Identifying which Street Characteristics Promote Walking for Transport - …

… A think-aloud study in Virtual Reality.

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Conclusion

Results

Methods

Introduction

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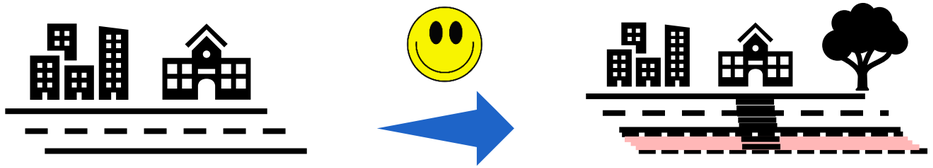
Background

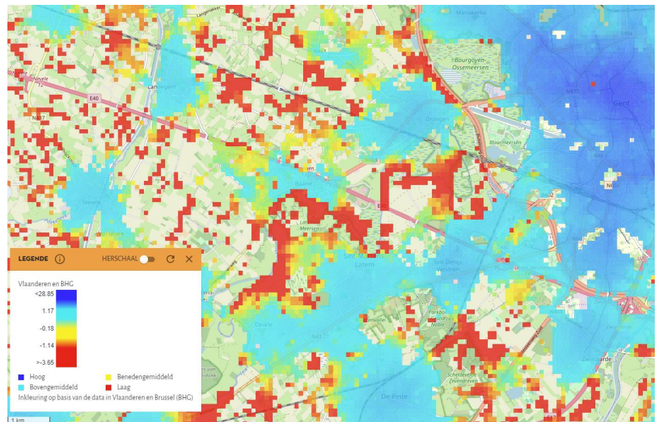
Importance of an encouraging physical environment.



Macro-environmental factors

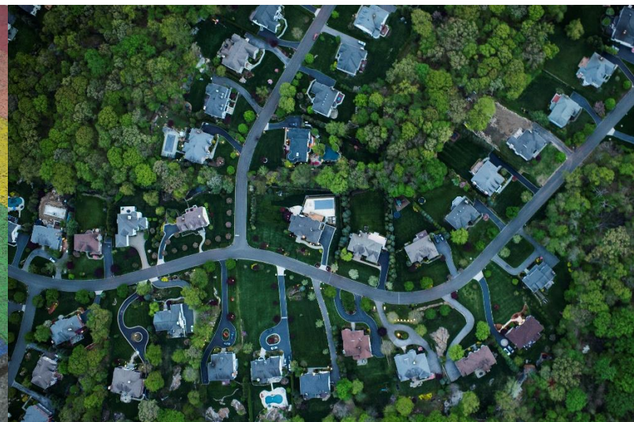
e.g. Neighbourhood walkability

speed



Micro-environmental factor

e.g. sidewalk, greenery and trees, tr



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Background

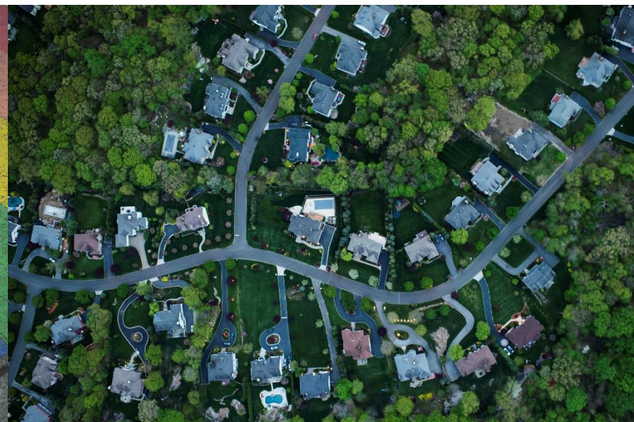
Mostly local governments → less stakeholders involved

Less complex nature of the factors

Less complex

Micro-environmental factors

e.g. sidewalk, greenery and trees, traffic s



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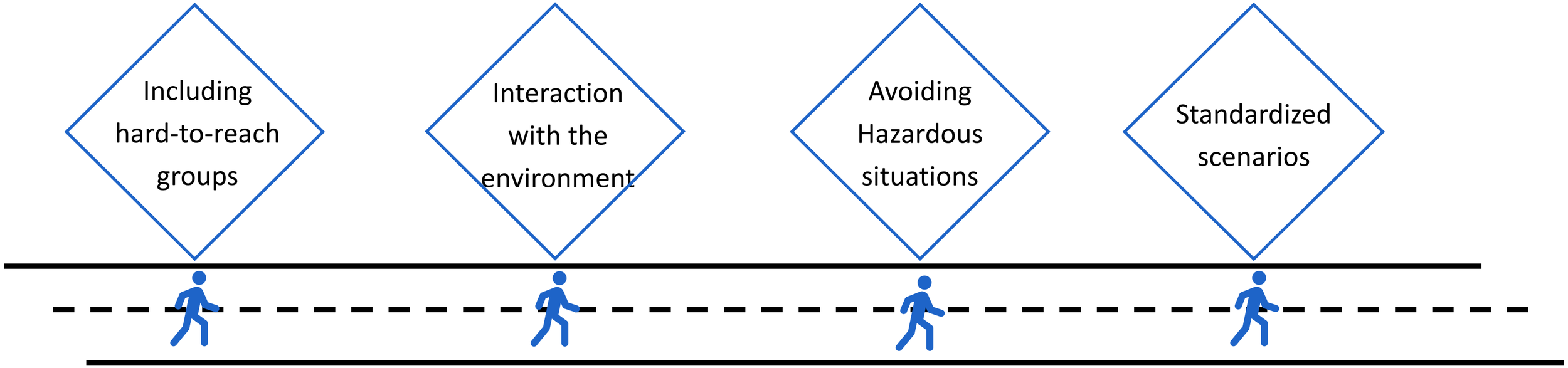
Why Virtual Reality (VR)



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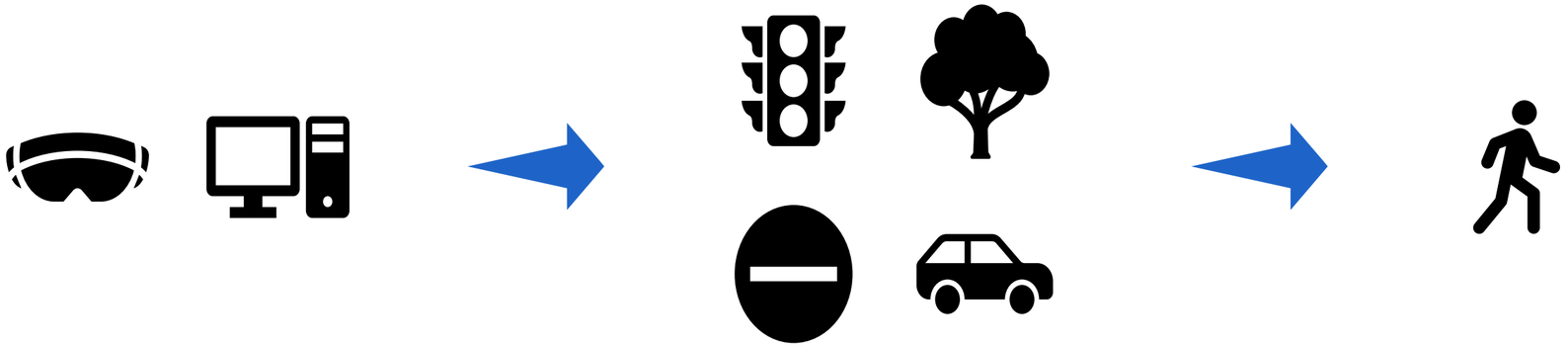
Aim

To determine the usability of VR to investigate critical micro-scale street characteristics

To identify which street characteristics are important in creating safe and attractive environments



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Recruitment

Convenience sampling

- Social media
- Friends & Family

Snowball sampling

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Set-up

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Think-aloud method

Open question:

Why do you or don’t you like to walk here?

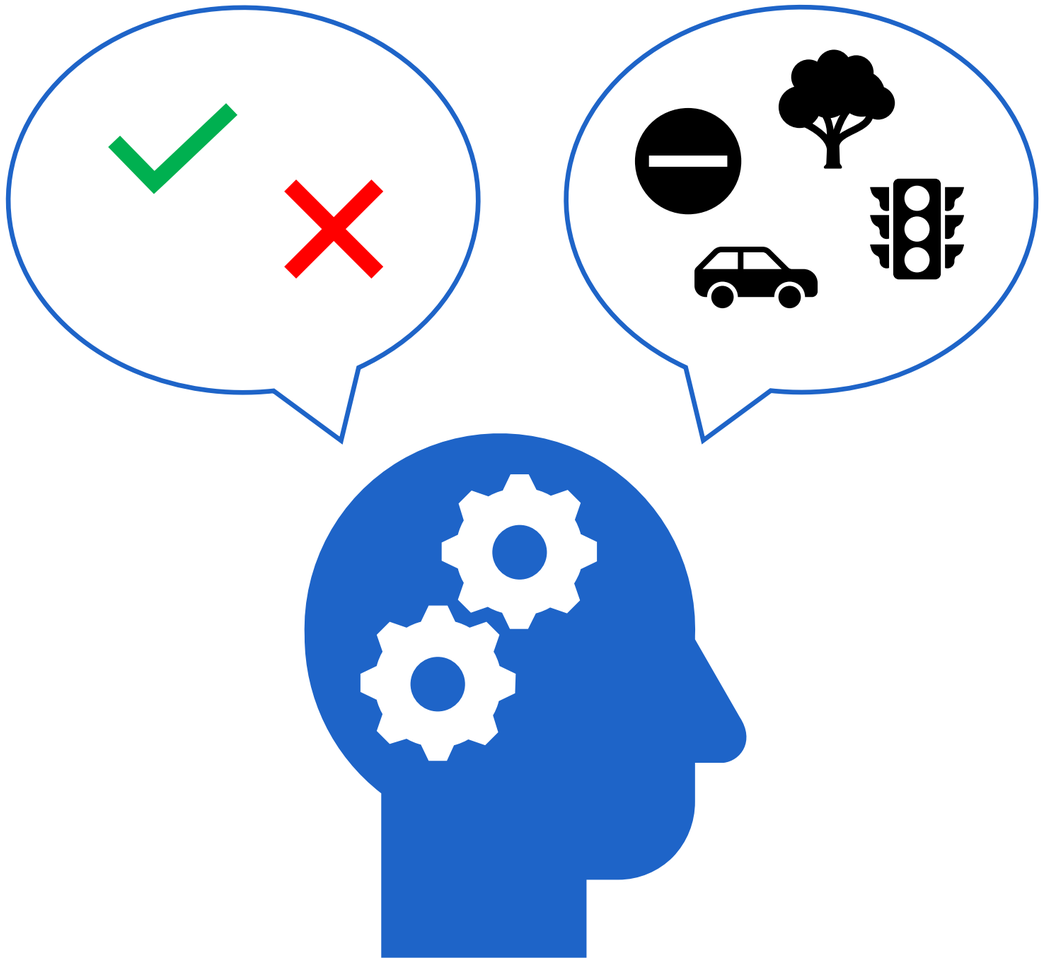
→ Identifying factors

Neutral cues

- What do you think about the environment?
- Keep talking
- What are you thinking?

Additional Questionnaire

- Score for safety and invitingness of environment
- VR set-up and test
- Self reported walking behavior
- Socio-demographics
- Task load for walking on the VR-treadmill



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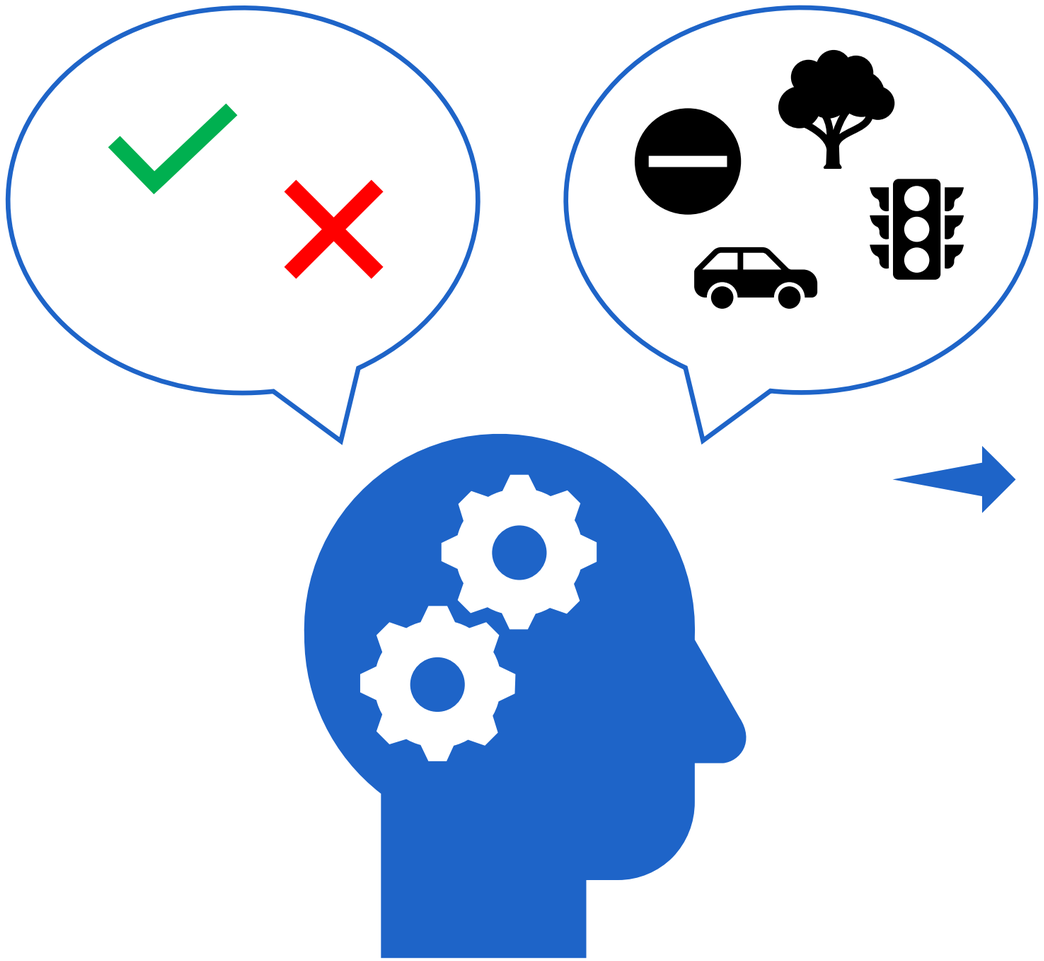
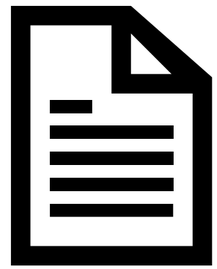
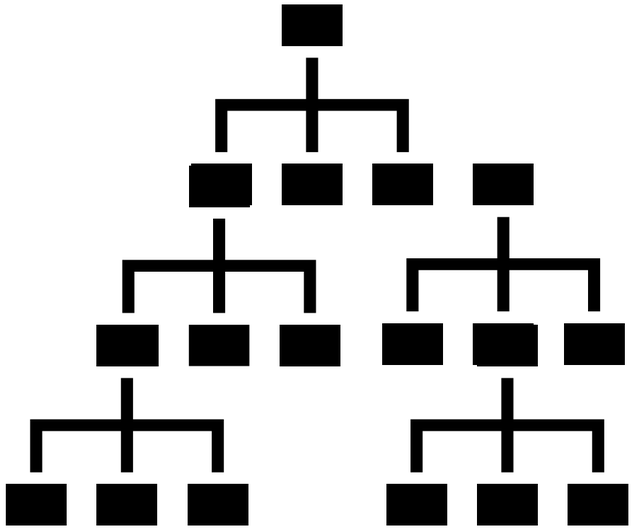
Analysis







Qualitative deductive content analy

Study sample

	n=37
Age in years	
Mean ± Standard deviation	32.81 (20.09)
Range	12 – 73
Sex (%)	
Male	51.4
Female	48.6
Walking as active transport (%)	
Not at all	10.8
Less than once a month	10.8
1-3 days per month	8.1
1-2 days per week	21.6
3-4 days per week	29.7
5-7 days per week	18.9
Walking as recreation (%)	
Not at all	5.4
Less than once a month	16.2
1-3 days per month	27.0
1-2 days per week	27.0
3-4 days per week	13.5
5-7 days per week	10.8

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VR experience

	n=37
Sence of presence (score on 5-point Likert scale)*	
Mean ± Standard deviation	3.54 (0.37)
How realistic is the VR environment (score on 5-point Likert scale)*	
Mean ± Standard deviation	3.65 (0.48)
Virtual reality sickness (score on 5-point Likert scale)*	
Mean ± Standard deviation	1.72 (0.49)
Task load for walking on the VR-treadmill (out of 100)**	
Mean ± Standard deviation	33.24 (16.17)
Time spent in VR (min)	
Mean ± Standard deviation	7 (2.4)

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* A higher score indicates a higher sense of presence, higher score on how realistic the VR environment is, and higher feeling of virtual reality sickness.

Important street characteristics

Important street characteristics

Buildings: **CS**

- P: "I don't really find all those black facades pleasant either. They're actually a bit blind facades, so, I think that just takes the life out of the street.“ **– F 32**
- P: "I think it is a beautiful place. There are beautiful houses” **– F 12**

Decay:

- P: "I think it is a rather shady neighborhood, generally speaking. Those bars, quite special, well, that over there looks like a rather decayed backyard.“ **– M 31**
- P: “Nice trash cans. It's bad for the environment when you throw something on the ground “ **– M 12**

Important street characteristics

Natural elements:

- P:"The trees are… really nice. Yeah, finally a bit greener.“ **– F 41**
- P: "Here I do see a bit more trees, like in that little square. I see 4 or 5 trees and then some plants. I find that nice to walk.“ **– M 12**

Openness:

- P: "No, I like that square, that square is… That square, it's much more open.“ **– M 61**
- P: "I like walking here because it's quite open.“ **– F 57**

Important street characteristics

Walking facilities

Crossings:

- P: “A crossing is always good. Because then you can cross the road safely.” **– F 21**
- P: "There are also many places where you can cross. I think that's good.” **– F 20**

Legibility:

- P: “Those cobblestones just indicate that you can park. And I find that orderly too. Just that it's a demarcation. That also doesn't lead to any discussions.” **– M 35**
- P: "Here it's a bit unclear where I should walk.” **– M 24**

Width:

- P: “Here I have to walk on the parking spaces to pass those people. So, it's very narrow here. For two people to walk.“ **– M 33**
- P: "I think it’s a very wide sidewalk. So actually, I find that very pleasant." **– F 31**

Important street characteristics

Walking facilities

Obstacles:

- P: "Those poles are a serious hindrance.“ **– F 27**
- P: "Too many traffic signs. They could centralize them all and do it differently.” **– M 68**

Sidewalk quality:

- P: "Here, for example, there’s an unevenness in the sidewalk. That might be a risk for tripping, but also for example, for wheelchair users.“ **– F 32**
- P: "Well, the surface is already quite good."**– F 72**

Important street characteristics

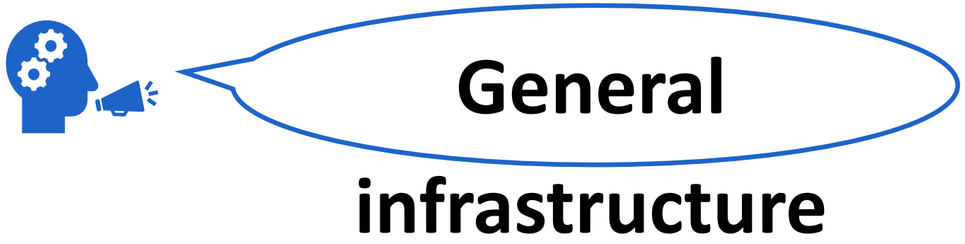
Barriers - separation:

- P: "Those poles provide some kind of separation towards the cars. I think that is positive." **– F 55**
- P: “I'm far enough from the cars as a pedestrian here, at least at this point. I think it’s much safer. If I would be walking here with a stroller or with children, I would find that pleasant.” **– F 31**

Busy traffic:

- P: “I find it a fairly busy street, and I don't really like that.” **– F 12**
- P: "It's also not too crowded on the sidewalk, so I don't feel like I have to walk around people." **– M 24**

Important street characteristics



- P: "Yeah, um, it's good that there are streetlights, so you can see at night when you go for a walk.“ **– F 14**
- P "I think the bike parking is quite nice. It gives a good feeling; I don't know why.“ R: “That is nice a a pedestrian?“ P: "Yeah, I don't know, I like it. It's just the feeling of… There are people cycling, I find that nice.“**– M 17**

Conclusion

VR in combination with an omnidirectional treadmill can be used as a new method to identify which street characteristics promote walking

Applicable to different sub-groups of pedestrians

Safe and standardized scenarios

Easily adaptable

What about smell, evenness, slope…?

→ Overall score on sense of presence and realism is still good

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Accessible tool for citizen-based science

Future Plans

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