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HOW DESIGN CAN SUPPORT GENDER AND DIVERSITY SENSITIVE SMART MOBILITY SOLUTIONS

Key Words

Gender
Design
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Abstract

From June 2020, design research activities have been conducted as part of the 3 year, H2020, Pan European TInnGO project (<https://www.tinn.go.eu/>) which aimed to create a sustainable paradigm shift in gender and diversity mainstreaming in transport. Such a shift is needed due to the lack of sex disaggregated gender data, gendered use of transport, gender gaps in employment and decision making. This lack of diversity together with difficulties in engaging 'hard to reach groups' in transport planning, means transport services and innovation continue to fail to consider gender and diversity. A central concept of TInnGO is to use design activities as 'provocations' to engage with people in new ways – e.g. through visualizations, vignettes and cocreation activities – to develop greater insights into mobility problems and drive gender and diversity sensitive smart mobility solutions. Significantly disrupted by the Covid-19 pandemic, this became an on line activity supported by an Open Innovation Platform.

This paper draws on the experience of the TInnGO design team in their creation of over 30 design led provocations to stimulate discussion on how to create more humane cities, which are aesthetically pleasing and inclusive.

1. INTRODUCTION

The aim of this paper is to illustrate, in a Pan European context how design thinking in development of smart mobility concepts can provoke greater awareness of the issues faced by users of transport systems.

Historically, men have dominated engineering and built environment professions. This, together with practices which have prioritized the male commute and journeys in and out of the city, has left modern cities with a legacy of spatial planning which caters for the needs of males, separating work and private spheres, and limiting women's opportunities to travel easily when fulfilling their roles as carers [1]. This has created contemporary problems: cities with outmoded, legacy transport systems which support outdated modes of employment and city usage. It is now recognised that women's journeys are not well supported by such systems [2], even though they form a higher percentage of public and sustainable transport users. Women typically combine unpaid care work with a paid job; they make more multimodal short journeys and trip-chain [3] (many small trips during the day: from work to school, from home to retail outlets). In a daily commute women make more trips related to shopping and children's education, which tend to be relatively short, whereas male commutes, tend to be longer [4].

We can therefore conclude that transport systems rarely cater for women's mobility needs [5]. Cities are car-centric, designed around male models of traveling, in which private forms of motorised travel has dominated. This has been exacerbated by the male dominance of all areas of transport design and engineering, and a bias towards high cost infrastructure projects over more sustainable alternatives. Due to the intersection of socio-economic factors, women (and other diverse groups) form the majority of public and sustainable transport users [6]. They are also the main actors leading a positive change toward sustainable cities. However the use of sustainable transport measures exposes women and those from other disadvantaged groups to gender-based street (and other forms of) harassment [7]. These and other factors contribute to gendered perception of cities and public spaces, and feed into a range of gender inequalities and injustices persisting in urban areas [8], leading to gender transport poverty [9].

2. THE ROLE OF DESIGN

By using an empathic approach [10], the TInnGO project has facilitated co-creative activities to address the gender bias in design of smart mobility products and services; building around users' experience, particularly of excluded or marginalised groups. The application of visual design to present concepts or working ideas is a widely accepted methodology in industry and design education. Using design to induce a response, that can break down barriers to discussion is less common outside of design studios or education. Transport planners and local authorities might place a high emphasis on citizen engagement, but find it difficult especially with hard to reach groups. As such, views of those groups may not be considered. Breaking this cycle is important if future transport is to be inclusive.

The TInnGO project sought to demonstrate the value of collaborative or participatory design, engaging new and different dialogues centred around the conceptual design of gender and diversity-sensitive smart-mobility. A portfolio of design concepts demonstrates the role of design thinking in a technology and science led sector. As with all new ways of working, or new findings; context is key. And context in the scope of design is paramount to understanding real need; and by virtue of better understanding the reasons, so the greater clarity of a design brief. we facilitated an Those with experience of exclusion and gender disparity, often struggle to be heard. Through the OIP, we have tried to create new ways to inform design briefs by experience; resulting in gender inclusive, respectful and responsible concepts. In this way we hope to break the barriers of passivity, tokenism and confirmatory feedback of *'hard to reach groups'*, whose exclusion merely replicates *'ex'clusivity*.

3. THE TINNGO DESIGN CONCEPT AND THE OPEN INNOVATION PLATFORM

The TInnGO co-design model centred around 10 national EU hubs, recruiting and training citizen scientists meeting in local design studios. There they could discuss mobility problems, turn initial ideas into briefs or mind maps which could be transformed into sketches, by designers from the UK hub shared via our Open Innovation Platform (OIP) (<https://oip.transportgenderobservatory.eu/>) – a web-based gallery and forum. Here, these could be presented back to the group and other interested parties as design provocations to elicit further, deeper insights based on collective mobility experience, progressing an iterative design cycle. The concepts, termed as *'design provocations'*, are used to *'initiate critical reflection on issues that are often overlooked, obscured or accepted as natural practice'* [11].

Our student design team (distributed, due to Covid in Indonesia, Spain, Pakistan, Serbia and India) had to develop empathy/envisage the problems of vulnerable user groups in different European cities based on (a)synchronous communication via MS Teams, Mural and Zoom. Design provocations were uploaded on to the OIP for comment by the wider *'non-design'* TInnGO community, using a discussion-board format who mostly have no design background.

4. THE OPEN INNOVATION PLATFORM

The project's Open Innovation Platform (OIP) uses a simple discussion forum, project gallery and feedback mechanism to discuss needs, share experience, feedback on ideas and disseminate general project material providing team-wide accessibility and encouraging contributions from the wider community to expand the knowledge base of the project. The OIP consists of an Ideas Lab, Initiatives, and Discussion was launched in March 2020 and welcomes inputs from different, non-academic audience. It has received over 60,000 views, and 140 contributions with 43.6% from UK, 15% from Italy, around 12% from Germany and France, and 8.6% from Spain (all partner countries) The Ideas Lab and Initiatives are almost equally

popular among viewers with 45.7% of all views accounted for former, and 47.9% counted in Initiatives section.

Although interacting with social media forums is now routine, discrimination, aggressive behaviour, 'trolling' and general unpleasant language remain all too familiar. Despite over 60000 interactions we have received no aggression, or trolling despite many topics being sensitive and writing about the need for change. There has been no hyper criticism of shared work, or presentations. We have shown disparity amongst people and produced ideas that try to resolve the problems. This begs the question if why TInnGO design provocations have not faced hostility?

All visitors may offer reflections on design ideas and posts including reference to personal, lived experiences of mobility issues when moving around the city, or comments on designs. This is an essential part of user-centred design and allows a richer understanding of how smart mobility can enable more humane cities.

Engagement tools like the OIP can complement other participatory methods in the transport and mobility planning process by providing another type of dialogue, based around sketches. Whilst dialogue between designers, transport stakeholders and users can be difficult, if not actually tokenistic, design provocations provide opportunities for deeper engagement, understanding and empathy all of which are key to creating more humane and inclusive cities. Table 1 presents examples of design provocations and responses on the OIP.

5. THE OIP AS A POSITIVE ENGAGEMENT TOOL

In terms of TInnGO, design students and tutors work over designs, from a received brief before uploading them and a short commentary on to the OIP, where they may be commented on by any visitors. Our experience over 12 months has been that the OIP offers a number of benefits over face to face critiques. For example:

Feedback is non-confrontational and intentionally constructive. It is taken on face value, noted and integrated into the idea's narrative.

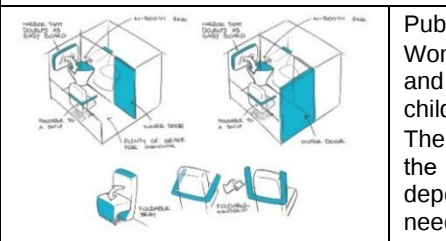
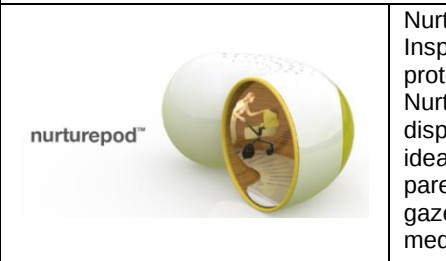
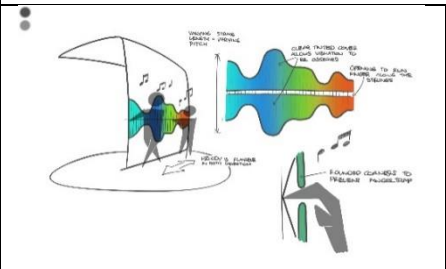
Discussion is asynchronous, allowing viewers time to reflect with others.

The 'provocation' is not the final design. It is a concept based on discussions, allowing the viewer to see the thinking and development stages. We have aimed for an 'understandable image' which can foster feedback about the idea, rather than its limitations, leading to comments such as 'if only it could do this...'.

The OIP's purpose and its designs are to start discussion. We are not asserting facts, or insisting on something changing – so we create a think-tank.

The design briefs and the genial, open manner in which we discuss a wide range of topics, and share experiences, comes very much from the heart; it is human experience and we uncover shared concerns using humour and anecdote. Discussion takes a positive angle, 'how can we make this better?', 'does anyone else know about this?', 'I know, why don't we...', rather than merely criticism.

Table 1. Example of designs and feedback

Design sketch	Short explanatory narrative
 The sketches show two versions of a toilet cubicle. The left version includes a wash basin, mirror, and storage shelf. The right version shows a different arrangement. Below are three types of seats: 'STANDARD SEAT', 'FOLDING SEAT', and 'FOLDING SEAT WITH BAGS'.	PublicToilets Women spend almost twice as long in toilet than men, and are more likely to use facilities with a dependent child/adult or a person with additional needs. The concept design addresses the problem of using the toilet by parents/carers' whilst travelling with dependents who cannot be left unattended, but also need some privacy and a quiet place
Feedback	
- Why can't we have a wash basin in the cubicle ? This should be standard for all toilet cubicles! - Somewhere to leave a bag or a fold down ledge/seat for a small child to wait in the cubicle with us. Bag theft occurs when handbags are left on the floor where there are gaps at the bottom of the door - Positioning of sanitary bins - we need them close but not brushing our thigh! Could they be wall mounted? [User 8] - Who would have access to this and how? What is the footprint compare to the space available in station	
 nurturepod™	Nurturepod Inspired by a sketch of 2 acorns and the concept of protection afforded by natural forms, the NurturepodTM is an infant feeding space for displacement locations such as airport lounges. The idea was to provide a special, quiet moment where a parent could nurture/breastfeed a child away from the gaze of other people, and break away from the medical aesthetic of spaces.
Feedback	
This looks like an inviting space, and could be made cosy, but thinking back to personal experiences, parents may prefer some more 'raised' seating inside here so that it is easier to get comfortable with a child- getting down almost to the floor is not easy when you have baby, toddler, bags and perhaps a pushchair to manage. [User 9]	
 The sketches illustrate a bus stop where users interact with a large, colorful, wave-like interface. Labels include: 'DIGITAL TONE CHANGES TO PREVIOUS FUNCTIONALITY', 'CLEAR THREE COLOURED LIGHTS CORRESPONDING TO MELODY', 'CHANGING TO NEXT FUNCTIONALITY', and 'PUSHING DOWN ON THE SCREEN'.	Melodic Bus Stop For children, anticipating the next bus could feel like an eternity. By attaching strings of varying lengths, children can have something to keep themselves entertained while also learning about how the varying length affects the note of the melody, invoking curiosity and creativity.
Feedback	
A lovely idea, would appeal to a range of users especially children and older people. Yet if applied say, to the West Midlands region, other issues would need to be considered. E.g.is the bus stop served by electricity points, will there be room for timetable information, safety messages and help points? Could it distract from existing digital advertising and be prone to crime and vandalism? For those customers with hearing impairments, a hearing loop system may need to be applied. Maintenance costs and funding should also be considered in any design options. But I feel this concept could work well at interchanges or mobility hub sites, where people may have to change modes. [User 12]	

Anonymity, privacy, security means the OIP is devoid of personal details. Usage is focussed on responses to design provocations, or experiential knowledge that may be difficult to express when face to face, either digitally or when co-located.

6. CONCLUSION

Mobility constitutes complex social activities and thus transport planning requires instruments addressing the knowledge of different actors, social groups, transport modes, technologies, organisations and authorities. New mobility solutions should address the needs of all citizens and respond to global sustainability goals. In order to address existing biases, and support design at a distance during the covid pandemics, we have demonstrated a participatory co-creative platform, which combines design provocation to initiate common action, which will lead to a new dimension of mobility in cities and towns.

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