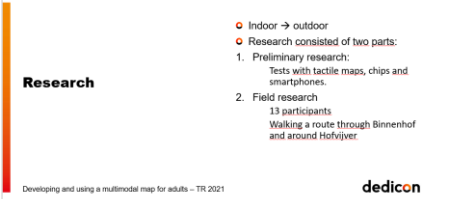



Developing and using a multimodal map for adults (script).

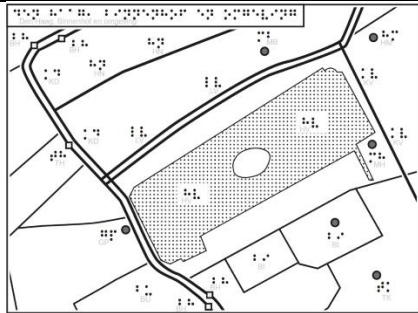
Tactile Reading Congress 2021 Dorine in 't Veld and Lisanne Aardoom.

Powerpoint:	Text:
	<p>Hello everyone, welcome to our presentation. We will present you the development of a prototype for a multimodal map for adults in an outdoor situation. On this slide you see two persons interacting with one of the maps that was used during our field study, where we started with the A3 thermoform maps Dedicon traditionally makes.</p> <p>Before we start, I would like to introduce ourselves.</p>
	<p>My name is Lisanne Aardoom, I am working as a product manager of tactile images and braille music at Dedicon in the Netherlands. Dedicon is a non-profit organisation in the Netherlands which makes existing text and 'image' accessible for people with reading disabilities.</p> <p>My colleague is Dorine in 't Veld, product manager tactile reading and learning at Dedicon and an expert on explaining concepts with the help of tactile images.</p> <p>First we will talk about the user tests we did, where after we will explain the portable twin vision prototype with QR-codes we developed.</p>
	<p>What was our motivation to develop a multimodal map for an outdoor situation?</p> <p>In the first months of 2019 a tactile map was developed for an indoor situation by the innovation team of Dedicon. On this map Near Field Communication chips could be applied, NFC-chips. In combination with an app these allow users to add their own recordings to the map on their mobile phone, thus personalizing the map.</p> <p>A little technical information for people who are not familiar with this technology. NFC-chips are available in many sizes and shapes; on the slide you see a thick one with a diameter of about 2,5 cms. There are also almost flat stickers, and small and big buttons, etc.</p> <p>The slide also shows a QR-code, a possible alternative. QR-codes can be printed, but are also available as stickers. Most visually impaired people are familiar with them and every current mobile phone has a QR-reader, whereas many current phones are not prepared for scanning NFC-chips.</p>

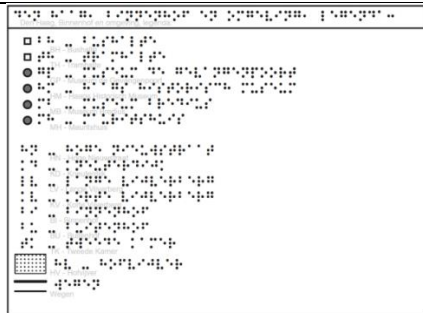
 <p>Research</p> <ul style="list-style-type: none"> ○ Indoor → outdoor ○ Research consisted of two parts: <ol style="list-style-type: none"> 1. Preliminary research: <ul style="list-style-type: none"> Tests with tactile maps, chips and smartphones. 2. Field research <ul style="list-style-type: none"> 13 participants Walking a route through Binnenhof and around Hofvijver <p>Developing and using a multimodal map for adults – TR 2021</p> <p style="text-align: right;">dedicon</p>	<p>The responses to the tactile map, where users could apply NFC-chips, were quite positive in this indoor situation.</p> <p>The municipality of The Hague was interested to see if this would work in an outdoor situation and sponsored a research project to find out.</p> <p>That’s why later in 2019 we started a project to investigate whether adding audio to tactile maps has added value for visually impaired people in an outdoor situation. Especially, we wanted to investigate whether it would be of added value to personalize the map with own audio recordings.</p> <p>The research consisted of two parts: a preliminary research and a field research. During the preliminary research, specialists at Dedicon conducted tests with various combinations of tactile maps, chips and smartphones in order to make a grounded choice for the tags and app to be used. This resulted in two prototypes that were tested with users in a qualitative field study.</p> <p>In total 13 blind or visually impaired users participated in the field study. The users walked, in pairs with an observer, a route through the Binnenhof and around the Hofvijver. The Binnenhof is a complex of political buildings in the city centre of The Hague, next to the Hofvijver which is a pond. A nice fun fact: the Binnenhof is among the oldest Parliament buildings in the world still in use.</p> <p>This route was chosen because of its varied and interesting circumstances, such as the presence or absence of traffic noise, places that require attention for safety and interesting places like statues, museums and government buildings. The route was in total 1 to 2 kilometres long, depending on the chosen detours of the participant.</p>
 <p>Den Haag, het Binnenhof</p>	<p>We tested with an existing A3 thermoform map with legend of the Binnenhof The Hague area. The map is a combination of a transparent thermoform overlay on top of a high contrast image (which can be seen on this slide), attached to each other with a ring binder.</p>

Register en Legenda bij de kaart van Den Haag, het Binnenhof		
Register straatnamen: ac - Achterom ba - Bagijnstraat bi - Binnenhof bu - Buitenhof ho - Hofplein hw - Hofweg kv - Korte Vijverberg lp - Lange Poten pa - Passage pl - Plein su - Spuistraat	gc - Gedenkteken ca - Carillon gk - Goudsmids Keurhuis gs - Gedenkmunt sp - Spoorport hp - Hofpoort hv - Hofvijver mh - Mauritshuis mp - Mauritspoort of Gloriederspoort mt - Mauritstoren np - Nieuwspoor ot - Oude Tweede Kamer rz - Ridderzaal sp - Stalenpassage st - Stadhouderspoort tk - Tweede Kamer to - Torenkle tv - Treveldezaal vh - Voormalige Hofkapel vj - Voormalig Ministerie van Justitie wp - Waterpomp	Legenda:  Wegen Tramlijn Tramhalte Gebouwen Gebouwen Binnenhof Poort Overige Gebouwen Water Noord 0 20 40 m

On this next slide we see the register and legend of the thermoform map on large print. This contains abbreviations of street names and special spots such as the Senate, and the legend of roads, tram lines, water, compass, and so on.



On this slide you can see the second map we used for the field study. This was a swell paper map on A4 format of the area around the Hofvijver, which you can see on this slide. The map was specially made for this project.



A legend on swell paper A4 was included with the map, which you can see on this slide.

Both maps have different scales and a slightly different orientation, but participants had no big trouble in relating them and appreciated both maps for their own merits; the big thermoform one with the smaller area for its details, the smaller A4 swell map for the better overview of the area. They appreciated the combination.





All participants explored the maps and practiced with the app reading NFC-stickers before walking the route. Each participant had an observer, that might help if things were not clear. This observer also could assist during the walk. Afterwards findings were discussed in a group.

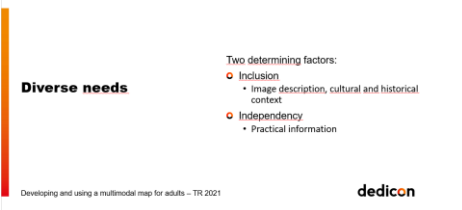
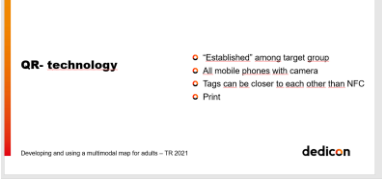
Both maps were equipped with a chip with a preregistered audio introduction, explaining in broad outlines the content and legends of the maps. To personalize the maps, users could add tags before and during their walk of the route. For this, we collaborated with the company Speechlabel.

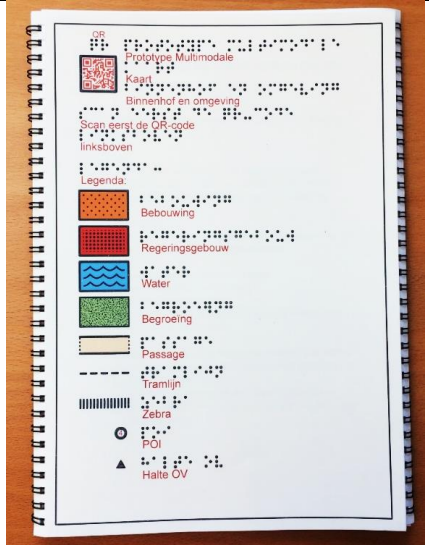
Speechlabel has developed an app in which you can make "speech labels" using QR stickers and / or NFC chips.

On this slide you can see a user touching the swell paper map with his left hand and reading a tag on this same map by using his mobile phone with his right hand.

Because of the small number of participants, we cannot generalize the results to the total group. But we can say

<p>Results</p> <ul style="list-style-type: none"> ○ Useful when preparing and memorizing routes ○ Gaining insight into the environment: <ul style="list-style-type: none"> • What lies where in relation to what • What other routes are possible • What is behind the façade or building <p>Developing and using a multimodal map for adults – TR 2021</p> <p style="text-align: right;">dedicon</p>	<p>something about whether such a product has an added value for the participants.</p> <p>The results of this research showed that tactile maps are very useful when preparing and memorizing routes beforehand – and especially in gaining insight into the environment and understanding things like:</p> <ul style="list-style-type: none"> • what lies where in relation to what • what other routes are possible • what is behind this façade or building <p>This increases both independency and easier communication with sighted people.</p>
	<p>But, the resources, both the maps and the app, turned out not to be ideal for use on the road or outside.</p> <p>Firstly, users already had their hands full with their cane and / or dog.</p> <p>Secondly: as can be seen on the picture; someone has to hold the map while the user identifies a tag with one hand and using the other hand to scan the tag with his phone.</p> <p>Thirdly: the size of the map was not practical to easily transport in a bag.</p> <p>Finally: sticking chips on a map is not easy while you're on the road, especially with cold weather and when there is no place to sit down.</p> <p>But these practical obstacles were not the only reason why participants said they would not use the app and the stickers. This research also showed that there is no strong need to personalize the map by adding own audio, spoken or as text-to-speech for daily use.</p>
	<p>We also found what participants would appreciate:</p> <p>Firstly, adding general information in audio to the map and legend is useful according to the participants - it makes reading and interpreting a map way easier. Especially as preparation to explore the map. Important is that the audio can be paused and repeated at will.</p> <p>Secondly, personalising information would be nice for touristic maps – as a kind of souvenir. For example: sounds in the environment, like the noise of a fountain (as shown in the picture on the present sheet) or a street-organ or seagulls. These sounds can also help with orientation.</p>

 <p>Diverse needs</p> <p>Two determining factors:</p> <ul style="list-style-type: none"> ○ Inclusion <ul style="list-style-type: none"> • Image description, cultural and historical context ○ Independency <ul style="list-style-type: none"> • Practical information <p>Developing and using a multimodal map for adults – TR 2021</p> <p>dedicon</p>	<p>We also gained insight in the diverse needs of the different users during this research. We will discuss two determining factors:</p> <p>The first one is inclusion; by means of social interaction and cultural participation. Users have the desire to take a pleasant and interesting walk and want to be able to talk about it later with sighted people. Hereby information in forms of image description and cultural and (art) historical context is important.</p> <p>The second factor is independence. Users have the desire to be able to walk routes independently and safely, even if routes or areas are unknown. Hereby practical information is important, such as: what is where, can I cross safely here, where can cyclists come from, is there a pharmacy or where is the entrance of this building?</p> <p>We found that in some cases participants indeed would like to add practical information, but they indicated that you can add it more quickly and easier in a navigation app and look it up on the spot itself.</p>
 <p>QR-technology</p> <ul style="list-style-type: none"> ○ "Established" among target group ○ All mobile phones with camera ○ Tags can be closer to each other than NFC ○ Print <p>Developing and using a multimodal map for adults – TR 2021</p> <p>dedicon</p>	<p>As to the technology this research also showed that QR technology is "established" among the target group and can be used with all mobile phones with camera. This is not yet the case for NFC technology and there are major differences between different devices.</p> <p>Moreover, unlike we had hoped and expected, in practice it turned out that for the time being NFC chips cannot be placed closer to each other than QR codes can.</p> <p>A third reason to prefer QR-codes at the moment for Dedicon is that they can be printed - and don't have to be pasted manually - on the map.</p> <p>Now Dorine will take over and present the prototype we have developed.</p>



The municipality of The Hague, based on our findings, received a prototype of what touristic maps for blind visitors could look like.

The map does contain stops for buses and tramways, pedestrian crossings, places with vegetation (for the dog) and other practical information. And the description will warn that there is no fence between the boulevard and the pond. But we also learnt that visitors with limited mobility skills will visit together with a sighted person.

We used swell-paper on A4 in the form of an A4 booklet that fits in any backpack and in most bags.

It has binders on both long sides, connecting 3 A4 swell papers.

The cover, containing the legend on the outside, opens to the left.

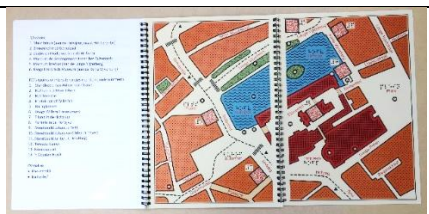
When opened, the blank back of the cover is on the left. Now the blank back of the page that can be turned to the right is between the binders.



When the third page is opened we see next to each other from left to right:

- the blanc back of the cover
- a paper sheet
- the right part of the swell paper map

The paper sheet is meant primarily to prevent the swellpaper drawings touching each other; when they do, they rub off and make stains on each other. It came in practical to provide information for partially sighted users or sighted assistants. It contains a manual for the use of the map and informs the user that it is a prototype/blueprint.



When we turn the paper page, we see from left to right:

- a paper sheet explaining the QR-codes and points of interest
- the total swell paper map, divided by one of the binders

We said we made a TwinVision map. Actually this term is used for our thermoform maps combining relief and blackprint – with colours. It is 'Inclusive' as it can be used 'by all'. We can realise this in swell paper too. In order to prevent the QR-codes from swelling one can print them in another colour.



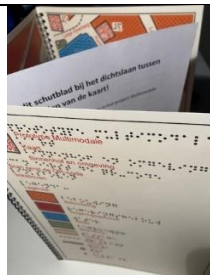
The QR-code on the cover leads to a website with information about the map:

- what is on it?
- the most important buildings have a QR code leading to more information
- there are routes described from building to building. The fingers are guided through the map. Every now and then there is a point of interest, mostly a statue. If the reader chooses he can click on links for more information and a description.
- the points of interest are very clearly distinguishable: they are small open rounds. They have a number that sighted users can read. The paper sheet gives the corresponding name.



The map contains 6 buildings that can be visited. They have their own QR-codes, clearly recognisable by their shape: equal squares with a braille number (1 to 6) and wide enough apart to scan them individually. Each QR code leads to a page, describing the façade of the building, the history of and knowledgeable facts about the building. The idea is that municipalities add further details or links to information. For example:

- What makes it worthwhile for a blind or partially sighted person to visit the building? Are there things she can touch?
- Where are the entrance and the reception and how can the blind visitor find it? Is there assistance?
- Is a tactile plan of the floors available? Where can the visitor obtain or find it? Is there a maquette?



Here we see a photo of the standing prototype. The idea is to populate the site with information that can be imported and is kept up to date by the municipality and/or the individual organisations. This we didn't work out fully; that would be another project. But we have a great blueprint! For a definitive version it would be nice to use UV-print for this map, but swell paper will do. So it is affordable!



We thank you for watching this video and please feel free to contact us if you have any questions! Our details are on the congress website and on this slide: dorineintveld@dedicon.nl and lisanneaardoom@dedicon.nl

Thank you very much and looking forward hearing from you.