The guide for

Stimulating

Passenger Interaction

In autonomous vehicles

Why?

The way we are travelling (together) nowadays will be very different in a couple of years. The role of the driver disappears because of the evolving technology of autonomous driving[1]; and the way we communicate amongst each other gets less and less personal because of the increasing amount of digital communication[2].
Whether your business or personal interest includes public transport, or other types of (shared) travel services, this guide could be of value to you.

A handful of requirements are provided with the common goal of stimulating interaction amongst passengers in a future-proof way (specific extra conditions might be necessary depending on the amount of travel-time, available space and amount of passengers).

Reader's guide

The provided requirements (**purple pages**) are all related to each other and, therefore, the application of any individual requirement should be done so while being mindful of its interconnectedness with the others. Equality between requirements is not always necessary; sometimes one requirement plays a bigger part than the other requirements. To clarify how this ratio between requirements could stand, an example of implementation is given as well as an example of a fitting scenario (**blue pages**).

The requirements do not require reading in a fixed order, although some requirements relate closely and therefore refer to each other (**bold text** indicates such references).

Background information

23rd April 2020

This guide is part of a graduation project, as a final part of the Master program 'Design for Interaction at the University of Technology' in Delft. The requirements discussed in the guide are insights gained by testing with several low-fidelity prototypes in test set-ups. The main function of the prototypes is to demonstrate which requirements are needed for stimulating interaction, it is not directly related with the travel itself. Therefore for this exploration, it was sufficient to use test set-ups, rather than actually testing inside of vehicles.

The wider graduation project focussed on stimulating interaction in a specific vehicle: the Hydrofoil *Seabubble*. For this reason a scenario, and a form of implementation of requirements regarding the Seabubble, was used as a case study. However the requirements can be implemented in many other types of shared (autonomous) transport, such as automatic people mover-systems, or any other form of personal rapid transport systems. Whether the mode of transport relies on either cable or rail systems, or no fixed system at all, the requirements are applicable for all.

The *Seabubbles* became part of the graduation project in collaboration with Advier and the Cities of Thing Lab of the TU Delft.

Thank you for reading,
Ilse van Zeumeren

TU Delft

ADVIER MOBILISEERT

SEABUBBLES

Possible area development[3]
High quality public transport (HQPT) infrastructure till 2039
+ Possible Seabubble route

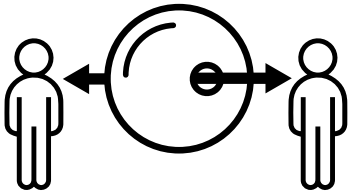
Example scenario

To illustrate in which scenario it would be interesting to stimulate interaction amongst passengers, the following example is given:

People living in water-rich surroundings whose first and last miles of their journeys take place on the water, in order to reach other transport-routes (illustrated by the figure on the left), a Hydrofoil called *Seabubbles*[4] could take care of transporting these people from and towards their homes. This vehicle offers 4 seats and a flawless ride because of its hydrofoil technology: perfect conditions to stimulate interaction amongst these people (who are actually neighbours).

The frequent encounter (5-10 minutes) that these neighbours will share inside the small vehicle, can be used to stimulate some kind of interaction amongst them.

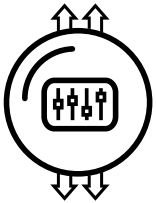
A facilitator for interaction



A form of indirect contact could lower the threshold of starting an interaction. It requires an indirect focus point, taking in sort of a facilitator role in which the kick-off of the interaction feels more anonymous, almost unintended. This unintended character might trigger a feeling of surprise (passengers were not planning it to happen), which could be the trigger for passengers to start talking about how they all experienced it.

The so-called facilitator should not take the focus of attention; passengers should have the feeling that the interaction came naturally, with the facilitator primarily as a means for this interaction.

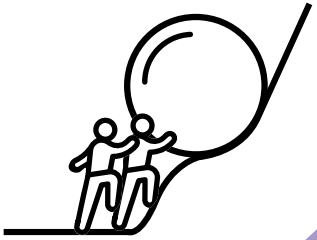
Supply a sense of control



The passengers should be given (a sense of) control over something that influences their direct surrounding. If the (feeling of) control can be influenced together and/or simultaneously, passengers' curiosity will be triggered, which could result in interaction. The effect should be made clear in some way, showing what the passengers are accomplishing (together). This relates to the **balanced feedback** that should be given. The way of supplying control should fit the way of travelling and the type of passengers (it should not be too future-oriented if the vehicle or the type of passenger is the opposite).

Moreover, the fact that the passenger does not have to take the role of the passive passenger[5], but is occupied with something related to having control, could result in higher acceptance of autonomously controlled vehicles.

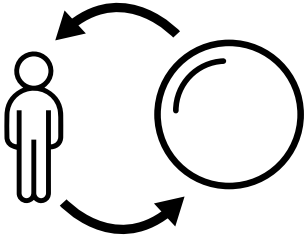
A need for simultaneous effort



There should be a need for simultaneous effort to get something done, in which a balance should be found between keeping passengers stimulated to put in effort, but not so much that they get discouraged. Also, it should be kept in mind that asking for too much effort will attract too much attention towards the facilitator. In this case the facilitator does not fulfil its main task anymore, which is having an unobtrusive role, but instead it will take the focus of attention.

This requirement also asks for direct **feedback** to show the effect of the passenger's effort and to keep them stimulated to continue.

Balanced Feedback

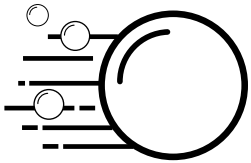


A form of feedback should be provided so passengers do not feel (too much) left in the dark during the interaction. It is not about negative or positive feedback, but more about the effect and reasoning of their actions and those of others.

The feedback should be given in a notable, but subtle way. It should not take attention, yet it needs to be able to pull people out of their own thoughts (or even comfort-zone). If there is too little feedback, passengers might keep their experience to themselves. It might lead to passengers starting to reflect on their own what is happening, resulting in a more individual experience.

Furthermore a balance should be obtained in which passengers feel informed, although not everything is completely spelled out (a bit of room is left to generate **uncertainty**).

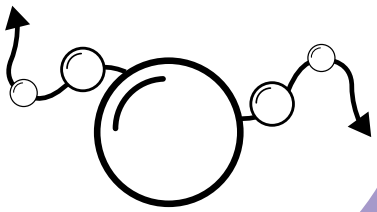
A non-static character



The feedback should be supplied in a non-static way. A non-static character will result in a loose atmosphere, which could positively affect the social attitude of passengers. Moreover it could function as a warm-up to get passengers in the right active mind-set in relation to interacting amongst each other.

This character could be achieved by continuously providing **feedback** or by actively stimulating **(simultaneous) effort** and/or taking **control.**

Successive stimuli



There should be a combination of successive (discrete) stimuli, instead of one stimulus, which are spread over the entire length of the journey. The stimuli should mainly be a means for interaction, without it taking the focus of attention (adopting a position of a **facilitator**).

The chances of triggering divergent types of passengers are being raised by maintaining several (different) stimuli. When it is self-learning, it could even measure if (and which) stimuli are needed for that specific moment and specific type of passengers. In this way, the entire length of the journey can be used to stimulate interaction and to incorporate as many passengers as possible.

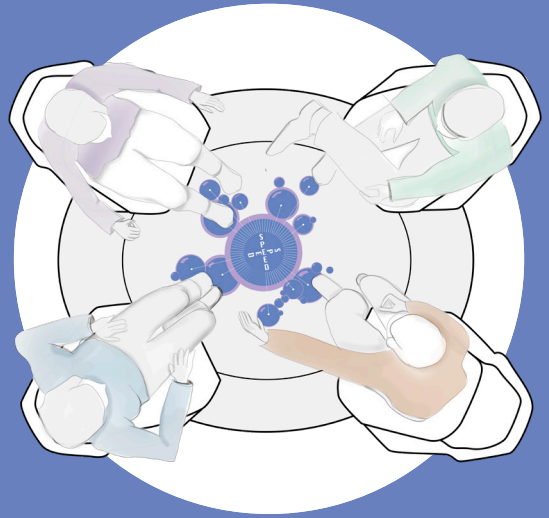
Create uncertainty

(Offer a mystery)

A certain amount of uncertainty should be created, related to a function and/or related to the effect of passengers' actions. The mystery of what might happen or how something might work, could trigger passengers to start explore together (which relates to **simultaneous effort**). The fact that the passengers already share the feeling of uncertainty could feel as if they have something in common which they might want to share.

Example of implementation

A good example of a quite literal implementation of the requirement **control** is the *SpeedBubble*. By **simultaneous effort** of the passengers, they can have (a restricted amount) of control over the autonomous Seabubble. **Feedback** is given by the increasing amount of projected bubbles when they speed up; it decreases when one of the passengers decides to drop out (**non-static character**). The *SpeedBubble* lets the passengers work together indirectly and it gives all of them a joint focus-point (**facilitator for interaction**). The fact that the passengers do not know the level of experience and who might take the lead creates a certain amount of **uncertainty**.



A self-learning check-in system could keep up with the level of experience (commuters or day trippers) and adjust the amount of **successive stimuli** during the entire (short) journey. By slightly challenging even the most experienced ones, everyone will have to keep actively involved and possibly stimulate other passengers to collaborate.

This interactive control-system projection is quite future-oriented (adopted to the futuristic character of the Hydrofoil *Seabubble*), but the implementation of requirements could be scaled down to complement present types of transport.

Situation specific points of attention

Although the requirements can be implemented in many different kinds of (autonomous) transport, every type of transport comes with situation-specific points of attention. These points are briefly discussed.

Type of passenger

Different kinds of passengers require different approaches. The level of familiarity can be an influencing factor in people's motivation for interaction. Furthermore, individual-oriented passengers are in need of a different approach than social-oriented passengers.

Length of the journey

One needs to take into account that every passenger is still following their own scheduled journey, meaning that most of them have different destinations and so their travel-times will differ. The requirements should be applied in a way that is usable for both short and long trips. This leads to two points of attention:

1. The passengers who remain while others depart should be motivated for (another)interaction.
2. An easy entry option is needed to maintain a low-threshold for the passengers entering in the middle of another passenger's journey.

Type of transport

The possibilities per type of transport greatly differ. One must take into account the amount of space that is available, the amount of light that comes in, vibrations that might occur as well as seating-position (which direction passengers are facing and their distance between each other). All these transport-specific factors can open up creative solutions for interaction, but can limit possibilities as well. One application of requirements might be a very successful formula for one type of transport, while it could be inappropriate for another.

References

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