EasyLINC 2.0

02809 UX Design Prototyping

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1 ABSTRACT

Many elderly people still have the energy and need to socialize and experience life, but many do not have the ability to travel from A to B. EasyLINC solves this problem by providing the elderly with an easy and viable way to get around. Using feedback from elderly we have over many iterations been able to optimize the product for the target audience. With EasyLINC the elderly are no longer stuck at home watching the world go by while they cannot experience it.

2 INTRODUCTION

In Denmark and in other first world societies the population is aging. There are a lot of elderly people who live independently, but cannot leave their home, because of transportation constraints. The reasons are many, but come often in the forms of health conditions (see appendix (I)). This often results in them sitting at home, not knowing what to do, not socializing and deprive them of having a normal life. This project wants to solve these transportation constraints by first understanding the specific needs of the elderly and then by making a minimal viable product with a sufficiently simple design.

3 EXISTING WORK

The existing transportation options in Europe for the elderly, without the ability to drive themselves, are public transportation, taxi services, 'Flextrafik' or to depend on family and friends to drive them.

Public transportation such as the bus or train can be very stressful at certain times of the day. Sometimes one has to stand up during the commute and or walk for longer distances between different kinds of public transportation, which can prove to be a big issue for those who may also have walking disabilities and/or experience pain when walking or standing for longer periods of time.

Taking a cab can be very expensive and most just cannot afford to take a cab everywhere. 'Flextrafik' is a cheaper version of a cab because it picks other people up on the way, but this is often poorly planned and can take too long in getting from point A to B. Lastly, using family and friends for transport has the drawbacks of not supporting the independence of the elderly person and lacking availability for many of the elderly. [7]

Concerning similar solutions, there exists a quite similar product in Australia, which is in the testing phase right now [2].

4 SCOPE

Based on the given project we identified the **problem** as transportation. It is hard for some elderly people to get around and it can therefore be hard for them to engage in regular activities of life. [3]

An example of this is that many elderly want to go to social gatherings on a regular basis, and when the elderly don't have these needs fulfilled it can lead to elderly feeling both useless, unhappy and worst case depressed. [6]

Our **Solution** to this problem is EasyLINC. EasyLINC is an autonomous shuttle that can be ordered on an easy to use and simplistic app. The shuttle then comes to the desired pick up location, at the desired time and date. The shuttle can be traced and timed on a map within the app. Inside the shuttle there is a display, where route, stops and time is visible. The display is a collaborate IoT device, in that the smartphone and the shuttle screen collaborate to create the full user experience. The continuity of this device relationship, comes from the shuttle screen being the device that orients the customer while inside the shuttle, while the smartphone interface does this outside the shuttle. The shuttle screen can be seen in appendix (6)

The **costumer segment** is elderly people who live somewhat independent, but have trouble traveling longer distances. Some level of independency is required of the users, as they are to enter a self-driving shuttle.

The **unique value proposition** is an option for elderly people to easily get around in their community with an A.I. guided shuttle on demand.

These segments of the product are gathered in a lean business model canvas, see figure (18) in appendix. This model was done accordingly to Ash Maurya's description of a business model diagram. [4]

The lean business model canvas is used to narrow down the customer segment, specifying the problem and solution, so that we might obtain a sufficient overview of the problem.

The user story map is made to understand what goals the target segment could have, what activities need to be done to achieve these set goals and finally what steps one has to take in order to

do the activity. The final user story map can be seen in appendix (C)

5 ITERATIONS

5.1 First iteration (Søren)

What: In this first iteration we tried to make the layout as simple as possible. Given our target segment, we tried to cover the most essential problems an elderly person may face.

How: We went out and made a semi structured interview with some elderly people to find out what problems they face, how they currently get around and if they wanted to use a service like EasyLINC.

Outcome: The feedback we got from this, was that the buttons were to small and that writing the departure time with the phone keyboard is tedious and that it should be made in a different way, for example with a scroll wheel. In relation to if they wanted to use this service the answer was yes.

See appendix (G.1).

5.2 Second iteration (Frederik)

What: Focus on easier usability for the elderly in the form of bigger buttons and icons. Furthermore, giving the passenger the option to add multiple people to their shuttle.

How: Using A/B testing and thinking out loud with three participants, we tested the first and third iteration of our prototype. We don't talk about the second iteration because the changes between iteration 1 and 2 is regarded insignificant, due to limitation on test participants. The first two participants was tested with the first iteration followed by the third iteration whereas the third participant started with the third iteration.

Outcome: The feedback from the three participants showed a preference towards the bigger buttons and the inclusion of icons on the buttons. Furthermore, participants made us aware that there currently was no way to cancel an order and follow it on screen. The participants also had concerns regarding not knowing how much time a given trip would take before ordering the shuttle. As we were already aware of these issues, these problems were of lower priority in comparison to the core features. The said problems was finally solved in the fifth iteration. See appendix (G.2)

5.3 Third iteration (August)

What: For this iteration, the focus was primarily on communication of creation of value. We wanted to make sure that the concept of our product was easy to understand for elderly people. We hypothesized that the concept of self-driving shuttles could be intimidating and alien to elderly people. We also believed an "intro page" would help grasp the idea of the shuttles.

How: Validation was conducted by first showing participants the landing page for 10 seconds and then asking them to explore the prototype in depth. They were then asked to answer a quantitative questionnaire with the purpose of collecting subjective data on the prototype. We divided 12 participants into four groups to A/B test. Testing was done with combinations of the new and old landing page and with or without the intro page. Afterwards both landing pages were compared by each of the participants.

Outcome: The feedback we got from this, was that participants strongly preferred the new landing page. When asked to justify the given score, this landing page was more appealing and a more simple way to show the core concepts of our solution. Furthermore, participants that were shown the intro page answered higher on the questionnaire. Thus we conclude that an intro page and the new landing page creates an easier experience. (See appendix (G.3)

5.4 Fourth iteration (William)

What: For this fourth iteration, one of our most important focuses was making the app more relatable and comfortable for elderly to use. This is why we in this iteration decided to change the color scheme from primarily green, to primarily yellow. We did this, because we thought that yellow would be more familiar with public transportation for the elderly. Other focuses for this iteration was the app layout, as well as reflecting on the natural flow of the app.

How: We used two methods to validate this iteration. Firstly, thinking out loud with one of the people who validated iteration two. Secondly, performing a five minute pitch of our project, with live feedback. From this presentation we got oral feedback, ratings and 32 responses.

Outcome: We got a lot of positive feedback in regards to our target segment, scope and design in this iteration. Some of the most constructive feedback we got was that the back button was placed awkwardly, that too many shades of yellow were used and that when booking a shuttle, the destination choice should come before choosing time and date. See appendix (G.4)

5.5 Fifth iteration (Bjarke)

What: To further improve the user experience, we used the feedback gotten from the previous iteration to inform the following changes.

Firstly, we wanted a way to cancel shuttle orders. Secondly, we wanted to change the back button by putting it in the top left corner instead. Lastly, we changed the ordering process so that the "destination" and "pickup location" inputs where the first part of making a shuttle order. This last change also makes the MVP conform to the industry standard.

How: We tested these changes by asking three elders. In short, we asked them which version they preferred between the previous and new iteration and to further elaborate their thoughts on the these. One drawback of this is that we cannot evaluate the changes independently of each other.

Outcome: From the feedback we observed a uniform preference for the new version. This implies that the changes made where preferable as a whole but not necessarily that any individual change was preferable. Moreover, the change of the ordering and the adding of a cancel shuttle option, were both specifically mentioned as positive.

A few comments regarding areas of improvement were also made. These included that the elders believed the description of time to be slightly un-intuitive. See appendix (G.5)

6 DISCUSSION

The feasibility and success of EasyLINC relies on a certain number of assumptions about technological improvements. Of course it is important to create an app built on great design principles, but this is not sufficient. It can be important to think about the several assumptions we had when creating the project. We of course looked at the project from a UX perspective, but we havent considered it much from an engineering, legal or financial perspective. Firstly from an engineering perspective, we assume big improvements in self driving, and assume that at least level 4 [1] driving automation has been achieved and is available. Specifically we assume that shuttle busses are fully autonomous at least along a large number of roads. From a legal perspective, we assume that our self-driving vehicles are allowed to drive on all public roads, and that there in general are no legal problems with our product. Lastly from a financial perspective, we assume that the project could be funded with municipality subsidies, but if the business model is financially feasible is difficult to know especially considering our lack of testing for this business model.

An important aspect of our product, and something we had in mind throughout the whole process was ethics. It was very important to us that our app and service was always ethical and transparent in its practices. This means that we do not collect and use data we do not need. It means that we do not lie to or manipulate our users. It means that we do not use dark patterns to trick and up-sell our customers. But another important part of being ethical is also being inclusive. Therefore, our services need to be usable for as many people as possible. This means that with all of our design, we have accessibility in mind, so that elderly with limited vision, limited hearing, or decreased mobility, also will be able to use the app and shuttle. This is achieved with many small features and micro-interactions that makes the app easier and better to use. An in depth overview of our thoughts about ethics, transparency and inclusive design can be found in the appendix. See appendix (H)

Considering the testing and validation done for the project, we encountered several difficulties. Firstly, since our target group was the elderly it was important to test and validate with the elderly, to get the best and most relevant feedback. This did come with some difficulties as we did not have access or time to test with an optimally large number of potential users, which inevitably will bias our results, considering our low sample size of elderly. It is also important to think about the fact that there are elderly in many different situations and needs, which means that not everyone who is in the right age bracket has a need for our product. We encountered this specifically when testing the fifth iteration (G.5), as both of the elderly we tested on had cars and were comfortable driving them, thereby making the utility of our product negligible. Another limitation when it comes to testing and validation is the fact that we did not have the actual product, as we did not have a physical EasyLINC shuttle people could test and review, which leaves some aspects to imagination. This of course does not affect the results from the testing on the app experience, but it does limit context fidelity of the validation.

A number of further improvements to the user experience could still be made. Notably, a desktop version of the app would be useful as many prefer to order from their computer instead of their phone. Furthermore, as the MVP was made to be as simple as possible, the resulting design came out as quite functional and thus a bit boring. This could be improved on by A/B testing purely on stylistic elements, like color patterns, button designs, font styles etc.

In conclusion, creating the best UX for EasyLINC had a number of obstacles, most relating to the difficulty of testing and thus iterating in an unbiased way. Because of accessibility our test subjects were mostly other students, and not the elderly. Moreover, the test subjects only had the ability to evaluate the app in the abstract, as the shuttle described in the app, was of course not available. With these limitations in mind, we were still able to iterate with some confidence and the resulting MVP was still shown to be usable by the elderly even when no walkthrough was provided.

7 CONTRIBUTIONS

Most of the work was made in total collaboration, the following table shows the people who had the responsibility for each part:

	August	Bjarke	Frederik	Søren	William
Landing Page	x				x
Lean Canvas					x
User Story Map		x	x		
Wireframes	x		x	x	
Prototype	x	x	x	x	
Validation		x		x	

Furthermore, Bjarke was responsible for the Market Validation in the appendix. William was responsible for the Motivation, Ethics and Transparency section in the appendix.

REFERENCES

[1] Jessica Shea Choksey and Christian Wardlaw. 2021. Levels of Autonomous Driving, Explained. *J.D. Power* (May 2021).

[2] World Economic Forum. 2019. This driverless shuttle bus is picking up elderly Australians on demand. *World Economic Forum* (September 2019).

[3] George Holley-Moore and Helen Creighton. 2015. The Future of Transport in an Ageing Society. *IKC* (June 2015), 9–13.

[4] Ash Maurya. 2012. *Running Lean: Iterate from Plan A to a Plan That Works.* O'Reilly Media.

[5] Jakob Nielsen Ph.D. 2012. Thinking Aloud: The 1 Usability Tool. *nngroup* (January 2012).

[6] Archana Singh and Nishi Misra. 2009. Loneliness, depression and sociability in old age. *ncbi* (June 2009).

[7] Christina Vejsgaard. 2019. Flextrafik: Er der et tilbud til dig? *Forbrugerraadet Tænk Passagerpulsen* (November 2019).

A LANDING PAGE (FINAL)

Figure 1: Final Landing Page

B LEAN BUSINESS MODEL CANVAS (FINAL)

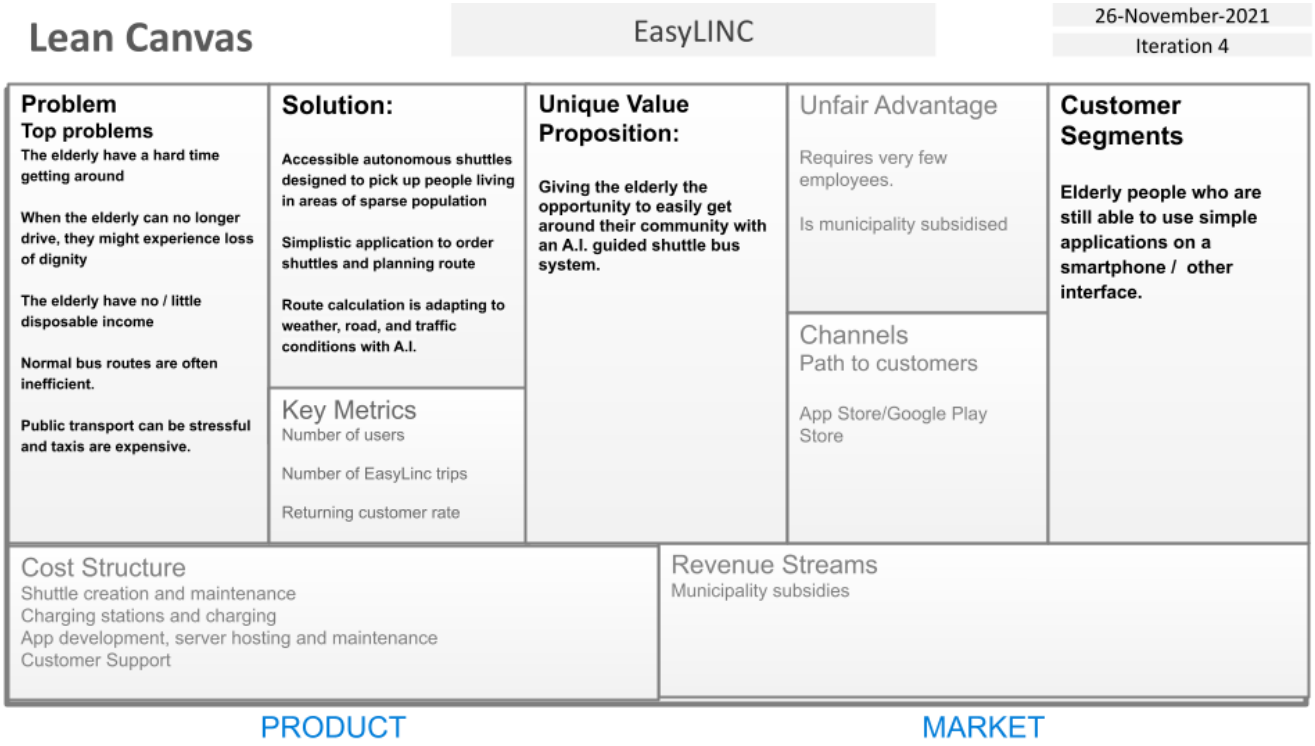


Figure 2: Final Lean Business Model Canvas

C USER STORY MAP (FINAL)

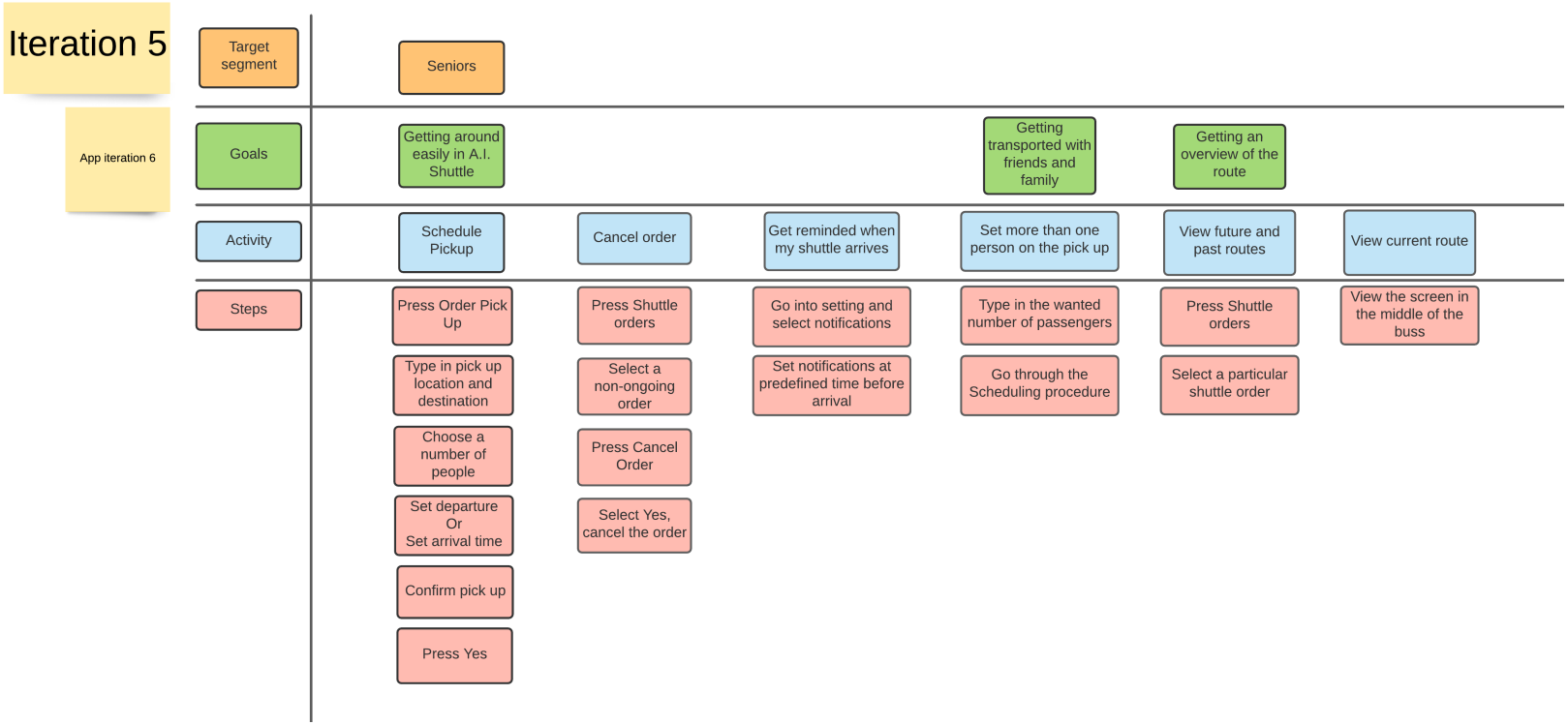


Figure 3: Final User Story Map

D WIREFRAMES (FINAL)

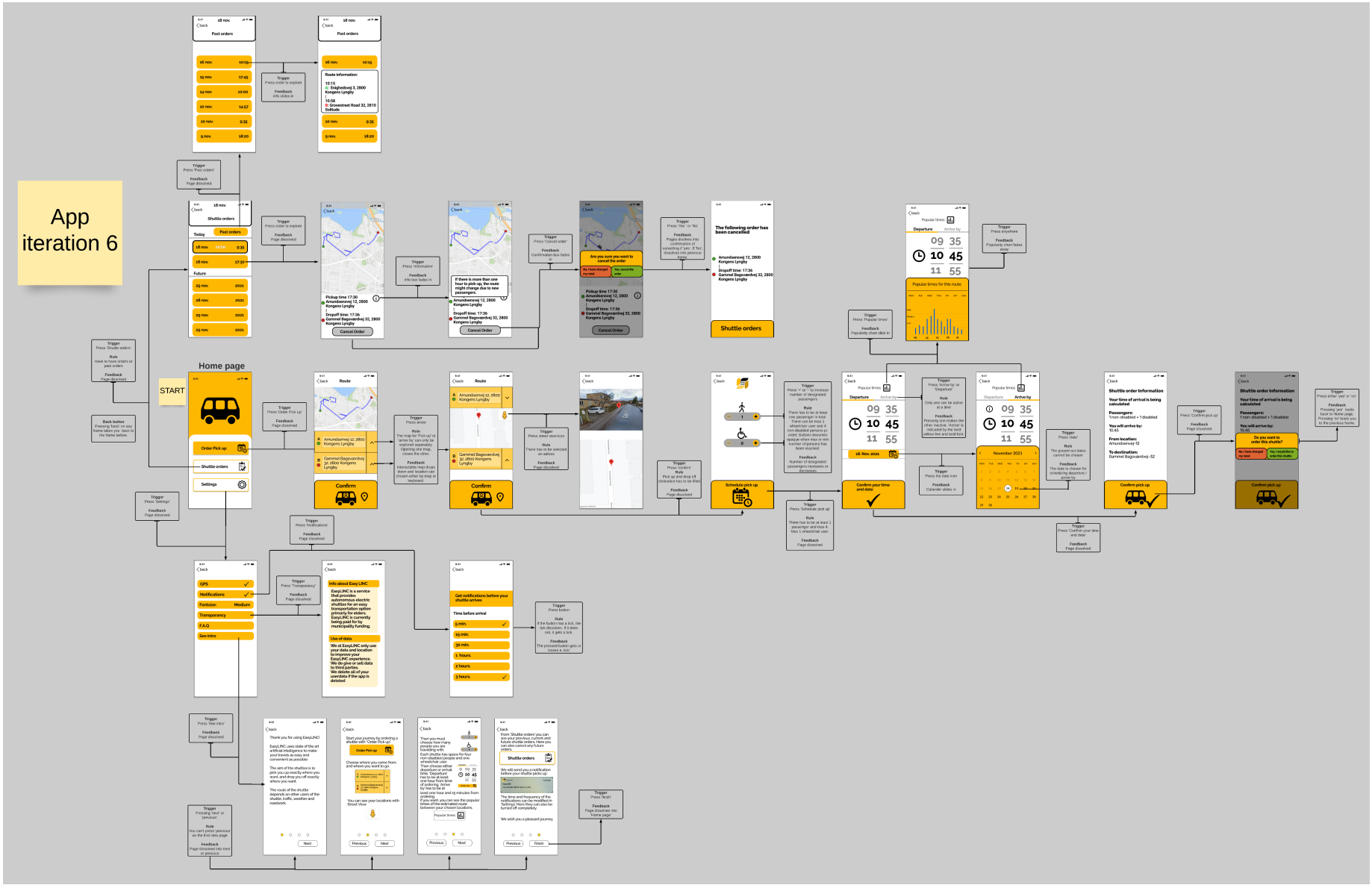


Figure 4: Final Storyboard/Wireframes

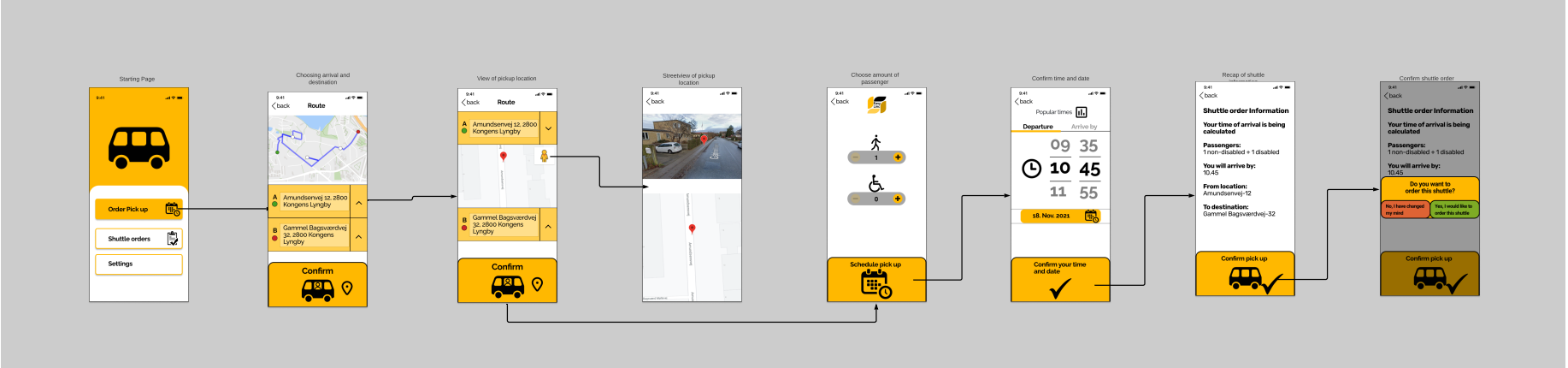


Figure 5: Final App Overview

E SHUTTLE SCREEN

This screen is intended for the screen inside the shuttle. It is not meant for being interactable, but simply to display information.

Figure 6: Final iteration of Shuttle Screen

F EXECUTABLE PROTOTYPE

https://www.figma.com/proto/fOcs9odDr54yTKgRn1F4XO/Final-Project—wireframes?node-id=513%3A3621scaling=min-zoompage-id=0%3A1starting-point-node-id=513%3A3621show-proto-sidebar=1

G VALIDATION

After the first iteration we used qualitative feedback from both elderly and non-elderly people. For each of the major iterations, the testing groups have been mostly different each time. There have been made a series of interviews. Most of these interviews has been semi-structured, while other interviews conducted the thinking out loud method, [5], where we gave a very brief introduction to the product. This gave us insight into how the user viewed our service and what possible changes should be made.

A combination of A/B testing and thinking out load was also used, where some were shown a product version A and then product version B while thinking out loud. We also reversed the order so that B was shown first, which was done so that the any confounding factor from the showing-order, would not affect the quality of our data.

We want to specify why we did this variation of A/B testing. It is done this way because we had a very limited number of people who had the time to test our app, that is why we showed these people more iterations for them to compare instead of having more people in two groups only testing one iteration or feature. This approach gives us more information to work with, although it may slightly bias the data. Overall we consider this a good trade off.

Furthermore, we pitched our project for fellow peers and thus collected their thoughts on our solution.

G.1 Iteration 1

We quickly went out to get some feedback after our first mock-up. We did a 'semi structured interview' and the feedback we got can be summarized as:
"The buttons were to small, there also was some confusion about the 'Request pick up' and 'Schedule pick up' at first glance. Also the way one changes time is done poorly and should be something else than typing it in manually."

G.2 Iteration 2

Conclusion based on Feedback (iteration 1-3): The feedback came from three non UX-students, who were asked to roleplay as elderly people, with the limitations that entail. The UX-students were tested between the first and third iteration with A/B testing and thinking out loud. Concerning our iterations we have gotten positive feedback on the improvement in the design especially about the visualisation we use in iteration three. We got positive feedback on the relatively small number of buttons used in both iteration one and three and we saw a general improvement in how positive the feedback was going from iteration one to three. Some features however were clearly missed, these include a system for remembering previously used destinations like one's home destination.

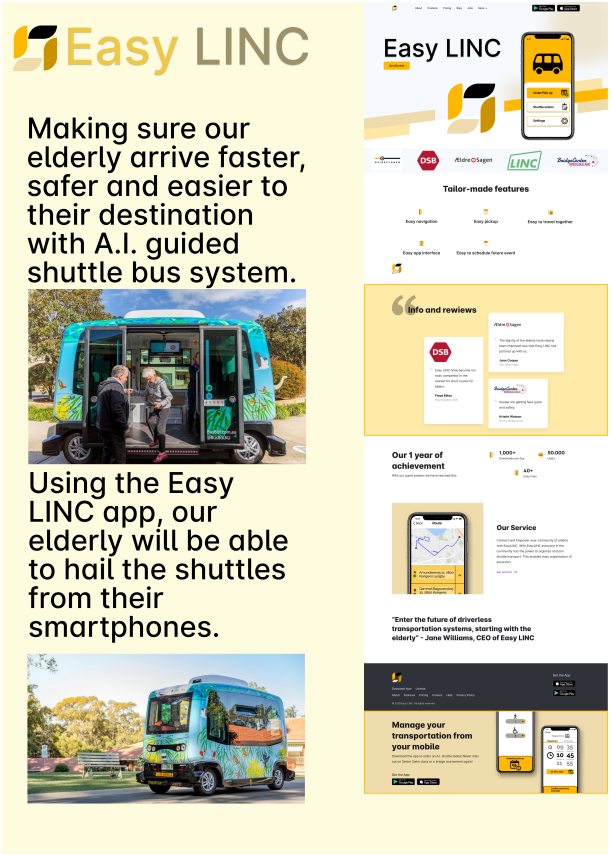
G.3 Iteration 3

In this iteration we wanted to validate our landing page. Firstly, we wanted to choose between two slogans.
First slogan: *Keep yourself connected with the transportation of the future.*
Second slogan: *Connecting our elders with the transportation of the future*

We explained the concept of EasyLINC to six elderly people of different backgrounds, and asked them which slogan they preferred. five out of six preferred the second slogan, thus we settled for that.
We then did A/B testing with 12 new people. We divided participants into four groups to A/B test. Testing was done with combinations of the new and old landing page and with or without the intro page. The participants were shown the landing page and then told to explore the prototype in depth. It should be noted, that testing was done on students, and not elderly people due to lack of options. They were asked to rank the following statements from 1-5: (1 = not true, 5 = very true)

(1) I understand the purpose of EasyLINC.
(2) I understand the function of EasyLINC.
(3) I had no trouble ordering shuttles through the prototype.
(4) I can see myself using EasyLINC in 50 years.
(5) I was intrigued by the landing page.

The landing pages used in this testing can be seen on figure (7). The average scores of the questionnaire are shown in table (**??**).



(a) Landing Page 1

(b) Landing Page 2

Figure 7: 2 Figures side by side

Average scores	**Shown intro page**	**Not shown intro page**
Landing page 1	3.9	3.3
Landing page 2	4.3	3.7

When asked to comment, common responses by the participants were:

- "Landing Page 1 feels messy"
- "I didn't quite get how the shuttles work" (Not shown intro pages)
- "This seems smarter than a normal bus or taxi."

G.4 Iteration 4

For this fourth iteration, one of our most important focuses was making the app more relatable and comfortable for the elderly to use. This is why we in this iteration decided to change the color scheme from primarily green, to primarily yellow. We did this, because we thought that yellow would be more familiar with public transportation for the elderly. Other focuses for this iteration was the app-layout, as well as reflecting on the natural flow of the app.

We used two different methods to validate our changes in this iteration. The first method was thinking out loud on one of the same people who validated the second iteration. The second method was the final presentation, where we got a lot of oral feedback, ratings on our Scope and on our MVP, as well as 32 written responses. All of the data from the validation can be found below.

Thinking out loud of the people who validated iteration 2

Thinks the date should be before time. The Destination should be before time and date. It is not easy to see that the screen changes between pick up and drop off. Default notification is good but there should be an option to turn off notification on the confirm page.

Figure 8: Scope and MVP ratings from the final presentation

Feedback from final presentation

LINC 2.0 (in psychedelic colours): Good initial research. Interesting focusing on the elderly. App seems to be well in line with target segment. Nice to see a display at the bus stop designed too – could it also allow interaction for some?

Easy Linc: Good use of user research. I like the chosen target segment. very nice design

50: Minor UI issue, the location of the back button is somewhat awkward and can be clicked by accident (which i did a few times when i tried it using your QR code).

50: Love the Accessibility part <3 I love the take on the project. Adding an assistance button would be nice, instead of just having it as an information displayed. Other than that, you should do more testing on your design choices, because your features are now clear but your features can be improved further. What about some data visualizations, can you find out if theres a way you can add that in? Perhaps imagine yourself as the user like 40 years ahead. The visualization can be kept simple and Im sure the elderly would be able to decipher simple graphs.

Easy LINC: nice design and very simple, so it's good for elderly people.

easyLINC: the landing page looks really fresh. Features are interesting, but the wireframes feel a bit empty

EasyLinc: I really like that you have twisted the user segment from young and able people to the elderly. They obviously have a larger need for a bus over shorter distances, than young people. Good use of statistics/sources to back up the problem. The ap seems frinedly to elderly - large buttons, text and simple design

LINC: very comprehensive problem scoping and intensive research of the issue at hand very interesting/different target group biggest challenge of the product probably will be the backend (how does the algorithm makes decisions about the route

50: It's so true that for many users, it's much better to bike than take line. Very nice customer segment in that sense! but I wonder how much older people can actually use smartphone apps.. Nice you touched upon inequality as well.. Good that you made screens for in-shuttle display as well. I also wonder, when there's no need, does LINC still makes the usual round? or does it idle? if it keeps making the regular round, how does it address to the current riders the change of route etc.? Very good idea, you can work on explaining some holes you have so it will be more complete.

Easy LINC: The design of the prototype is minimal and user-friendly considering that the customer segment is old people.

easyLINC: The shuttle screen might bee to small for elderly people, some weeks ago I overheard two old ladies who could not read the station text in the s train, so consider that it should be very visible!

50: Great design for the app and nice thinking of using elderly to model the app. But do elderly people use apps?

Easy LINC: I think you are right about the problems with LINC - but the issues were mainly technical issues and you could maybe have focused more on the UX problems and then assume the technical things will be solved. Nice presentation of wireframes. For elderly people, isn't a lot of the informational text too small? Consider make the map more simplistic. Also make text bigger and/or add contrast to text High contrast colours but 3 types of yellow are used? Really interesting scope! I can see that this can work. Are the routes defined? or is it a call service?

Easy Linc: I like that you included the google view so people can see where to get picked up. Its also cool that you included the linc bus screen in your wireframes and use it to provide more information to the users so they don't need to look at their phone again. Concise design!

Easy LINC: Very well defined customer group. The design is ideally targeted at the seniors. Also nice LINC shuttle wireframes.

Easy linc: In general good presentation. Good solution and it seems like it easy to get around in the app. But will it make sense to drive that far with that small busses? And how should this be financed?

Easy Linc: Good scoping and explanation on the problem. Maybe consider how you will do the onboarding as starting to use on the app might be difficult for the elderly also specify where the route should be.

Linc: Very nice. User segment and problem is very clear.

Linc (50): Good detail that you can see where the shutte you ordered is. Would be nice if you could see where all the lincs are at once, and what route they will take to get a better overview.

Easy Linc - Group 50: Very in depth explanation of the problems, and specific target group. Confused on how this could actually be implemented though. How will it be ensured that there are enough shuttles in the "right" sparse area to meet demand? How will routes work if people try to join an existing ride? What reasons should they take this over the bus? The bus might be a little more expensive but the waiting times are probably lower.

Easy Linc (Group 50): Solving driver license inequality with your app seems bizarre to me. However, I really like your focus on elderly and the solution of ordering the shuttles directly close to them. Nonetheless, I would be concerned about the availability of the buses since it can take a long time to pick up and drop off each person individually. Your idea is very clear and well presented, but the fact that LINC turns into a cab needs a lot of work to become a realistic solution

Linc group 50: i like the idea of the IoT. But how would you make these busses operate? How do you target these elderly? Validation seems to be missing.

50: Problem and user is VERY clear! That is very nice, because you then really understand you user segment and can design your app according to this. Your prototype is very simple and nice and aligns well with the customer target. I like that you choose between handicap and normal person, but I think the icon for a "normal" person is a bit confusing, that the man is walking, because I start to think - do I now have too walk a long way to the bus. Maybe a normal standing man icon, would be better?

Easy Linc: Very nice "problems" research work to accommodate the best your target group. The overall app looks a bit confusing, have you made any testing on the target goup ? what are their opinions about the flow of the app and its usability?

50: nice presentation !

G.5 Iteration 5

Experimental setup: Three elderly people, specifically one couple and another guy, were asked to go through both iterations of the app. One couple were asked to go through the changed app first and the other guy was shown the original app first. Both were only given a description of the purpose of the app and the purpose of the test. They were not given any introduction to the interface. We then asked them to give feedback on which app they liked more and why.

Person 1: (age 73)

(the following has been translated from Danish and slightly paraphrased) Preference = Last iteration.

I like the B version more (Here B = the last iteration) because it is easier to follow. I use google maps and 'Rejseplanen' and it is closer to those apps I think. I think both versions use too much text in the settings. I could use both apps pretty easily however the B version was definitely easier as a first time user. I don't know if I like the design or not, but it is usable so it can't be that bad. If I would use it day to day, I would like a previous location section and something like what I have on my GPS.

Person 2: (age 69)

(the following has been translated from Danish and slightly paraphrased) Preference = Last iteration

The B version seemed a little easier (Here B = the last iteration). I couldn't see any cancel feature on the A version which is definitely a needed feature so that alone makes the B version much better. Also, I like that the new route display looks better and easier to use than the other one. Both apps seem to have the same time display thing, but I don't really like that part of it, if I recall correctly 'Rejseplanen' has a better way of organizing the arrival and destination time part. This is maybe a small thing but the back button in version A is a bit obstructive but it's also easier to spot, overall I think both app versions are good.

Person 3: (age 65)

(the following has been translated from Danish and slightly paraphrased) Preference = Changed version

I preferred the A version (Here A = the changed version) because I like the design more. The A design was also a little bit easier to follow except for the back button part. The back button in version A is a little prettier, which is good and it is also not as easy to miss click. Don't know what else to say, maybe the A version seems a little more like other apps on the GPS and the GPS on the phone. I think it's good that it's so easy to see that handicapped people can also use the shuttle but I guess that's not a difference between the apps. Maybe I'm wrong but i can't see how you can cancel an order which is of course necessary.

H MOTIVATION, ETHICS AND TRANSPARENCY

Why did we choose elders as our primary users for the Easy LINC project?

For our EasyLINC project we decided to pivot the target segment from the first iteration of LINC. The current LINC project focuses primarily on helping students get around campus by driving the routes on the private streets of DTU. But the current version has several flaws, that we think when fixed could make the project more useful. Right now the shuttles can only drive up to 20 km/hr, can only drive on private streets and have very inefficient predefined routes around campus. All of these three factors would need to be fixed in order for LINC to reach its full potential. Right now it is easier for students to take a bike or even walk around campus, than taking a shuttle. But if the three previously mentioned factors were fixed, we believe that the shuttles could do more good out on the roads, than within the DTU campus. We thought about which people groups would benefit the most from having these shuttles. Our pick landed on the elderly, as they normally do not have the same mobility as other groups. This is because they often have a harder time walking or biking to their destination, they sometimes dont have a driver's license, and if they want to go out, they are often forced to take regular busses, which can sometimes be a crowded and stressful experience. The LINC project could therefore be a way for the elderly to be more movable, and therefore more independent and social, in a world where loneliness among elderly is a very real problem. This is the reason why we chose to pivot from students getting around DTU, to helping the elderly staying connected around the country.

How does the EasyLINC project become more inclusive for a diverse group of elders?

When designing a system, where the primary user group is the elderly, it is very important to make the system as inclusive as possible for a diverse group of people, as everyone is different, with many different needs and abilities. We therefore want to think a lot about accessibility when designing our product, both when it comes to our EasyLINC app, but also the actual shuttles themselves. Some of the accessibility features for the app, we can design and show, but other features such as the actual EasyLINC-shuttles we dont have the capacity to create, so we are limited to writing this paragraph to share our thoughts on what would be needed. Here is a list of some features we think would help accessibility for the overall EasyLINC experience.

For people with limited vision we think that bigger buttons, with large text in a font that is easy to read, is very important to boost the user experience. A text to speech feature could also help to navigate the app easier, even with limited vision. For the shuttle experience it would be important to install speakers in the shuttle that could give relevant information, such as the estimated travel time and notifying the users when they are close to their destination.

For people with limited hearing, it would be important that the whole experience from start to finish would be achievable without sound output. This means that all features in the app should be accessible by reading, typing and pressing buttons, without requiring sound. For the shuttle experience, a display with relevant information would be important, so you dont lose valuable information due to hearing loss.

For people with limited walking or standing ability, it would be important to make sure that the shuttles arrive as close to the users as possible, which is actually a really great feature of EasyLINC compared to regular busses. It would also be important to make it as easy as possible for people to get in and out of the shuttles, so small stair steps and with extra time to get in and out at each stop. It would also be great to have special EasyLINC units, that are made specifically for people in wheelchairs, with ramps and removed seats within the shuttle for the best user experience.

These are just some of the features we would like to see for our EasyLINC project. It is important that new features would be added in continuity, as more accessibility features can always be found. A testing phase with community feedback would also be valuable, as this would give us more knowledge about user wants and needs.

How is EasyLINC ethical and transparent in regards to its practises?

When creating a product or service it is always important to be ethical and transparent in your practices. This is the case for several reasons, both because it is the moral thing to do, but also because trust is important to many users, when deciding what product or service to use. Therefore our EasyLINC project should be as ethical and transparent as possible. This involves many different parts, but this is a list of some of some our thoughts as it relates to ethics and transparency:

One of the most important factors in regards to transparency is the use of data. It is important that users know exactly how user data is being stored and exactly what it is being used for. It is also important that our service only takes the exact data it needs to give the best experience and nothing more. It is also important that data is not shared with third parties, without the consent of the user. This also means that some features that require more data or the help of third parties, need to be able to be switched off. All of these different initiatives help users be in control of their own data, and build trust between the user and service.

Another feature in regards to ethics, is that the user has the ability to use all features and know how all features work. There should not be hidden settings or any features that are hard to use on purpose. There should not be any dark patterns to trick, mislead or manipulate the user. This also means that the user should be able to turn off notifications and that there should not be any hidden costs or fees that the user is not aware of. All of this is important to build trust, and in the end make users more likely to use the service more.

I VALIDATION OF MARKET

Easy LINC being in the short to medium length transportation marked for the elderly, has the following competitors: 1. Transport via personal vehicle, 2. Public transportation services including trains, metros and busses, 3. Taxis and similar services. We will explore the problem of elderly transport and the market it constitutes, via data collected in the UK by, specifically ageuk.org.

While transport via personal or shared vehicle is quite convenient we see on the following graph that this choice is only available to on average around 60% of the elderly population.

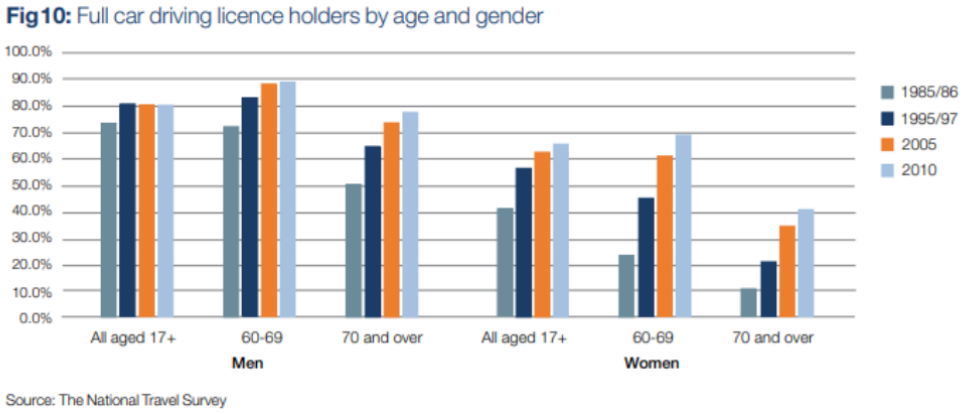


Figure 9: Full car driving licence holders by age and gender[3]

This is particularly problematic as we see women having much lower access to this option, because of a lower driver license rate.
Concerning public transportation we see general lack of use and dissatisfaction. This is clearly inferred from the following graphs.

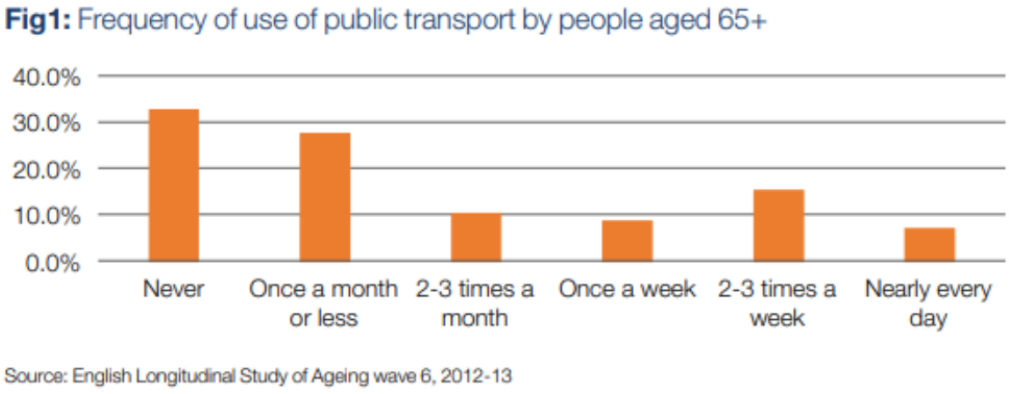


Figure 10: Frequency of use of public transport by people age 65+[3]

As seen on the graph, the frequency of use of public transportation by the elderly is quite low, the reasons for this are illuminated in the following graphs.

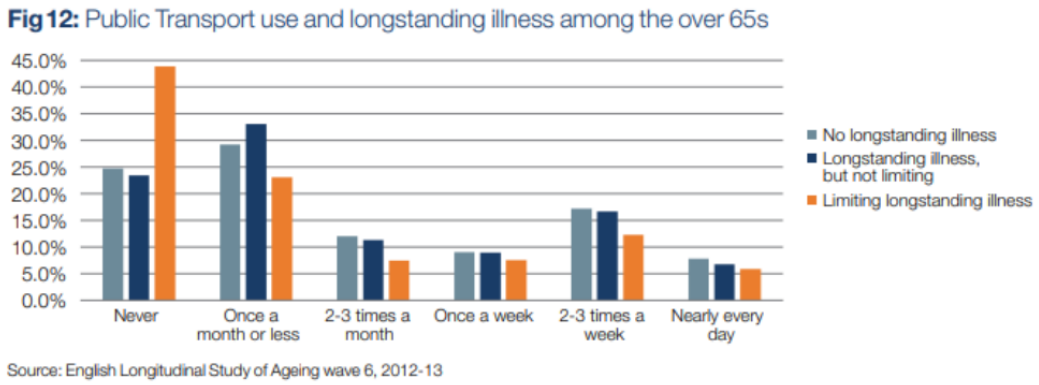


Figure 11: Public Transport use and longstanding illness among the over 65s[3]

Moreover, we can also see how the illnesses of the elderly negatively affect their use of public transport.

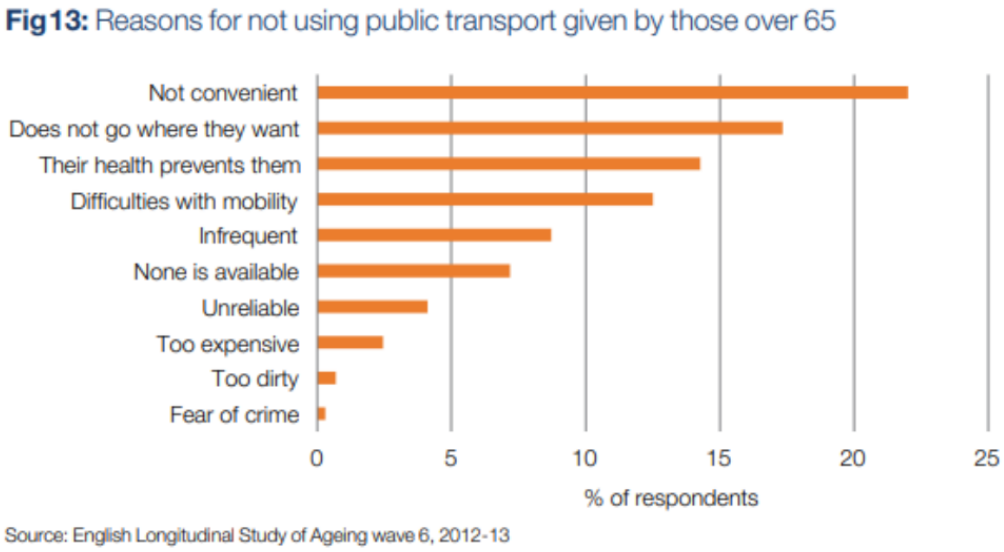


Figure 12: Reasons for not using public transport given by those over 65[3]

Highest on the reasons for not using public transport is convenience, which narrows down the problems of public transport. Interestingly, difficulties with mobility and the health of the elderly person are also among the top reasons.

Lastly, taxis, while convenient, are out of economic reach for day to day transport of the average elderly person. From the listed mobility options and their characteristics, we see a narrative emerge of lack-of convenience, high costs and/or low availability. These factors affect the elderly differently based on gender, economic position and their health. Extrapolating from this we come to the conclusion that the current options for elderly transport are not sufficient, particularly in the dimensions of convenience and in the equality aspect. Furthermore, looking especially at the graph for reasons for not using public transport and the graph for ease of medical visits, we see a definitive market for convenient short-medium distance travel for the elderly.

J LANDING PAGE (ALL ITERATIONS)

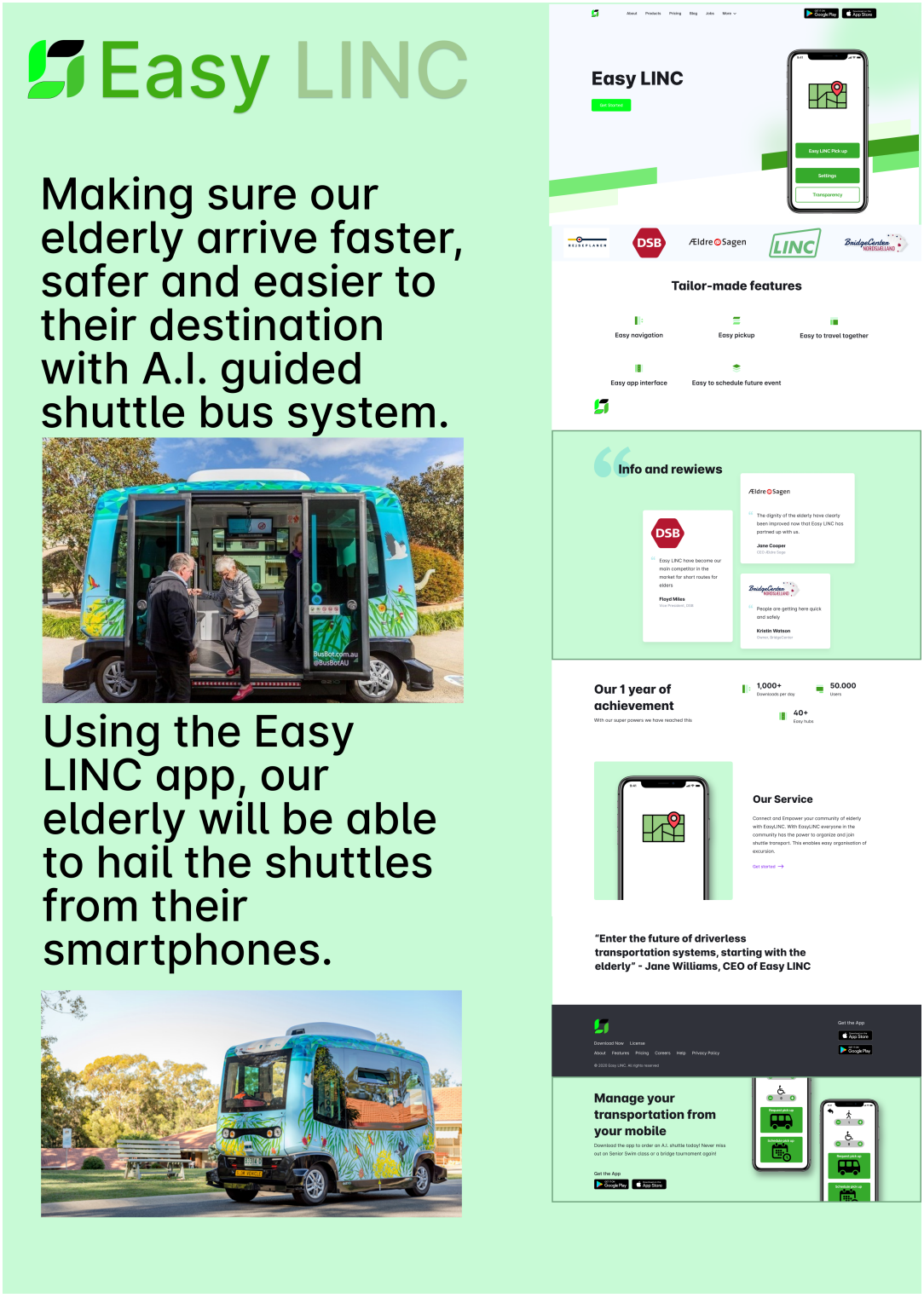


Figure 13: Landing Page Iteration 1.0

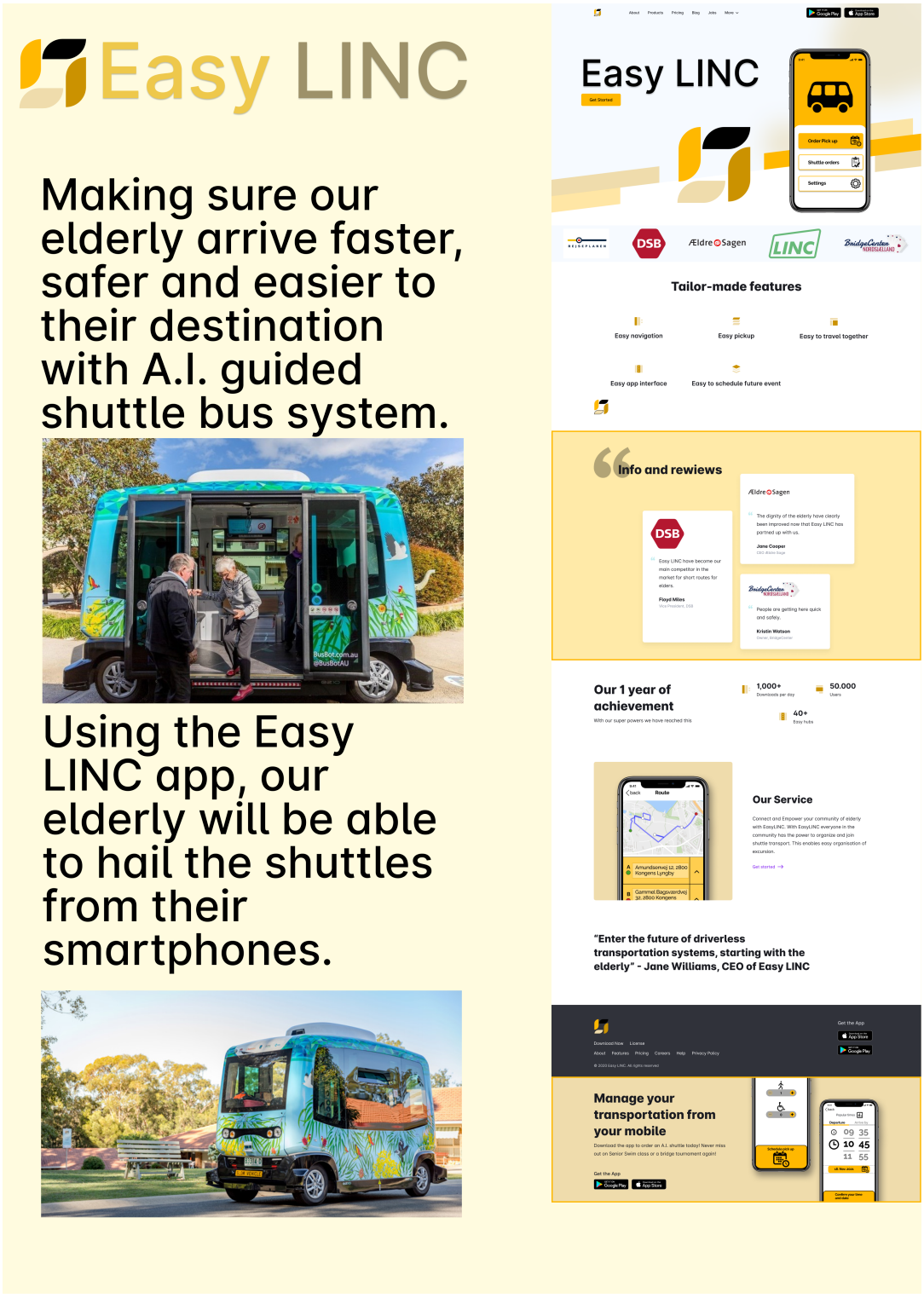


Figure 14: Landing Page Iteration 1.1

Figure 15: Landing Page Iteration 2.0

Figure 16: Landing Page Iteration 2.1

K EXECUTABLE PROTOTYPE

https://www.figma.com/proto/fOcs9odDr54yTKgRn1F4XO/Final-Project—wireframes?node-id=513%3A3621scaling=min-zoompage-id=0%3A1starting-point-node-id=513%3A3621show-proto-sidebar=1

L LEAN BUSINESS MODEL CANVAS (ALL ITERATIONS)

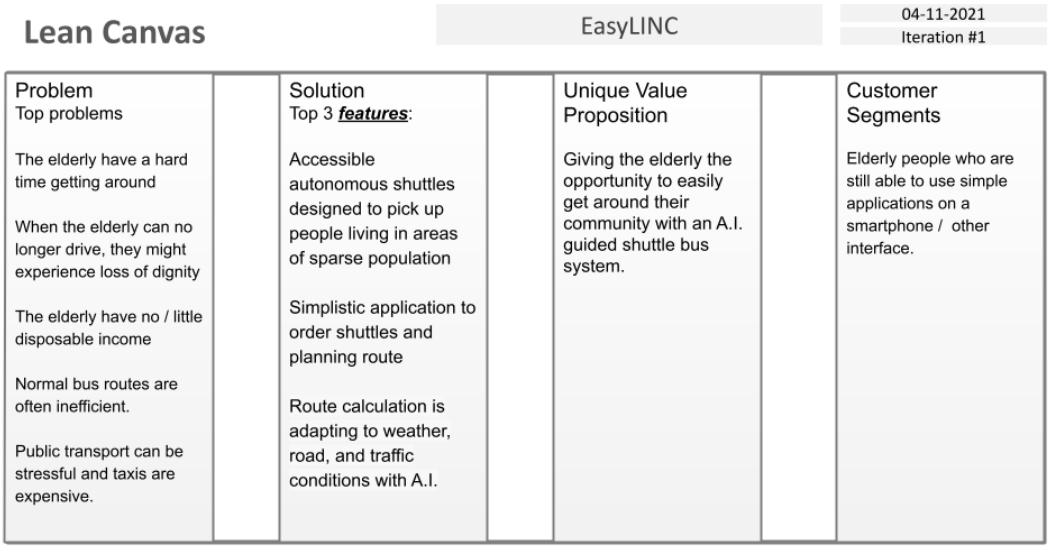


Figure 17: Lean Business Model Canvas, First Iteration

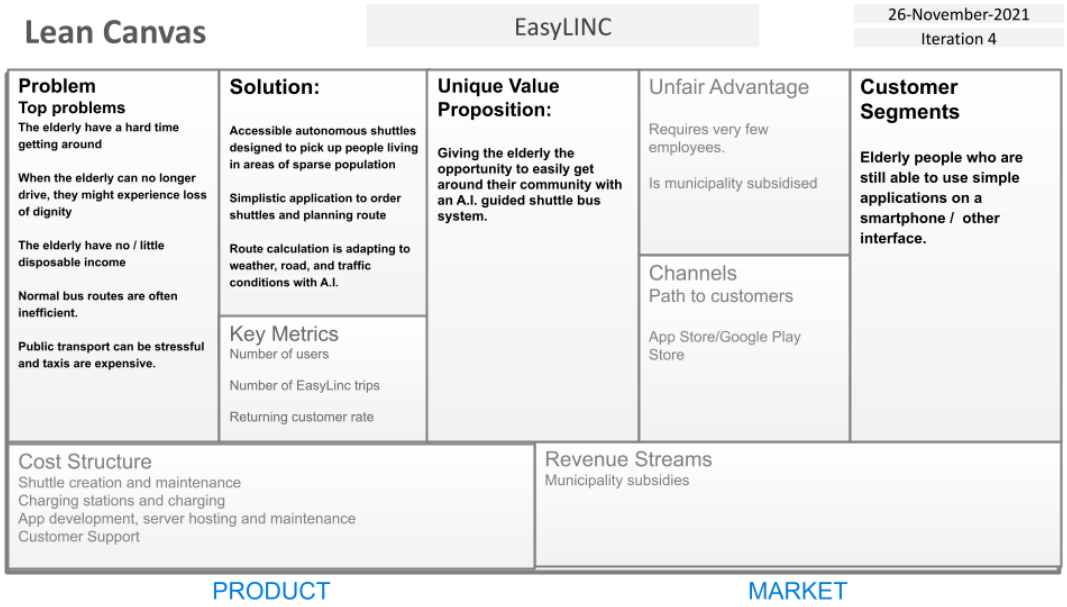


Figure 18: Lean Business Model Canvas, Final Iteration

M USER STORY MAP (ALL ITERATIONS)

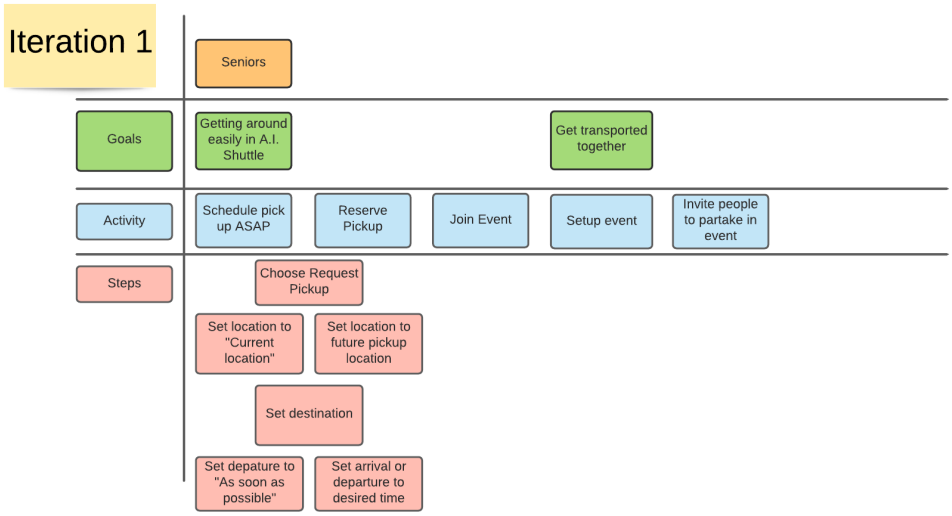


Figure 19: User Story Map, First Iteration

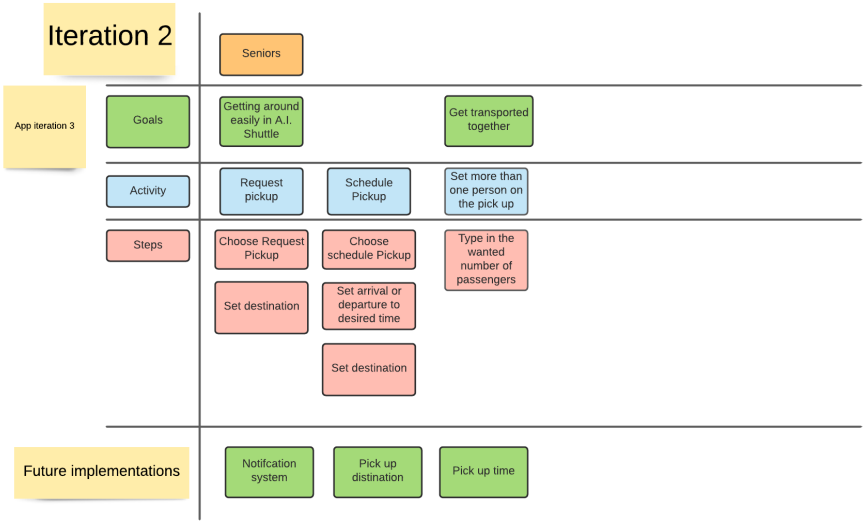


Figure 20: User Story Map, Second Iteration

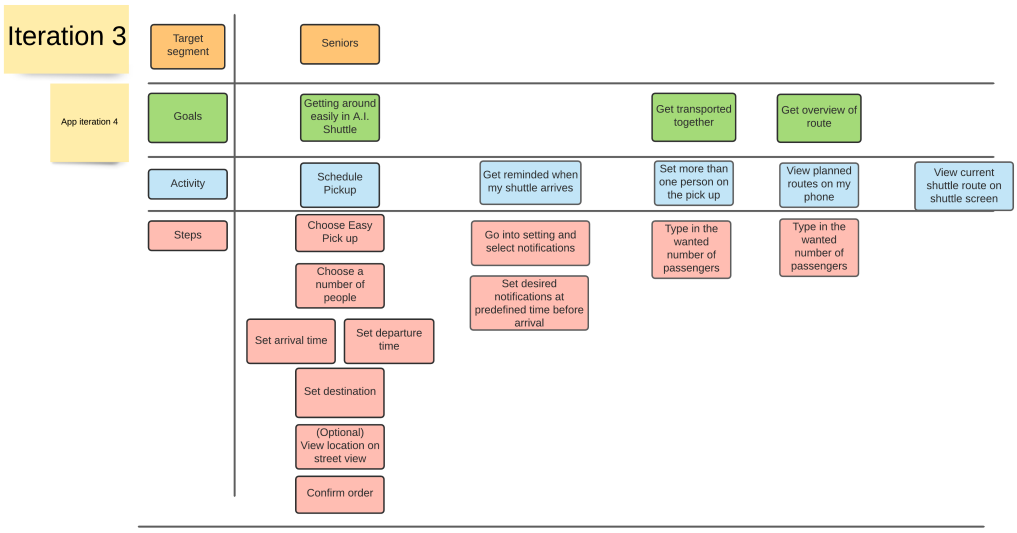


Figure 21: User Story Map, Third Iteration

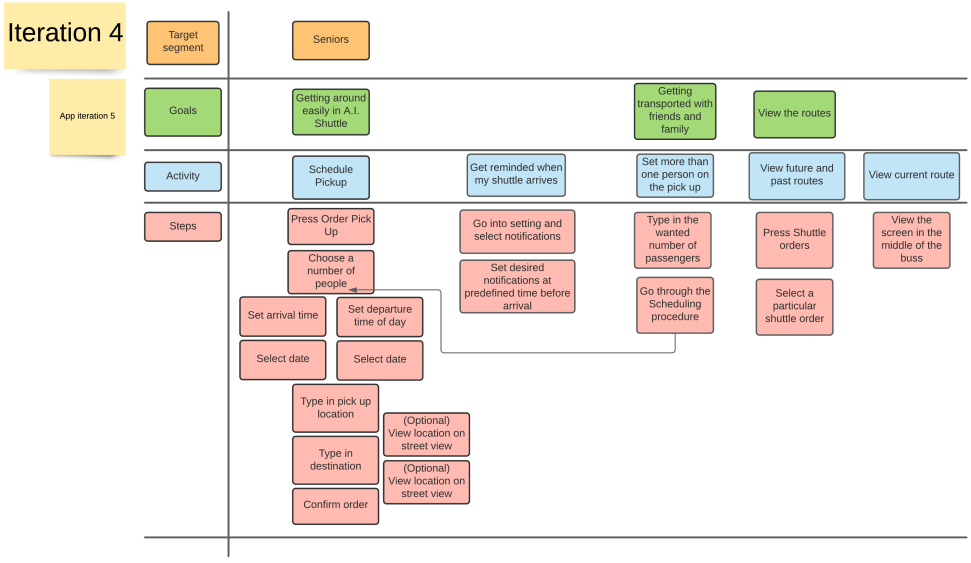


Figure 22: User Story Map, Fourth Iteration

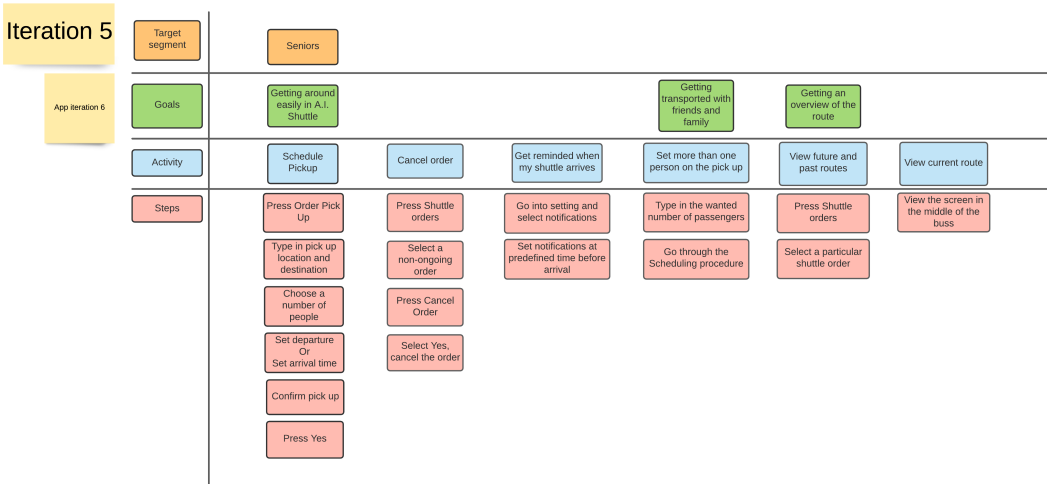


Figure 23: User Story Map, Final Iteration

N WIREFRAMES (ALL ITERATION)

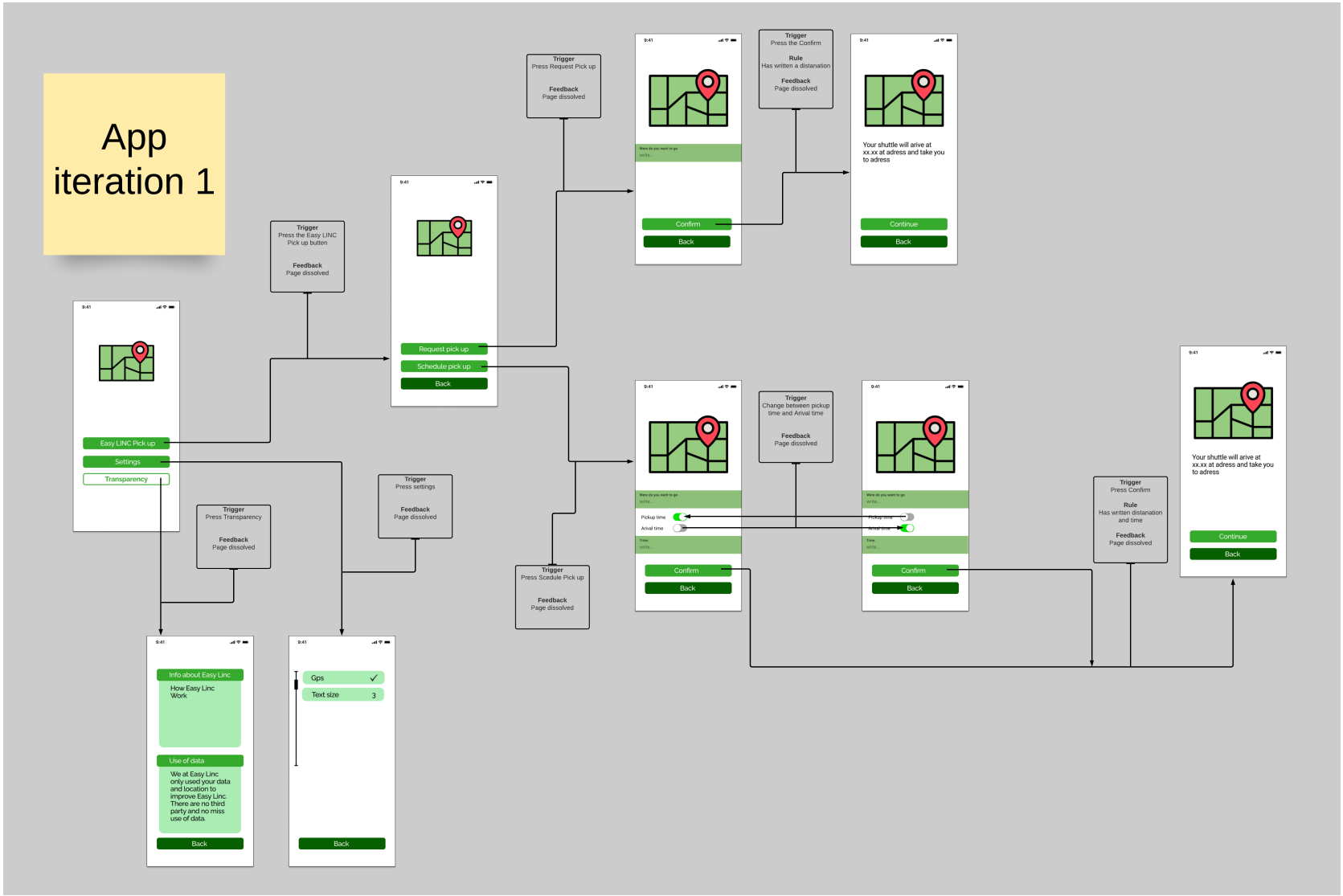


Figure 24: First iteration

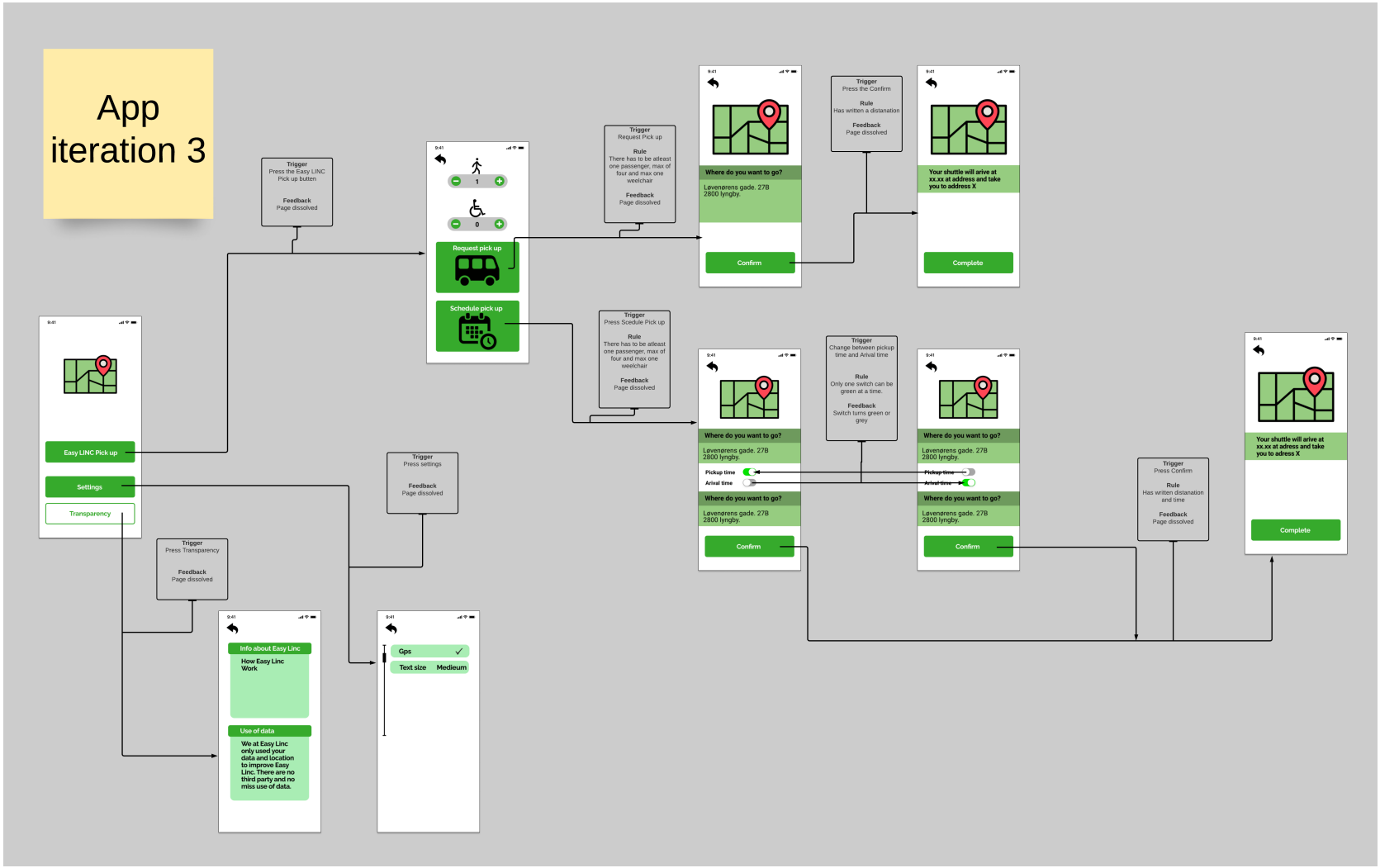


Figure 25: Third iteration

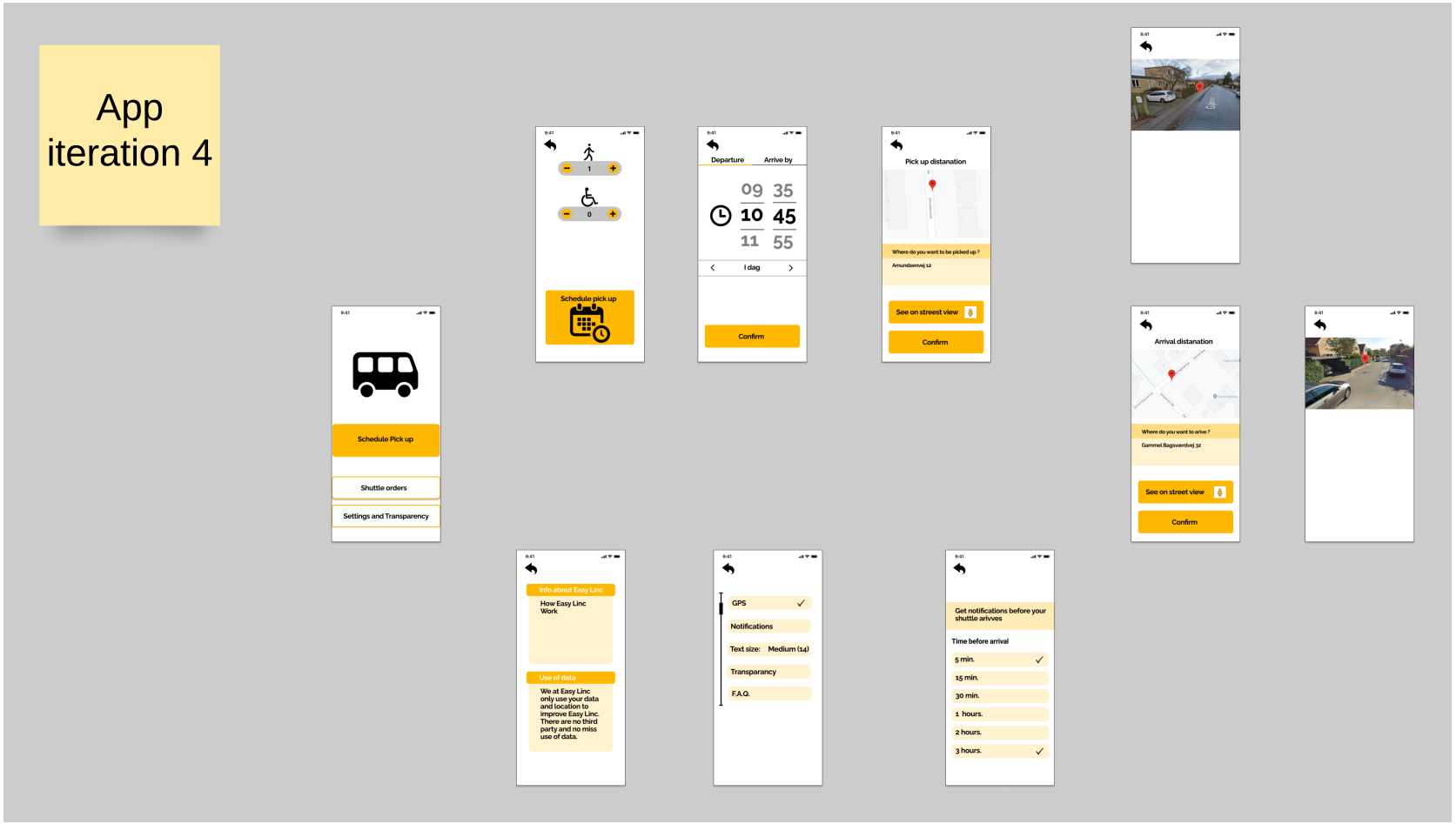


Figure 26: Fourth iteration

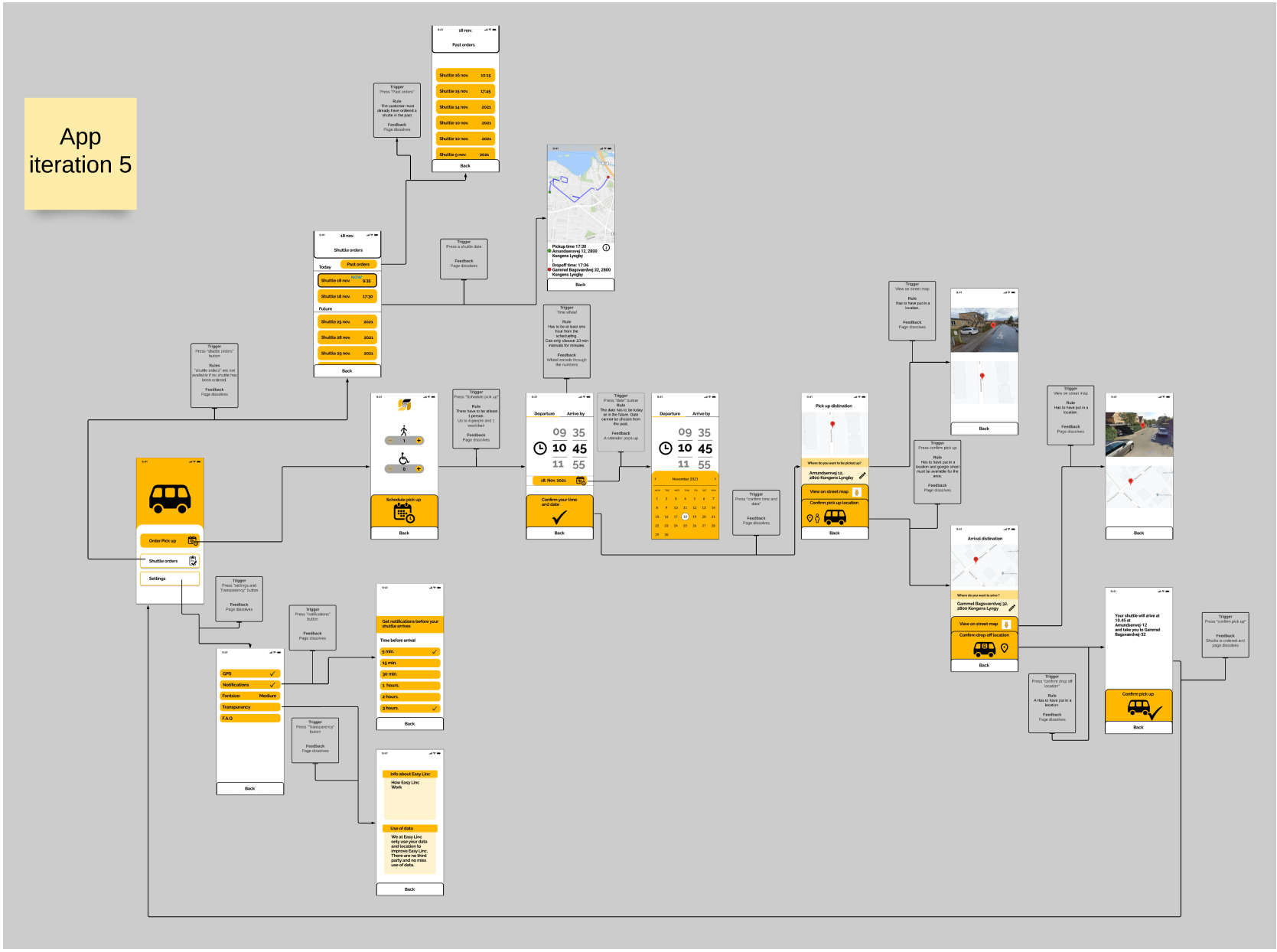


Figure 27: Fifth iteration

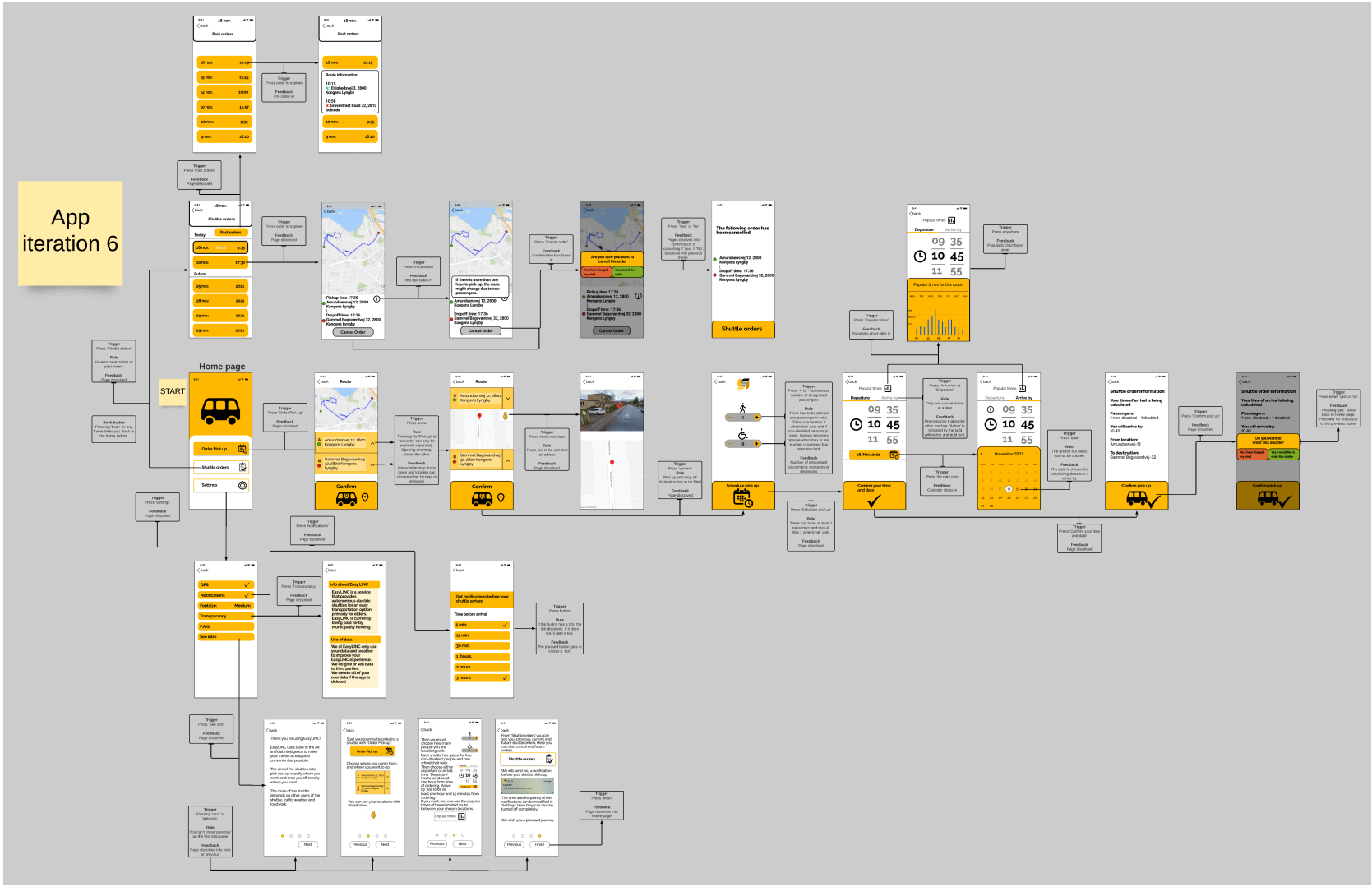


Figure 28: Sixth iteration