

# Nuni- A case study: A platform to distribute digital content to analog television data towards enhancing quality of life of senior citizen in Mexico.

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## ABSTRACT

Nuni is a platform to distribute digital content for analog television. This was the final product derived of an student research project that was carry out to design a digital product to enhance quality of life of elderly people. This exploratory study help us to obtain quantitative and qualitative data from real users. The following document relates the process of implementing a User-Centered approach to identify a problem in an specific population and come out with a potential solution to improve, in this case, elders' lifestyle from a Mexican village in a southern state of Mexico who were the target audience in such project.

## Keywords

Seniors, UCD, UX, Usability

## 1. INTRODUCTION

In 2017 young researches as part of one of the Human-Computer Interaction (HCI) courses in the Master Degree from the Technological University of the Mixteca were challenged to design a product/service to help a vulnerable population in a semi-rural context. Researches chose by convenience a village (Huajuapán de León) located in a poor zone in Oaxaca state (a region in the south of Mexico). The constraint to do the activity was to use the existing knowledge in HCI to solve the problem. The topic selected by students was: Elderly people.

Nowadays, there is a gap between technology and old adults that cuts off or limits the ability of the last ones to do their daily life and in some sense affects the way they interact with the surrounding world. According to the United Nations Fund for Population Activities (UNFPA) the number of elderly people in the world is increasing and the global population aged 60 year or more is twice larger than in 1980 [11] and is expected that this quantity will continue growing in future years. Mexico is not the exception and according to the federal government is estimated to have a population of 32.5 million of elders in 2050[5]. This is a major concern since seniors are been overtaken by the upgrades, changes and evolution related with technology. Such phenomena is forcing them to dislike, reject or in the worst case: being subjects of abuse, extortion or fraud through technology-related scams[9] as they become digital illiterates. From the perspective of Human-Computer Interaction we have observed that this phenomenon could be approached in another way,

the idea is exceed the usability frontier and also fulfilling user experience attributes, name them: utility, adaptability and satisfaction.

### 1.1 Assistive technology for seniors

Technology for elderly people is not a new topic in the field. There are tools destined to help seniors in their day to day life, such as: hearing aids, conversation companions, digital tablets or mobile applications[7, 8]. Tools like those are categorised as "Assistive Technology" (AT).

An AT is defined as any tool that allows individuals with special necessities or disabilities to perform one specific activity without any kind of physical or mental barrier. There are many examples but the most commons are the wheel chair and the walkie-talkie. Despite the variety and quantity of technologies oriented to this population the misconception of them can lead to the dis-likeness or rejection of the tool, because of this, we consider relevant to distinguish between two different dimensions of ATs: i) Technologies designed for Seniors and ii) Technologies designed for care takers.

In this context, researches in HCI community have proposed new approaches that deal with this challenge of designing tools for old adults[10, 1]. But even though there are meaningful advances in the field is evident that old adults still show some resilience to use technology in their daily life. We see in this context an area of opportunity to do research and come up with one potential solution. We believe that by following a methodology centered in the senior, we will produce a consistent and feasible tool.

## 2. METHODOLOGY

For the purpose of this project we used a User-Centered Design Methodology (UCD) and combined it with some elements presented in other design models, such as: Norman's Emotional Design (2005)[6] and Design Aesthetics: principles of pleasure in design from Hekkert (2006)[4](see Figure 1)[3].

### 2.1 User Experience (UX)

User Experience (UX) is concept related with assessment of interactions produced between users and technological products/services. The goal is to provide meaningful and relevant experiences to users [2]. The value and interest that one

users gives to one specific tool/product/service come from the field of HCI. At the beginning, evaluations in this field were merely focused in assessing metrics, such as: success, efficiency, learnability and satisfaction. Usability was the most important metric of quality of any system.

As time passed, UX has included some other aspects that go beyond the usability and focuses in: a) motivations, values and views; b) characteristics of system (functionality, features) and c) interaction process (accessibility, aesthetics)[2].

For this project UX played a significant role in developing a system for old adults because it was important to pay attention in:

- What encourages elderly people to use technology, what makes an user like or dislike it, how do users feel regarding technology
- Are the existing systems suited for these special users, the system accomplish the goal it was meant for, what features make the system unique
- Is the system following patterns or guidelines of design for this population, is the system aesthetically attractive for users

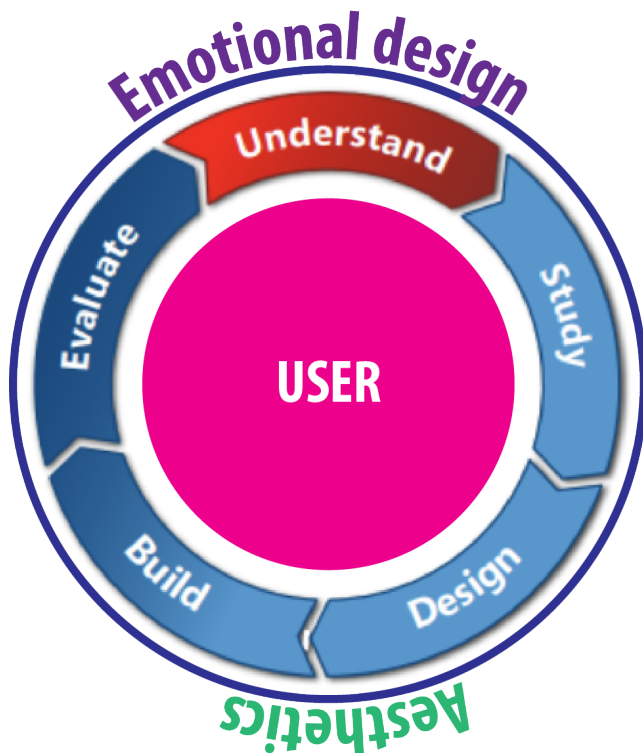


Figure 1: UCD-e: A typical iterative methodology.

### 3. EXPLORATORY STUDY

In this section the findings of the study are listed following the structure the methodology implemented during research.

#### 3.1 Understanding

In order to comprehend what elderly people in Huajuapán de León face or struggle with in daily life, we did a documentary research followed by interviews with experts in the corresponding topic. This allowed us to understand the political, social and cultural variables that surround old adults. For instance, we found out among other findings, that mostly the person who takes care and/or is responsible of the grandfather or grandmother is the oldest woman related with them, namely: daughter, sister, auntie, etc.

#### 3.2 Study

After previous stage, we visited the only nursing home in town to observe every-day life of the subjects. In order to do that, we used a technique called: contextual inquiry. We worked with 46 old individuals in between 60 and 95 years. The outcomes were the description of activities of the subjects in their day to day life. We were witnesses in real life of: the poverty, abandonment, harassment, cognitive and physical sickness they are exposed. In the other hand, we could also observe the relation they have with technology and the type of technology they use, which were mostly analog devices. Another technique to collect data during this stage was the focus group, which was implemented with people who is responsible whether of a grandfather or grandmother. In this activity, participants talked about how they support older people, specifically, how they supply medication, how they establish communication via phone with them and also how they implement activities to distract them from depression, such as: chitchatting, handcrafting, playing or walking.

#### 3.3 Design and development

Findings from contextual inquiry and focus group allowed us to discuss, plan and propose a solution to deal with some of the problems elderly people face in daily life. The concept of the project was generated through the sketch board technique. The result was the design and development of a platform to distribute digital content for analog television. The project was named in Mixtecan (native indigenous Mexican language): Nuni that literally means corn but in this context works as analogy of something that needs no be cared.

##### 3.3.1 What is Nuni?

Nuni is a web platform that hosts mobile apps designed for seniors. The apps can be installed in an android phone and are designed to work in complement with a Google Chromecast (take carer dimension). Nuni merges analog and digital technologies, allowing old adults to manipulate a medium that they are used to, in this case an analog television, and complement them with the features of new technologies (elderly people dimension). The idea is to take advantage of the already existing mental model in the users (e.g. users know how to operate an analog radio or use a sewing machine).

##### 3.3.2 How it works?

The Chrome-cast is connected to the analog television by using a modified HDMI to RCA converter. The Nuni system installs by default 4 applications that can be controlled using the standard TV remote control. The default applications are listed as: Inner calls: This app allows the grandparents just to receive inner calls from the smartphone. When the user gets a call, the picture and name of the caller is displayed in the TV. The call can be picked up whether using the button enter of the control remote or directly in the phone. Reminders: This app allows the caretaker to send reminders of medication via message to the grandparents. The app shows in the screen the image of the medication, the generic name of the medication, the underlying type of treatment and also the time and possible restriction of the medication. Mobility: Designed for the grandparent, the app encourage users to do some exercises, specifically designed for the limitation of their motor skills. This app uses the smartphone's camera to monitoring the workout. Stories: The application contains an avatar that pops-up randomly in time to ask the user to tell one history. The objective is to record the subject when telling the story. This story can be saved and later propagated to the family members of the user.

As we noticed, the system it self was not enough instrument to offer a solution to many different problems. There was a huge diversity and variety of issues that affects grandparents, and try to solve them all with one app was no ideal. For this reason, we went one step forward and propose to make an inclusive platform, where anybody interested in developing tools for one specific problem could do it just by reusing already existing projects or build with other users a social solution. In this context and to unify standards and generate well designed interfaces for seniors, Nuni platform offers pre-coded building blocks, apps presets, design guidelines, pre-design elements that helps developers to create more usable and efficient apps for the final user.

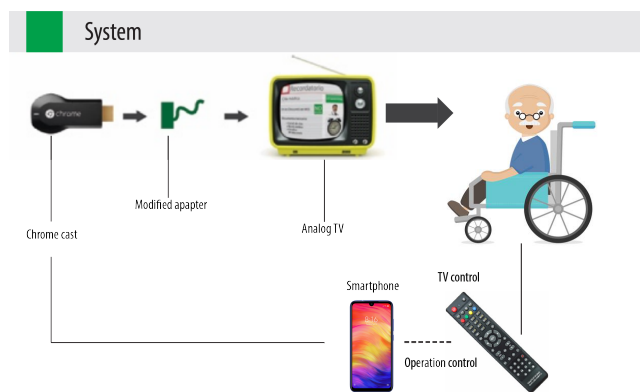


Figure 2: Nuni's workflow

### 3.4 Evaluation

*First iteration.* Using a first low fidelity prototype we assessed the interfaces by implementing a Wizard Oz technique with 5 real users. The intention was to validate the idea proposed. The outcomes of this exercise were: User struggled

with icons and colors Interfaces. They were adapted accordingly to users feedback.

*Second iteration.* After implementing the modifications to the system a second prototype was tested with 10 users. The findings can be summarized as: Users faced problems with the typography and its size. Overall the system was accepted by users.

*Third iteration.* The high fidelity prototype was evaluated by 5 users. The technique implemented was usability testing. The overall results are:

- For the first prototype we evaluated 45 tasks of which 66.6% were successfully done.
- For the second prototype 170 task were evaluated with 92.9% of success fullness.
- For the last prototype we assessed 50 task and the completeness of the was 98%. 80% percent of users accepted and trust the system.
- Satisfaction of the system was mark with 9/10.



Figure 3: Usability testing

## 4. DISCUSSION

UCD is a methodology that is focused on identifying, comprehend and solve a potential problem but lacks of tools to deal with: aesthetics and emotional issues linked to the problem. In this case after reviewing the models of Norman and Hekker we were able to understand the problem as one small part of major problem. This conducted us to propose not just one product but a family of products that complement each other. With this exercise we learned good practices like:

- Make the task easy to understand and according to the user's context, skills, knowledge and background.
- Merge existing and new knowledge to generate an easy to remember-model.
- Re-use technology that people is familiar with.
- Create short tasks that don't demand an excessive use of retention. Seniors tent to have short memory and they struggle recalling details.

## 5. CONCLUSION

Developing tools for any group should consider not just usability and innovative features. Furthermore, while doing it, it should pay attention in cultural, social, personal, affective, and aesthetic implications. Applying UX tools allowed us to generate positive emotions in users. The result was a total users' adoption of the system.

Regarding to the observation we realized that there is more than one actor involved in elderly people life. To build better tools for them was important to consider caretakers, family members, doctors and neighbors, among others when developing tools for old age people.

Although Nuni is a scholar project, it has provided tools and guideline for future works related with seniors in semi-rural context. This work can easily be replicated in other contexts and adapted to different cultures. However, there is still too much to explore and consolidate in order to achieve a feasible result.

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