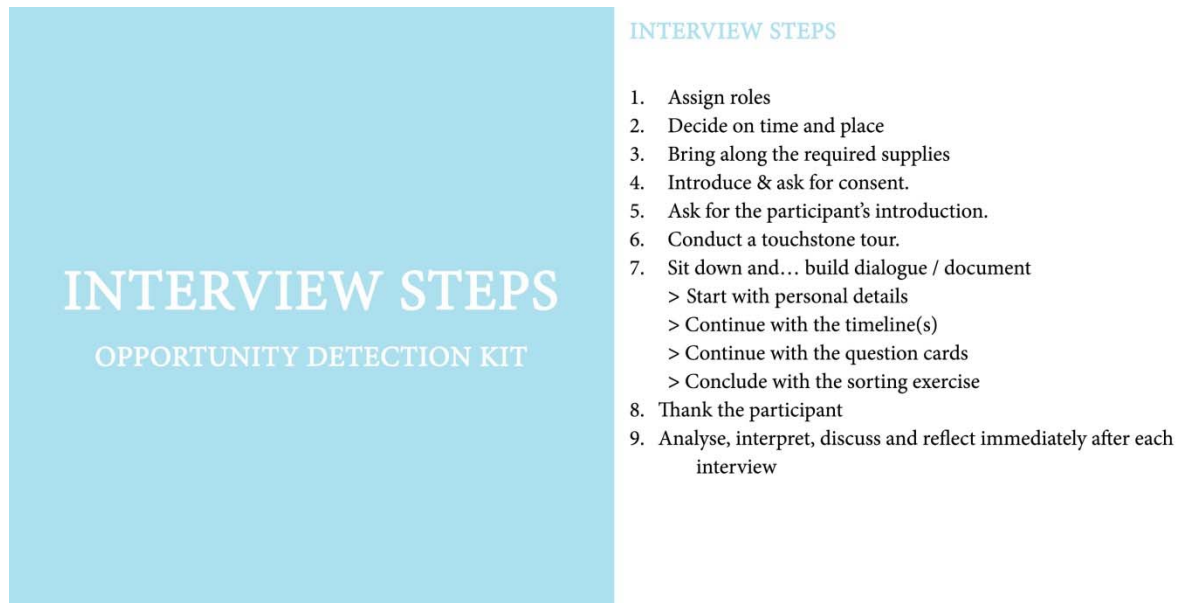A card shortly stating the interview steps of the ODK will be added (see figure 34).

INTERVIEW STEPS

1. Assign roles
2. Decide on time and place
3. Bring along the required supplies
4. Introduce & ask for consent.
5. Ask for the participant's introduction.
6. Conduct a touchstone tour.
7. Sit down and… build dialogue / document
   > Start with personal details
   > Continue with the timeline(s)
   > Continue with the question cards
   > Conclude with the sorting exercise
8. Thank the participant
9. Analyse, interpret, discuss and reflect immediately after each interview

Figure 5: Interview steps reminder card

Drawing / mapping on timelines and mapping sheets

The timeline as presented below in figure 35, is meant for drawing a typical day of the participant, and should be used as a conversation starter, to identify starting points for dialogue. The timeline can be used on an electronic drawing device, or can be printed and laminated to allow for drawing with erasable markers.

Figure 6: Timeline for drawing

A timeline of the year can be used additionally to learn more about participants' activities throughout the year (see figure 36). A timeline of personal history can be used to learn more about participants' personal history by going back to past experiences (see figure 37).
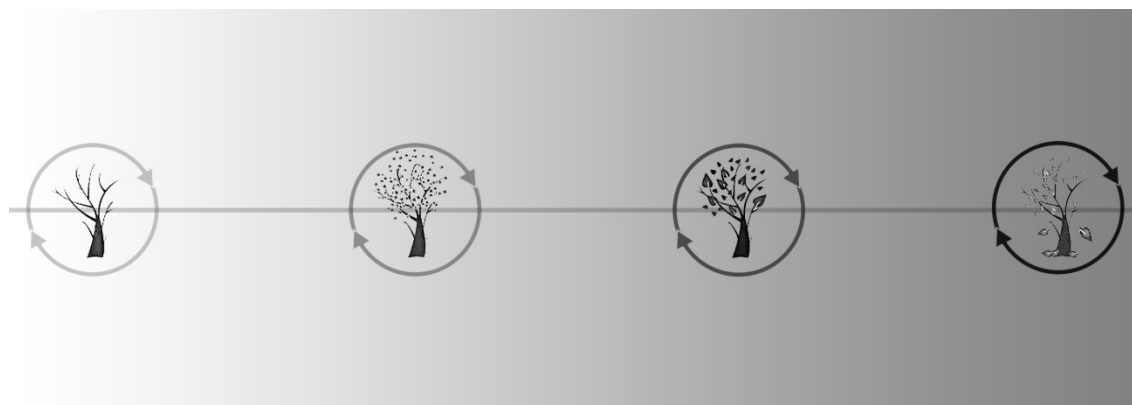
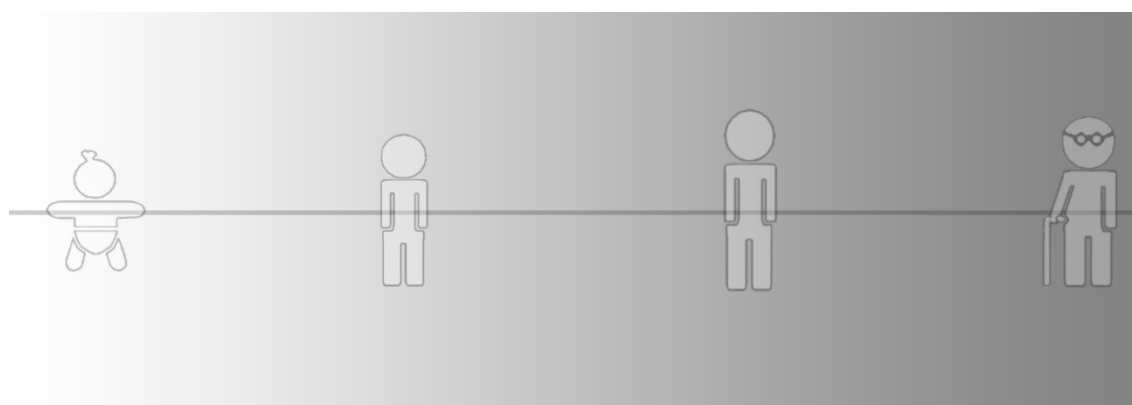*Figure 7: Timeline for activities throughout the year*

Figure 8: Timeline for personal history

Moreover, two drawing sheets are part of the ODK. One to enable mapping of participants' housing, surroundings and movement patterns, and one to map participants' appearance and social life (see figure 38 and 39).
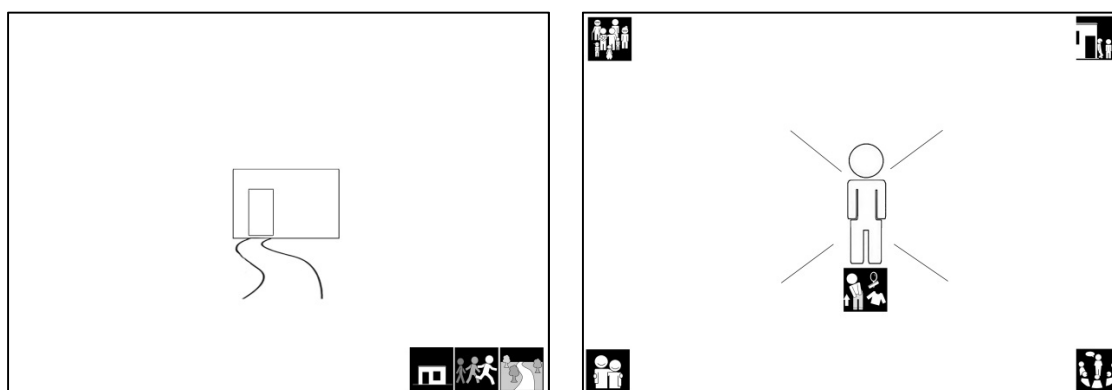

Figure 9 and 10: Mapping sheet for 'Living' and 'Movements' and Mapping sheet for 'Appearance' and 'Social Life'

Sorting

The sorting exercise is to understand how people value the different themes. Participants should indicate which sub-themes they value most in their lives. The sub-theme pictograms are available in a smaller size and can be placed on the sorting sheet. The exclamation marks indicate importance. The participants have to sort the sorting cards in six categories from very important (six exclamation

marks) to not important (represented by one exclamation mark) (see figure 40). To avoid confusion, this can be done best by providing the sorting cards one by one and let people sort them one by one.
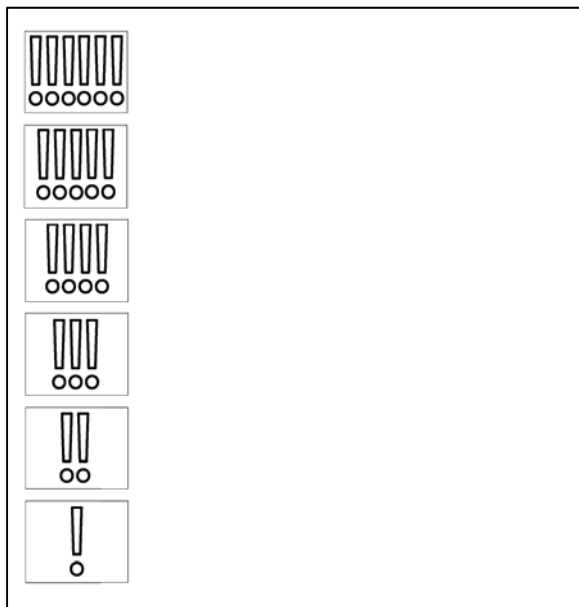

Figure 11: Sorting sheet

Opportunity Detection Kit Interview Steps

The steps that need to be executed in order to conduct semi-structured interviews are the following:

Prepare the interview

1. *Get familiar with the ODK procedure, techniques and tools*. The team members must become acquainted with the flow and structure of the interview. By being familiar to the themes and questions it is easier to switch between them, offering flexibility which improves the building of dialogue. Roleplay the interview in the team, pilot the interview and read the full manual to get the most out of the interviews.

2. *Include general product questions in the ODK.* During the ODK interviews, 'generic' product questions can be posed. Product questions can be added when certain themes are discussed that are obviously related to the product or service to be developed. For example, when a solar charging station for mobile phones needs to be developed, questions about mobile phones ('Products'), connectivity ('Mobility', 'Significant Relationships', 'Family' or 'Services') and energy ('Services') can be posed. More specific questions, for example about aesthetic preferences for the charging station, are not adequate to pose during the ODK interviews, they will make the interview too long and focused on the product, while it is meant for a comprehensive insight.

3. *Localize the content and conduct a local pilot*. Locally discuss the ODK contents beforehand. As accents, words, expressions, dialects and pronunciations might be different and words might mean different things in different regions, it is important to make sure the translator and the participant have the same understanding of the themes and questions. To adjust wordings to local dialects and to point out sensitivities it is important to discuss the themes and topics with people familiar to the potential users and their context. To improve participants' understanding of the themes and build relationship, the pictographs can best be replaced by local

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visualizations. Be careful to select visualisations to which the participant can relate, but which do not steer the participant into a certain direction. Adjusting the ODK to the local context results in better dialogue and better outcomes. After adjusting the ODKs contents, a local pilot should be executed in the field. By conducting a pilot in the field, the designer becomes familiar to the ODK content and procedure. Moreover, sensitivities and terminology become even more clear. Especially when using a translator it is relevant to conduct the pilot locally, as in this way the translator also becomes familiar to the ODK content and procedure. Tips & tricks for contextualizing visualizations are provided in the manual.

4. *Carefully select and instruct a translator (if required)*. Follow the tips & tricks in the manual. The translator should be thoroughly informed about the task at hand and his or her role. Share the goals of the research and explain the rules. If step 5 (conduct a local pilot) is not feasible: go through all the themes and questions before the first interview to get the translator acquainted with the interview flow and structure, the themes and key questions. It is best to use one and the same translator for every interview, as this reduces training and interview time. Moreover, when the translator is familiar to the participants, but does not have a stake in the interview, it is easier for participants to open up.

5. *Select participants*. A local partner, translators or other participants can aid in selecting participants. However, the selection criteria should be followed. As stated in prerequisite H, a variety of participants should be selected, also outside the potential user group.

Conduct the interview

6. *Assign roles*. Conduct the interview with at least two (a facilitator and a note taker / photographer) and a maximum of three designers and assign roles beforehand to clarify the purpose for each researcher. Appoint a facilitator who resembles the participant most (e.g., in gender, age social class, religion and ethnicity), when possible.

7. *Decide on time and place*. Time and place of the interview should be at convenience of the participants and preferably in their local context. Try to prevent to conduct interviews with participants who are busy and distracted (e.g. because of work, time limitations), and interviews that suffer from interruption by audience. Try to not bring employees from the client organization, as they have a stake in the research outcomes and might influence the participant's answering. Make sure there is sufficient space to use the ODK techniques and tools.

8. *Bring along the required supplies*. The materials for the activities, recording devices, a notebook and pen should be brought along to the interview. Consider to bring along pictures of yourself and your surroundings and food for the participant as well.

9. *Introduce & ask for consent*. Introduce the research, the interview, the translator and yourselves. Be honest and explain the research goals and why comprehensive user insight is required to be able to develop a product and / or service that suits the people's needs and wants. Explain that they are the experts and that the interview is to learn from them. Giving your introduction in the local language helps to build rapport and to establish a more relaxed atmosphere. Participants should be informed about the research and its goals and about the activity. Ask for consent to record the interview, to take pictures and to use the data. Stress that participants are not obliged to participate and can withdraw from the activity at any time. Clarify how much time the interview will approximately take, based on the local pilot. It is very important to be clear about compensation to set the right expectations for participants.

Communicate openness and being non-threatening, stress that there are no wrong answers and that not all questions have to be answered. Explain the participant that he or she is free to leave. Make the participants feel relevant as participants by sharing yourself, verbally or with help from pictures.

10. *Ask for the participant's introduction*. Asking participants to tell something about themselves provides an easy start and shows interest. Learn participants' names, age, place of residence, job and religion and note this down, in order to acknowledge the participant and make him or her feel relevant.

11. *Conduct a touchstone tour*. Let the participant show you around in their house or the environment where the interview is conducted. Use the show me technique: let the participants show you objects, spaces and tools. Conducting a touchstone tour results in better outcomes, as the observations made can be used to establish dialogue and to cross-check the information that participants share.

12. *Sit down and…*

    When multiple team members are present, try to not sit together and do not discuss things in your mother tongue. Also try to limit discussions in English with the translator. The participant should be the one talking.

    a. *For the facilitator: …build dialogue*.

    ➢ *Start with personal details.* Ask the participant's name, age, place of residence and religion. Share pictures that you brought from your home country. Look at the tips & tricks for appropriate behaviour and attitude to help you to build a comfortable and relaxed atmosphere.

    ➢ *Continue with the timeline*. Ask what the participants do during a day. The timeline can be combined with the visualization cards and erasable markers to create an overview of their day. Try to let participants create, if they are unwilling let the note taker create.

    ➢ *Continue with the question cards*. Use the drawing sheet, the visualization cards and the erasable markers to visualize the answers. Start with the current situation for one theme and from that point ask about changes in the past and aspirations for the future, before continuing to the next theme. When discussing a theme, explain what the pictograph/local visualization is about. Again, try to let participants create, if they are unwilling let the note taker create. There is no indicated order for discussing the themes, but start with an 'easy' theme or topic and also end with an 'easy' theme or topic (which themes are 'easy' can be found out by discussing the themes with a local partner and / or conducting a local pilot). The questions for each theme are mere options for starting conversations than exact questions that need to be asked. However, the questions should be kept general enough to stimulate conversation, and focused enough to reveal the desired information. Questions can be left out and for each theme it is also important to ask questions in different ways, to pose questions about topics and experiences that come up during the conversation. Pose follow-up questions to follow-up on the unexpected, and on topics that the participant finds interesting. When participants have difficulty opening up, fall back to 'easy' topics or use drawings to elicit more response. When certain topics are clearly sensitive or close down the participant, switch topic. Any question affecting the dignity of participants must not be pursued. It is important to consider and respect people's privacy, and their personal space. If participants do not allow the designers to enter that personal space, that should be respected.

➢ *Conclude the conversation with the sorting exercise*. Use the sorting cards and let participants place these cards on the ranking sheet, based on their importance: not important (.), less important (!), important (!!) or very important (!!!). For each sorting card, explain what the pictograph/local visualization means. The ranking exercise works as a confirmation of the things being told during the interview and provides insight in what and how participants value.

b. *For the note-taker: …document*. Let the interview preferably be recorded by a recording device (but be aware of the possible effects of recording devices: participants becoming shy or holding back) and take notes to document anything surprising and participants' behaviour, attitude, body language and interpretations. The note-taker can also draw, and capture photographs and video. Look at the tips & tricks about 'what to pay attention to'.

13. *Thank the participant.* Thank participants for their invested time and effort and for sharing personal information. Bring a small gift, food and / or money to show appreciation and compensate for time and costs (see ODK guideline C).

14. *Analyse, interpret, discuss and reflect immediately*. Analyse and interpret the data after each interview and discuss the interview outcomes, the most striking insights and perceptions with the design team directly after each interview, before things become 'normal'. This aids to verify insights and detect design opportunities. The insights can also be discussed with the translator and the local partner(s). Reflect on the insights (see prerequisite N) with the full team and use the outcomes during the following interviews.

When using the ODK, all fourteen steps should be followed and step five to thirteen should be repeated for each interview.

Guidelines of the Opportunity Detection Kit

The presented guidelines provide support to designers for conducting ODK interviews:

A. *Start broad, then go deeper.* During the first interviews it is important to touch upon all themes and topics. After some initial interviews, some of the topics and questions can be left out in order to deeper investigate the topics and questions that seem surprising or interesting for the design project.

B. *Time and place of the interview.* It is useful to conduct interviews at homes to combine interviews with observation and to create a comfortable setting. However, if the home setting results in shyness, embarrassment, is too hot, or results in a lot of audience or other disturbances, it might be better to conduct the interview in a more contained space.

C. *Flexible but focused individual conversations*. The ODK provides steps, themes and guiding questions, but there is room for flexibility and unexpected turns in order to stimulate dialogue. There is no indicated order indicated for addressing the themes. Do not ask questions from a script, and feel free to add or change questions. The interview should feel like an open-ended, dynamic conversation to make participants feel comfortable. It is important to continue dialogue regarding topics that seem to be of interest to the participant, and regarding surprising, idiosyncratic or contradictory responses or behaviour from the participant. It might be useful to hide the list of questions and to learn the key questions by heart or keep them out of sight. Do, however, exert some control over activity topics. Use the question cards and drawings to keep an overview of the themes and topics discussed and preferably start and end with 'easy' to discuss themes.

D. *Duration of interviews.* The interview should be sufficiently long to make participants feel to make participants feel they are being heard, but should not continue too long resulting in participants becoming tired and disinterested. Follow up on answers, but also keep focus: if focus is lost, the interview can become overly long without obtaining useful information. End the interview when no questions are left, or when you feel like delaying a participant. The ODK interview is scheduled to last between 1.5 and 3 hours. The participants should be properly informed before the interview about how much time the activity will take, before they give their consent. Participants can be compensated for their time, for example by providing food or compensation for expenses, and a gift can be provided. If an interview takes longer, participants should be informed and asked for additional consent. The participants can be offered a compensation for continuing the interview. If the participant is not willing to continue longer, the interview should be concluded. When being familiar to the themes and questions, interviews can be conducted quicker. When more drawings are being made and more follow-up questions are posed, interviews become longer. Decide, based on the participant's behaviour and attitude, how to approach the interview.

E. *Number of interviews.* The objective of the ODK interviews is to get to know people's available and valued beings and doings, and to become inspired. The amount of interviews is not fixed and it is up to the team to decide when sufficient insight is obtained. The context, the project, the participants, the translator, the variety of participants that can and should be included, and the skills of the facilitator all influence the outcomes and therefore the number of interviews required. It is not the intention to obtain statistically generalizable data, and after the first few interviews the amount of new insights will decrease. The 'quick scan' program includes at least five interviews, to be conducted in three days. However, it depends on the amount of insights if this is sufficient or that more interviews are required. The 'extensive scan' allows for conducting more interviews in combination with other methods.

F. *Consider to use specific questioning techniques.* As mentioned under 'questioning techniques'.

G. *Dealing with sensitive questions.* Sensitivity differs per culture, so it might be that the questions you think are sensitive, are not sensitive to the participant. Your own assumptions and feelings towards questions should not be leading. Discuss the questions beforehand with a local partner to identify sensitivities. Start with more general and easy to answer questions, and later in the interview, when rapport has been build, it might be possible to pose sensitive questions and probe broader and deeper. However, be understanding and sensitive towards the feelings of participants and the potential of causing psychological harm for the participant. Try to rephrase a question when the participant is hesitant to answer it, or ignore the question if it leads to an uncomfortable situation. Sensitive questions should not be forcefully asked, just because they are in the ODK. It is not always possible to obtain answers to all questions, but that is also not required. Participants must be free to share what they want and remain comfortable. An unwillingness to answer questions also provides valuable information. It might be wise to let sensitive questions to male participants be posed by male facilitators and translators and to female participants by female facilitators and translators. Sensitivities can be pointed out beforehand by local partners and / or the translator, but the information provided by them should not be leading.

References

The prerequisites, guidelines, tips & tricks have been derived from the following sources:

Larsen and Flensborg (2011); Viitanen (2011); IDEO (2008a); Beyer and Holtzblatt (1995); Narayanasamy (2013); Handwerker (2001); Barab et al. (2004); Simanis and Hart (2008); Verdu-Isachsen (2012); Naidoo (2012); Beebe (2014); Chambers (2004); Pelto (2013); Van Boeijen et al. (2013); Kapoor (2012); d.School (2010); Von der Lippe (2012); IDEO (2008b); Johansson and Messeter (2005); Polak (2008); Ramberg (2012); Sperschneider and Bagger (2003); Martin and Hanington (2012); FrogDesign (2012); Freudenberger (1999); Nesset and Large (2004); Smart and Whiting (2001); d.School (2013); Johansson and Linde (2005); Gielen (2008); Kensing, Simonsen, and Bødker (1998); Park (2011); Van der Veer (2008); Diggins and Tolmie (2003); Liedtka (2011).

Barab, Sasha A, Michael K Thomas, Tyler Dodge, Kurt Squire, and Markeda Newell. 2004. "Critical Design Ethnography: Designing for Change." Review of. *Anthropology & Education Quarterly* 35 (2):254-68.

Beebe, James. 2014. *Rapid Qualitative Inquiry: A Field Guide to Team-Based Assessment*. London, UK: Rowman & Littlefield.

Beyer, Hugh R, and Karen Holtzblatt. 1995. "Apprenticing: With the Customer." Review of. *Communications of the ACM* 38 (5):45-52.

Borland, Ralph. 2011. "Radical Plumbers and PlayPumps: Objects in Development." PhD Thesis. Trinity College, Dublin.

Boztepe, Suzan. 2007. "Toward a framework of product development for global markets: a user- value-based approach." Review of. Design Studies 28 (5):513-33.

Button, Graham. 2000. "The ethnographic tradition and design." Review of. Design Studies 21 (4):319-32.

Chambers, Robert. 2004. "Rural Appraisal: Rapid, Relaxed and Participatory." In *Participatory Rural Appraisal: Methods and Applications in Rural Planning, 2nd edition*, edited by Amitava Mukherjee. New Delhi, India: Concept Publishing Company.

Darnton, Kate. 2010. "Where are the baby girls?" In Boston.com. http://www.boston.com/ bostonglobe/editorial_opinion/oped/articles/2010/09/01/where_are_the_baby_girls/: Boston.com.

d.School. 2010. "Bootcamp Bootleg." In. http://dschool.stanford.edu/wp-content/uploads/2011/03/ BootcampBootleg2010v2SLIM.pdf: Stanford University.

———. 2013. "Bootcamp Bootleg." In. http://dschool.stanford.edu/wp-content/uploads/2013/10/ METHODCARDS-v3-slim.pdf: Stanford University.

Diggins, Tim, and Peter Tolmie. 2003. "The'adequate'design of ethnographic outputs for practice: some explorations of the characteristics of design resources." Review of. *Personal and Ubiquitous Computing* 7 (3-4):147-58. doi: DOI 10.1007/s00779-003-0226-y.

Donaldson, Krista M. 2002. Recommendations for Improved Development by Design. Paper presented at the Development by Design (dyd02) Conference, Bangalore, India, December 1-2.

———. 2009. "The Future of Design for Development: Three Questions." Review of. *Information Technologies & International Development* 5 (4):97-100.

Duflo, Esther. 2010. "Social Experiments to Fight Poverty." In 2010, edited by Entertainment and Design. TED: Technology. https://www.ted.com/talks/esther_duflo_social_experiments_to_fight_poverty: TED: Technology, Entertainment and Design.

Freudenberger, Karen S. 1999. *Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA): A Manual for CRS Field Workers and Partners*. Baltimore, Maryland: Catholic Relief Services.

FrogDesign. 2012. "Collective Action Toolkit." In, edited by Robert Fabricant, Jacob Gardner, Denise Gershbein, Kyle Hoyt, Kate Quigley, Erin Sanders, David Sherwin and Rayna Wiles. http://www.frogdesign.com/cat.

Gielen, Mathieu A. 2008. "Exploring the Child's Mind – Contextmapping Research with Children." Review of. *Digital Creativity* 19 (3):174-84.

Gupta, Shantanu. 28 November 2011. "Government Gives Money For Toilets, They Build Kitchens." In IndiaSpend. http://www.indiaspend.com/investigations/govt-gives-money-for-toilets-they-build-kitchens-94081: IndiaSpend.

Handwerker, Penn W. 2001. *Quick Ethnography*. Plymouth, United Kingdom: AltaMira Press.

Hodge, Sean. 2016. "7 Principles of Effective Icon Design." http://design.tutsplus.com/articles/7-principles-of-effective-icon-design--psd-147.

IDEO. 2008a. "Human Centered Design Field Guide." In. http://www.ideo.com/images/uploads/hcd_toolkit/IDEO_HCD_FieldGuide_for_download.pdf: IDEO.

———. 2008b. "Human Centered Design Toolkit, 2nd Edition." In, edited by IDEO. https://www.ideo.com/work/human-centered-design-toolkit: IDEO.

Johansson, Martin, and Per Linde. 2005. "Playful Collaborative Exploration: New Research Practice in Participatory Design." Review of. *Journal of Research Practice* 1 (1):1-18.

Johansson, Martin, and Jörn Messeter. 2005. "Present-ing the user: constructing the persona." Review of. *Digital Creativity* 16 (4):205-17. doi: 1462-6268/05/1604-0205.

Kapoor, Nita. 2012. "International exchange as a tool for development." In *Design without Borders - Creating change*, edited by Truls Ramberg and Leif Steven Verdu-Isachsen, 161-4. Oslo, Norway: Livonia Print.

Kensing, Finn, Jesper Simonsen, and Keld Bødker. 1998. "MUST: A Method for Participatory Design." Review of. *Human-Computer Interaction* 13 (2):167-98. doi: 10.1207/s15327051hci1302_3.

Larsen, M. L., and A. Flensborg. 2011. "Market creation toolbox: your guide to entering developing markets." In. http://www.access2innovation.com/download/market_creation_toolbox.pdf: DI International Business Development.

Liedtka, Jeanne. 2011. "Learning to use design thinking tools for successful innovation." Review of. *Strategy & Leadership* 39 (5):13-9. doi: 10.1108/10878571111161480.

Margolin, Victor. 1997. "Getting to know the user." Review of. Design Studies 18 (3):227-36.

Martin, Bella, and Bruce Hanington. 2012. *Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*. Beverly, MA, USA: Rockport Publishers.

Mwape/AP, Moisés. 11 November 2014. "Niños africanos se divierten en una cancha improvisada de fútbol." In Cultura. http://laestrella.com.pa/estilo/cultura/marco-ramas-pelota-papel-plastico-ninos-juegan-futbol/23819691/foto/69941: La Estrella de Panamá.

Naidoo, Ravi. 2012. "Breaking out of the silo and onto the street." In *Design without Borders - Creating change*, edited by Truls Ramberg and Leif Steven Verdu-Isachsen, 144-8. Oslo, Norway: Livonia Print.

Nakata, Cheryl, and Kelly Weidner. 2012. "Enhancing new product adoption at the base of the pyramid: a contextualized model." Review of. *Journal of Product Innovation Management* 29 (1):21-32.

Narayanasamy, N. 2013. *Participatory Rural Appraisal: Principles, Methods and Application*. New Delhi: SAGE Publications India Pvt Ltd.

Nesset, Valerie, and Andrew Large. 2004. "Children in the information technology design process: A review of theories and their applications." Review of. *Library & Information Science Research* 26 (2):140-61. doi: 10.1016/j.lisr.2003.12.002.

Nhlema, Muthi. 26 October 2015. "Playing with Failure." In Blog Posts Improve International, edited by Susan Davis. https://improveinternational.wordpress.com/2015/10/26/guest-blog-playing-with-failure/: Improve International.

Park, Jisoo. 2011. "Developing a knowledge management system for storing and using the design knowledge acquired in the process of a user-centered design of the next generation information appliances." Review of. *Design Studies* 32 (5):482-513. doi: 10.1016/j.destud.2011.05.001.

Parmar, Vikram S. 2009. "Design Framework for Developing ICT Products and Services for Rural Development: A persuasive health information system for rural India." PhD Thesis, Delft University of Technology.

Pelto, Pertti J. 2013. *Applied Ethnography: Guidelines for Field Research*. Walnut Creek, USA: Left Coast Press, Inc.

Pettersson, Rune. 2010. "Information Design - Principles and Guidelines." Review of. *Journal of Visual Literacy* 29 (2):167-82.

Polak, Paul. 2008. "12 Steps to Practical Problem Solving." In, edited by Paul Polak, Isaac Klepac and Stephanie Bane Fry. https://www.facebook.com/Paul.R.Polak/videos/1030649719263/.

Prahalad, CK. 2012. "Bottom of the Pyramid as a Source of Breakthrough Innovations." Review of. *Journal of Product Innovation Management* 29 (1):6-12.

Rangaswamy, Nimmi, and Supriya Singh. 2009. Personalizing the shared mobile phone. Paper presented at the Internationalization, Design and Global Development, San Diego, USA.

Ramberg, Truls. 2012. "Creating change." In *Design without Borders - Creating change*, edited by Truls Ramberg and Leif Steven Verdu-Isachsen, 19-23. Oslo, Norway: Livonia Print.

Robertson, Toni, and Jesper Simonsen. 2012. "Challenges and opportunities in contemporary participatory design." Review of. *Design Issues* 28 (3):3-9.

Roibás, Anxo Cereijo. 2008. "Understanding the Influence of the Users' Context in AmI." Review of. *Social Science Computer Review* 26 (1):103-18. doi: 10.1177/0894439307307699.

Simanis, Erik N., and Stuart L. Hart. 2008. "The Base of the Pyramid Protocol: Toward Next Generation BoP Strategy, 2nd Edition." In. Ithaca, NY: Johnson School of Management, Cornell University.

Sklar, Aaron, and Sally Madsen. 2010. "Global Ergonomics: Design for Social Impact." Review of. Ergonomics in Design 18 (2):4-5, 31. doi: 10.1518/106480410x12737888532921.

Smart, Karl L, and Matthew E Whiting. 2001. "Designing systems that support learning and use: a customer-centered approach." Review of. *Information & Management* 39 (3):177-90.

Sperschneider, Werner, and Kirsten Bagger. 2003. "Ethnographic Fieldwork Under Industrial Constraints: Toward Design-in-Context." Review of. *International journal of human-computer interaction* 15 (1):41-50. doi: 10.1207/S15327590IJHC1501_04.

Unicef. 2007. "An Evaluation of the PlayPump® Water System as an Appropriate Technology for Water, Sanitation and Hygiene Programmes." In, 17. New York, USA: Unicef.

Van Boeijen, Annemiek, Jaap Daalhuizen, Jelle Zijlstra, and Roos van der Schoor. 2013. *Delft Design Guide*. Amsterdam: BIS Publishers.

Van der Veer, Gerrit C. 2008. "Cognitive Ergonomics in Interface Design -Discussion of a Moving Science." Review of. *Journal of Universal Computer Science* 14 (16):2614-29.

Verdu-Isachsen, Leif Steven. 2012. "Why does design make sense in the context of development aid?" In *Design without Borders - Creating change*, edited by Truls Ramberg and Leif Steven Verdu-Isachsen, 11-7. Oslo, Norway: Livonia Print.

Viitanen, Johanna. 2011. Contextual inquiry method for user-centred clinical IT system design. Paper presented at the International Conference of the European Federation for Medical Informatics (MIE 2011), Oslo, Norway.

Von der Lippe, Katinka. 2012. "A catalyst for both camps." In *Design without Borders - Creating change*, edited by Truls Ramberg and Leif Steven Verdu-Isachsen, 149. Oslo, Norway: Livonia Print.

Wilkinson, Christopher R, and Antonella De Angeli. 2014. "Applying user centred and participatory design approaches to commercial product development." Review of. *Design Studies* 35 (6):614-31.