Human Navigational Aids for the City

an exploration into potential downsides of mobile navigation software

December 2023
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introduction

How we move through the urban landscape has transformed with the presence of digital technology. One piece of urban technology that has had a lot of effect on mobility and behavior in the city is navigation apps (Google Maps, TomTom, open street maps, etc.) The rapid spread of GPS-enabled smartphones since the early 2000s has fundamentally changed navigation in the city. We no longer get lost and do not have to ask our way, even in cities foreign to us. Current navigation systems offer a lot of convenience.

While the advantages of these technologies are evident, this exploration seeks to uncover potential drawbacks that might have been overlooked during this technological transition.

"Can we imagine an alternative to current navigation systems?"

research approach

To explore the topic, this exploration includes various sources for inspiration. It includes looking at current navigation software, scientific research, news articles, and interviews with approximately 15 individuals, including academics from the TU Delft.

Insights from different sources are synthesized into possible focus areas to inspire concept designs. One concept is iterated further upon. This took place over a time of two months.

focus on slow mobility without a rush

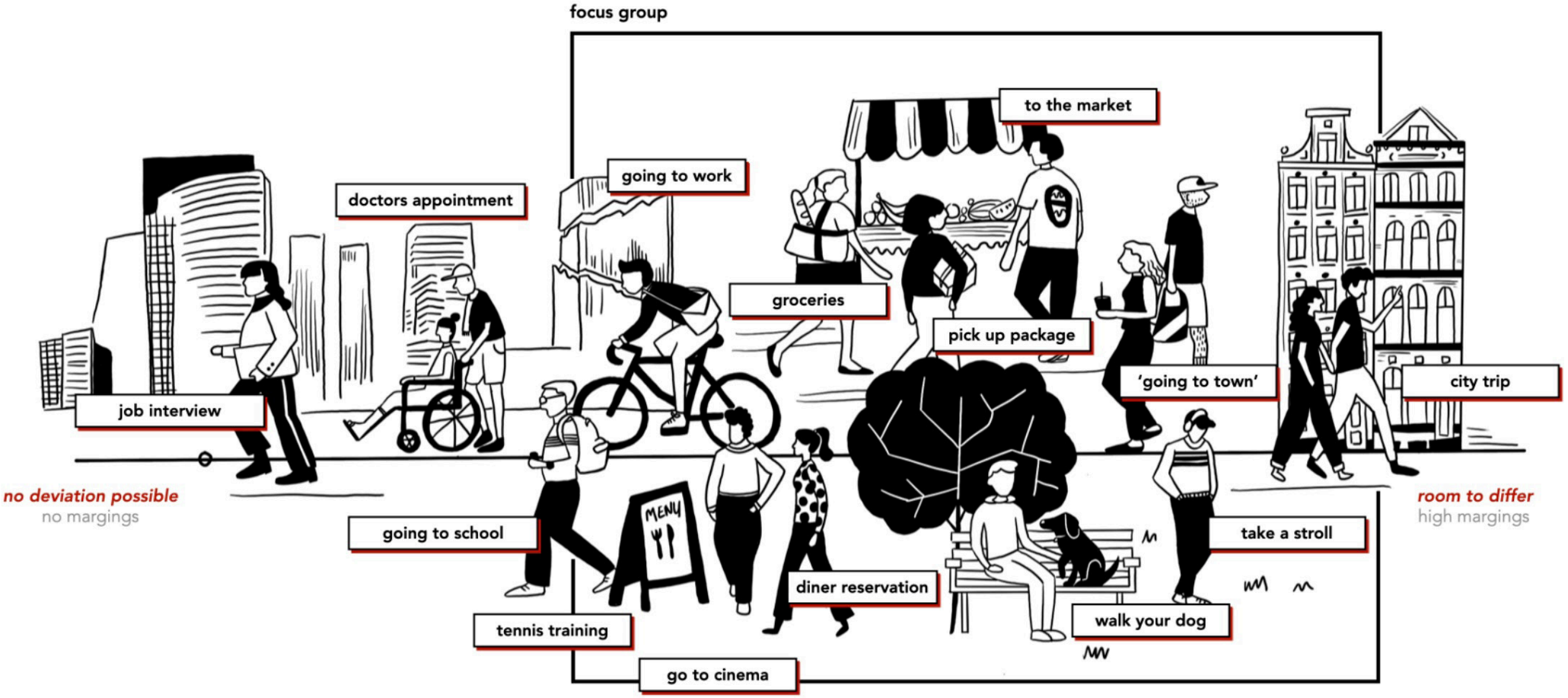
Navigation software can assist in different forms of navigation. While driving around, taking public transport, biking, or walking to your destination, navigation systems can support you to reach your desired destination on time. These different modes of transportation can even be combined into the quickest route.

Current navigation systems excel in assisting those with rigid schedules and fixed destinations: they provide confidence and certainty that you will reach a specific place at a specific time. Even if you take the wrong turn, the navigation will recalculate and guide you back on track.

However, some people do not have these strict margins to get somewhere, meaning having more time and space to differ. These include activities as going to the market, walking your dog, or strolling around on a Sunday afternoon. Other activities as going to work, school, or sports training might be possibilities to differ from your routine as well.

These people are overlooked by current navigation systems and thus provide an opportunity to rethink and tailor navigation support to those people. In this exploration, we specifically focus on slow mobility—individuals walking or biking through the urban environment.

These slower forms of mobility are more affected by the positive and negative influence of an environment, have more options to stop or wander when and if you want, and experience more of the environment than in a safe car bubble.


focus group
to the market
going to work
doctors appointment
groceries
pick up package
'going to town'
city trip
job interview
no deviation possible
no margings
going to school
MENU
diner reservation
take a stroll
tennis training
walk your dog
go to cinema
room to differ
high margings

layers of navigation software

In the era of physical maps, navigating the city was a tactile and engaging process. Actively planning routes, was a hands-on experience, requiring personal involvement in every aspect of the navigation process.

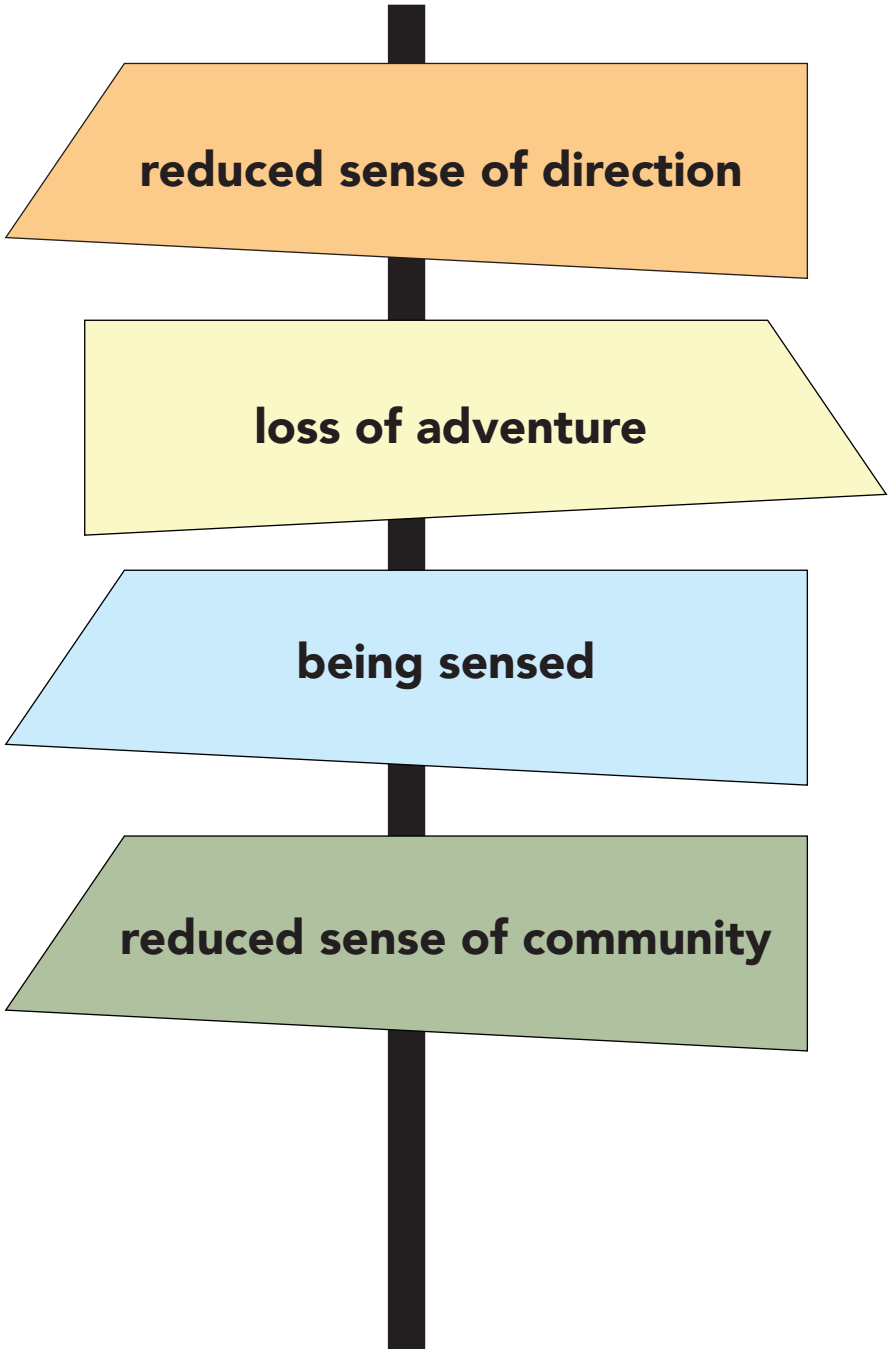
Navigation Interface: The once hands-on approach has evolved into a more automated system, where a digital interface takes over numerous tasks and exerts influence over how individuals pass through the urban landscape.

Base Map: Beneath this interface, there are layers of data: the physical city's base map—a spatial representation that forms the foundation of the navigation experience. Yet, questions arise about the completeness and accuracy of this representation. How well does it capture the dynamics of a city?

Other Layers: Beyond the base map, what other layers of data could lie beneath? What types of information can give a more nuanced and personalized representation of the urban environment?

potential areas to reimagine navigation

Conversations about past experiences with navigation, interviews with academics, and new articles unveiled four primary areas of potential downsides in current navigation systems for our focus group. Within the different sources, there was a consensus on the helpful efficiency of navigation software, yet all sources reflected on their personal experiences in the past with a nostalgic feeling. This indicates room for improvement.



reduced sense of direction

how to change the attention from screen to surrounding?

Distraction from Environment

Focus on GPS keeps attention partly from the surroundings to the screen

Safety concerns: paying less attention to actual surroundings, being distracted by other notification

Lack of referencing between information delivered by application and real environment: requires user to make more connections between the two

The more automated navigation, the less you're aware of your surroundings

(Brügger et al., 2019) (Willes et al., 2009)

Interference Mental Mapping Skills

With this higher level of automation (turn-by-turn instructions) of navigation, people are not challenged to think for themselves

> interfere with our ability to create mental/cognitive maps of our environment.

> you can train these skills! how to notice & read your environment is a skill you can train (know what to look for)

can navigation make you smarter instead of dumber?

Reliance on Technology

We trust technology more than ourselves, because it knows better. We depend on it

can navigation make you rely more on yourself or surroundings?

Reading Environment Skills

Habits: we tend use the same route (automatic pilot)

With fewer cognitive maps in our heads, we are worse at choosing and imagining alternative routes (if necessary)

We don't need to rely on landmarks or street signs anymore: we are becoming less trained at using and reading this kind of information

Perceived Distance and Walk Times

People overestimate distance and walk times

People are more likely to overestimate in car-dependent locations, along routes with many turns or barriers, or for destinations that are relatively closer

Experience walking and familiarity with the area both lead to lower estimates, while concerns about crime, getting lost, or carrying something heavy increase estimates

> people who overestimate are less likely to walk

loss of adventure

Becoming Less Patience

Using GPS navigation shows you the quickest routes, expecting instant solutions if you make a mistake

We become frustrated when we are two minutes behind schedule, are faced with delays, or if it are inaccurate

> less patience than before: took more time/margins for traveling for the unexpected

Focus on Destination, not Journey

Focus is on reaching a certain destination in time, not on the experience of how you got there

> vacation: more focus on journey because you have the mindset to explore/less strict time management

> commuters: want to get somewhere on time, doesn't matter how

more flexibility/ adaptability

Reduced Serendipity/Exploration

GPS (often) provides the fastest/shortest/most efficient route

> discourage exploration and spontaneous discoveries > miss interesting landmarks of places > you are in a different mode than traveling, as your focus is different

curiosity?

Sense of Accomplishment

It used to be a real task to successfully navigate to a new place. Reaching the place gave a sense of accomplishment (pride/self-reliance), but this is feeling not there anymore relying solely on technology.

(Over)emphasis on Efficiency

Focus on efficiency in current tech

What happens to your experience, safety, or enjoyment?

Should we include other qualities?

Hidden Gems not Hidden

Social media has become a way to explore 'hidden gems', which leads to long queues. Lots of likes and these queues can then be a sign that a particular place is the best. Especially if you don't know a city very well, these kinds of signals are more important.

This leads to crowded areas and inconvenience to nearby business owners, through over-sharing

being sensed

Car-centric

Most navigation software is based on car-centric data: might not take specific needs (i.e. safety requirements, or specific paths) to account for bikes/pedestrians

Bias in GIS

Users' perception of geographic space depends heavily on geographic information systems (GIS). GIS is the most common way for users to estimate travel time, provide routing information, and recommend appropriate forms of transportation.

> Need to take into account other elements getting into your car and time to park to represent the actual time.

(Wagner et al., 2021)

Privacy (tracking) Concerns

Navigation apps collect location data, raising privacy concerns about how this data is used, stored, and shared. Users can be uncomfortable with the idea of (companies) tracking their movement, even for navigation purposes

Is there an option to opt-out? Do people care?

Can we use this data for the city or citizens' benefit?

Commercial Exploitation

who is in control?

Depending solely on commercial platforms as Google Maps gives these companies significant control over how people navigate their cities, potentially leading to profit-driven decisions rather than community-centric ones

who is making decisions?

> small street where children play becomes 'fastest route' and thus very busy

> i.e. places to eat are recommended, but how are these exactly pushed forward?

Involving other Data

Next to physical data, time estimates, and your GPS location, are there other sources of data that we can include in our maps?

Involving your own data can provide the opportunity to create highly personalised navigation suggestions

reduced sense of community

Social Disconnection

Less social interaction: no need for conversing anymore: asking directions or recommendations. Mobile navigation took over these tasks

> Are people still open to taking the time to help someone? "You can just look it up"

> nice that someone else you don't know dedicates some time & thought to help

> It used to be more common to help people reach their destination by going with them for a bit

Loss of Local Knowledge

Locals also rely on GPS

> Knowing shortcuts, interesting (less popular) landmarks, stories of the neighbourhood happening less > disconnection to community?

"I don't think people would recognize certain street names anymore: why would you remember? It is easier to look up"

could it also influence feeling of safety?

Social Interaction, Subjective Wellbeing

Commuters who greeted, thanked, or expressed good wishes to shuttle drivers experienced greater momentary positive affect than those who did not speak with drivers.

These findings add to the burgeoning literature on the hedonic benefits of interacting with strangers by showing that even very minimal social interactions with strangers contribute to subjective well-being in everyday life.

(Gunaydin et al., 2020)

Easy Social Isolation

Due to mobile navigation, it is easier to isolate yourself in a city: be in your bubble.

> Miss out (on purpose) on social interactions, because you're not open to it and there is no need for (smiling, making eye contact, or conversing)

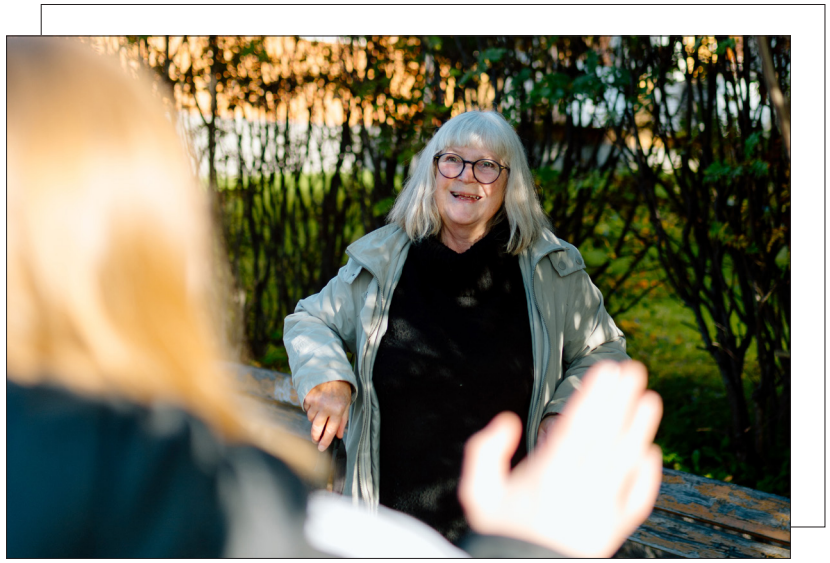
> Miss out on interaction with the environment, because you are in your bubble

> Develop (simple) social/communication skills less?

loss of social interaction

Social interactions as asking for directions, local recommendations, and other spontaneous conversations that occurred afterwards, were once an integral part of navigating the city. The shift to the current navigation raises questions about the loss of these meaningful contact moments. From a city perspective, it can be interesting to dive more into this change. This loss of **social interaction** was not only confined to multiple conversations: it is observable in news stories and campaigns in the Netherlands and Scandinavia, where a simple greeting—a shared recognition—is promoted as an interaction that we should be more aware of, and its impact. It is visible in the automation of counters and checkouts.

Scientific studies echo these sentiments, demonstrating that even brief social interactions with strangers can elevate subjective well-being. However, it prompts a critical reflection on whether the role of navigation should extend to fostering these interactions, or if this is a broader societal shift that needs to happen.



points of interest from city perspective

The city of Amsterdam wants to ensure that the city becomes more accessible and navigable for everyone by deploying new technology. This could include new forms of navigation software, that can enhance **mobility opportunities** to more people.

The municipality is working on creating a better picture of the city's accessibility by making better use of our own data keeping it up-to-date, and combining it with partners. They are exploring the ability to make **personalized route suggestions** with this data, lowering barriers to exploring the city.

Amsterdam wants to be a safe and liveable city for its residents, entrepreneurs, and visitors. While tourism in Amsterdam is a big source of income, unfortunately, it also causes nuisance. Tourists and visitors who come to Amsterdam to enjoy the historic city, our rich cultural aspect, culinary diversity, and events and conferences are welcome, but we try to keep nuisance at bay as much as possible. Mobility and navigation data could play a role in this **distribution of crowdedness**. Navigation software could through an interface influence this behavior to the advantage of a city.

Navigation software is using and collecting GPS locations. Next to helping users to locate themselves, this data might also be used for other instances. Users might be unaware of or used to this **data collection** as we share live locations. Rethinking the collection of this mobility data could add to strengthening the digital rights and freedoms of Amsterdam residents, such as privacy, transparency, and control over their own data.

support locals in exploring

The ability to look up directions and locations independently removed the need to engage with locals for guidance. The reciprocal effect is that locals no longer need to be walking directories, as there is no need to remember details. From a city's perspective, this loss of local knowledge could also be an interesting element in navigating urban space that might have gone lost. As a local, do you still explore and stumble upon new experiences in your own city? Do you know how to get somewhere, or do you keep following directions? Do you stick to familiar places and routes getting somewhere, without even being aware of your surroundings?

It might be interesting to look into how we can steer people in new directions and unexplored areas nearby. This includes finding a balance between how much effort someone is willing to take versus what they get in return.

concept designs

Provocative questions challenge the status quo of navigation: What if our routes are not predetermined? What if our routines are subject to analysis? What if we look beyond the map structure we are familiar with? These questions are the starting point for exploring alternative concepts that could redefine our navigation experience.

take-aways from ideation

During the ideation process, it became clear that there were still a lot of directions navigations could develop in, making it hard to come up with specific concepts. As the chosen focus group is still very broad, it results in a diverse field of potential users. Balancing the effort of the user with their return on effort invested therefore can be very different, and thus difficult. This was reflected in the different preferences that multiple IDE students voiced when shown a few concepts.

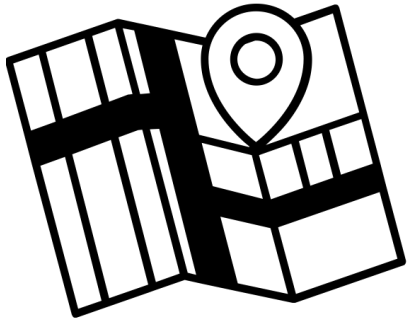
Further exploration could look into what kind of layers of information could be added to a map, to become more accessible. However, it is also interesting to leave out the metaphor of a map. This opens space to rethink how information is presented to and could support the user. By leaving out visible representation of the area, how we need to navigate and handle the information becomes different. Comparing the definition of navigation, we might need to shift to exploration to support users in a desired way.

navigation *= the process or activity of accurately ascertaining one's position and planning and following a route*

focus on efficiency

exploration *= the action of exploring an unfamiliar area*

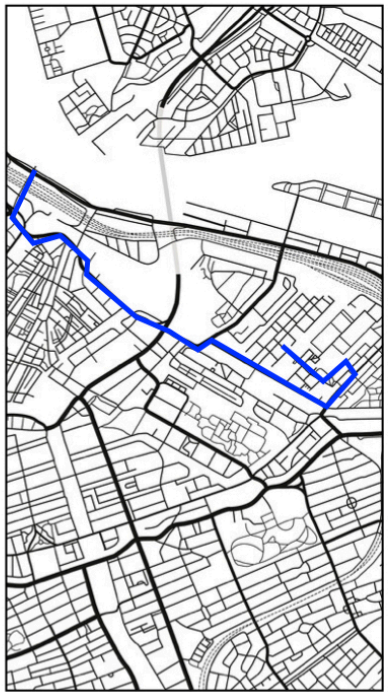
bigger margins

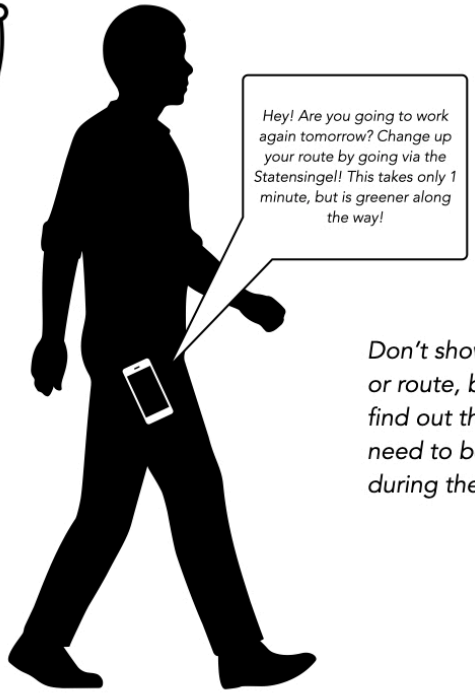


(Over)emphasis on Efficiency

Route Alternatives

GPS navigation can recognize your patterns: there will be routes that you take often, like going to work. Based on this data it will give you suggestions to take an alternative route. This alternative route can be based on user-selected preferences, for example: a route with more greenery, or a less busy route. Before you leave your home it can give you a heads-up notification.





Don't show the directions or route, but let people find out themselves: they need to be more aware during their routines

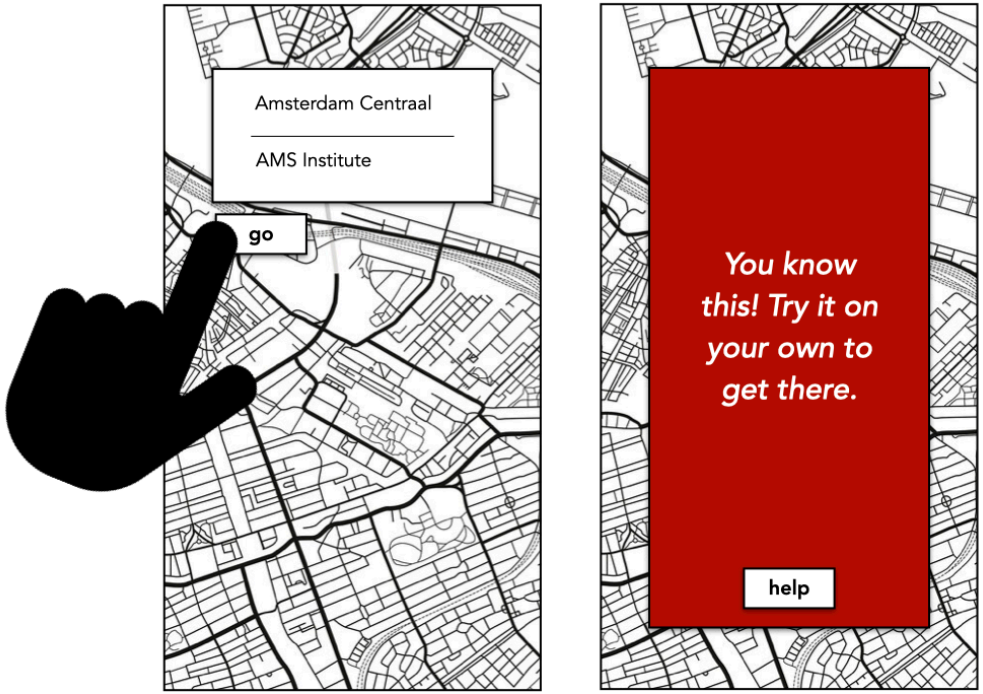
Select what you are interested in

Tailor to you own preferences

Interference Mental Mapping Skills

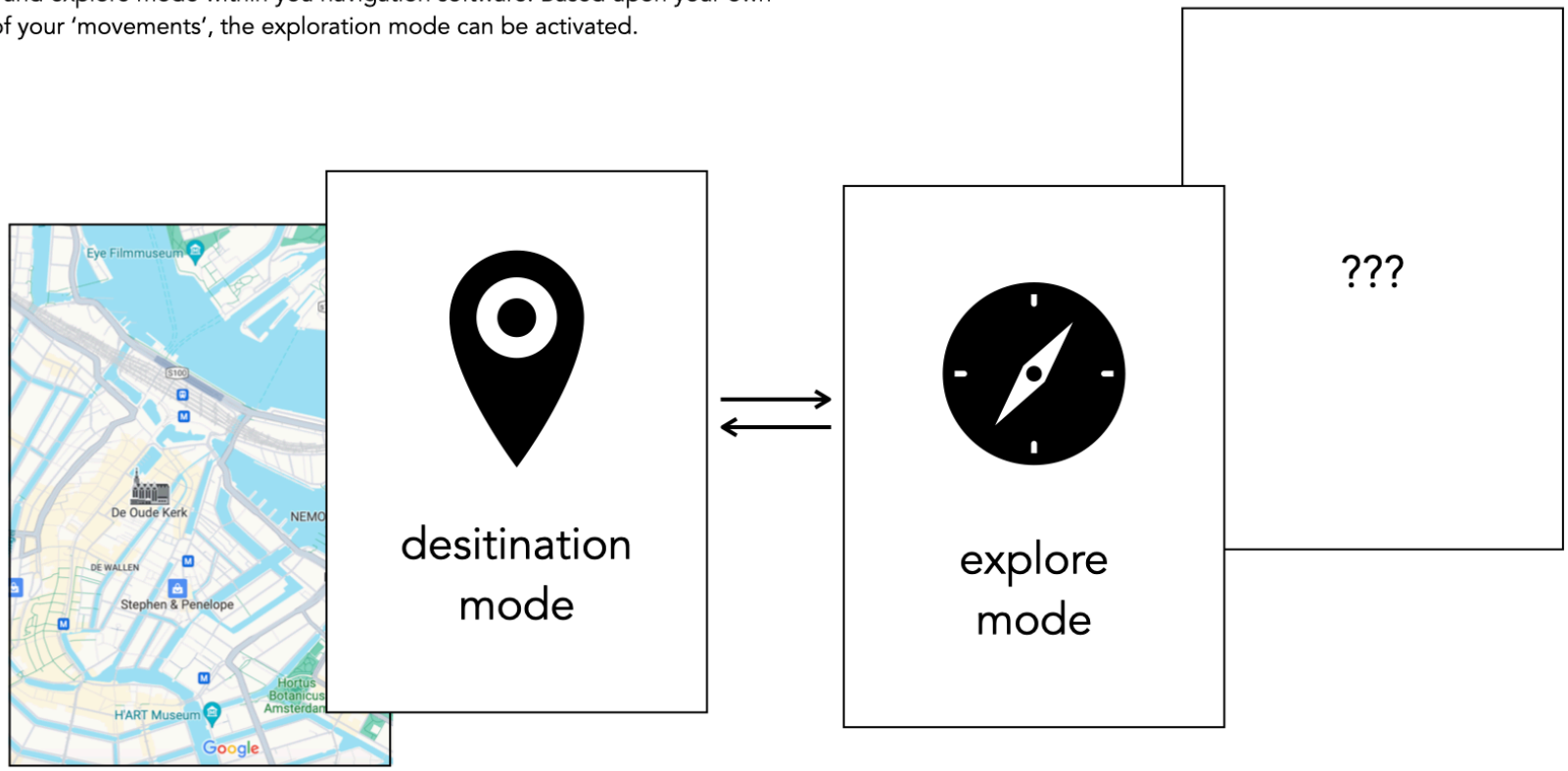
Gentle Parenting

GPS navigation can recognize your patterns: there will be routes that you take often, like going to work or visit a certain friend. After looking up the directions multiple times, the navigation software can stop giving the complete directions. You can do it own your own. To remain a safe and secure feeling, the navigation will step in if needed. This could be an important turn you need to take, or if you are continuing in opposite direction



Destination Mode versus Explore Mode

All the following concepts are based on the idea that you can switch between your destination and explore mode within you navigation software. Based upon your own intentions of your 'movements', the exploration mode can be activated.



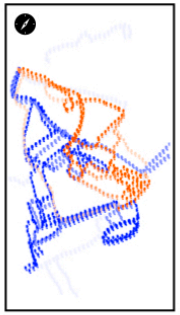
Reduced Exploration/Serendipity

Interference Mental Mapping Skills

Tracing Footsteps

Where do you leave your footprints behind? The main idea behind this concept is becoming aware where you do and do not go within your city. The goal is to stimulate going to places where you have never been to before, by using your own data in the form of footsteps

Click > animation of tracing footsteps > leave map of unexplored places



Options:

A) Without maps in the background, more challenging

B) Share your footsteps with other, see where you together can explore and go to, or about places the other has been to.

Loss of Local Knowledge

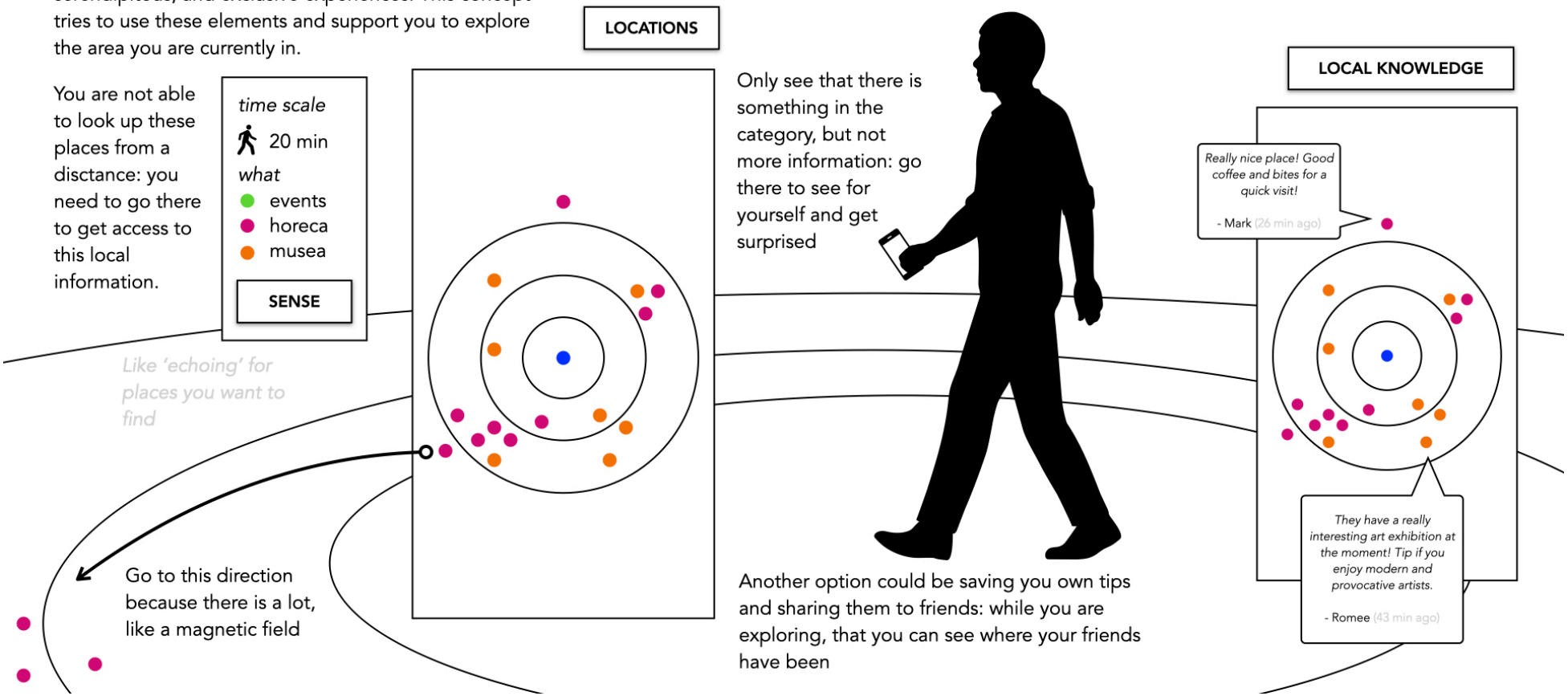
Reduced Exploration/Serendipity

Interference Mental Mapping Skills

Geo-tagged Information

When you ask a local for tips, or explore a city, you stumble upon 'hidden gems'. They are spontaneous, serendipitous, and exclusive experiences. This concept tries to use these elements and support you to explore the area you are currently in.

Same principle could be nice to share tips: they can be location based, be visible for one day only or only shown to a small number of people so it will stay exclusive.



Loss of Local Knowledge

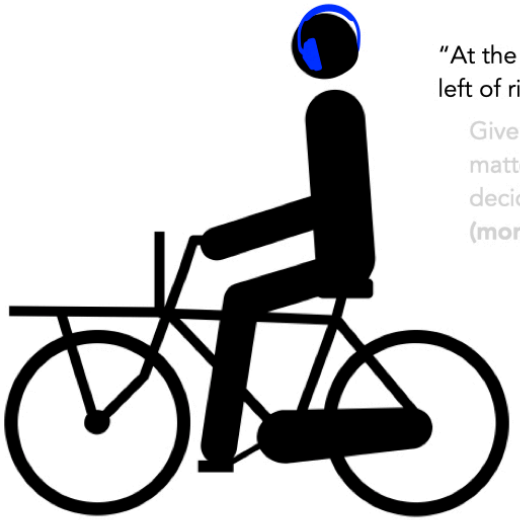
Distraction from Environment

Interference Mental Mapping Skills

Audible Cues

Using current navigation, we focus on visual dislplays. Instead of these visual cues, in this mode you will receive audible suggestions or descriptions for you route. This could have different options, as receiving more information of the landsmarks you pass by, receive directions based on landmarks of receive suggestions.

Desired effect: look more around you, perceive the city and make connections (just like how we explain to get somewhere), less focus on interface



"At the next crossing you can go left of right"

Give suggestions if it does not matter, this way the user can decide what works best right now **(more autonomy?)**

~~"Turn right in 300 meter"~~

"Go left after *het Groothandelsgebouw*"

Need to use local knowledge (or train it) to reach your desitination

"The big building on your right handside, het Groothandelsgebouw, used to be .. Now it is used as an office building"

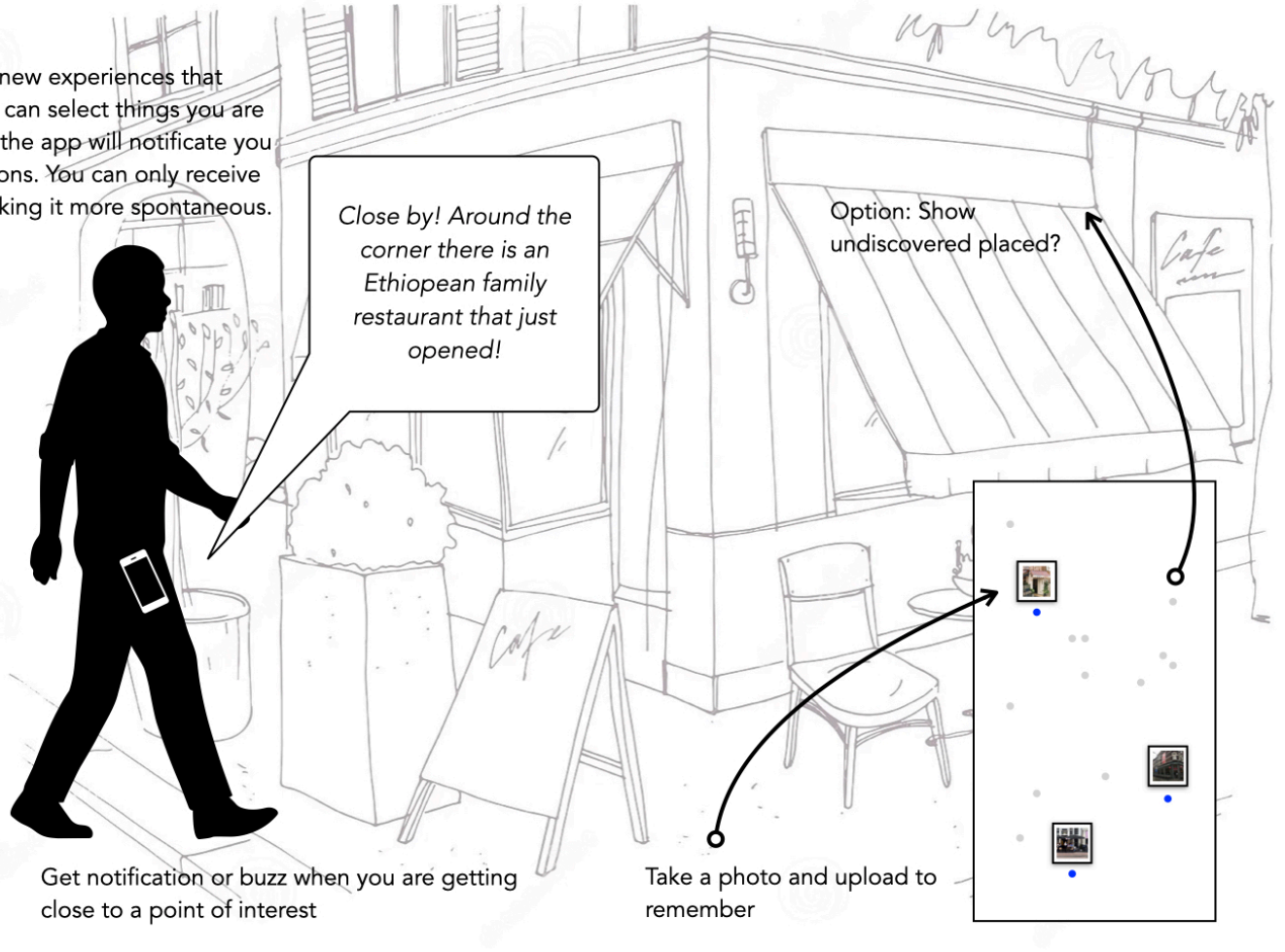
Navigate with an audio tour, receive more local knowledge about the area you go through. Based on your location, and information you have received before, you will get to know new things.

Loss of Local Knowledge

Reduced Exploration/Serendipity

Point of Interest

When you walk around in the city, are you open to new experiences that might interest you? Before you start exploring, you can select things you are interested in. Then, by analysing your movements, the app will notificate you with possible points of interest in upcoming directions. You can only receive and access this information by going out there, making it more spontaneous.



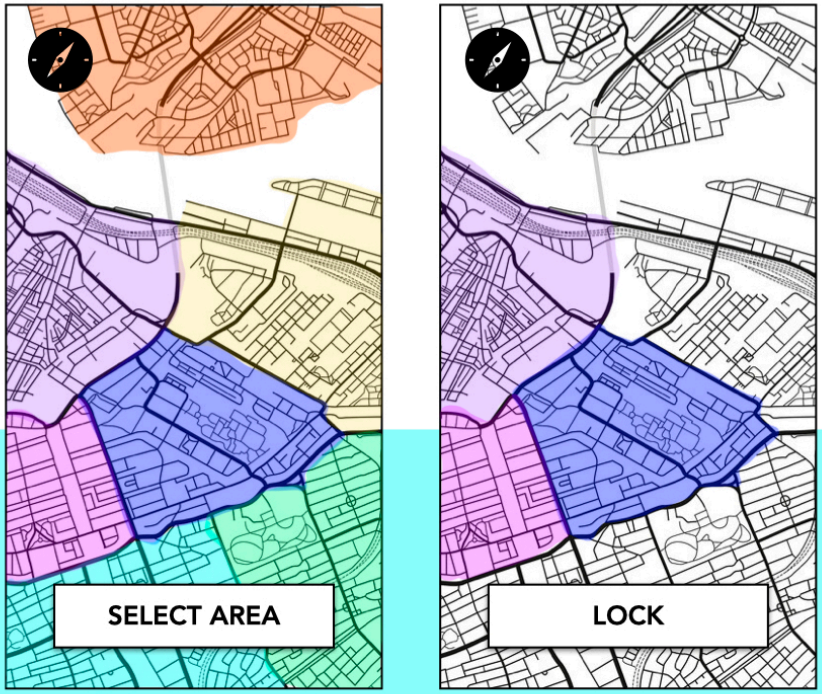
(Over)emphasis on Efficiency

Distraction from Environment

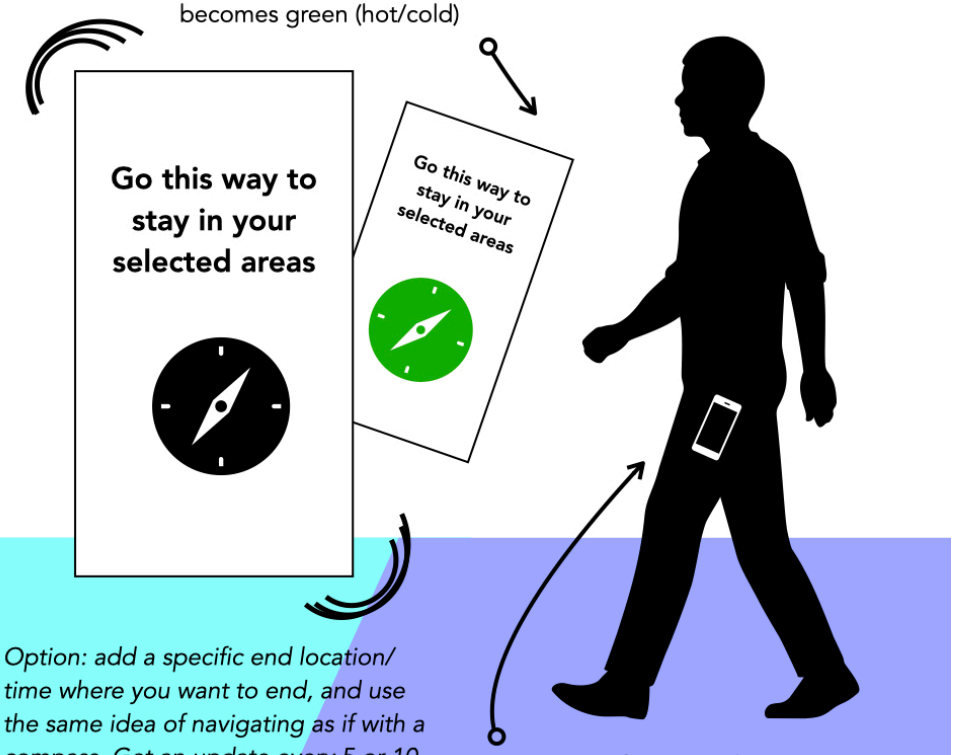
Interference Mental Mapping Skills

Explore Compass

Want to wander around without getting lost or too far from your starting point? This explore mode allows you to lock a certain area to stay in. You won't be able to search specific destinations (as we are familiar with now). To stay in the desired area, every 10 minutes you will be able to use your mobile as a compass for a moment to redirect (instead of using detailed route descriptions)



turn: when pointed in the right direction, compass becomes green (hot/cold)



Option: add a specific end location/ time where you want to end, and use the same idea of navigating as if with a compass. Get an update every 5 or 10 minutes?

Get notification or buzz when you need to redirect

final concept

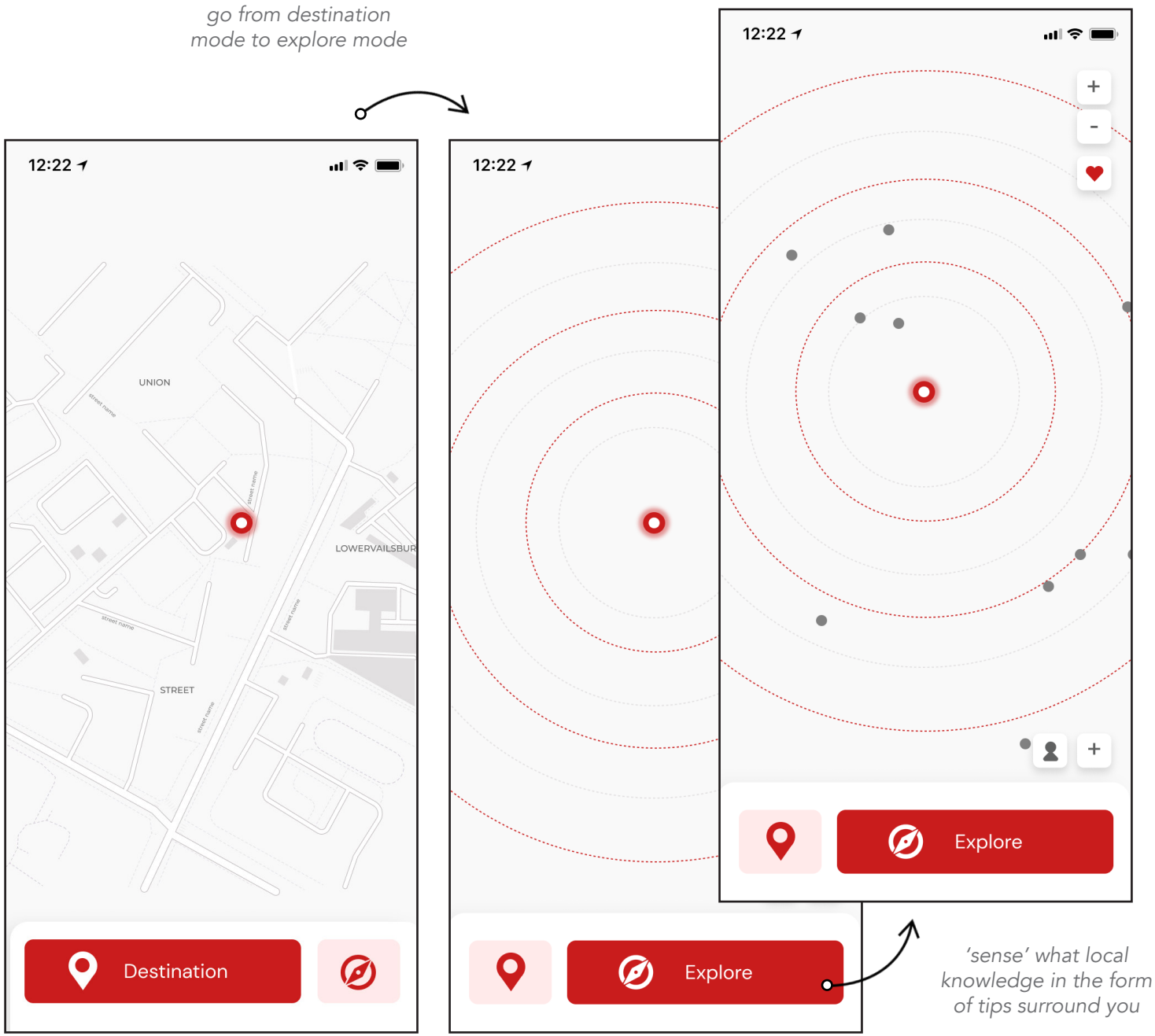
The final vision reimagines navigation not as a prescriptive set of instructions to follow but as a tool that fosters an individual's connection with their city. It promotes exploring your own surroundings and creating your own local knowledge database. The concept promotes reaching a destination on your own, playing into your sense of direction and mental mapping skills.

explore mode

This concept addresses the potential downsides of local knowledge and serendipitous experiences.

By switching from the destination mode to the explore mode, the user can sense previous experiences and tips of others.

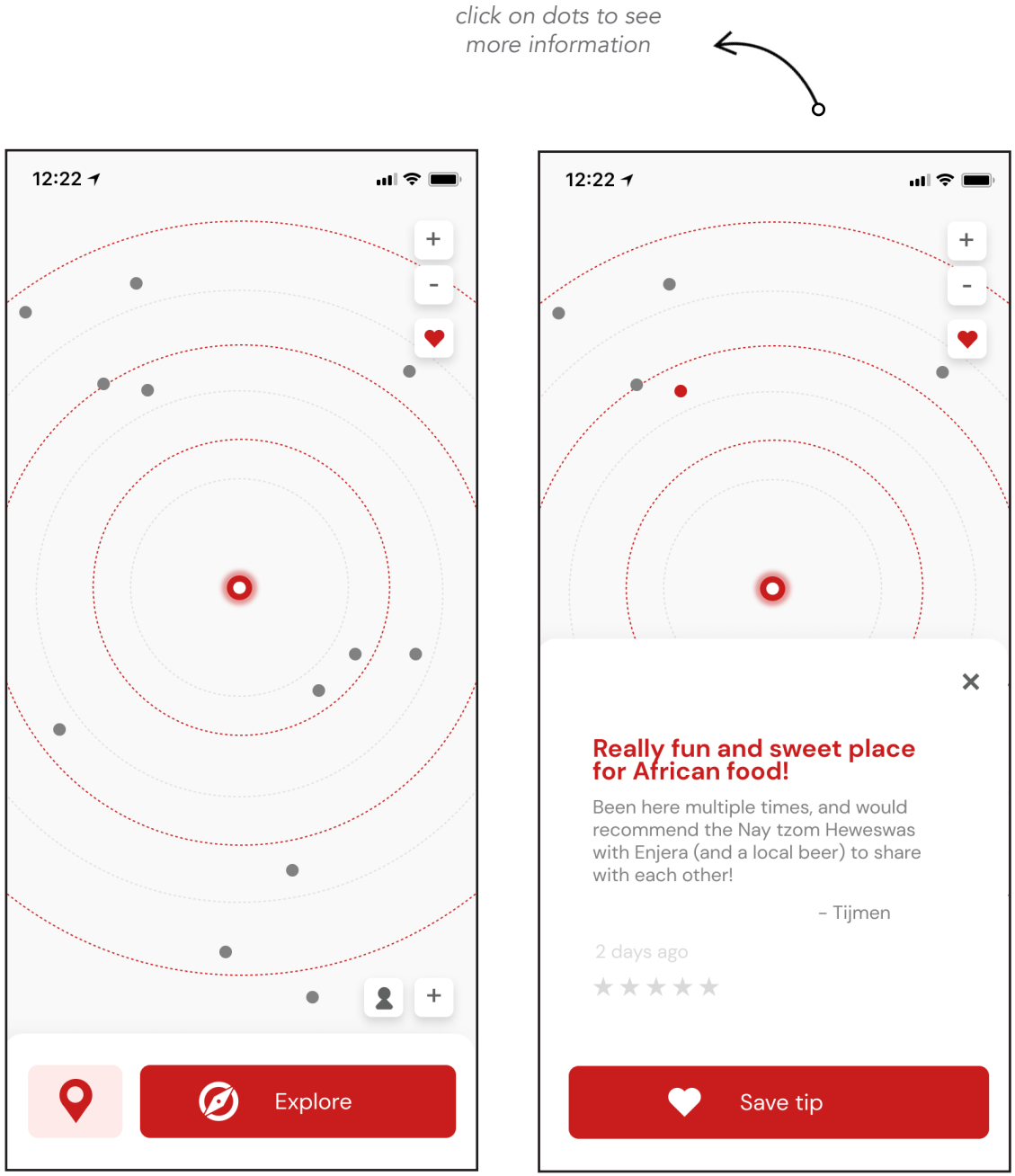
Moving your mobile phone as a compass shows in what direction certain tips and recommendations are. The mode will not provide you with how to get there but shows distances to a location on a proximity map (up to 30 minutes of walking).



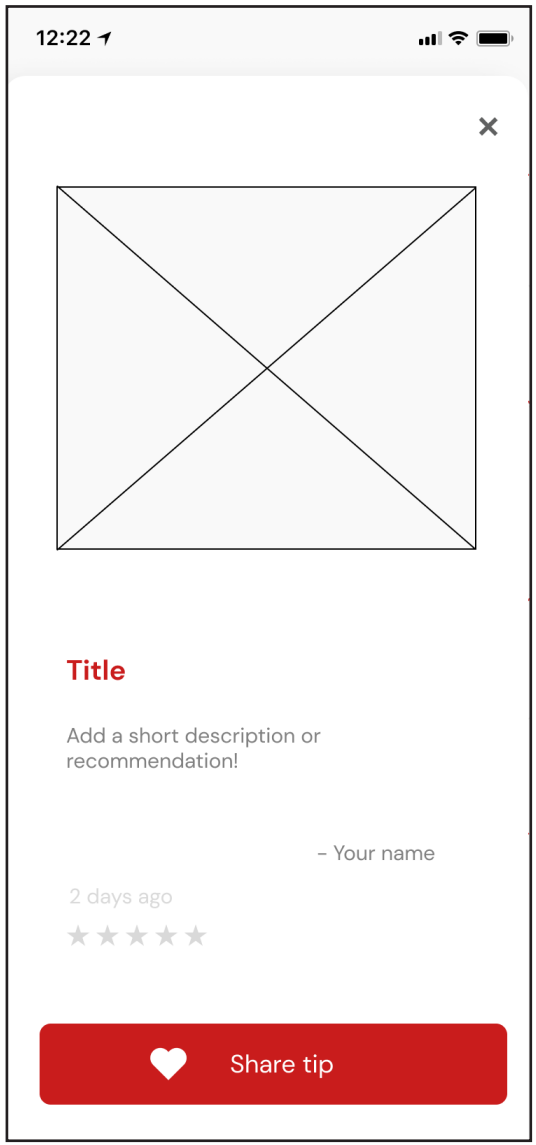
echoing tips

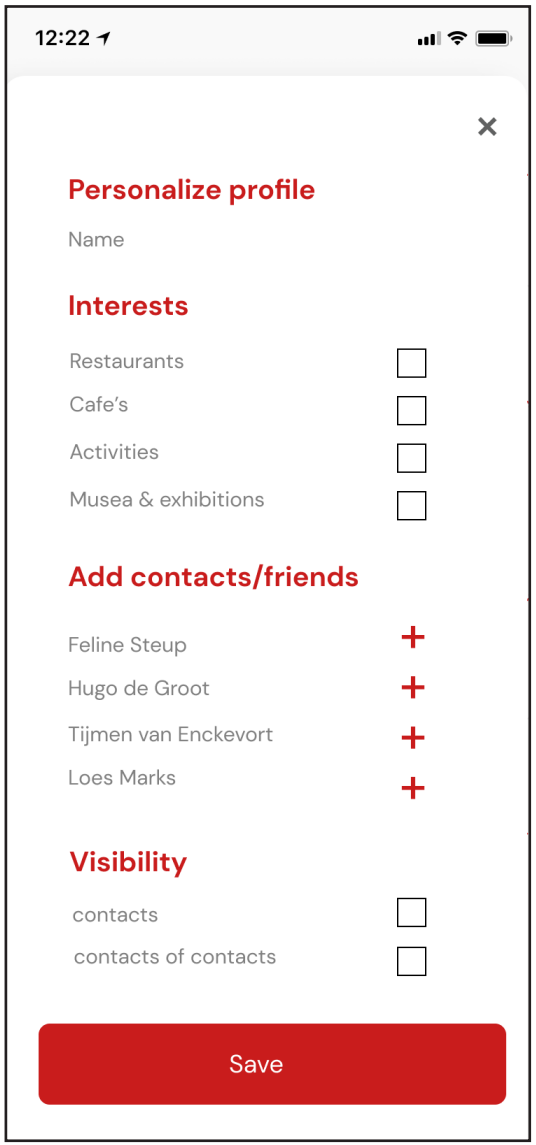
Asking strangers for tips is an interaction that can most likely happen in the area, with a personal touch to it. This information is only shared with you during this interaction. Instead of endlessly scrolling through Google Reviews, Trip Advisor, or 'hidden gems' on TikTok, this application tries to keep tips personal and exclusive.

The tips are only visible if you are in the area, and only for a certain amount of time. They are not shared with everyone, but only your inner circle. This can be personally added contacts, but also their contacts if you want to. This way, the information stays exclusive to you and your friends. By clicking on a dot you can find a bit more information about the place. This does not include complete menus, so you still can be surprised when you get there. Should there be an option to save tips?



add and share your own tips





personalise your profile and interests, add contacts

finding tips

You are not only able to find tips but can add your own tips as well. You can leave the information tagged to a certain GPS location to make in findable to others in the area.

It is an option to include or exclude photos: it depends on how much people would like to know before going somewhere, while not revealing too much. Next, it could be further explored with whom the tips are shared. Is there an option to share your tips with close friends, contacts from your friends or is it public to everyone? Is this a decision you can make your self?

conclusion

In wrapping up this exploration, it has become clear that navigation apps, while providing undeniable convenience, could also take on another role for urban experiences.

With a focus on slow mobility and imagining alternative concepts, this exploration strives to reintroduce a sense of exploration and local knowledge sharing. By doing so, the proposed mode of navigation could support the user in a different way of exploring their own urban environment.

Further opportunities might stay closer to navigation instead of exploring. It might be interesting to think how could it make us smarter, instead of dumber. Focus on, if navigating, how to stimulate active thinking or planning. How could navigation support its users in navigation on their own?