Formulating “the obvious” as a Task Request to the crowd: An Interactive Design Experience across Cultural and Geographical Boundaries.

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ABSTRACT
The exhibition will demonstrate the technologies that were co-designed with Namibian rural communities with the main objective of preserving Indigenous Knowledge (IK) and Cultural Heritage (CH). Set up as a simulation we showcase how rural communities collect information (images, text, audio, video) about their traditional items or events to be crowdsourced to graphic designers. The graphic designers then model the items in 3D format and send back the rural communities for evaluation and acceptance to be integrated into the existing technologies. Conference participants will be engaged in exploring the technologies as well as discussions around the specific usage and design challenges.

CCS Concepts
● **Human-centered computing → Interaction design → Interaction design process and methods**
● **Participatory design**

Keywords
Crowdsourcing; Rural communities; community-based co-design;

1. INTRODUCTION
In an effort to digitally preserve Indigenous Knowledge (IK) and Cultural Heritage (CH) in Namibia we have established long term collaborations with OvaHerero and OvaHimba rural indigenous communities. We have framed a community-based co-design approach, which is grounded in principles of participatory design and action research. Frequent design and evaluation sessions at the rural sites have opened up many more design research questions, opportunities and challenges. The main aim of the collaboration is to co-design tools that will enable local knowledge holders to collect, curate and disseminate their IK & CH.

We have previously co-designed and deployed a mobile application called HomeSteadCreator (HSC) that enables OvaHerero knowledge holders to visualize their knowledge and heritage in a 3D graphical simulation of the appropriate rural context on a tablet. As part of a national project to widen the scope of community users across all traditions in the country, we have evaluated the HSC with an ethnic group, namely the OvaHimba. We recorded a number of necessary modifications to the graphical representations to cater for the OvaHimba traditions and customs. The localized adaptation to a different group and eventual national roll out of the tool to many different groups thus requires a substantial number of new graphical models (assets) and that in turn requires the services of many graphic designers. This level of graphical design talent is simply not available to us. Thus a new research question was posed, namely: Can we tap into crowdsourcing to enable rural communities to develop their own unique systems?

This creates the significant challenge of enabling communication between the rural indigenous knowledge (or problem) holders and the diverse online community from whom graphical models are being solicited. We call this a *task request* from the rural community to the online community. Once someone in the crowd fulfills a task request then the rural knowledge holder assesses the new asset. We then require an *evaluation feedback mechanism* to apprise the supplier of the extent to which the task was successfully completed. We thereby recognize the challenge of facilitating a cross-contextual (culture, language, urban vs. rural, etc.) and technology-supported communication, especially in form of appropriate task request formulations and evaluation feedback mechanism. We have so far co-designed with the rural community a Task Request Management (TRM) mobile tool to collect different media (audio, video, text, pictures and drawings), which can be combined, into a task request to be crowdsourced. The task is comprised of a request for a 3D model of a traditional object of the community. Once received and approved by all community members it will be integrated in the local version of the HSC.

Our interactive display of technologies within a simulated context of the rural settings in an effort to communicate with the crowd or in this case PDC participants is an attempt to exhibit the real life design and usage challenges. Especially the associated task fulfillment and complexity of the feedback required.

2. SEEMINGLY SIMPLE TASKS
Over more than a year we have had multiple participatory design encounters with an OvaHimba community, led by the elder Uaraike, cycling towards the design of a usable tool to support the formulation of 3D model tasks to be sent to the crowd. Furthermore we have completed one full simulated request feedback cycle with the community which unveiled a number of challenges [2].

How difficult can it be to design a 3D model based on a series of photos taken of the object from different angles? We acknowledge that a 3D model is an abstraction of the real object

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that will compromise features as decided on by the designer. We have already established that some of those omitted, seemingly insignificant, features were of utmost importance to the community. Thus we have explored different methods to ensure "the obvious and significant" features for the community but "insignificant" to the designer are made explicitly important. Previous efforts of adapting Pictionary approaches led to further open interpretations of drawings across cultures rather than guiding the graphic designer [3]. Our last attempt of collecting verbal descriptions from the rural community in the absence (i.e., from memory) and presence of the object to guide the modeling process introduces new challenges of translations and contextualization.

Current results indicate that an additional feedback loop within the crowdsourcing process might be necessary. This would include visual and verbal clues on the first version to deliver recognizable and satisfactory models in a second round. In other words, the process becomes iterative and constitute of active feedback on the graphic to be enhanced in the second round of crowdsourcing.

3. DESCRIPTION OF DISPLAY

We will simulate a full crowdsourcing cycle in a theatre type display staging the different contexts in the background and the usage of the technologies (10 min). Based on a number of previous task requests and resultant models provided, PDC participants will be engaged in conceptual and methodological discussions around the optimization of task requests, modeling and evaluations (20 min).

3.1 Physical set up

We will have a booth like space (see Figure 1 below) where the background banner (app size 2.50 m (width), 2m (height)). The background banner will display on the left right a photo of the rural surroundings of Namibia, on the left side a crowd of graphic designers and in the center upper part a diagram showing the entire crowdsourcing flow and the related technologies.

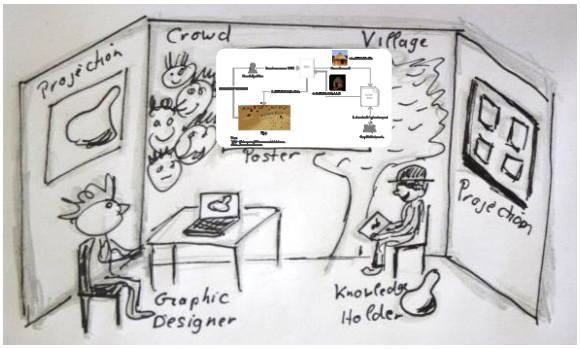

Figure 1: Exhibition set up

In front of the banner the *HSC* and the *TRM* tablet will be on display for usage and demonstration by one of our researchers. Displays and video recordings will be projected. On the left side we will display a web-based interface for a graphic designer to check posted requests and solutions as well as a graphic package to design 3D models. Once done the graphic designer will upload it via the web interface. Our indigenous researcher representing the role of a Knowledge Holder in the village will be on the right side operating a tablet loaded with the HSC, enhanced HSC and TRM applications. He will explain the challenges of designing 3D graphics that meet the villagers' expectations. The remaining of the sections provides a brief description of the applications and how the participants will interact with these applications. In the 30 minute allocated slot we challenge PDC participants to understand the task formulation process, to evaluate existing models, and make suggestions for improvements based on the recorded indigenous communities' feedback.

3.2 HomeSteadCreator (HSC)

The HSC is a tablet based 3D visualization app. It has a 3D landscape where the knowledge holder uses gestures and 3D objects to tell a story. The available objects are representations of real things, animals and people in a traditional community. The objects are not arranged in traditional taxonomies but are grouped according to local practice. The interactions and discussion around the prototype system has proven as a viable approach to further the designers' understanding of the relationships of objects and practices [1].

3.3 Enhanced HSC

A 3D model of a typical OvaHerero homestead was developed in Unity 3D and deployed on to an android tablet. Different artifacts and objects arranged as scenarios, such as cattle branding, were embedded as well as conventional hints that are inherent in other 3D environments such as video games e.g. glowing and floating objects, which lead to additional information in form of videos. An evaluation by the community showed that they could not relate to the meaning of the conventional hints in a 3D model, yet, they could correctly identify known scenarios.

3.4 Community Crowdsourcing Platform

Community Crowdsourcing Platform (CCSP) consist of two front-ends, a web-based and the tablet based (TRM). The web-based allows graphic designers to view or download submitted task requests and upload the completed 3D modeled requests. The tablet based TRM is for the request or task formulation and evaluation of the completed requests for acceptance by the rural communities. The two front-ends communicates to each other (i.e., a task requested by the rural community from the TRM is posted as a request to the web-based front-end for the graphic designers to work on.

4. ACKNOWLEDGMENTS

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