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Gender-related contemporary challenges in the transport ecosystem and women's mobility needs TInnGO (special session on "Women in Transport - EU Projects for Change")

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Abstract

TInnGO addresses contemporary challenges in employment, education and male-domination, through an intersectional analysis applied to examine inequality and privilege in transport and mobility. The European transport sector is marred by strong, persistent biases, which produce gender and other inequalities, permeating the sector whilst having wider repercussions in relation to quality of life, accessibility and inclusivity.
The TInnGO project will create a framework and promote mechanisms for sustainable change in gender and diversity sensitive smart mobility through the development of a Pan European TInnGO observatory. This will lead, coordinate, and be fed by hubs across EU (UK, France, Germany, Greece, Spain, Portugal, Romania, Baltic states, Denmark/Sweden, Italy) providing leadership, innovation and critique of smart mobility innovations. The ambition is to become a template for further observatories monitoring and addressing barriers to women's mobility through gendered, culturally sensitive smart mobility innovations. This paper provides an overview of the concepts and initial results.

Keywords: Europe, co and participatory design, gender mainstreaming, gender and diversity sensitive, smart mobility.

1. Introduction

The EU funded TInnGO project - Transport Innovation and Gender Observatory - brings together 20 partners from 13 EU countries to create a framework and mechanisms for a sustainable game change in European transport through a transformative strategy of gender and diversity sensitive smart mobility.

Society is full of norms regarding gender, gender identity and gender expression, age, ethnicity, religion, sexual orientation, functionality and class, leading to people being sorted into categories. Because of this categorization,

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norms lead to variations in people's structural living conditions – everyday life options and resources – including mobility (Christensen and Breengaard 2019; Ihlström, Levin and Henriksson, 2019). TInnGO recognizes the huge gender inequalities in current transport provision, addressing contemporary challenges (e.g. employment, education and prevalent male dominated STEM cultures) and future mobility scenarios in EU transport strategies, to draw up a new route for Gender and Diversity Sensitive Smart Mobility. It will use intersectional analysis to scrutinize inequality and privilege in transport and mobility using newly generated and legacy transport data, to show the prevalence of transport poverty experienced by women and traditionally hard to reach groups (e.g. those with (hidden) disabilities, economically disadvantaged and ethnic groups). TInnGO will combine existing tools and knowledge with new data, approaches and strategies as follows:

- Existing gender mainstreaming tools (such as Gender Impact Assessment (GIA) and Gender Action Planning (GAP)) will be used in advanced with design and cultural research methods (such as workshops, ethnography, scenario building and participatory citizen research).
- Existing mobility data will be collated, and new standards developed for collection of socio-demographic mobility data which enables women's travel behaviour to be prioritized using intersectional analysis. It will do this, whilst recognizing that smart mobility should be inclusive, adaptable and capable of intelligent action in the light of new information.
- New datasets, analysis and resources will be created to inform both policy and practice leading to more equitable, fairer smart mobility.
- TInnGO will co-create, attract support and investment in GAPs and gender sensitive smart mobility innovations by working with different groups of women and local stakeholders to effect change.

2. Concept

Previous studies and strategies have demonstrated the importance of changing European transport in order to meet the ambition of a safe, efficient, technologically advanced, sustainable and accessible transport system. Despite this vast body of knowledge and numerous policy recommendations, ground-breaking changes in European transport priorities or policies have not occurred.

The TInnGO project builds on and extends existing European gender and transport projects. Firstly, the Transgen project (2007) outlined gender gaps, the usefulness of GM in transport systems, transport labour market, and the gendered character of transport -related media. Secondly, the EIGE report (2012) that substantiated transport and sustainability as a vital part of the European responses to the Beijing Platform of Action and equality gaps. Thirdly, the DGMove report (2014) which documented the different travel patterns and concerns of male and female transport users, the limited attention placed in developing gender-specific policies, programmes, and mandates, the evolution of intersectional issues such as employment trends, reduction in traditional gender divisions around household roles and responsibilities and 'mobility of care' as a concept to explain trip chaining

The TInnGO project will build on such initiatives by taking an intersectional perspective – related to socio cultural categories such as class, ethnicity, and age - particularly in relation to smart and sustainable mobility. *Gender* refers to the social construction of roles, responsibilities, and obligations associated with being a woman or a man. However, since the concept of gender emphasizes the social meaning making of gendered identities, it opens up for more than two genders, such as transgender, or non-binary gender.

Gender and diversity awareness and action plans will be created for translation into different cultural contexts to develop gender and diversity sensitive smart mobility as a fundamental component of a smart city. Considering *Diversity / Intersectionality* requires the inclusion of more social categories, such as age, ethnicity, class, sexuality, disabilities, etc. Working with diversity (or intersectionality) in research, planning and policymaking requires awareness of how the category of women, for example, does not represent a single group, but contains large differences due to variables of age, class, etc. (Christensen and Breengaard 2019). The TInnGO Roadmap connects the concepts of smart transport and smart mobility to gender and diversity to create *Gender Smart Mobility* as a 'critical and creative concept with the aim of transforming and widening the scope of notions, practices and policies of smart mobility' (Christensen and Breengaard, 2019, p. 10). Given that transport systems are already gendered, the question for future action is how we to avoid the reproduction of gendered meanings and practice in new smart mobility technologies and services.

TInnGO will increase the knowledge about gender and diversity in the progress of smart mobility, and contribute

to the development of methods and tools for gender and diversity mainstreaming in the planning processes for new smart transport systems. Its focus is

- To develop a replicable and sustainable Pan European Observatory and model for TInnGIdLabs which feed into and are then informed by the Pan European TInnGO.
- To develop validated, practical and replicable gender and diversity sensitive tools and methods in line with the 'Gender and Urban Transport' to facilitate
    - Gender mainstreaming across the Smart Mobility (SM) ecosystem.
    - Cultural and behavioural change in relation to smart mobility services, ICT and transport usage
    - Creation of usable, gender and diversity sensitive mobility datasets desegregated against socio-demographic categories using intersectional analysis,
    - Demonstration of the power of gender sensitive analysis and mainstreaming to inform/predict SM innovations,
    - Policy makers and innovators in the design and implementation of gender and diversity sensitive smart mobility measures through the creation of Gender Action Plans linked to Sustainable Urban Mobility Plans (SUMPs).
- Co-design of gender-sensitive smart mobility innovation and dissemination at local level.
- Women's entrepreneurship, inclusion and requirements in the SM sector.

This will be achieved by creating a framework and mechanisms for sustainable change - the TInnGO Observatory (table 1), which will lead, coordinate, and be fed by hubs across EU providing international and national leadership, innovation and critical reviews of smart mobility innovations. The hubs will translate knowledge in the gender research area into a form applicable for stakeholders, so they can consider gender-specific requirements of certain user groups, for example in the development of mobility offers. The TInnGO Observatory, national hubs and TInnGIdLabs will spread awareness and dialogue about gender related issues. TInnGIdLabs will be used to create excitement around inclusive mobility, which will complement work on computer models, big data repositories and intersectional analysis of mobility, policies and practices.

Table 1. Mapping TInnGO as an observatory

Traditional observatory	TInnGO observatory
An entity	Virtual entity with national, virtual and physical hubs
Providing an extensive view of a phenomenon	Smart mobility across EU hubs
Providing tools or research instruments to enable an examination	Datasets, GM and gender action planning tools, standard surveys for use across hubs and sector
Open to scholars and those wishing to increase understanding of the phenomenon	Open source legacy and new mobility data
Creating inspiration to make new contributions.	TInnGIdLabs act as ideas factories and outreach centres to support and enable citizens to express creative and transformative ideas around gendered, inclusive smart mobility innovations
Leadership	Pan European TInnGO, clear focus and tools providing leadership, innovation and critical review of smart mobility innovations

3. Methodology and approach

TInnGO will use and advance gender mainstreaming (GM) which has proven useful in the promotion of gender equal transport with its duel focus on just and accessible transport and in achieving gender equality in the transport labour market. GM consists of tools to identify imbalances and inequalities in processes where gender has been invisible or regarded as unimportant. It has been suggested as a tool for mobilization and participation and for addressing gender and diversity in new ways TInnGO will advance GM into diversity mainstreaming exploring influences on travel and transportation needs.

Given the project's scope, a mixed method, pragmatic approach has been developed (Table 2). Many of these, such as the use of intersectional analysis, co-design and citizen science are innovative in the field of gender and transport.

Table 2. Overview of Methods to be used in TInnGO

Method	Description

Gender and diversity Smart Mainstreaming	TInnGO will further develop and employ models of gender mainstreaming in transport in line with recommendations
Mixed methods	Quantitative and qualitative methods will provide thick explanations and new hypotheses for gendering and diversifying key notions and gendered/genderless stereotypes such as user, passenger, safety, smart mobility
Qualitative research methods (feminist social psychology methods + Personal Construct Psychology+ citizen social science tools and methods)	Feminist research acknowledges the centrality of female/gendered knowledge and experience and places an emphasis on the social construction of meaning, with emphasis on the role of language as the primary vehicle to enhance criticality of thinking, broaden research scope providing an extra dimension by adding to understanding of women's daily lives.
Quantitative methods	Development of an interrogatable and standardized open access and open data repository combining historic and real-time data sets for use with intersectional analysis to uncover new and significant mobility patterns. These will be modelled to evaluate and inform existing policies, operational issues, transport infrastructure and innovation.
Big data analytics and Agent Based Modelling (ABM)	ABM entails the sampling of the quantitative data collections into a larger data scenario perspective. This will be used for enhancing data and strategies; geographical comparisons; advancing GM; validation of qualitative data; consciousness raising and new policy recommendations
Digitalized and visual methods	Media and visual analysis will be combined with textual and visual methodologies to understand how future scenarios of smart mobilities are embedded in existing and emerging gendered discourses. Themed discourse analysis will be based on digitalized and visual research methods in a topic modelling method which allows the combination of quantitative/distant and qualitative/close readings of the textual corpus. It will provide a knowledge based comparative analysis of various gender diversity and transport discourses throughout Europe, using national media archives as data material and together with a visual analysis of marketing material a knowledge-based analysis of smart mobilities.
Case studies	Case studies allows a multi-perspective analysis to develop theory, evaluate assessment programs, and develop interventions.
HUBs as living labs/mini publics	The TInnGO Hubs (each having a specific area of interest based on local concerns, e.g. safety, bicycling, design) will function as living labs, according to the principles of deliberate and participatory democracy, user-centred design and open-innovation to inform practice, policy and act as a collection point for issues relating to women's mobility.

4. Initial results

4.1 Progress towards gender mainstreaming in representative countries

Ihlström, Levin, and Henriksson (2019) conducted an initial desk top review of methods and tools for gender and diversity mainstreaming in the transport sector in eleven European countries: Denmark, France, Germany, Greece, Italy, Lithuania, Portugal, Romania, Spain, Sweden, and United Kingdom to assess the level of progress in gender and diversity mainstreaming. An overall conclusion was that none of the eleven countries have sufficiently developed and applied methods for gender and diversity mainstreaming in the transport sector and they seem to lack overall strategies at a national level. More elaborated examples could be found at local and regional level and from applied research projects funded by research agencies trying to improve and speed up sustainable development. Examples of best practice (as shown in Table 3) were identified from ongoing work in Germany, UK, Spain (Valencia), Italy, Denmark and Sweden which could form the basis of a toolbox and disseminated through the observatory.

Table 4 Examples of best practice in GM

Country	Practice
Germany	Handbuch Gender Mainstreaming in der Stadtplanung und Stadtentwicklung" - awareness-raising handbook for gender-sensitive issues in interdisciplinary planning.
Sweden	1) Manual on gender impact assessment for transport planning (Halling, Faith-Ell & Levin 2016) provided examples, analysis questions and indicators for each national gender equality objective. 2) "Gender mainstreaming with intersectional perspective" (Almén 2016) providing a basic introduction to intersectionality.

Denmark	Handbook on gender equality and transport: "Bæredygtig & Ligestillet Transport" (Breengaard 2008) presents challenges in relation to knowledge about women's and men's transport needs.
UK	Regional/local examples of publications, initiatives and guidance e.g. the Transport for London's (TfL) "Manual for the streets" (2007) and "Streetscape Guidance" (2019).
Spain	1) Equal Opportunities Strategic Plan sets out priority measures and objectives for removing gender-based discrimination to attain equal opportunities. 2) Madrid Social Policy and Family Regional Ministry -Women's General Directorate have developed a strategy for gender equality which includes measures related to transport. 3) In Valencia GM is being incorporated into public policy and support manuals/handbooks exist in relation to this. The SUMP has inclusivity objectives.
Italy	Regional initiatives directed at women in public transport and car parking and car-sharing; e.g. "pink passes", reduced off-peak travel rates in public transport; "pink parking", parking spaces or free parking for pregnant women or women with babies in certain places.

4.2 Gender diversity in STEM

TInnGO specifically addresses issues and innovations in the field of Smart Mobility. This is commonly associated with the development of new technologies in transport, involving four aspects - Intelligent Transport System, vehicle technology, new mobility services and data (Jeekel, 2017). Women should not simply be seen as a passive user of SM, but also as provider- as a designer, engineer and innovation. For this this reason, we are assessing opportunities current and future opportunities provided to women in education and employment. Emerging out of traditionally male dominated Science, Technology, Engineering and Maths (STEM) subjects such as computing, engineering, manufacturing and planning, women may play minor roles or be directed into 'softer' or more qualitative work. A lack of diversity in STEM professionals has contributed towards a fractured and gender-biased transport ecosystem (embracing education, employment, operation, data collection and innovation) that does not allow a gendered Smart Mobility transport provision.

TInnGO will address this by developing a set of guidelines for use by educators in order to improve the gender and diversity balance in STEM and transport sector education. The first action requires gaining deeper insight into the situation on those topics in TInnGO contributing countries, for example looking at staff and student distribution in representative STEM secondary schools and universities, which might dealing with transport and SM both in teaching and research. The activities carried out and some preliminary results are presented in (Pirra et al., 2020). The accessibility of data and information is one of the main difficulties that had to be faced.

This has been accompanied (Pirra et al., 2020) by a desktop review of practices for encouraging and supporting women in STEM in TInnGO countries: they can be quite different and can include the way subjects are taught, the implementation of student centred and problem-based approaches or the promotion of gender balance through association, communication campaigns and awards. Preliminary results showed how campaigns proposed by technical universities for promoting STEM studies among girls attending secondary schools can influence their choices, as it could be inferred by the rise of the percentage of female students enrolled over the years. Moreover, the desktop review revealed the presence of a considerable number of associations and mentoring actions operating across our countries. They aspire to make women aware of their potentialities in a greatly gender-biased domain like the STEM one through workshops and communication campaigns. On the whole, the initiatives involving females and transport sector are very few: TInnGO project can try to fill this gap by yielding new knowledge and proposing innovative ways to tackle this topic.

4.2 Requirements for TInnGO observatory

TInnGO's chief vehicle for dissemination will be the observatory and open innovation platform to enable knowledge sharing, co- creation and collaboration across the different hubs. Although the hubs will not be active until 2020 and analysis was undertaken of the mobility planning process and which user groups have not yet been considered in this context. During a workshop with project partners from thirteen countries, the eight most important users/target groups were: citizens/ citizen initiatives; national authority/government; educational institutions; academics; pubic transport authorities/mobility service providers; mobility consultants; local decision

makers; local authorities/city and mobility planners. With regard to the Observatory, all the represented user groups act in a dual role - they are users and providers of information at the same time. But it is not enough to "just" identify the user groups/ stakeholders. Rather, they must be analysed and viewed in relation to their individual contexts of use, responsibilities, competencies and task flows. This is the only way to derive their Knowledge Goals (Maier, 2004), which ideally can later be met with the help of the observatory. For this purpose, profiles of the individual stakeholders were created. In the following, the profile of the *Public Transport Operator and Mobility Service Provider* (Schöne et al., 2019) is shown as an example.

	PUBLIC TRANSPORT OPERATORS & MOBILITY SERVICE PROVIDERS
CONTEXT OF USE RESPONSIBILITIES & COMPETENCES	• preparation of and participation in strategic planning concepts internally and externally • network expansion and line network design, updating of urban framework planning such as land use plan, urban development plan for transport • route identification and optimisation, determination of stop locations, securing trafficability • ability to quickly grasp complex knowledge and map it to one's own problem • a high level of knowledge based on a high level of education in the field of transport and civil engineering Regarding gender issues, this means e.g. → implementing gender-sensitive measures in transport companies
TASKFLOW	• user-centred design and operation of mobility and service offerings • implementation of safety and security standards • further development of mobility services with a focus on accessibility • responsibility in the role as employer, improve working conditions, design of workplaces and work tasks • participation in tenders • customer acquisition
KNOWLEDGE GOALS	Regarding to the repository, they pursue the following knowledge goals: → studies, data, numbers → knowledge of the diversity of users (Personas und typical Scenarios) to better address their services → relevant Good Practice examples → work experiences from other providers and operators → regulatory framework

In the joint evaluation of all Knowledge Goals, the profiles of the eight stakeholders mentioned above provide the first superordinate knowledge accesses for subdividing the knowledge to be made available on the platform in the future. *Theoretical Knowledge* includes studies, data and numbers as well as methodological insights. *Experience Knowledge*, on the other hand, includes relevant good practice examples that enable the adaptation of successful implementations to similar and/or other areas of application. However, in order to get as far as this, stakeholders usually have to inform themselves about *Country-specific Regulatory Conditions*, which include legal foundations, possibilities and limitations. Two further accesses to knowledge were formed by the demand for *Communication Information* and *Up-to-date Information*. While the first is intended to facilitate an exchange of knowledge through direct contact between stakeholders, the latter provides information on current projects as well as planned events and conferences.

Based on the evaluated Knowledge Goals and the available access to knowledge derived from them, the Observatory should have at its disposal and offer intuitive access to the desired information, allowing stakeholders can mutually benefit from the knowledge they provide. It is argued that such a user centred approach will overcome well known hurdles such as lack of contacts within the industry (especially at international level), barriers to access

to information due to institutional provisions or non-transparent publication channels, lack of knowledge of ongoing projects, due to an information chain that is too complex and/or too long, lack of preparation of the information so that it cannot be found.

The observatory (http://transportgenderobservatory.eu/uk-hub/), currently in its earliest instantiation, has also been informed by a state of the art review of over 35 worldwide observatories associated with the sector, through an analysis of characterisation, static and active content and interaction (Sanvicente and Woodcock, 2019). The benchmarking activities led to the development of a key set of features for the observatory including

- Clear definition of scope of observatory, its ambition and who it is for, what people can expect from it
- A business model to allow its sustainability and growth after the project
- user friendly interfaces and make an easy registration process
- Attach the observatory to a strong network to promote the widest dissemination of news and actions by key actors in gender and diversity smart mobility
- Use a map to show where the members/experts are to provide information about them and their expertise
- Create dissemination resources for different type of stakeholders (infographics, notes and videos)
- Promote events and social media of interest to the community, keeping the links live
- Provision of information in an organised and coherent manner
- Information in the form of factsheets, summaries and easy-to-understand sections such as “why this matters” with full length documents where appropriate.

And the need to avoid

- Inclusion of poorly described tools
- Downloading of additional apps or software to access or optimize content,
- Animated menus
- Non-integrated content and snap shots of work conducted by the project
- Social media which is not used or integrated into the main site
- Protected/non member areas
- Information which is not relevant to the scope of the project
- Broken or outdated links.

Features and functions that we did not see addressed

1. User driven content and material which had been uploaded by users. With an open innovation platform it is key that users are provided with ease of access and can share information, and comment on material
2. Open discussion forums and areas where users could exchange ideas with project partners and each other. This might be because they are restricted areas.
3. User centred design approach was missing in some observatories along with adherence to web usability guidelines. The site must be accessible across a wide range of devices, languages, and must be accessible to those with limited vision, hearing, dexterity etc.

5 Summary

The TInnGO project’s ambition is to raise issues of inclusiveness before new transport solutions and “smart” mobilities are implemented. If smart mobility is to live up to its hype, attention needs to be urgently placed on the on the needs and behaviours of diverse user groups and find ways to help them shape the transport sector. Many of the team have witnessed the successes and failures in the adoption of gender mainstreaming. Therefore TinnGo is process oriented, adopting transdisciplinary, top down and bottom up approaches involving various citizen groups, stakeholders, policymakers. The outcomes will be scientific knowledge (academic writings) and practical use (methods, tools, indicators, and data which enlighten the needs and behaviours of diverse groups in the transport sector). At this stage we assume that there is a need for shepherding the process of inclusiveness in the right direction – TInnGO will raise the awareness and help the process in the European countries studied.

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