OldSmartphoneVideoCall-App - Inexpensive, easy-to-use video calling for seniors (v01)

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Abstract

Many old people experience serious health problems from loneliness and isolation. Due to immobility and a lack of technical sophistication, they often only have the landline telephone. Although video calling solutions for seniors already exist, very few of those in need use them. The goal of this design thinking micro cycle, which was reduced to a processing time of just a few days, was to gain a better understanding of the assumed problem, generate ideas for its solution, and test its critical functions through a prototype. After confirming the existence of the problem and its significant scope, a combination of an old cell phone, a special TV mount and an app for interacting with the TV and Skype etc. turned out to be the best idea. The prototypes, low res flowchart on a functional level, addressed to a future helper (e.g. a caregiver) and a software developer brought the following results: There probably won't be any problems setting up the selected solution, but the budget of EUR 99 would have to be exceeded. A revised but not yet tested prototype should answer the following questions: What are the critical functions of the app, and what are the critical hardware requirements?

(This document is based on several papers written as part of the last module (capstone) of the MicroMaster Program in Design Thinking from the Rochester Institute of Technology (RITx @ edX). I have corrected them based on feedback from my lecturers, merged them and included them in my portfolio brought into a nicer form with Overleaf. The pure working time was about 35 hours in total. A permission to publish my capstone project is available in written form.)

Contents

1 Starting Point

During my civilian service in 2000, I worked as a technician in a retirement home. Inevitably, I kept talking to the residents. The main theme was their loneliness, the far too infrequent visits from their friends and family. Very few had cell phones. Most of them used community phones that were spread around the nursing home. I could clearly feel the fear and resignation of the old people.

An older woman from my circle of acquaintances lives alone here in Germany. Her friends and family live abroad. She is not particularly mobile, and she also has certain problems with the German language. Her communication is limited to phone calls and short conversations with a cashier when she goes shopping. I visit them occasionally. And every time she complains about psychological problems, which we both attribute to the isolation.

More than two decades lie between the two experiences. Despite this, the problems do not seem to have changed. Further investigation needs to be done.

2 Design Thinking Micro Cycle Process Overview

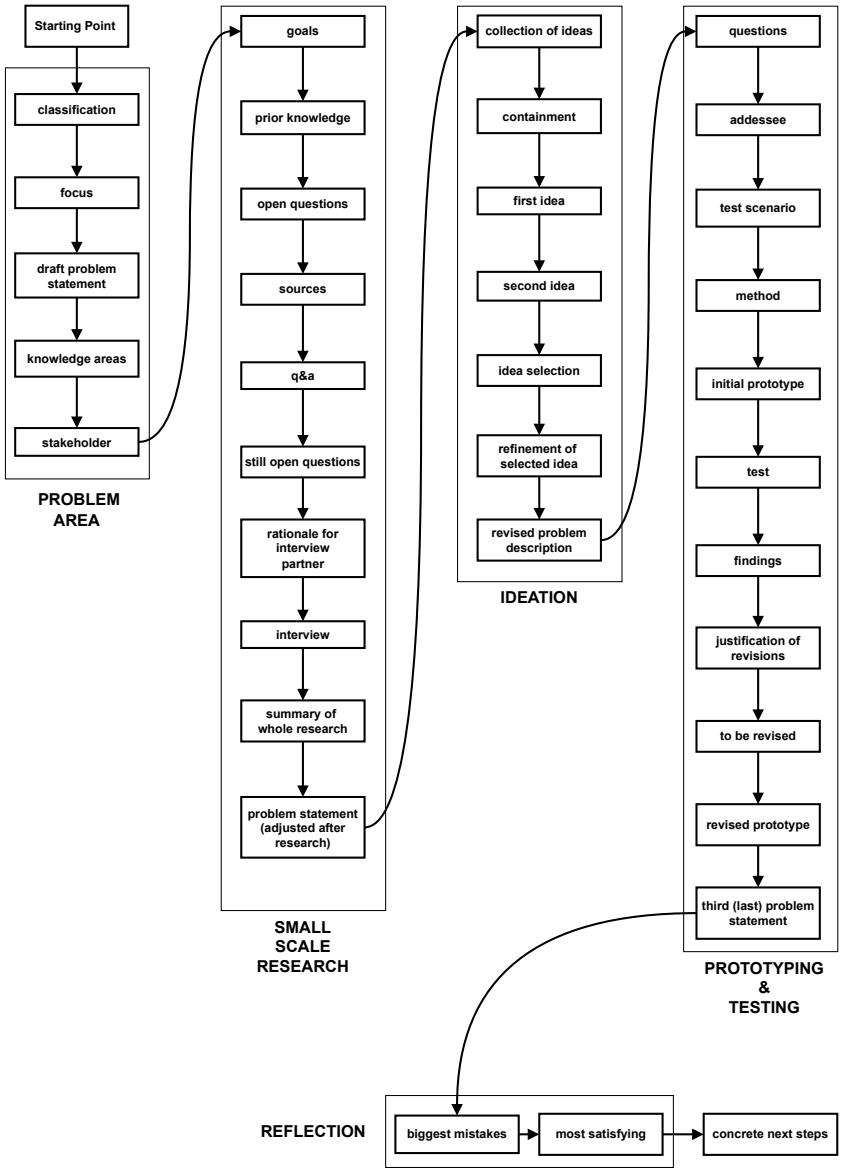

Figure 1: Design Thinking Micro Cycle Process Overview (adjusted to the limited processing time of 5 days)

3 Problem Area

Classification

- elderly self-care
- social activities
- communication

Focus

- ways to help alleviate loneliness for the elderly or staying connected and communicating with family and friends

Draft Problem Statement

- Older, retired people living alone suffer from isolation from friends and family. With a few exceptions, such as shopping, this problem is omnipresent.
- For the health of a person, as a social being, mental well-being is just as important as physical wellbeing

Knowledge Area

- psychology
- social pedagogy
- UX / UI

Stakeholder

- caregiver
- seniors
- social worker
- senior's children
- senior's grandchildren

4 Small Scale Research

Goals (Generalization of coming questions)

- What is the relationship between isolation and health?
- Is there a connection at all?
- What is the scope of the problem?
- How many older people even suffer from loneliness?
- Are there already solutions for videotelephony or similar on the market and if so, why are they not good enough?
- What prevents older people from counteracting their loneliness by using Skype or similar?
- What is the maximum price for a videotelephony device for seniors?

List of Sources for the Desk Research

- Konnekt 2022
- Majcen et al. 2011
- Pantel 2021
- Schöneck 2020
- Solovyova und Titova 2020
- Thege et al. 2019; Wild 2020
- Wild 2020

Questions and Answers from Desk Research

- 1. Does loneliness and isolation in old age actually pose any health risks?
  Social isolation has a negative impact on both physical and mental health. In numerous studies, social isolation is identified as the most important risk factor for increased morbidity and mortality in old age. The existence of this problem and its consequences is empirically well documented [1].

- 2. What is the extent of those seniors who are isolated, or who are not digitally connected, i.e. are offline to a certain extent?
  "A large proportion of seniors in Germany are offline. Little or no digital competence in an increasingly digitizing society carries the risk of being socially left behind."[2]

- 3. Is it even important to seniors, or can they imagine working with new technologies to communicate more with friends and family and thus fight against isolation?
  Even if help is needed, 91.7% of the senior citizens surveyed would prefer to stay at home. 66% of them value closeness to friends and family. About 30% are open to technological aids, including something like telecommunications services [3].
  62% of German seniors cannot imagine living without the Internet and more than half use a PC, laptop or mobile phone [4].
  2/3 of people over 65 use social networks. They are convenient because you can connect with others from the comfort of your own home [5].

- 4. Which communication solutions for seniors who cannot work with a mobile phone, laptop or tablet does the competition offer?
  The Konnekt Videophone is the easiest way imaginable to use Skype. The device is prepared so well that the user only has to touch someone to dial from a list or answer a call. No setup is necessary [6].
  The ALICE project deals with the possibility of enabling videotelephony for people over the age of 60 via a set-top box (on the TV set) [7].

Interview - Rationale for participants

- The older lady for my first interview, I don't think, knows anyone else apart from me and my mother. She withdrew after the death of her husband and eventually got used to being alone. But she is curious, and I was very interested in where the hurdles lie for her to start with videotelephony. I know that she talks a lot on the phone with relatives in Russia. She would also have enough money for a device like Konnekt's.

- I know from the geriatric nurse that he almost exclusively visits older people who never wanted to go to an old people's home and therefore stay almost exclusively in their apartment. They also ask him again and again for help with technical problems. Over time, they trust him and talk openly about their problems.

Interviewing an 75 years old woman

- 1. Do you use any other communication technology besides your phone?
  I only use my phone. That's enough for me.
- 2. What is the maximum you would pay for a videotelephony device?
  I do not know that. It's definitely expensive. My pension is small. No idea.
- 3. Why not buy a tablet for Skype, for free video calls?
  I've had a tablet before. At some point, it didn't work anymore. It's in the closet now.
- 4. If you had a video calling device and could use it easily, would it replace physical meetings?
  I don't know. I need to see this. What if someone calls me and I don't know what to do?
- 5. What are the hurdles for acquiring such a device?
  I need to see this. Then I pay for it and if breaks, or I don't know what to do. Who should I ask? When my phone rings, I answer it. My caregiver showed me how to call my daughter

Interview of an elderly caregiver

- 1. You certainly know Skype, and what do you think, would many of your customers like to use it if they could use it? There is such a device from Konnekt that really anyone can use. If I showed them, and they got used to it, then maybe. Most are afraid of breaking something. I know some customers who don't use their earpiece because it was expensive, and they're afraid it will fall out of their ear and break.
- 2. Do you think video calling would be a good substitute for physical meetings?
  No idea. If someone can't get out of the apartment and isn't being visited either, videotelephony is better than being alone and just phoning like that.
- 3. How much would your customers be willing to pay for video calling?
  If I show up there now and talk about something like that, then they don't take it seriously. Mostly they are afraid that it is a trick. You sit there and think about the past. Staring in front of you with your eyes wide open.
- 4. Suppose there was a video calling device that was affordable and easy enough to use. What would be the reasons why their customers wouldn't use it anyway?
  If they saw it on someone somewhere. But they never come out. Maybe with a trial period. You're always afraid of doing something wrong. Calling a stranger like that, or being on TV somewhere. But above all that they might get used to it, and then it breaks, and they have to ask someone again.

Summary of key findings from desk research and interviews

- It is empirically well proven that loneliness and isolation can lead to serious health problems and ultimately even indirectly lead to death. The scale of older people suffering from loneliness is great.
- At the same time, many, around 30%, are quite willing to use new technologies for communication. There is already a well-thought-out, very easy-to-use device for videotelephony via Skype on the market. It can be used by practically anyone without any thought or tech-savvy.
- Older people become more and more anxious over time. Often they are simply afraid of breaking something. They are also afraid of becoming dependent on someone to explain or repair a new device. Therefore, they cling to what is familiar and stable.
- The decisive factor in the purchase of a device for videotelephony is that it is demonstrated to the customer so that he can see it with his own eyes in his own home. Of course, it must not cost much, although that is relative and needs to be better investigated.
- I conclude that a modification of a TV set would be best. Even the oldest person knows TV sets. Almost everyone has a TV. In addition, even large formats are now quite cheap.

Problem Statement (Adjusted after Research)
How can older people who suffer from loneliness and isolation and whose physical and mental health is increasingly deteriorating, be carefully informed and then equipped with a videotelephony device, that can be integrated unnoticed, inexpensively and robustly into their usual technical equipment, so that they can communicate with friends and family much better than it is possible with a phone alone. Except for an on/off switch and a selection of contacts, there shouldn't be any other options.

5 Ideation

First Idea - OldSmartphoneVideoCall-App (OSVC), TV Mount, Old Smartphone

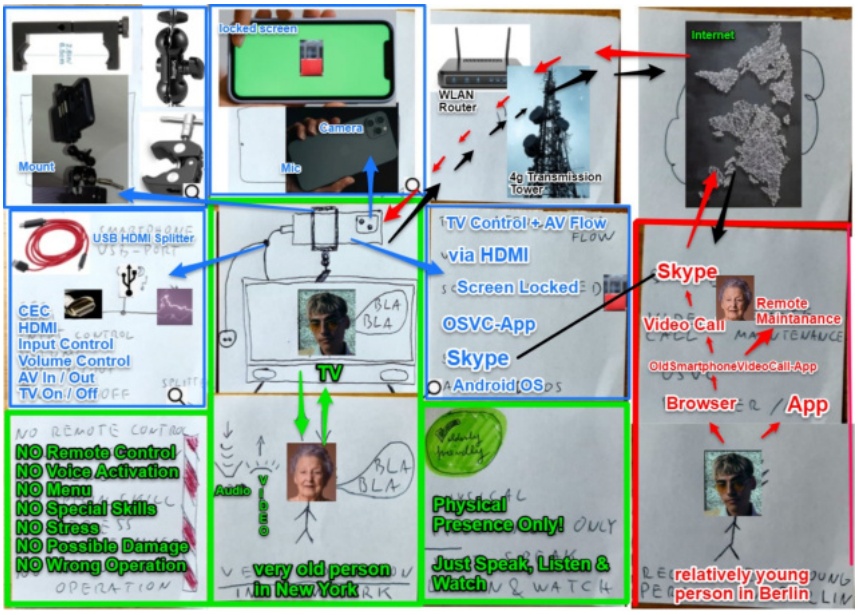

Figure 2: OldSmartphoneVideoCall-App (OSVC), TV Mount, Old Smartphone - Collage

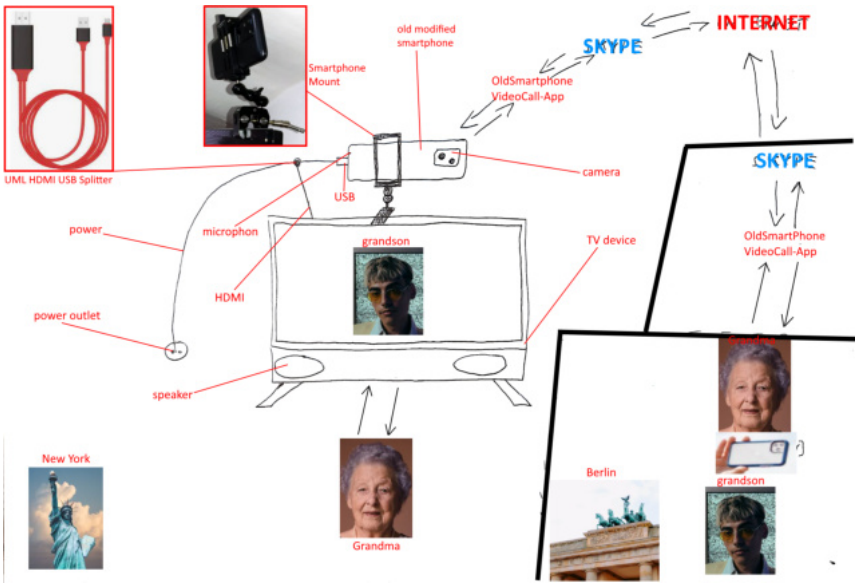

Figure 3: OldSmartphoneVideoCall-App (OSVC) TV Mount Old Smartphone - Sketch

Rationale for the OSVC-App TV Mount

- Most cell phone manufacturers launch a new model every 2 years. Many people purchase their mobile phones on a two-year contract. After two years, these people will have one cell phone too many when their contract is extended. However, this old cell phone is often still functional and powerful enough for an app like Skype. Camera and microphone are integrated as standard.
- Even very old people usually own a TV set.
- Cable connections between cell phone and TV set are cheap to buy and work well. An attachment consisting of a clamp, ball joint and mobile phone holder is also available in inexpensive and robust versions.
- Assuming that you have an old cell phone that is no longer used, the rest of the hardware, just mentioned, would cost around 50 EUR.
- Thus, the combination of the OSVC-App TV mount would be inexpensive and robust.
- Help to set up the system from a grandson or similar would be better than communicating with a call center or similar.
- Thus, an elderly person would be carefully helped. It would also strengthen the connection between the helper and the helped.
- My solution has minimal functionality. The recipient can only be called - nothing else. A single stable and simple function, being reachable via video call without having to do or understand anything, is better for a very clumsy old person, than having many functions, but being afraid of doing something wrong.
- The specification from the problem description, to have to press at most one on and off switch, would even be surpassed by the automatic switch-on function.
- The use of the TV set and only the TV set for videotelephony means almost perfect integration into the familiar environment of a person in need of help.

OldSmartphoneVideoCall-App (OSVC), Desk Mount, Beamer

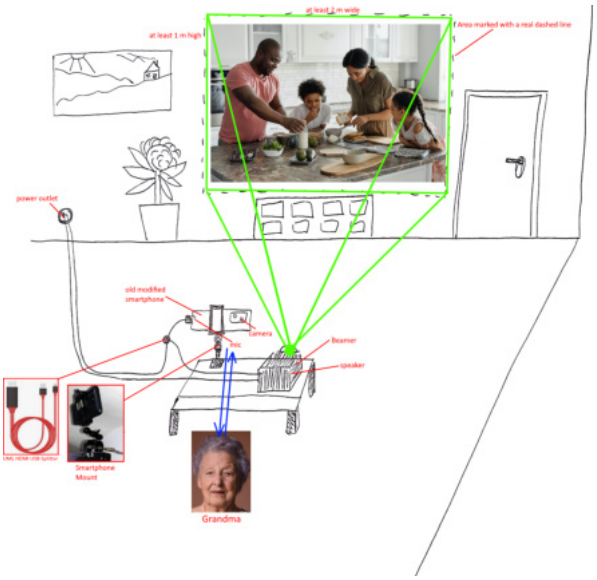

Figure 4: OSVC-APP, Desk Mount, Beamer - Sketch

Rationale for the OSVC-App Desk Mount Beamer

- A lonely old person, of course, is happy when he hears the voice of a relative or friend at all. If he then also sees the person he is talking to via videotelephony, that is of course even better. However, the image on a tablet or even from a certain distance on the TV set is only large enough to see the other person's face.
- A projector that projects an image of at least 85 inches onto the wall is like a huge window. This allows for a much more immersive videotelephony experience.
- Since the projector connected to an old cell phone is supposed to be right next to the person on a coffee table, the microphone and speakers are also closer, which improves the audio quality.
- It is true that certain requirements of the problem description are not met, such as: simplicity, unnoticed integration into the technical environment and low costs - however, these disadvantages are at least balanced with the advantages:
- The video calling experience is much more immersive because of the huge picture. It's a bit like opening a large window into someone's room far away.
- And the idea is ultimately about counteracting loneliness, which works even better this way than with tablet videotelephony.

Re-adapted problem description due to new findings:
How to set up videotelephony for lonely and technically clumsy people who long for contact with other people but cannot get out due to immobility. It must be taken into account that after a one-off initial installation, no further work on the videotelephony system may be necessary for it to work. For regular videotelephony to be successful, minimal functionality is desirable. Only the physical presence of the recipient should be required.

6 Prototype and Test

Documentation of Initial Prototype

- A few important questions still need to be answered before the idea of videotelephony can be implemented using a standard TV set using a combination of app, mobile phone holder and special cable.
- The convenience for an elderly person, as an actual user on the one hand, requires some effort in setting up and managing for a helper on the other hand. This work would fall to a grandchild, child or caregiver, for example. I would like to know if the whole process, starting from resetting an old phone, managing contacts, to getting it up and running is smooth and so understandable that setting up and managing it doesn't take too much precious time and effort.
- I would also like to know how much effort it actually takes to develop an app with the necessary functionality for a software developer. Is it enough that an existing app is only modified so that it communicates with Skype and controls a TV set, or does an app have to be developed from scratch at great expense in terms of time and money?
- I will do virtual tests to answer. To do this, I'll sketch a low-resolution flowchart that will guide the user through the entire process. The concept of the entire videotelephony system should be presented clearly on a functional level.
- The test scenario will look like this: Presented with the flowchart, the future helper who is setting up and managing the system should imagine that his grandmother or grandfather or similar would contact him and ask for help. After going through the setup and management process, let's answer some questions regarding simplicity etc. . .
- In a very similar way, but with a focus on the functionality of the app alone, a software developer should answer questions about the difficulty of implementation.

Initial Prototype

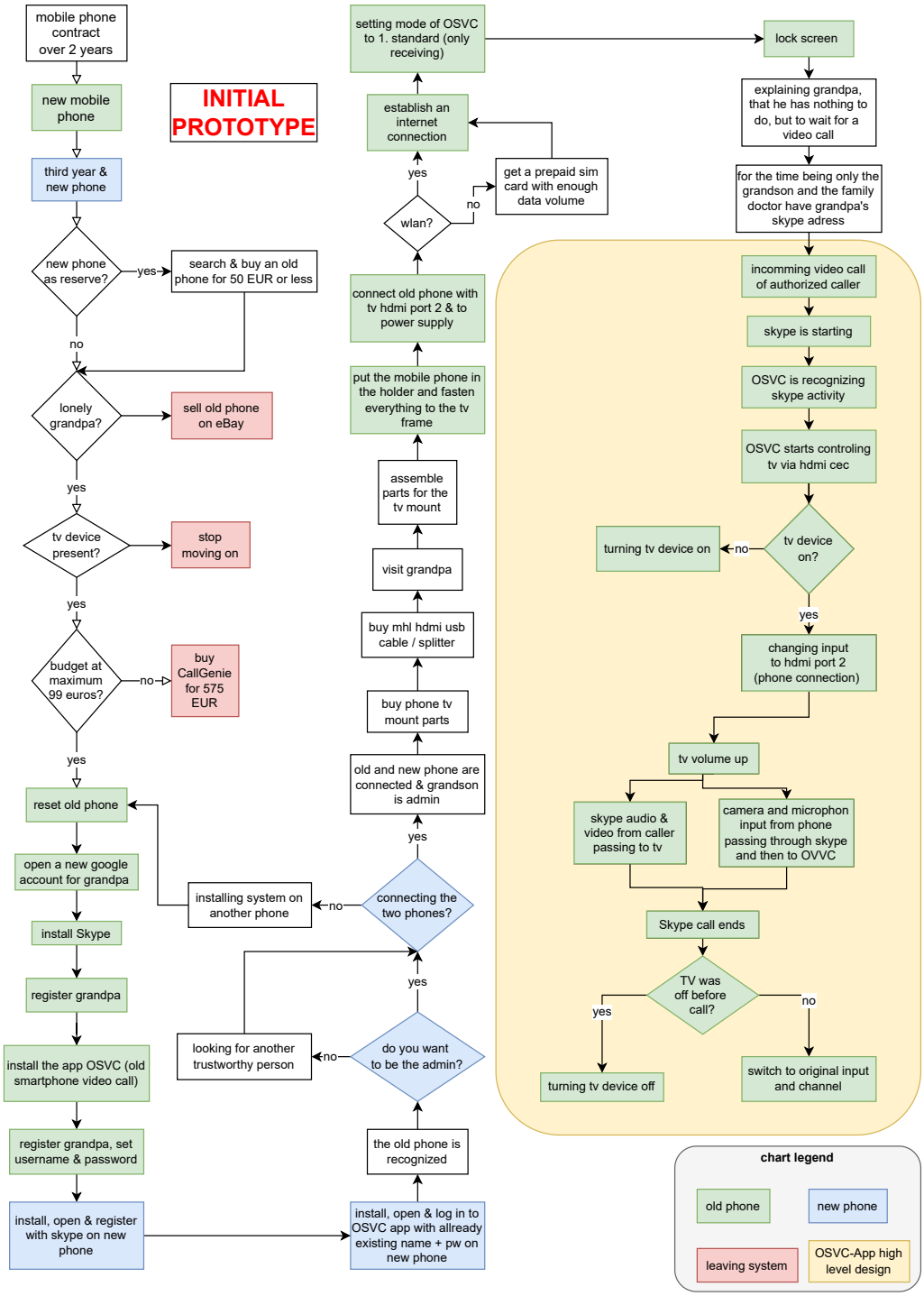

Figure 5: OldSmartphoneVideoCall - Initial Prototype – Flow Chart

Summary of Findings from Critique / User Test

- The grandson to whom I showed the flowchart says he can see himself setting up his grandfather's planned video phone system, as long as it's a one-time setup. He had no major difficulties following the process presented in his mind, and no questions arose. An integration of the setup instructions into the app itself would be desirable. This means that only the app (OldSmartphoneVideoCall app) really needs to be installed at the beginning. All further steps would be organized via the app.

- Since it is intended that his grandfather will be passive for the most part, the asked grandson is of the opinion that his grandfather should not have any major difficulties using videotelephony via TV.

- The grandson sees the greatest difficulty in giving away a two-year-old smartphone. He would rather sell it. Even after two years, his last cell phones were still worth more than 300 euros. He cannot imagine that the budget of EUR 99 is enough.

- A software developer friend of mine criticizes that the flowchart shows too much, i.e. just a bit of everything. He is aware that my solution is a combination of service, hardware and software, but in order to assess the development effort, he would need a more detailed model of the relationships between the app, Skype, a cell phone and TV set. He would need a catalog of specific requirements and a framework for the budget and the maximum development time in order to make a judgement. For the time being, he can only say that he doesn't know of any template for an app that could control Skype, TV and mobile phones as shown in the flowchart.

- Should he be able to examine a competitor's product with a similar range of functions at the source code level and recreate it without major changes, then the development of the OSVC app would be conceivable for him within a few weeks. But that only applies with reservations. As I said: He wants a requirements catalog or a diagram with a focus on the relationships and main functions of the app.

Justification of Revisions

- Nowadays, quite a few mobile phones cost significantly more than 1000 euros new and even two-yearold devices are relatively expensive at 300 euros. It is therefore unlikely that such valuable second cell phones will be given away and not sold. However, if a grandfather had to buy such an expensive second cell phone, then the desired budget for the solution cannot be met. So the OSVC app must also be able to run on devices that are more than 4 years old.

- The age of the batteries in these old devices is not really a problem, since it is planned that the old mobile phone will be permanently connected to the power grid. The findings from the test with the grandson now raise 2 important questions:
  1. What are the minimum requirements for such an old cell phone (memory, camera resolution, microphone sensitivity, etc.)?
  2. Is it dangerous if an old mobile phone is constantly charged? Is there a fire hazard in this regard?

- The flowchart (initial prototype) was not shown to a team of software developers, but only to a single developer. And even in the near future, no contact will be made with a team, but only with individual experts, such as inexpensive freelancers. You need a smaller area of the entire system to assess the development effort and therefore also for a cost estimate. This area should mainly represent the critical functions. A concrete list of requirements would also be useful.

- The next prototype (revised prototype) should therefore on the one hand contain the question of the performance of an old mobile phone and also include the possibility of continuous operation or permanent charging as a condition. Because otherwise the rest makes no sense!

- Since the setup process is unproblematic and the person called will behave rather passively, the focus of the flowchart or diagram should be placed on the critical functions relationships for the development of the solution.

Documentation of Revised Prototype

- The prototype, revised based on the findings of the tests, now presents critical hardware requirements, focuses more on the most important functions of the OSVC app and, on an abstract level, presents requirements for the software to be developed.
- The new diagram or flowchart will now be shown to at least two software developers to find out what effort is to be expected when developing the OSVC app.
- In addition, someone who is familiar with the mobile phone hardware must assess to what extent continuous operation with or without a battery poses a fire hazard.
- Finally, I would like to know what price to expect for a cell phone that meets the minimum hardware requirements.

Revised Prototype

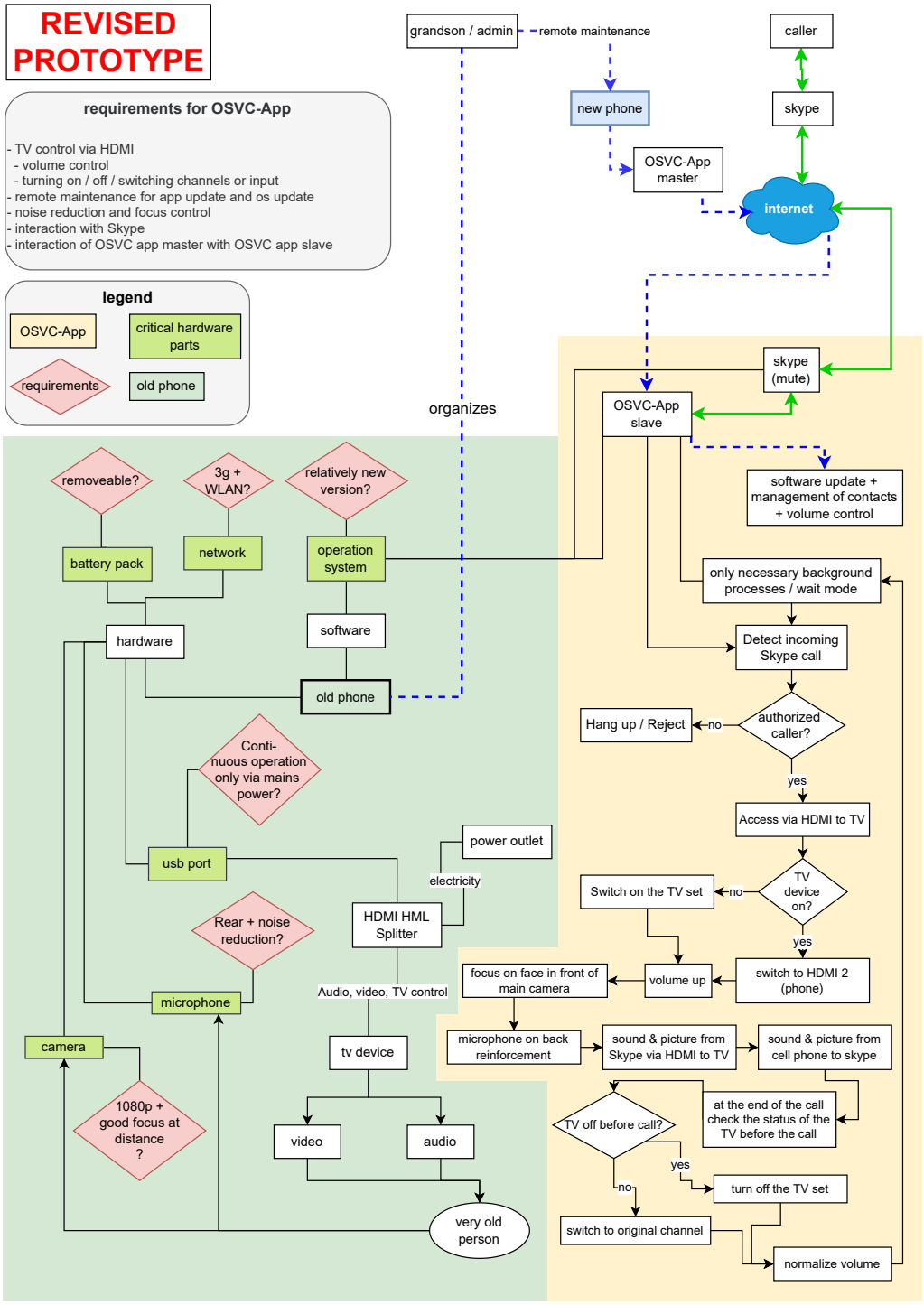

Figure 6: OldSmartphoneVideoCall - Revised Prototype – Flow Chart

7 Reflection

For my solution, I would need significantly more information about cheap used cell phones and the dangers of continuous use with and without a battery. In addition, statistics about family circumstances of very old people and willingness to set up and manage a mobile phone app would be necessary.
For an implementation or further development of my idea, I would have to talk to many more old people. They would have to be of different ages, belong to different cultures, have a wide variety of technical skills and, last but not least, be in different financial situations.
I assume that very few of my potential users are aware of the possibility of a very simple and cheap video call if a considerable advertising effort would have to be made.
Next time I'll focus more on the features essential to the problem. Also, I want to replace more text with sketches. Finally, I would limit the feedback more to a few but important questions.

References

[1] Johannes Pantel. "Gesundheitliche Risiken von Einsamkeit und sozialer Isolation im Alter: Chronisch kranke Senioren sind besonders betroffen". In: *Geriatrie-Report* 16.1 (2021), pp. 6–8. ISSN: 1862-5363. DOI: 10.1007/s42090-020-1225-0. URL: https://link.springer.com/content/pdf/10.1007/s42090-020-1225-0.pdf.

[2] Britta Thege, Juliane Köchling-Farahwaran, and Sonja Bröm. "„Ich verstehe jetzt ein bisschen, wenn mein Enkel mir was erklärt. Jetzt sagt er nicht gleich ‚Ach Oma, du verstehst das nicht'": Erste Ergebnisse eines Forschungs-Praxis-Projektes gegen soziale Isolation und digitale Exklusion älterer Menschen". In: *GENDER* 11.2 (2019), pp. 23–24.

[3] Bernd Schöneck. *Größter Senioren-Wunsch: Daheim wohnen bleiben*. 2020. URL: https://www.rechtsdepesche.de/groesster-senioren-wunsch-daheim-wohnen-bleiben/.

[4] Vera Solovyova and Daria Titova. *IoT für Senioren: wie digitale Lösungen die Lebensqualität im Alter erhöhen können*. 2020. URL: https://www.softeq.com/de/blog/iot-fuer-senioren-wie-digitale-loesungen-die-lebensqualitaet-im-alter-erhoehen-koennen.

[5] Alexander Wild. *Soziale Netzwerke für Senioren*. Ed. by mitpflegeleben. 2020. URL: https://mitpflegeleben.de/themen-des-monats/soziale-netzwerke-fuer-senioren/.

[6] Konnekt. *Skype Calls For Seniors & Eldery - Konnect*. 2022. URL: https://www.konnekt.com.au/skype-for-elderly/.

[7] Kurt Majcen et al. *Workshop-Proceedings der Tagung Mensch & Computer 2011: ÜberMEDIEN-ÜBERmorgen*. Chemnitz: Univ.-Verl., 2011. ISBN: 978-3-941003-38-5. URL: https://dl.gi.de/handle/20.500.12116/8008.

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