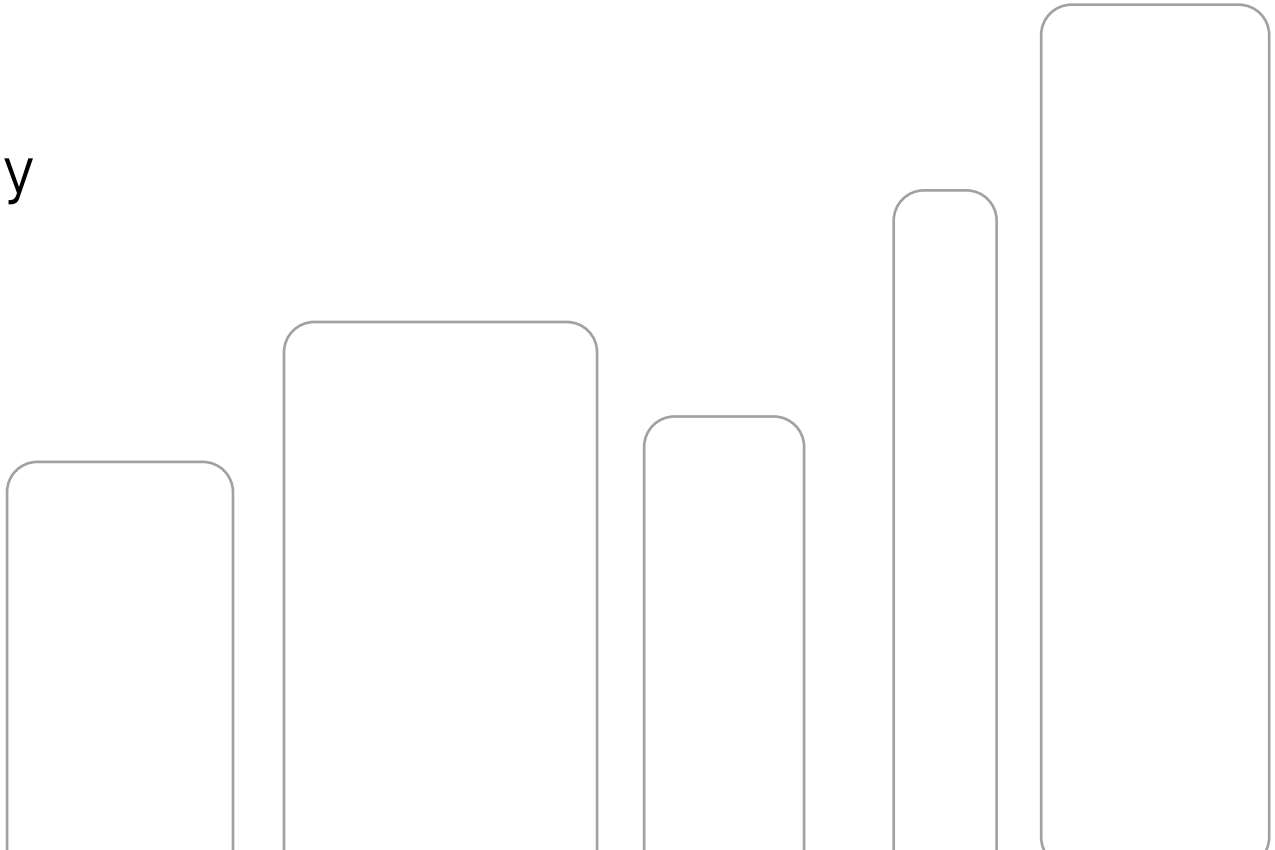
Design Guidelines and Recommendations

A human-centered approach
to zero energy housing renovations
with focus on visually impaired residents

Inclusivity is sustainability



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A human-centered approach
to zero energy housing renovations
with focus on visually impaired residents

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HOW CAN IT HELP YOU?

This booklet is meant to enable the members of the 'Demand' side of a housing renovation to **choose more inclusive products and systems**. If You are one of the people, responsible for these decisions, then this is for You!

In case that You are on the 'Supply' side, the content could still be beneficial. It can help You get to know the needs of your clients better and thus create more appealing offers.

If You are involved with the case of Reigersbos renovation, then the whole booklet could provide valuable information. In case You are not, the parts that are labelled 'Reigersbos specific  ' can be skipped.

CONTENTS

INTRODUCTION

Amsterdam aims towards zero-energy housing until 2040 (Gemeente Amsterdam, 2020). In order to achieve this goal, many housing renovations are being planned and currently taking place. Prior research in the filed of zero-energy housing renovations has discovered the importance of residents' engagement in the process. Performing an accessibility evaluation of a design before making final decisions, could not only **increase the satisfaction of the residents**, but also the **efficiency of the system in terms of social and environmental sustainability**.

Therefore, the content of this booklet aims to provide support from **human-centered design perspective in the form of guidelines and recommendations for renovation projects with focus on visually impaired residents**. Actionable steps for narrowing the gap between the residents and the newly installed heating and ventilation systems are proposed. This project is developed in parallel with the investigation of a demo-apartment in Reigersbos neighbourhood. Next to the **general** guidelines and recommendations, are included ones, **specifically targeting the case of Reigersbos**. In the foundation of the suggested methods and strategies, lie months of literature research, user studies, on-site research, data analysis and validation. The content is based on an extensive report 'Designing for a more accessible zero energy system' which could be found on the TU Delft Repository website.

USER CONTEXT

How would you feel if that happens to you?

Imagine this scenario:

It is late in the evening, you are sitting on the couch and your halfway through a movie. After it ends, you want to take a shower as always. First, you want to preheat the bathroom. But then you remember - you cannot control the bathroom radiator because it is not accessible to you. Your wife can but she is already asleep. Should you wake her up or should you just go to bed without showering...

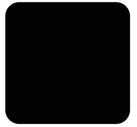
As one of the main goals of a renovation is to improve residents' comfort and well-being*, we should strive to avoid provoking such feelings in them, especially while in the safe space of their home. Therefore, **the decision-making process should be driven also by the thought of accessibility** next to all the other factors. Performing an accessibility evaluation of a design before making final decisions, could not only **increase the satisfaction of the residents**, but also **the efficiency of the system** and the sustainability of the building. Even though, we are explicitly mentioning residents with visual impairments, many of their needs overlap with those of other user groups, e.g. older people, ones unfamiliar with such technology, etc. Furthermore, **the insights, acquired during that phase could also serve as input for other future projects**.

*state of happiness and contentment, with low levels of distress, overall good physical and mental health and outlook, or good quality of life.' (APA Dictionary of psychology)

'There is a big difference between a product being usable and a product being accessible - it needs to be intuitive to use instead of needing adaptations.'

Try different kinds of visual impairments in real time through this app!

Expert user 1



Total vision loss

'We already have too many things to remember'

- combination of voice control and physical controls
- appreciates truly accessible apps
- always chooses the device with physical buttons
- requires straight-forward intuitive interactions

Expert user 2

Tunnel vision

'Unexpected system errors make me frustrated'

- combination of automation and regular things
- youngsters pick up technology faster
- transparency about possible issues
- there will always be a market for knobs

Expert user 3

Loss of central vision

'Audio feedback is a must'

- wants to turn everything at his home start
- upgrades step by step because of high prices
- does extensive research before buying a device
- sometimes simple tasks require a lot of energy

Regular user

Overall blur

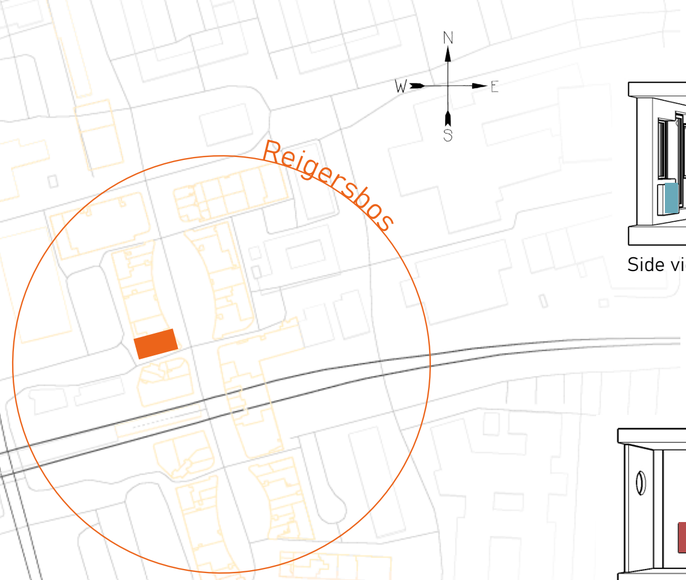
'I like how patient Google is with me'

- uses Google mini as it is affordable
- has difficulties guessing buttons and knobs
- has difficulties guessing the right voice command
- uses bump dots to map her devices

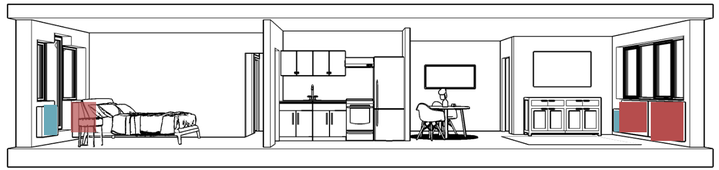
REIGERSBOS CONTEXT

The case study examined in the booklet is the refurbishment of 288 housing dwellings in the Reigersbos neighbourhood.(Fig. 1) Located in the south-eastern part of the city, it mainly consists of buildings, constructed in the early eighties. The project aims towards providing the inhabitants with a more comfortable indoor climate, improving their quality of life, while still complying with their budget and user needs.

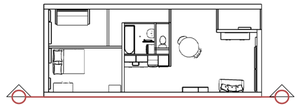
Figure 1, Reigersbos residential buildings

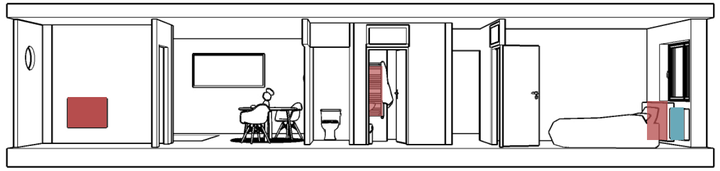


A **short-term monitoring project** on resident needs, indoor climate and energy usage has been conducted in a **first prototype apartment**. (Fig.1, 2) This apartment is available for user research and prototyping of solutions and **its purpose is to develop requirements for the renovation**.

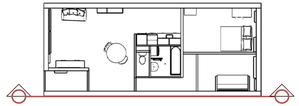


Side view from the South side





Side view from the North side



Newly installed systems

Heating system

Ventilation system

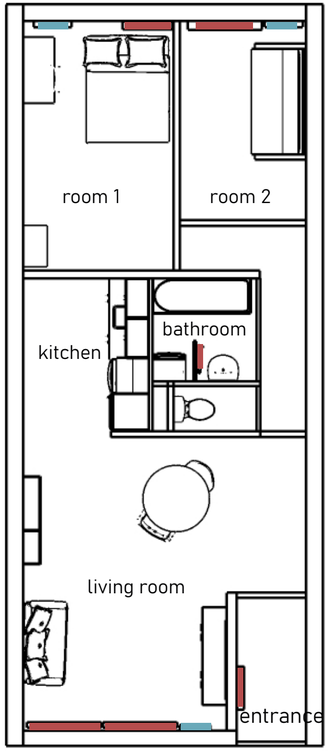


Figure 2, Demo-apartment floor plan

Before going further...

Reigersbos AR
educational

Google Play

In case you use iOS please use the QR codes next to the videos or click the play button on a digital version

App Store

Please download the app in order to have access to the interactive content of the booklet.

1. Scan the code
2. Choose 'Package Installer'
3. Install the app
4. Throughout the booklet, notice the images with a play button and this icon - AR
5. Open the app, allow camera access and point your phone camera towards the image
6. Wait for the video to play.

CHALLENGES

CHALLENGES // General

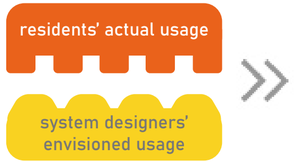


Fig. 3, Current undesired situation

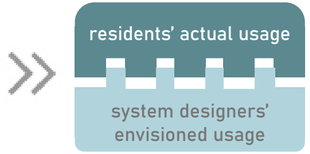


Fig. 4, Future desired scenario

Latest research has thoroughly examined the causes of various issues, emerging among residents as a result of zero-energy renovations. Many suggest that in the core is the misfit between systems' functioning mechanisms and residents' expectations about them. (Fig. 3) The concerned parties have to be well aware of the actions required for a successful implementation of a new technology. Good understanding of residents' needs is crucial, together with clear initial introduction and sustained support, as a steep learning curve is expected to occur. An improper approach is likely to result in a misfit leading to undesired interactions between the residents and the system as setting it on unrealistic values, turning it off, avoiding maintenance, etc.

User research conducted prior to the final implementation of the technologies could yield positive results instead. (Fig. 4) Correctly identifying the user needs' leads to choosing more suitable systems depending on the specific context. In the long-term that brings on one hand the satisfaction of residents and healthier indoor climate, while on the other - more energy efficient systems.

UNDESIRABLE SCENARIO

Implementation of new technologies **without** prior user research	+	Residents unfamiliar with it's working mechanism	=	Misfit between residents' expectation and system's functioning	+	Undesired interactions between the resident and the system
requires:		requires:		might lead to:		might lead to:


Steep learning curve by the resident


Initial introduction and training


Residents do not understand what the system is doing


Turning off the ventilation system


Establishment of new habits by the residents


Sustained support and monitoring


Setting the heating or ventilation to unrealistic values


Avoiding maintenance, leading to systems' damage

DESIRABLE SCENARIO

Implementation of new technologies **with** prior user research	+	Choosing more intuitive technologies	=	Match between residents' expectations and system's functioning	+	Residents interfere only when necessary
requires:		requires:		leads to:		


Small learning curve by the resident


Initial introduction and training


Residents understand and trust the system


Efficiently working systems


Evolving old habits by the residents


Sustained support and monitoring


Less unexpected undesired scenarios


Improved residents' comfort

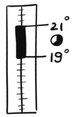
CHALLENGES // Reigersbos specific

Here, the challenges that are likely to occur with the currently installed heating and ventilation systems In Reigersbos are discussed. Numerous participants have stayed in the demo-apartment during a period of five months which allowed determining the most common issues.

Heating system

Feedback

Slow system feedback



consequences for the residents:
- hard to understand whether the system is working
- confusion why their needs are not met
- climate discomfort
- frustration because they do not know how to reach the desired result

consequences for the systems:
- being set on unrealistic setting (too high/too low)
- high energy consumption
- failure to keep up with residents' commands
- residents interfere needlessly and decrease the efficiency

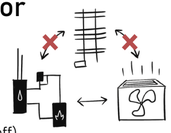
Lack of direct warm stream

consequences for the resident:
- unable to identify by touch whether the convector is working or not
- could not receive direct heat supply when feeling cold (hands, feet)
- discomfort

consequences for the systems:
- receiving unrealistic commands (too high temperature)
- that could lead to inefficiency and energy waste

Electric bathroom radiator

Heat-pump and electric radiator do not communicate



consequences for the residents :
- harder to operate with it in the most efficient way
- more factors to think about
- discomfort (if the residents forget to turn it on or off)
- inability to control everything remotely

consequences for the systems:
- not synced
- harder to function efficiently
- excessive energy usage if the radiator is put on a high setting and forgotten

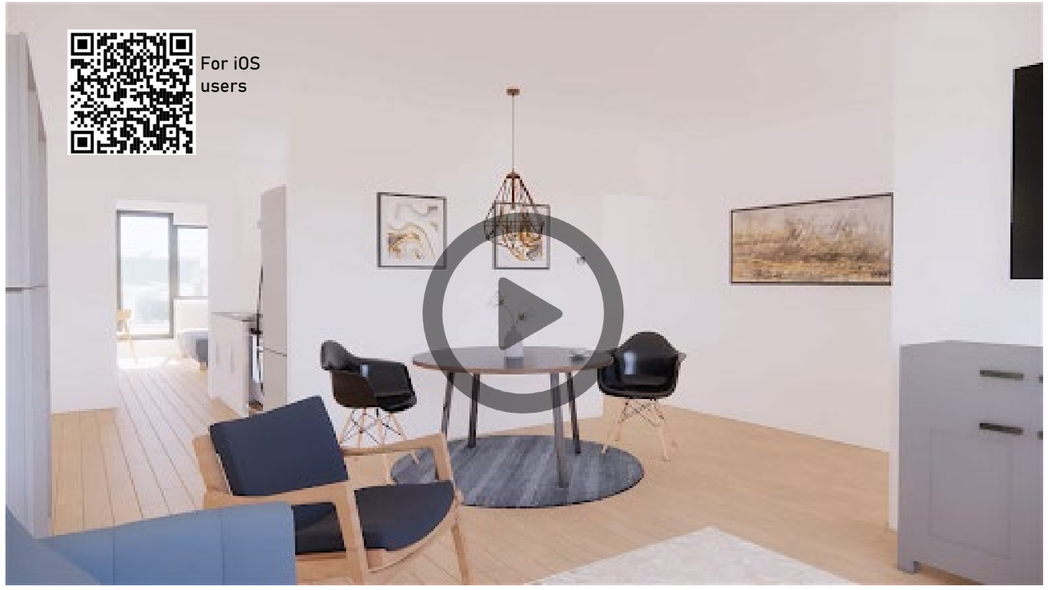
Bathroom radiator controller is hard to reach

consequences for the resident:
- difficult to control (hard to reach, hard to see)
- the residents might hit their head on the sink
- lack of other control option
- climate discomfort (if the residents could not operate with it as they wish because of it's location)

consequences for the systems:
- left on longer than needed - energy waste
- being set on a wrong setting because of the lack of visibility access

AR

For iOS users



CHALLENGES // Reigersbos specific

Ventilation system

Control

Confusing controls on ventilation units (Fig. 5)

consequences for the residents :
- difficult to set the system on the desired setting
- a cause for confusion and frustration
- self-doubt if they interact with it 'correctly'
- climate discomfort
- compromised air quality

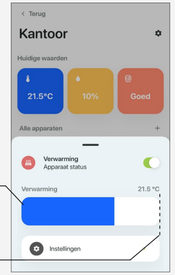
consequences for the systems:
- undesired changes to some main settings
- hard to function efficiently and autonomously - energy waste
- working unnecessarily (when there is no one at home)

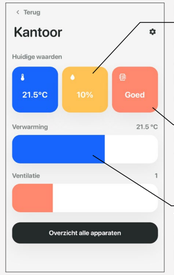
Fig. 5, Control units of the ventilation

A newly developed control app for the system

- some control instruments do not correspond with system's functionality
- some main rules for accessible interface are not kept (please find guidelines on page X)
- lack of option to connect other devices e.g. sensors, triggers, etc.
- does not support residents in keeping track of their energy usage easily
- illogical color usage

EXAMPLE:





Indicates that the system is warming up, however the color is blue which is associated with cold

What is at the end?

Is that good or bad?

Indicates that the air quality is good, however the color is orange which is attention-grabbing

It does not change when the indication turns to 'bad'

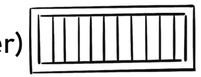
Too easy to move it back and forth - hard for the system to react to rapid changes

Maintenance

Complicated maintenance is required (cleaning and replacement of the filter)

consequences for the residents :
- fear of damaging the system
- avoiding performing maintenance
- experiencing worse air quality in terms of CO2
- opening the windows more often which could cause excessive energy usage of the heating system

consequences for the systems:
- inefficient working (not filtering well)
- long-term damage
- shorter life-span

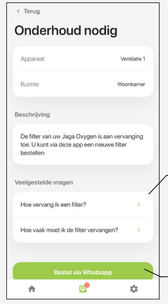


filters could be damaged because of the lack of clear indication of a grabbing spot

main cables could be easily detached

EXAMPLE:

Is the message supported with an explanation how that could influence the residents?



Is there easy access to visually supported manual about how to perform maintenance?

Is there direct connection to a professional who can support the resident during maintenance?

CHALLENGES // Reigersbos specific

CO2 sensors are situated too close to the fresh air

consequences for the residents :
- as the sensors read the CO2 values from the clean air, the average values at the apartment tend to be higher
- the system starts ventilating only when the values have become too high
- health hazards because of the higher CO2 density

consequences for the systems:
- inefficient working (not starting working on time)

Loud noise from systems

consequences for the residents :
- disturbance and annoyance
- using the ventilation system less than intended which could lead to high CO2 levels
- health hazards because of the high CO2 level

consequences for the systems:
- might be turned off directly from the plug
- inability to keep up supplying fresh air
- inability to maintain the balanced air pressure inside

Cold air stream from ventilation units (Fig 6, 7)

consequences for the residents :
- discomfort in terms of temperature
- sore muscles
- using the ventilation system less than intended which could lead to high CO2 levels
- health hazards because of the high CO2 level

consequences for the systems:
- might be turned off directly from the plug
- inability to keep supplying fresh air
- inability to maintain the balanced air pressure inside

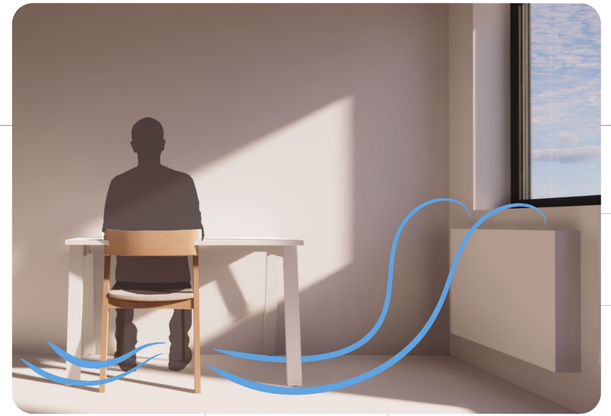


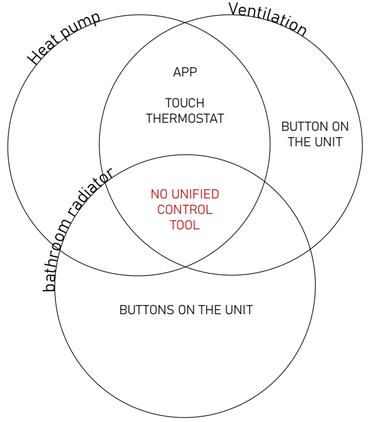
Fig. 6, The cold air from the ventilation goes to the feet of the working person

'Having the head close to the ventilation is not nice. Nice, clean air, but too cold.'

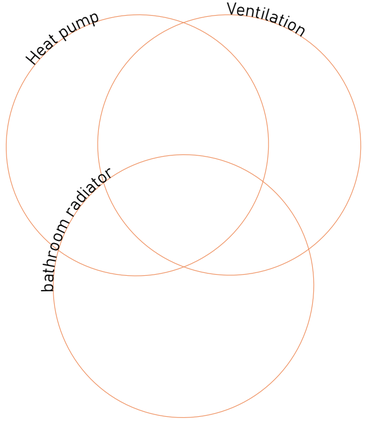
Fig. 7, The cold air from the ventilation goes directly to the sleeping person

CONTROL // Reigersbos specific

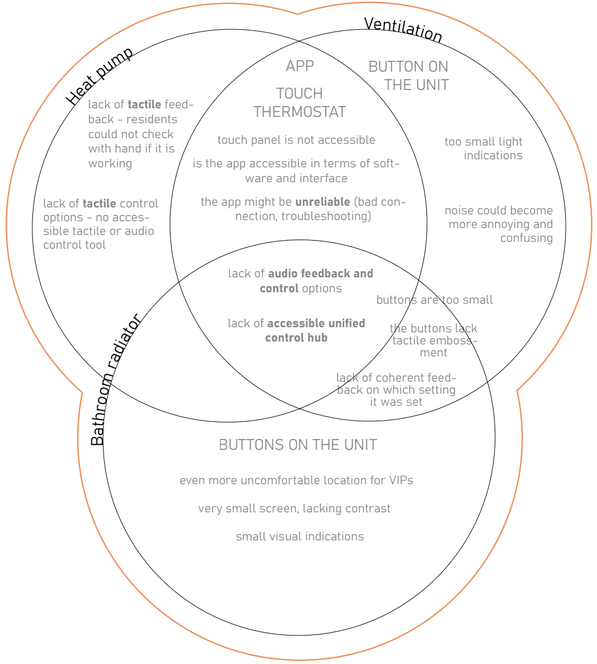
Current control tools



Current ACCESSIBLE control tools



ACCESSIBILITY LIMITATIONS // Reigersbos specific



In the **international standard for accessibility and usability in the built environment ISO 21542**, experts explicitly mention that it has to be ensured that 'ventilation and heating equipment are operational'[1] by everybody. Considering the guidelines which they have provided and supporting them with additional research, an accessibility evaluation of the systems in Reigersbos was performed in terms of control possibilities. From the graph on the left, it becomes clear that currently those systems are hardly accessible which would lead to huge obstacles for some residents. In order to prevent that, the next chapter provides a set of selected guidelines on how to prevent the selection of inaccessible systems for housing renovations.

[1] ISO 21542, 2021

GUIDELINES

From this link You can also download only the Guidelines section of the Booklet and use it in practice

How to perform an accessibility evaluation?

with focus on visually impaired users

Fill in the **'NEN 17210'[2] checklist of functional requirements for accessibility and usability of the built environment** according to the choice of technology for the specific case.

Requirements	YES/NO	Comments
1.Access and operate equipments and facilities		
2. Access and understand information via multiple senses (e.g. signage, apps)		
3. General ICT usability and accessibility		
4. Natural lighting		

Please find a biger, detachable version of the checklist on Page 41.

Questions to ask:

1. Are visually impaired residents able to access and operate the chosen technology freely?
2. Does each selected technology provide three options for interaction (visual, audible and tactile) ?
3. Does the digital interface provide accessible features for visually impaired residents?
4. What amount of natural lighting penetrates the living space?

[2] NEN -EN 17210, 2021

How accessible are the systems?

VITAL - Do that for each system.

Question 1

Option 1	Option 2
Step 1	Step 1
Step 2	Step 2
Step 3	Skip
Step 4	Step 4

Question 2

Question 3

Step 5	Step 5

Question 4

Additional question

Fill in the accessible checklist

Question 1

Option 1: **Facilitate user tests**[3] **with visually impaired users**.

Step 1: Define specific testing objectives depending on the case.

Map all the systems that are or will be installed in the demo-house. Then, for each system, list all the interactions which the user should be able to complete, e.g. turn on/off, set the temperature high/low, set a routine, etc.

Suggestion// First start with the functions that are vital for the resident. Try to list at least 5. Then continue with the ones that are of lower priority. Try to put yourself in the shoes of the user. You can use either the app that simulates low vision on Page 7 or the Simulation Glasses method from Page 26. Act out an imaginative scenario in order to come up with more possible interactions.

Step 2: Create a plan.

Where will the user testing take place? How long will it last? Would you recruit participants to stay at the apartment overnight or would you invite them only for a shorter period of time? Write a task scenario - what actions would you exactly ask them to perform and in what order? Prepare materials to keep track of the results. Think about what answers are you looking for specifically. You will most probably be interested in the process as well

Suggestion// Plan how long the user test would take - maybe it could be a usability user test of around 1 hour while for an in-depth user test for this case, you might need to recruit participant to stay overnight. Take into account that staying overnight would require more time for preparation. Decide how you will record the results - would you do it yourself, or would you involve another person to help you with that. Do you intend to record videos, or would you be only taking notes? If the person stays overnight, would you ask them to document anything themselves while there? When all this is ready, perform a pilot user test.

Step 3: Recruit participants.

Partner up with associations and companies involved with visually impaired users (e.g. Koninklijke Vision, Envision, WOON!, etc.) Provide information about the study in accessible manner - Braille print, audio, contrast colors, large text.

Suggestion// Recruit a minimum of 5 participants. Make sure that you have well explained the goals of the study and what will be required from them - in terms of actions and time. Decide how you would compensate them for their time - you could grant them giftcards for example.

[3]Delft Design Guide: Design Strategies and Methods

Step 4: Conduct the test

Depending on the context, you can refer to the explanation of Question 2 and/or 3 for accessibility requirements. Reflect on each user test and if needed, make changes to the following ones.

Step 5: Analyse the results and fill in the checklist from Page 41.

Look at all findings and think what they mean for the project. If any problems emerged, think what kind of solutions could be applied. You can evaluate them with the Design Fundamentals on Page 32.

Option 2:

Simulate visual impairment.

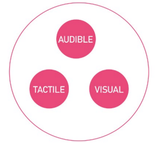
Step 1: Choose a tool which could assists you in simulating

- Simulation glasses (fig. 8) are proven to enhance designer's empathy and creativity.
- You could tie your eyes with a scarf.
- In case you wear glasses, obstruct the view of each lens with tape or paper.
- Get plastic safety glasses and paint them or scratch them.
- You could also use the guide by Erin Ringwald (eHow, UK)

Step 2: Follow the above procedure from 'Option 1' while skipping 'Step 3'.

Figure 8, Cambridge Simulation Glasses, Inclusive Design Toolkit

Question 2. By using the provided graph, assess to what extent each selected technology provides three different options for interaction. According to **ISO 21542**: 'Information in audible, visual, tactile and simple language formats should be provided where possible ... **visual information to be supplemented by audible information plus tactile information where appropriate...**'[3]



Audible

commands
feed-forward
feedback
questions

Tactile

big contrasting buttons
air stream
embossment, min. rise of 0.8 mm, preferred is 1mm to 1.5mm [4]
sliders
vibration
hot & cold
texture

Visual

light signals
accessible digital interface (Question 3)
text and color mapping
contrast

OTHER ACCESSIBILITY FEATURES TO KEEP IN MIND

solid
loud speakers
audio cues
offline voice dictation
NFC reading function
compatible with different visual add-ons
easy navigation (with a click of a button)
intuitive
big buttons - electrical switches should have large push plates to prevent accidental operation[3]
truly tactile buttons

[4] ISO 21542, 2021

Question 3. Evaluate all digital interfaces on the basis of the provided criteria for digital accessibility extracted from **EN 30154**.[5]

What? Provide at least one mode of operation that does not require vision

How?
- well formed semantic structure
- audio and tactile user interfaces

What? Provide features that enable users to make better use of their limited vision

How?
- magnification, reduction of required field of vision and control of contrast, brightness and intensity

What? Provide a visual mode of operation that does not require user perception of color

How?
- provision of additional methods of distinguishing between the features

Please fill in the checklist. A bigger, detachable version can be found on Page 42.

Requirements	YES/NO
Accessibility setting on the main screen	
Voice over	
Zoom in option	
Color filters	
Most important information on screen	
High contrast colors	

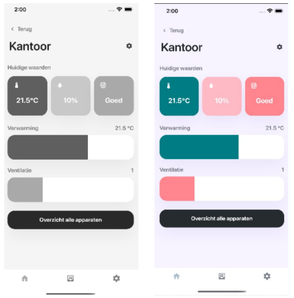


Fig. X, A simulation of color blindness on the app of Reigersbos systems, http://www.color-blindness.com/coblis-color-blindness-simulator/

[5] EN 301549

Question 4. Create a light study of the space using a 3D software in order to predict the movement of natural light in the dwelling

This has implications for the thermal comfort of the residents as well as for decisions on the light throughout of window panes, overhang and type of glass.

Step 1: Create a model of the space that you would like to examine in SketchUp.

Step 2: Import the correct geo-location and sync the orientation of your model.

Step 3: Turn on the shadows feature in SketchUp and explore how the light comes into the space throughout different times of the day and the year.

Suggestion// For a more realistic feeling, you can use the rendering software 'Enscape'.

Step 4: Make conclusions about how the thermal comfort could be influenced and what kind of means are the most suitable to control natural lighting in the specific case.

Example of a light study, Reigersbos' living room

January, 10 AM

March, 1 PM

June, 7 AM

AR

'I worked in the bedroom during the most of the day because there was sun in there and it was warmer and brighter than the living room'

Additional question: How to measure the psychological well-being of the residents ? (being one of the goals of the renovation) This evaluation tool can support designers in creating products that improve the well-being of disabled users by including the emotional layer in the project. The 'Well-being calculator' is a matrix, incorporating the most important criteria for the well-being of disabled users. This is a method that aims to translate the needs of the users in a scalable form. It can be applied in the initial phase of a project or in its final evaluation stages. Give a grade to each criterion in order to compare different products.

Well-being calculator

CRITERIA	GRADE	NOTES
ACHIEVEMENT	1 — 10	
MEANING	1 — 10	
SELF-ACCEPTANCE	1 — 10	
AUTONOMY	1 — 10	Example // Peter can control the heating all by himself.
PERSONAL GROWTH	1 — 10	
SAFETY	1 — 10	
SOCIAL INCLUSIVENESS	1 — 10	

DESIGN FUNDAMENTALS (DF)

By combining the accessibility research with the zero-energy renovation research, the following Design Fundamentals were formed. They serve as a set of requirements that guide us in the selection of suitable systems for accessible zero-energy renovations.

Design for accessibility

Inclusion is one of the main goals of this project. Therefore it is crucial that the designed solution is accessible to VIPs while also desirable for the wider public.

Design for trust

When leaving the control of your home to a smart system, you should definitely trust it. The user has to be sure that it is indeed executing the desired commands at the right time and he should be able to check that at any given moment. It is also desired that possible bugs are envisioned and being transparent about.

Design for low-maintenance

As the bigger part of VIPs usually need assistance for tasks that are not performed often, low maintenance products are preferred. Not only they need to ask for help more rarely but for them that also means a more reliable

Design for simplicity

Certain commands have to be executed with as little actions as possible. Moreover, the interactions should be natural and familiar. Only vital information should be presented, unless additional information is explicitly asked for. Simple interactions are in the core of accessible interactions. Simplicity in terms of maintenance is also desired.

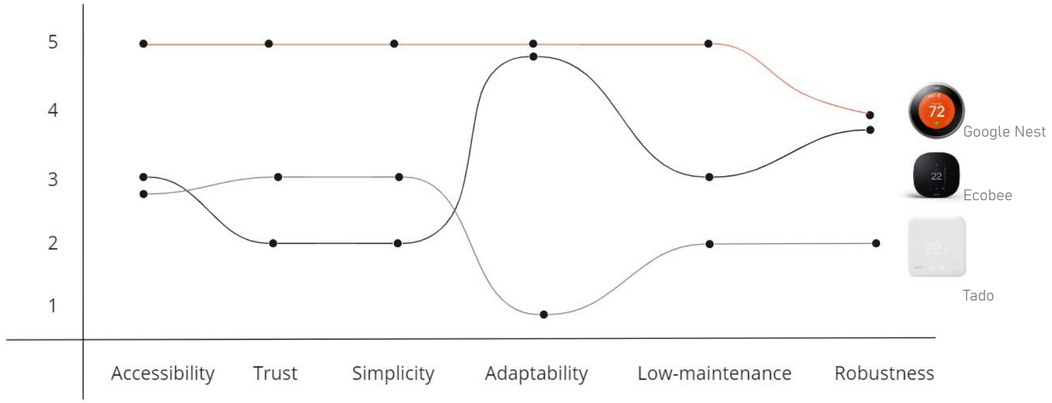
Design for adaptability

Each visually impaired user has different needs and habits. Some want more automation while others prefer to do things the old way and I want to give them the option to choose. Therefore, it is very important that the product is adaptable.

Design for robustness

The product has to be solid both in terms of physical characteristics and software. Reliability and easy troubleshooting are required.

HOW TO APPLY THEM?



This is an example on how the DF could be used. By creating an evaluation matrix- on their basis, different products can be compared so the most suitable one for the case is chosen.

IMPORTANT NOTE

Please, take into account that in that kind of user evaluations, it is recommended to use the services of a professional such as a Design Researcher for example. Their expertise will contribute to obtaining richer and more valuable results for your project.

RECOMMENDATIONS

RECOMMENDATIONS // General

One unified system to control all heating and ventilation units in the apartment (including the electric bathroom radiator)

Advantages

- more energy efficient systems
- less components for residents to learn and be aware of
- better control of the humidity in the bathroom
- allows residents to connect other devices and sensors
- provides better control
- better connectivity

Provide three control options of each system (tactile, audible, visual, on the basis of the above guidelines)

Advantages

- more reliable system
- more accessible system

Provide immediate feedback (audible, tactile, visual, on the basis of the above guidelines)

Advantages

- more energy efficient system because users would interfere less when they know what the system is doing
- more accessible system

Provide air recirculation hood in the renovation package, one with rounded edges

Advantages

- better fit to the other systems
- easier for the residents
- safer

Choose ventilation units that preheat the air

Advantages

- more energy efficient heating system because warm air comes in
- better comfort for the users because of the lack of cold

Collaborate with companies that are transparent about envisioned issues and troubleshooting

Provide an accessible troubleshooting manual - use clearly legible fonts and symbols with good visual contrast, standardized symbols; provide tactile and audible formats[7]

Implement a function (app) so users could make basic diagnostics themselves

Advantages

- allows taking better informed decisions
- the residents will perform maintenance more easily
- less interventions will be needed from professionals
- lower maintenance costs both for the user and the company
- better functioning of the system
- better reliability
- trust

[7]NEN 279091

Install balanced heating and ventilation system when possible

Advantages

- decreased heat loss
- highly automated
- better comfort for the resident
- more energy efficient

Include a reminder signal for residents to close the windows on time

Advantages

- more energy efficient heating system because there is no uncontrolled cold air inlet
- more energy efficient ventilation system because there is no uncontrolled unfiltered air inlet

Install automatic blinds

Advantages

- improved comfort for the users
- more energy efficiency system when the sun contributes to warming up the space
- better control of natural lighting

RECOMMENDATIONS // Reigersbos specific

Change the position of the CO2 sensor of the ventilation system

Advantages

- better air quality (because of the more accurate data)

Choose an electric unit for the bathroom equipped with a controller at the top and/or one that has a wireless control option

Advantages

- easier access and control
- safer

Provide a manual control option for the air extraction in the toilet

Advantages

- better comfort for the residents
- include auto turn off function after 10 minutes

FUTURE STEPS

FURTHER STEPS

Scale up

The Booklet currently includes mainly guidelines for accessibility for people with low vision. In the future, requirements for other disabilities could be similarly structured and included as well. This will expand the usability of the tool.

Develop the app further

The AR app that complements the booklet opens room for countless future possibilities. In the short term, the interactions with the systems installed in a demo-apratment could be integrated in the app so some tests could be performed remotely. Then, those could turn into a VR version allowing more thorough experience, more accurate conclusions and **boost in inclusivity**. Software developers will need to collaborate with professional researchers and designers in order to integrate the most suitable functionalities.

Bring it to the public

This booklet has to be promoted, so the stakeholders that could make use of it are aware of its existence. Initially, **presentations** and small **workshops** could be organised to introduce it to the public and explain its value. It can also be included in the weekly **newsletter**.

ANNEX

Product/System:

Requirements	YES/NO	Comments
1.Access and operate equipments and facilities		
2. Access and understand information via multiple senses (e.g. signage, apps)		
3. General ICT usability and accessibility		
4. Natural lighting		

Product/System:

Requirements	**YES/NO**
Accessibility setting on the main screen	
Voice over	
Zoom in option	
Color filters	
Most important information on screen	
High contrast colors	

"The one argument for accessibility that doesn't get made nearly often enough is how extraordinarily better it makes some people's lives. How many opportunities do we have to dramatically improve people's lives just by doing our job a little better?"
— Steve Krug