TInnGO

Transport
Innovation
Gender
Observatory

WP3 – D3.2

Knowledge Map of Gender and Diversity Smart Mobility

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Deliverable fact sheet

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CO	**Confidential, only for members of the consortium including the Commission Services**	
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R	**Report**	X
D	**Demonstrator**	
W	**Websites, patents filing, etc**	
O	**Other**	

Abstract

One goal of the TInnGO project is the development of an information and knowledge platform on the topic of Gender and Diversity Smart Mobility. This so called Observatory will contain a knowledge base providing selected good practice examples, reports, guidelines, training materials and data sets on this topic with the aim to raise awareness of its relevance among the multitude of stakeholders in the mobility sector and to encourage them to initiate concrete activities in this direction.

To assist the later users in exploring the platform content and building a mental model of the subject area, a knowledge map is developed and implemented on the Observatory. The knowledge map supports a multi-directional access to the information from different user perspectives and information interests.

The Deliverable describes the theoretical background of the development and presents the structure and functional principle of the developed knowledge map.

Contents

List of Figures

1 Introduction

One goal of the EU project TInnGO, which deals with the subject of Gender and Diversity Smart Mobility, is to develop a topic specific knowledge base. This knowledge base will contain numerous practical examples from all across Europe, showing which activities are suitable to make the mobility sector more Gender and Diversity smart, so that it meets the needs of the different user groups and especially the hard to reach groups.

The knowledge base is intended to make mobility planners, decision-makers and citizens aware of the importance of the topic and give concrete examples on methods and tools so that they can contribute to the realization of the European Union's demand for a transport system that is truly accessible and usable by all citizens.

To support the later users of this knowledge base in exploring the contents, the possibility of alternative information access via a so-called knowledge map will be provided. The purpose of this document is to describe the theoretical foundation of the development of such a knowledge map in the context of the TInnGO project.

In chapter 1 of this deliverable the TInnGO project and the creation of the Observatory and the knowledge base will be described. Chapter 2 builds up an understanding of the concept and the subject area of Gender and Diversity Smart Mobility, and shows how a classification of the subject area was developed on the basis of numerous good practice examples, which serve as an important basis for the development of the knowledge map. The basic prerequisite for a functioning knowledge map, which gives users an alternative, efficient access to the information in the knowledge base, is a uniform tagging of the individual content elements. Chapter 3 focuses on the development of the knowledge map. For this a theoretical consideration of the concept as well as an analysis of 3 selected example applications is given. Subsequently, the structure and functionality of the TInnGO knowledge map will be presented.

1.1 The TInnGO Project

In the field of mobility, women still face major risks and inequalities compared to men. The reasons for this can be attributed primarily to unequal access to resources, education, job opportunities, but also to established socio-cultural norms.

Moreover, the requirements of so-called hard to reach groups are not sufficiently taken into account. As a result, barriers for certain user groups with special mobility requirements and mobility restrictions arise that make it difficult for them to use certain mobility offers. In order to

counteract this, the TInnGO project pursues the goal of a so-called "Gender and Diversity Smart Mobility" - a gender- and diversity-aware intelligent mobility, which deals with current gender- and diversity-specific challenges in the field of mobility. In order to achieve this goal, the project aims to develop a policy framework and instruments that will initiate a sustainable change and anchor principles of gender- and diversity-specific intelligent mobility in European transport, both at the level of mobility providers and mobility users.

Within this scope, the development of a pan-European information and knowledge platform (= Transport Innovation Gender Observatory) for gender and diversity specific intelligent transport innovation is the nexus for data collection, analysis and dissemination of gender mainstreaming tools and open innovation. TInnGO will collect the existing knowledge from ten different EU countries, process it and use it to generate a rethink in the planning and implementation of concrete mobility strategies.
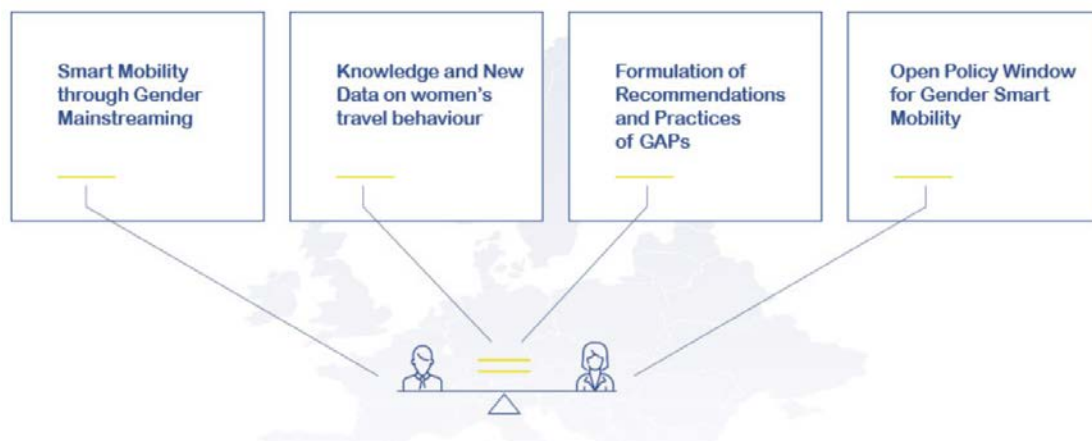
TInnGO-Objectives:

- **The advancement of smart mobility through the tools of Gender and Diversity Mainstreaming** - refers to how a gender and diversity perspective can be integrated into all policy and planning processes. Through this strategy, TInnGO aims to explore both potentials and limitations of upcoming smart modes of transport, such as car sharing, bike sharing and the use of ICT from a gender perspective and to combine the development of new transport solutions with an intersectional gender perspective.

- **The comprehensive understanding of actual problems and prospects and of transformative solutions** - by creating and operating an accessible and interrogatable open-source data repository and by using (real-time) survey tools to augment existing data sets in TInnGO-Cities, accessible through the Transport Innovation Gender Observatory.

- **The formulation of a range of recommendations and good practices of Gender and Diversity Action Plans (GaDAPs) in the transport sector.** The aim is to create recommendations and guidelines for GaDAPs in a form applicable for stakeholders to meet gender-specific requirements of certain user groups and support gender-balanced employment.

- **A final TInnGO objective is to open a policy window for Gender and Diversity Smart Mobility** in the provision of proximity between stakeholders at both regional and european levels and to contribute with new knowledge in the design and implementation of sustainable future strategies of transport.

TInnGO-Hubs & TInnGIdLabs

The special character of the TInnGO project lies in its unique comparative approach, based on the impact and contributions of 20 partners from 13 EU countries, which form an essential component of the project - namely the 10 so-called TInnGO-Hubs.

Figure 2: The TInnGO-Partners
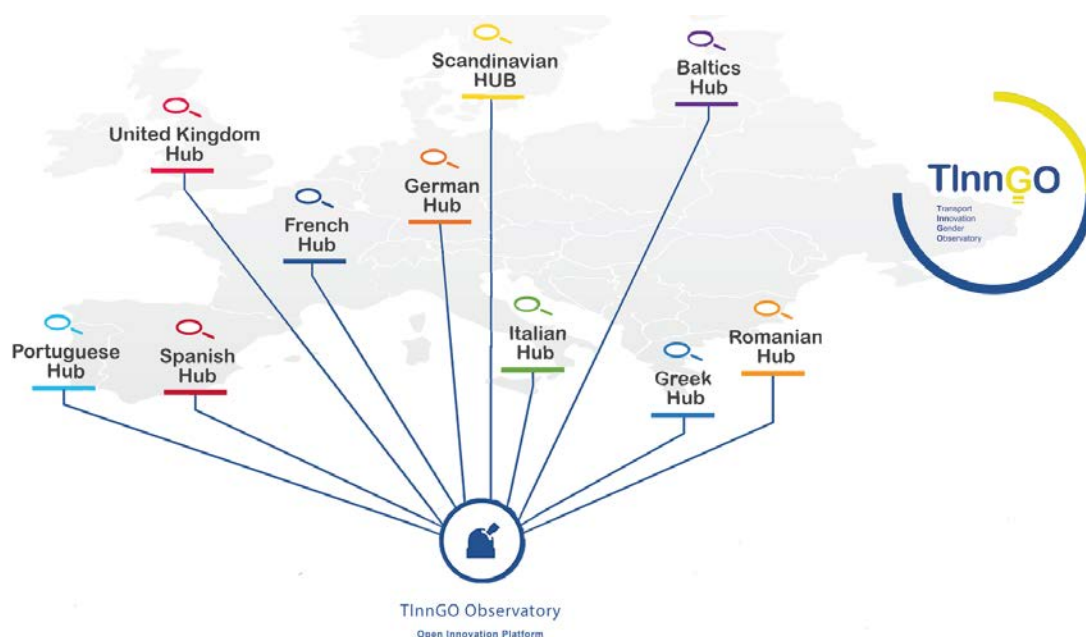
Figure 3: The project partners from 13 EU-countries forming 10 Hubs

The 10 Hubs extract and prepare nationally and internationally available knowledge in the tension field of mobility, gender and diversity. They apply qualitative, quantitative and design research methods and combine practical knowledge, concrete measures and best practices to develop gender- and diversity-sensitive intelligent mobility and solutions through the associated TInnGIdLabs. The Transport Innovation Gender Idea Labs (= TInnGIdLabs), which are best understood as Fab Labs or Idea Factories, will be established in selected cities. The laboratories are operated by the Hubs in cooperation with different mobility stakeholders. A TInnGIdLab covers various activities aiming institutional and public engagement to develop gender and diversity smart mobility that will lead to an visible and sustainable change in local practice.

Together the hubs develop a user-centered information platform (= Transport Innovation Gender Observatory) on which the prepared knowledge, tools and practical examples are made available to a broad group of users in an application-oriented manner. To ensure this, the Hubs work together with regional stakeholders to understand their context, tasks, goals and interests and at the same time sensitise them for the idea of Gender and Diversity Smart Mobility and increase their capacity to act through the transfer of knowledge and training materials. Therefore, the hubs' scope of action includes researching specific issues on Gender and Diversity Smart Mobility, developing concrete solutions together with stakeholders and testing them with users, and finally disseminating the results.

Each Hub is focussing on specific issues on Gender and Diversity Smart Mobility. In the following a short overview of the specialisation directions is given:

The Scandinavian Hub analyses diverse mobility needs of different groups of citizens and smart biking approaches that take these differences into consideration in the design and planning of relevant mobility measures.

The UK Hub focuses on inclusion of traditionally excluded groups of women and on research on rural transport and gendered discourses around Smart Mobility and on measurements of the impact of new vehicles in the inclusion of women.

The French Hub investigates new forms of mobility regarding women's safety (shared use, private and public) and employment opportunities and necessary skills within the transport sector.

The **Spanish Hub** focuses on the provision of safety and security adapted mobility services (public and private transport) and enhancemes womens employment opportunities in the transport sector.

The **German Hub** promotes gender- and diversity-sensitive participation culture as key element of the mobility planning process and strengthens gender- and diversity-sensitive evaluation of mobility data.

The **Italian Hub** measures how shared mobility services contribute in reducing the gender mobility gap and investigates the suitability of sharing mobility services to satisfy special mobility needs (e.g. parents traveling with children).

The **Romanian Hub** develops mentoring programms for women wishing to work in the smart mobility sector and coordinates a network of female entrepreneurs and maps employment opportunities and barriers for women within in the transport sector.

The **Portuguese Hub** analyses relevant statistics and research on gender issues and produces new knowledge on innovative services, which increase the level of safety and security of women in public transport.

The **Greek Hub** supports gender mainstreaming in policy-making and analyses specific transport requirements and needs of different groups of women using or being employed at Public Transport.

The **Baltic Hub** contributes to gender equal employment opportunities in future transport system through the systematic analysis of the main barriers for women and the reasons why women rarely choose STEM studies in Smart Mobility.

1.2 The Transport Innovation Gender Observatory

As already mentioned, one of the key objectives of the TInnGO project is the creation of an information and knowledge platform on the topic of Gender and Diversity Smart Mobility. The platform - the so-called Observatory - provides selected good practice examples, reports, guidelines, training materials and data sets on this topic with the aim to raise awareness of its relevance among the multitude of stakeholders in the mobility sector and to encourage them to initiate concrete activities in this direction.
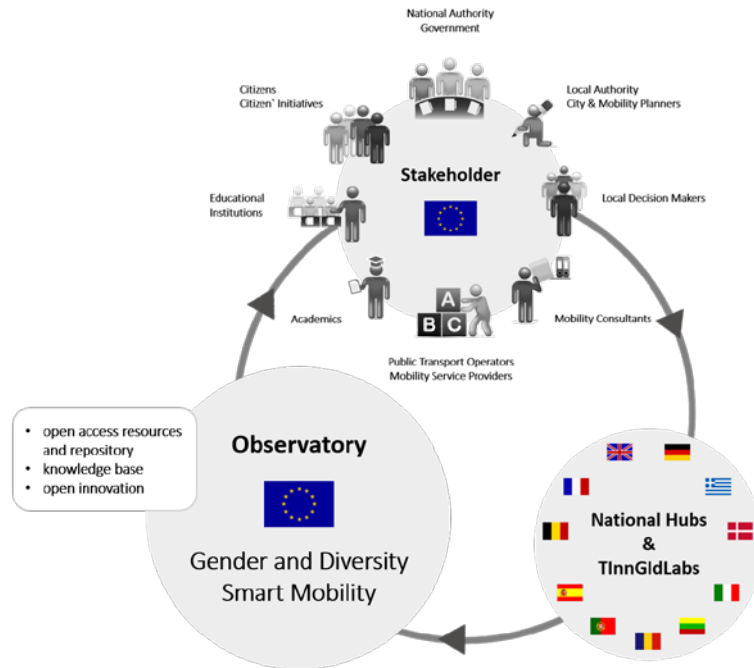
Figure 4: The process of using and filling the TinnGO Observatory

In the project the 10 national TInnGO-Hubs are responsible for enriching the Observatory with the relevant content. Their task is to collect, analyze and prepare relevant data and information on mobility, gender and diversity available in their respective national context. This knowledge can be extracted for example from research findings, local practices, guidelines or policies.

After the end of the project the Observatory will continue to operate and should be actively used and filled with content by the various stakeholders/users in order to remain up-to-date and to be able to initiate and consolidate a game change also in the long term. However, in order to give all stakeholder/users equal access to the information and knowledge on the Observatory some challenges need to be addressed:

1. **Language diversity** – **A lot of relevant information and knowledge on the topic is available in the different European countries, but often only in the respective national language. Thus, this knowledge remains hidden for a large part of potentially interested users. A big challenge therefore is to make this content and context visible to a broader number of users .**

   Approach

   Of course it is unrealistic and not very useful to translate loads of material/information completely. However, this is not necessary at all. For example, it is sufficient to provide users with the core idea of a respective mobility measure, a brief description of the

background and some links to further information. A short overview is quite enough to inspire users and to let them assess the relevance of an information for their own context. Further information can be requested selectively, during the project period from the respective hubs, and later ideally via the platform community.

The Hubs and the future platform users are asked to analyze available materials on the basis of a provided template with predefined criteria according to which they can prepare the information in a short and concise essay form which will then be published on the Observatory. Furthermore, the hubs or future platform users can make themselves available as contact person to provide further information and enter into dialogue with other users if required.

2. **Stakeholder diversity** – People with different prior knowledge and expertise of the topic and terminology are accessing the Observatory.

Approach

Contributions made to the platform must be prepared in a form that makes it easy graspable and applicable for everyone. Thus, a provided template with predefined criteria, categories and tags, to support the uniform appearance of the information, will be used for the preparation of the content. Because of this uniform input of information and the uniform understanding of terms especially regarding the tagging terms, the contributions can be compiled, linked and made searchable in a better way.

Figure 5: Template for provision of information on the Observatory

3. **Technical affinity – People with different skills and experience in dealing with technology and online services access the Observatory.**

   Approach

   To deal with this challenge, the content structure of the Observatory, already defined by the template and by predefined categories and terms, has to be extended and optimized by appropriate design solutions. This means that simplicity and clarity

regarding the placement and visibility of elements are crucial to ensure that access is as easy as possible for all users. This includes for example a responsive design, the structure of surfaces, but also the use of e.g. colours, fonts and font sizes.

As can be seen from the challenges described above, everything revolves around the one ultimate goal - to translate, prepare and provide the collected knowledge into a form that makes it accessible and applicable for the users. The joint task is to gather a pool of experience in different countries and to develop a collection of data and information that reflects the current, Europe-wide state of knowledge and practical experience in the field of Gender and Diversity Smart Mobility. A knowledge map can make a significant contribution here, as it provides a clear set of terminology and support platform users to develop a mental model on the topic. In the following chapter 2, the theoretical principles that play a role in the development of the knowledge map are explained. The developed knowledge map is then presented in chapter 3.

2 Gender and Diversity Smart Mobility

This chapter aims to develop an understanding of the concept of gender and diversity smart mobility. Developments at European level will be discussed and the term as it is used in the context of the project will be defined. Subsequently, some examples are given to gain a better understanding of the topic and to show how gender and diversity smart mobility can be implemented in practice. Moreover, the results of a classification of topic related examples will be presented, which was developed on the basis of numerous good practice examples. This classification represents an important basis for the development of the knowledge map.

2.1 Gender and Diversity Smart Mobility in the European Context

In various strategy- and position papers, the European Union continuously point out, that the "mobility sector plays a vital role in the EU economy and society." [1] Calling for an "easy mobility and an accessible transport network" and a "clean, competitive and connected mobility as a reality for all" [1] it is evident, that a key priority for the commission is to make mobility "more accessible for all citizens, including those who may be cut-off from mobility services today, such as the elderly and disabled." [2]

The *European Institute for Gender Equality* concludes that transport is not gender neutral and the main gender inequalities are: [3]

- gaps in access to transport infrastructure and services
- segregation within the transport labour market
- weak representation of women in the decision-making process in the transport sector

■ **gender-based violence in transport, which mostly affects women.**

Policy Notes such as CiVITAS *Smart choices for cities. Gender equality and mobility: mind the gap!* provide information on these mentioned gender differences in mobility patterns, on gender-sensitive mobility experiences across Europe and on gender-sensitive perspective for urban mobility planning. It is made clear that "... still little is known about specific needs of genders. On the other hand, the analysis of the socio-economic background together with projections and trends confirm that, though narrowing, the gap between genders is still evident and has effects on mobility patterns. Lower employment rates, part-time roles and low-wage positions are the main factors which determine a sensible difference between genders in the labour market, in social life and in transport behavior ...". [4, p. 6]

The existing imbalance essentially concerns 3 aspects: [4, p. 6]

■ **the lack of knowledge of gender issues and the scarcity of gender mobility data and statistics,**

■ **the need to plan gender-tailored mobility services**

■ **and the need to better exploit the synergies between urban and mobility planning.**

In order to encounter this, it is important that the mindset behind concepts such as gender and diversity also gains in importance in the mobility sector in the various countries of the European Union.

The CIVITAS Policy Note also presents a selection of initiatives that counteract this lack and deal with gender mobility aspects. In this context "policies and actions are grouped into three main areas of intervention, assessed as being the most critical": [4, p. 22]

GENDER MOBILITY ASPECTS	EXPERIENCE / INITIATIVE	
Knowledge enhancement	Gender auditing and National Transport Surveys (UK)	1
	Extrapolating gender data from a European survey (EU)	
Developing mobility services	Gender development of local transport services (Malmö and Kalmar, Sweden)	2
	Mobility measures accompanying Time and Schedule Plan (Bolzano, Italy)	
	Target-group-oriented local public transport (Berlin, Germany)	
Urban mobility planning & design	Public space design to provide gender equality in mobility (Vienna, Austria)	
	Definition of gender criteria for mobility planning (Berlin, Germany)	
	Urban planning for the benefit of girls (Malmö, Sweden)	

Figure 6: Selection of initiatives focusing on gender & mobility in Europe – Overview **[4, p. 22]**

Figure 7: Two examples of initiatives focusing on gender mobility aspects [4, pp. 24, 27]

So that such examples set a precedent, an awareness must be raised throughout all levels of action and on the part of all actors shaping mobility, of which target groups must be given greater consideration in future and what their mobility requirements are.

The EU Horizon 2020 program *Promoting Gender Equality in Research and Innovation*, for example, provides a basic approach that can be adapted to any scientific or industrial sector − e.g. transport sector. [5]

Three objectives underpin the strategy on gender equality in Horizon 2020: [5]

- **Fostering gender balance in research teams, in order to close the gaps in the participation of women.**
- **Ensuring gender balance in decision-making, in order to reach the target of 40% of the under-represented sex in panels and groups and of 50% in advisory groups.**
- **Integrating the gender dimension in research and innovation (R&I) content, helps improve the scientific quality and societal relevance of the produced knowledge, technology and/or innovation.**

By following these aspects, „[…] barriers that generate discrimination against women in […]careers and decision-making (supporting […] organisations to implement gender equality plans) can be removed and gender dimension in research content can be integrated." [5]

2.2 Gender and Diversity Smart Mobility – The TInnGO Approach

Initially, the TinnGO project pursued the goal of a "Gender Smart Mobility" - a gender-aware intelligent mobility, which deals with the current gender-specific challenges in the field of smart mobility, as well as the consideration of the mobility needs of women. However, it quickly became clear during the project that the concept of gender alone does not go far enough when it comes to designing the mobility sector in such a way that it takes account of all potential user groups - which is why the research approach was expanded to include the concept of diversity. On this basis, the TinnGO-Deliverable *D4.1 Roadmap* [6] examined the concept of Gender and Diversity Smart Mobility in detail, so only a brief definition of the terms will be drawn up here.

Explenation of the term Gender & Diversity Smart Mobility according to the *TInnGO-Roadmap* [6]:

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.

Diversity
points to the inclusion of social categories, such as age, ethnicity, class, sexuality, disabilities, etc. Working with diversity in research, planning and policy-making means to be aware of how the category of women, for example, does not represent a single group, but contains large differences due to variables of age, etc.

Gender & Diversity Mainstreaming
is a case-based approach of integrating gender and diversity into research, policy-making, and planning. The strategy of Gender & Diversity Mainstreaming is broad enough to consider the diversity of transport needs and travel patterns among the population in the same time as the strategy works on a context-based, concrete, local level.

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Smart Mobility
refers to forms of transportation that aim to reduce the 21st Century's big transport challenges, such as traffic congestion, environmental pollution, fatalities, and time-waste. Although, Smart Mobility repeatedly is associated with technological innovations in driving cars, Smart Transport can take many different forms, including public transportation, walking, and biking.

=

Gender & Diversity Smart Mobility
refers to forms of transport that take gender and diversity into consideration. Gender Smart Mobility connects to actual actions of transport research, policy-making and planning, which react on and meet the needs and aspirations of different genders as well as other social groups.
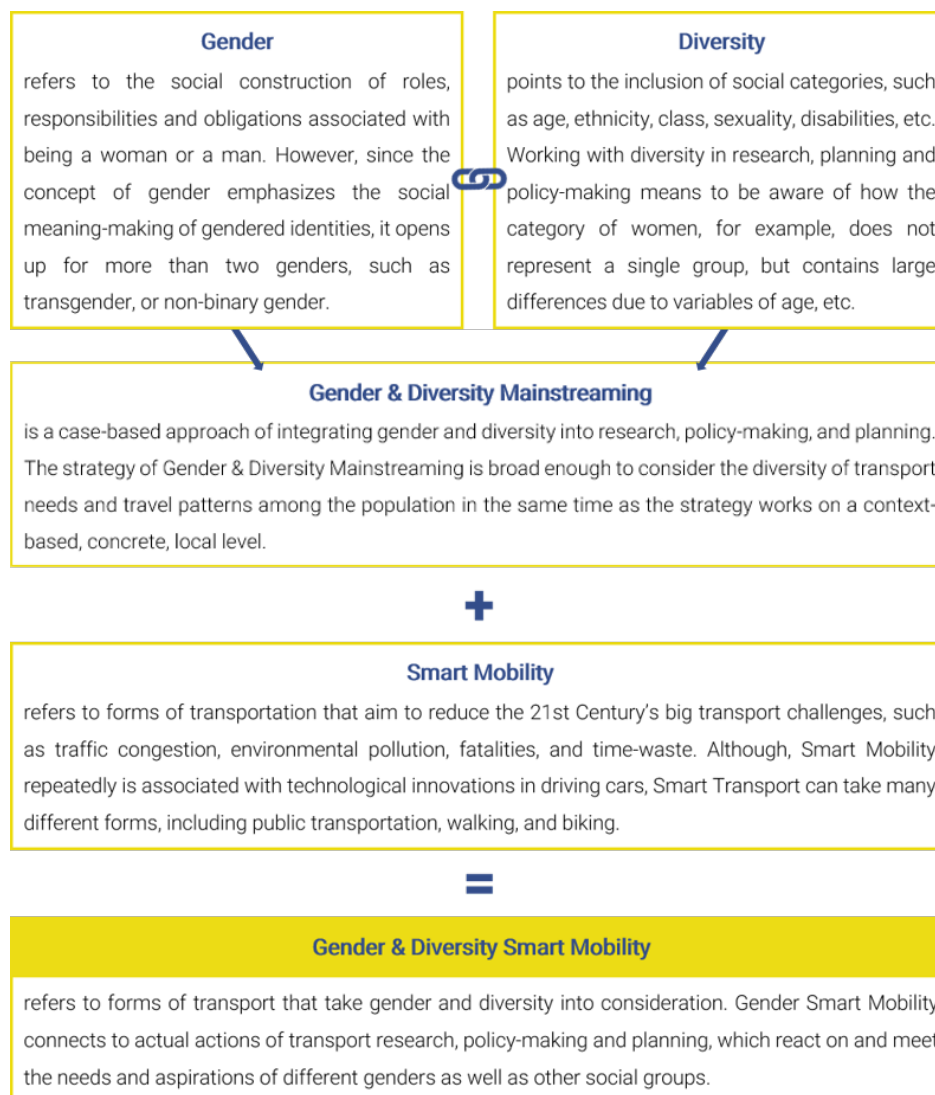
Figure 8: Definition Gender & Diversity Smart Mobility (own representation according to [6])

Since Smart Mobility to a big extent is associated with technological innovation, the understanding of the ongoing technological change (that the transport sector is subject to) plays a major role.

In addition, "the focus is no longer on the means of transport; as a result of increasing networking and automation, the user is now the focus of a much more flexible and integrated mobility system" [2].

TInnGO will apply a broad, inclusive and dynamic concept of Gender and Diversity Smart Mobility, that will be elaborated and advanced during the project. The key concepts of smart transport should meet the following requirements: [6]

Inclusive ⟲ **Affordable** ⟲ **Effective** ⟲ **Attractive** ⟲ **Sustainable**

Inclusive

➜ address various groups of citizens (gender-neutral, old, young etc.) = non-stereotyping
➜ various groups must be included in processes of design, accessibility, safety, communication and marketing, living labs, and end-products

Affordable

➜ public and public private investments should be addressing robust and stable public transit provisions
➜ e.g. investments supporting the innovation of smart cars for all rather than luxury cars for the few
➜ keep in mind - gender pay gap

Effective

➜ seamless transport for all
➜ market stakeholders to produce smart and efficient public transport devices rather than smart luxury cars for individual use

Attractive

➜ transport planning to provide safe, accessible and liveable spaces in all districts of cities
➜ smart solutions for shared transport and non-motorized transport modalities for various user groups

Sustainable
➜ **non-motorized transport to be included in smart transport ideas and practices**
➜ **actions to motivate/ socialize different groups of citizens to prefer non-motorized transport modes**
➜ **these modes should be cheap and accessible for all**

2.3 Examples of Gender and Diversity Smart Mobility

As already indicated in chapter 1.2, the TInnGO Hubs have collected almost 100 European good practice examples in the field of gender and diversity smart mobility in the first phase of the project. At this point, a number of examples will be presented to illustrate how gender smart mobility can be promoted in practice. The collected examples form the basis for the development of the knowledge map. They serve as a starting point for the classification of the subject area which will be presented in the next chapter 2.4.

Naming more Metro stations in Paris after women
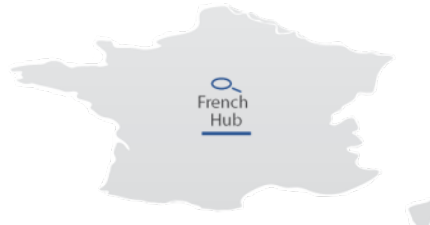
Overview

- **Location:** **Paris/France**
- **Year:** **2018**
- **Initiator:** **The Osez le féminisme (Dare to be a feminist) interest group (http://osezlefeminisme.fr/)**
- **Category:** **Awareness Raising; Public Transport**
- **Type:** **Measure; Campaign**

Goal

More equality in the naming of Metro stations in Paris.

Background/ Starting Point

Until 2018, only 3 of the 303 stops of the Paris Matro were named after famous female figures. Many people feel that this has little to do with equality, especially as there are also many famous women in French history.

Measure

The *Osez le féminisme (Dare to be a feminist)* interest group started an initiative to ensure, that more stations bear the names of women. They achieved that a public online vote was conducted to find the names for two new stations on the Metro line 4 planned to be put into operation in 2021. There were 6 names to choose from, 3 female and 3 male names. [1]

Outcome

Almost 30,000 people took part in the online voting. Two women's names actually turned out to be the winners. Additionally, in 2018 a station in the north of Paris was renamed Europe-Simone Veil - in honour of the former President of the European Parliament and Holocaust survivor. It can be assumed that more attention will be paid to this topic in the future, there are similar initiatives in Brussels and Amsterdam. Street names are also very unevenly distributed, with only 2.6% of street names recalling female personalities, compared to 31% with male names. [2,3]

Sources/Further Reading

[1]   Next stop, Nina Simone ... Paris metro 'must honour its heroines'
https://www.theguardian.com/world/2018/jun/17/paris-metro-male-names-world-without-women-public-vote-new-stations

[2]   Osez le Féminisme: Campaigning to Add More Women to Paris's Metro Station Names
https://theculturetrip.com/europe/france/paris/articles/osez-le-feminisme-campaigning-to-add-more-women-to-pariss-metro-station-names/

[3]   In Paris, Amsterdam and Brussels, feminists are campaigning to name more streets after women.
https://www.citymetric.com/fabric/paris-amsterdam-and-brussels-feminists-are-campaigning-name-more-streets-after-women-4137

Figure 9: Example 1 - Naming more Metro stations in Paris after women

Bus stop on request in the evening hours and at night

Overview

- **Location:** **Stuttgart/Germany**
- **Year:** **2017**
- **Initiator:** **SSB-AG Stuttgart (Stuttgarts Public Transport Operator)**
- **Category:** **Public Transport, Safety and Security, Accessibility**
- **Type:** **Measure**

Goal

Increasing Safety and Security on the last mile for vulnerable users of public transport.

Background/ Starting Point

When using public transport during evening hours or at night, covering the last mile can be a source of danger especially for women but also for other vulnerable user groups. So far, public transport did not allow stops beyond the defined stations.

Measure

The Stuttgart public transport provider SSB offers flexible stops after 9 pm on all bus lines, which is intended to increase safety, especially for women who use public transport in the evening and at night. A stop between the scheduled stops is possible if the passenger informs the driver in good time about the wish to stop and the bus does not have to leave the scheduled route. In addition, the driver must assess whether the traffic and operating situation allows this.

Sources/Further Reading

[1]   Halt auf Wunsch (Bus stop on request)
        https://www.ssb-ag.de/kundeninformation/sicherheit/halt-auf-wunsch/

Figure 10: Example 2 - Bus stop on request in the evening hours and at night

Facilitating parking for pregnant women and women with children

Overview

- **Location:**   various municipalities, Italy
- **Year:**   Since January 2018
- **Initiator:**   Italian municipalities
- **Category:**   Accessibility, Private Transport, Services
- **Type:**   Measure, Policy

Goal

Facilitating the finding of a parking space for pregnant women and women travelling with small children.

Background/ Starting Point

In Italy, there is not a national regulation on the provision of parking lots reserved for pregnant women or women travelling with children. The art.7 of the Italian highway code allows the municipalities to manage the distribution and set the parking fares in their territory. The absence of a national regulation on this topic leaves the proposal of a measure to the regions and the municipalities. The 'pink parkings' are also called courtesy parkings, as drivers should be made aware and give way in the privileged parking place to pregnant women or newly mothers. The procedure usually starts with some politicians willing to present a proposal of the initiative in the governing body as a policy document. Then, if the municipal administration approves the proposal, the City Council deliberates and adopts a resolution allowing the creation of 'pink parking' spaces, commonly in specific areas. The final step involves an Ordinance of the local police officer that formalises the location of those parking spots and how they can be identified (pink stripes, road sign, etc).

Measure

Setting up parking lots for women is not difficult and does not involve significant costs. Cost include horizontal and vertical markings and suggestive graphics and texts to inform current and future mothers about the availability of the respective parking lots. Municipalities can decide to provide a special permit to park in those spots after the provision of proper documentation at the Authorizations Office of the Municipal Police Department. Fine can be given to drivers who do not leave the space to whoever has the right, due to the absence of an official regulation.

Sources/Further Reading

[1]   Summary of the decisions taken during Liguria's Regional Council on 30 January 2018.
https://www.regione.liguria.it/consiglio/archivio-comunicati-stampa-del-consiglio/item/17850-lavori-consiglio-regionale-marted%C3%AC-30-gennaio-pomeriggio.html

[2]   Catania municipality's application to obtain a "pink parking" pass.
https://www.comune.catania.it/il-comune/uffici/polizia-municipale/modulistica/allegati/20150424-istanza-rich-pass-rosa.pdf

Figure 11: Example 3 - Facilitating parking for pregnant women and women with children

Promotion of women's career in technical areas of public transport

Overview

- **Location:** **Italy**
- **Year:** **Since 2017**
- **Initiator:** **Ferrovie dello Stato Italiane Group (ailway company) in collaboration with Valore D association**
- **Category:** **Employment, Education and Training**
- **Type:** **Campaign**

Goal

Gender-balanced employment in the public transport sector through simplification of access for women to (technical) public transport jobs.

Background/ Starting Point

The public transport sector still has a large gender imbalance with a female employment rate of 22%. [1] To change this situation, numerous efforts are needed to attract women to job opportunities in the transport area, particularly with regard to technical professions. As in several EU countries, in Italy there are different initiatives to achieve this goal, most of which are launched by the transport companies.

Measure

The Ferrovie dello Stato Italiane Group (Italian railway company) in collaboration with "Valore D" – an association of companies that promote diversity, talent and female leadership – is involved in the "WIM – Women in Motion" project. The aim is to educate and motivate female students to get out of the "stereotypes" and undertake alternative study paths to those that are today more "obvious" for them. The project involves the presence of the company in schools and universities to support a series of technical studies, to inform students about job perspectives and to provide the tools, such as motivation, skills and opportunities, to best realize their potential and talent. This path will be possible thanks to mentors: about 100 women who work in the technical areas of the company will meet female students to advise them on the course of study and their future work. One of the goals is to select a group of 10 women to be integrated in the training courses for technicians in the company laboratories. Moreover, with the new industrial plan the idea is to bring 8,000 women into railways within the next ten years.

Sources/Further Reading

[1]   Women in Transport – EU Platform for change https://ec.europa.eu/transport/themes/social/women-transport-eu-platform-change_en

[2]   Video explaining the Women in Motion (WIM) project.
https://www.fsitaliane.it/content/fsitaliane/it/sostenibilita/valorizzare-il-talento/women-in-motion.html

[3]   Women in Motion (WIM) project official website https://wim.win/

Figure 12: Example 4 - Promotion of women's career in technical areas of public transport

Increasing the security of women in public spaces – mapping of fear causing spaces

Overview

- **Location:** **Worldwide**
- **Year:** **Since 2016**
- **Initiator:** **The organisation Plan International Australia – Leading Girls Rights Charity in collaboration with CrowdSpot, Monash University's XYX Lab and young women**
- **Category:** **Safety & Security**
- **Type:** **Campaign**

Goal

Providing a tool to map fear causing places for women and thus also bringing benefit to a safer use of public transport..

Measure

The organisation Plan International Australia – Leading Girls Rights Charity [1] in collaboration with CrowdSpot, Monash University's XYX Lab and, crucially, young women, are developing a mapping tool named Free to Be. The initiative started with a pilot in Melbourne in 2016. In 2018 an improved version was rolled out to five cities: Sydney, Delhi, Kampala, Lima and Madrid. The tool is a crowdsourcing initiative which shall help to identify public spaces that make women feel scared/insecure or safe. By using the tool young women can report their experiences and geographically identify spaces where change needs to occur. [2]

Outcome

Within a few months, by the end of 2018, almost 21,000 entries were made by users. The majority of these marked unsafe places. Most entries were made in Delhi. Under the following link a very descriptive evaluation of the project can be found [3].

Sources/Further Reading

[1]   Plan International Australia – Leading Girls Rights Charity https://www.plan.org.au/

[2]   Free To Be Project https://www.plan.org.au/freetobe

[3]   Unsafe in the city – Project Report https://www.plan.org.au/-/media/plan/images/unsafe-city/reports/unsafe-in-the-city-full.pdf?la=en&hash=53997CB2224BB61FF2AC0FC9BE8DED97D634364C

Figure 13: Example 5 - Increasing the security of women in public spaces – mapping of fear causing spaces

Public transport for me #PT4ME campaign

Spanish Hub

Overview

- **Location:** **Worldwide**
- **Year:** **Since 2018**
- **Initiator:** **The International Association of Public Transport and the World Bank**
- **Category:** **Safety & Security; Awareness; Public Transport**
- **Type:** **Campaign**

Goal

Growing initiatives to include more women in the public transport sector.

- 2018 – Better tailoring public transport services to the needs of women and increasing the safety of use.
- 2019 – Implement a more inclusive workforce for women in the public transport sector.

Background/ Starting Point

The PT4ME campaign is meant to spread awareness and advocate for an inclusive public transport to better serve women passengers, as well as to promote the benefits of a diverse workforce comprised of women as well as men, in efforts to advance public transport.

Measure

The campaign launched by the International Association of Public Transport and the World Bank, looks for working together through awareness activities, promotion of good practices, setting up projects, technical assistance and training. The campaign was launched with a video of women's testimonies about harassment experienced in public transport, along with posters and social network updates.

In collaboration with the International Transport Workers' Federation (ITF), they have also released joint recommendations for the public transport sector to better implement a more inclusive workforce for women.

Outcome

Last year, 241 members and partners shared the video in their stations and vehicles, as well as on their social media networks. This campaign is one of many steps UITP is taking to ensure accessibility for all in public transport.

These campaigns are working to achieve gender equality and empower all women and girls to be involved in public transport as users or workers.

Sources/Further Reading

[1]   International Association of Public Transport website presenting the PT4ME campaign.
https://www.uitp.org/pt4me

[2]   **Youth for Public Transport Foundation website explaining the PT4ME campaign.**
       https://www.y4pt.org/projects/third-parties/pt4me/

[3]   **CONFEBUS joins the PT4ME campaign.**
       https://www.ceoe.es/es/contenido/actualidad/noticias/confebus-se-une-a-la-campana-pt4me-por-una-
       transporte-publico-seguro-para-todos

[4]   **Arriva Dblas joins the PT4ME campaign.**
       http://www.nexotrans.com/noticia/89773/NEXOBUS/Arriva-Dblas-se-suma-a-la-campana-PT4ME.html

[5]   **TIB joins the PT4ME campaign.**
       https://www.tib.org/es/web/ctm/noticies-esdeveniments/-/veure/campanya-dia-de-la-dona

[6]   **AMTU joins the PT4ME campaign.**
       https://www.amtu.cat/notes/1926-l-amtu-se-suma-a-la-campanya-pt4me-per-un-transport-segur-per-a-
       tothom

Figure 14: Example 6 - Public transport for me #PT4ME campaign

2.4 Classification of Gender and Diversity Smart Mobility Examples

The classification of relevant knowledge elements in the field of Gender Smart Mobility collected by the Hubs is an important basis for the development of the knowledge map. Even though the knowledge map concept and the development of the TInnGO knowledge map will only be described later in chapter 3, the classification will be presented here, as it is closely linked to the theoretical considerations on Gender and Diversity Smart Mobility and the practical examples identified by the hubs

To ensure that the knowledge elements can be correctly positioned and displayed in the knowledge map later on, each content element must be systematically tagged. These tags must be defined in advance, because if each user creates and assigns additional tags when feeding in the information on the Observatory, there won´t be a uniform terminology and a risk that the knowledge map becomes confusing. The big challenge is to develop a classification that can be used to describe and categorise all available examples. This categorisation must also be expandable, as it must be possible to include further elements in the future. Accordingly, the development of the knowledge map is an iterative process which is highly linked to the further development of the Observatory and the knowledge base anchored there.

The conducted classification is based on almost 100 good practice examples in the field of gender and diversity smart mobility, researched, summarized and provided by the TInnGO Hubs. These examples are e.g. mobility measures specially adapted to the needs of specific target groups, which simplify access to and use of mobility offers, guidelines that have emerged from research projects and practical work and which aim to adapt development processes in the

mobility sector in such a way that gender and diversity is taken into account right from the start. In addition, there are activities aimed at creating a broader awareness of the importance of the topic in the population but also, and above all, among the actors involved in mobility planning. The examples are very varied, and one quickly notices how large the field of action actually is and what different approaches exist. Some of the examples are also only indirectly related to mobility, but the underlying principles can be transferred and adapted very well to the field of mobility.

However, based on this sample selection, a classification was conducted. Analysing the numerous examples it became apparent that all actions pursue a specific *Gender and Diversity Goal*. Furthermore, every example has a concrete *Outcome* which is either a product, a service or a process. In addition, all examples can be assigned to a specific *Field* and *Section*. Moreover, each element can be assigned to a specific *Content Type*. Figure 15 **shows the developed classification, the** *classification levels* **on the left side and the respective** *categories*, **which can be seen as the tags, on the right.**

Figure 15: Current classification based on the sample selection

The different *classification levels* are important in order to give later users of the knowledge map the possibility to choose different entry points into the knowledge map depending on their search interests. Based on the underlying content elements, different categories/tags were defined within the levels. Since the field of work is a very complex and constantly developing area, the classification model offers a certain flexibility and room for expansion. The tags can be refined or extended continuously. Especially the Section level asks for the creation of further tags, which might become more relevant for future examples to be added.

During the tagging procedure, users have to make at least one assignment per classification level but they are free to make as many assignments as needed. This is mainly due to the fact that the materials from which the information is extracted often address several levels and aspects simultaneously.

The individual classification elements are described in more detail in the following.

2.4.1 Gender and Diversity Goals

The classification level *Gender and Diversity Goals* describes the typical objectives pursued in activities in the mobility sector. Equality refers not only to equal opportunities between men and women, but also to the consideration of their different life situations (e.g. status, income, ethnicity, etc.).

When thinking about Accessibility usually the first thing that comes to mind is "barrier-free" in the scope of using public transport. But this does not go far enough, as accessibility does not only refer to the physical empowerment of users. It is just as much about creating an organizational and digital access to the mobility sector. It is therefore an increase of accessibility both as mobility users and as people entering organizations, accessing information, education, communication, technology, goods, resources and services. On the other hand, there is the term Inclusion, which means that no user may be excluded or marginalized. The term is thus directly linked to the claims for freedom, equality and solidarity. In the sense of *Gender and Diversity Goals*, Participation also plays an important role. Here, the main aim is to give users the opportunity to contribute themselves and their opinions to the entire process of designing and developing mobility. Users therefore actively and decisively participate in all decisions that have an influence on their lives. The goal Sustainability refers to the handling of resources with regard to their permanent availability and their natural ability to regenerate. This means that mobility products, services and processes are designed to be affordable, to function and be useful in the long term for all users and that they are resource- and environmentally friendly when implemented. In this context, a balanced integration of the economic, social, environmental and cultural dimensions needs to be ensured.

2.4.2 Outcome

Another classification level is the *Outcome*. Several content elements for the Observatory have shown that in most cases it is possible to make a fairly clear assignment regarding the result of an measure. For example, this can be a product. In this context, a Product is understood as the development and provision of a material good. In contrast, the Service aspect refers to a performance, i.e. the development and provision of an immaterial good. And last but not least, by Processes are meant procedures or action sequences that can be implemented in systems or organizations.

2.4.3   Field

There is a similar situation with the classification level *Field* as with *Outcome*. An assignment is comparatively simple and can be intuitively made. *Field* refers to the three different areas of impact in which a measure is applied. On the one hand, there's Public Transport described as passenger transport as part of the provision of basic services by road, rail, water and air. On the other hand there is Private Transport, which refers to the development and individual use of private means such as a car, a motorcycle etc. Shared Mobility, however, stands, with regard to the Observatory, both for the multi-modal use of means of transport along a route chain (private and public means) and for the joint use of sharing vehicles/offers.

2.4.4   Section

The classification level *Section* is the most flexible level of allocation. It allows users to add and define additional aspects that will become more relevant in the future as the sector continues to change and develop. The examples considered so far can essentially be assigned to the following points.

Education & Training describes initiatives, which aim to improve the knowledge and skills of persons and opens new opportunities for professional development in smart mobility, on transport topics as well as on gender equality within the sector (e.g. increase the interest of female students towards STEM studies). Awareness refers to measures that create attention around the topics of gender, diversity and smart mobility across all levels of actors and actions and their interaction. Development refers to the creation of products, services and processes in which gender and diversity aspects are actively incorporated. A similar situation applies to Design, which, however, does not only include the design/shaping of new products, services and processes according to gender and diversity specific considerations, but also the redesign of existing products, services and processes and thus contributes to their optimization. Another aspect of the classification level *Section* is covered by Employment. This refers to activities and initiatives aiming to increase the access of women and specific groups of employees to the male-dominated labour market (e.g. promoting equal pay, fair workplace practices and work-family/life balance). And last but not least, an important aspect, that concerns women verifiably more than men - Safety & Security. This includes measures that help to promote and ensure the feeling of safety and comfort of people during and around the use of transport and the surrounding infrastructure. But safety and security does not only apply to the use of mobility, it also applies to employment in the mobility sector.

2.4.5 Content Type

Policy/ Administration Documents A policy document is a document with a legal binding character. It contains definitions, responsibilities, directions, limits, principles but also reflect values and ethics to follow. It mirrors what leadership, for example at national or company level wishes to have happen and how.

Research Projects/ Publications, includes all findings and results from research projects that have been carried out.

Good Practices Good practices are positive experiences that institutions and organisation has made in a concrete situation with a certain approach or solution.

Data Sets are collections of (digital) data records e.g. on travel patterns, conditions etc.

Guidelines are documents that provides general rules, principles recommendations or pieces of advice derived from different kinds of practical experiences.

Campaigns A campaign is usually a temporary action with a specific goal, which is attempted to be achieved through the cooperation of several people or actors. A famous example in the present field are campaign to raise public awareness.

3 Developing a Knowledge Map for the TInnGO Observatory

As already mentioned in the previous chapters, in the TInnGO Observatory, a knowledge base is being created that provides examples of Good Practice in the field of Gender and Diversity Smart Mobility. This section is continuously filled by the individual hubs with examples of relevant activities from the various European countries. The examples not only include practical measures or initiatives, but also tools, guidelines and methods that show examples of how Gender and Diversity Smart Mobility can be implemented in practice.

With an increasing number of content elements, there is a risk that the knowledge base will become disorganized and hard to explore for the users. It is therefore of crucial importance to structure the knowledge elements in such a way that users are able to systematically browse for information on the one hand, but also to gain a better understanding of the domains and relations in this field. A knowledge map can greatly assist users in accessing the information and building a mental model of the subject area.

> *"You do not understand anything, until you understand it in more than one way."*
>
> Marvin Minsky

Figure 16: Quote on Information representation by Marvin Minsky [7]

As the quote of Marvin Minsky makes clear, it is always helpful to provide alternative access to the information. The knowledge map should make it easier for users to explore the knowledge base. It will provide an interactive visual alternative for accessing information in addition to pure sorting and presentation via categories. The knowledge map will essentially support the users in:

- finding examples for specific information interests
- easy and fast browsing through the information
- Recognizing connections between different knowledge elements
- building a mental model of the subject area

According to [8] and [9], interactive and visual presentations allow the following advantages

- Exploration of large databases: If search criteria are not yet known, information visualizations can help with navigation.
- Fast acquisition of knowledge and connections: Information can be grouped visually and can therefore be processed cognitively more easily.
- Recognition and identification of patterns, structures, relations and special features: Especially alternative views and scaling options can be contributing to a better understanding of the information.

The knowledge map shall support a multi-directional access making the information accessible from different user perspectives and information interests. Since the Observatory is to stay in the long term and be enriched with knowledge and thus grow, the associated knowledge map must be able to adapt and expand accordingly and must allow flexible and efficient exploration of knowledge for users.

In the following, we take a closer look at the concept of knowledge maps, look at definitions and types and discuss some relevant examples that serve as inspiration for the knowledge map to be developed in the project. We then look at the requirements for the knowledge map and present the prototypical implementation.

3.1 The Knowledge Map Concept - Theoretical considerations

3.1.1 Definition and Goals of Knowledge Maps

A knowledge can be defined as a "graphical index that indicates the knowledge available in an undertaking. There are different versions of knowledge maps, which are adapted to the individual needs of the undertaking and differ graphically and in content." (own translation, original only available in German language) [10]

The knowledge map concept is often connected to the business environment, as exemplified by the following definition: „A knowledge map is a visual aid that shows where knowledge can be found within a group or organization, and how to find those with the most expertise." [11]

This concerns in particular the competencies of employees and teams and the knowledge that is available among them.

All the definitions show, that a knowledge map is a graphical presentation of knowledge. But a knowledge map typically does not display the information itself, it refers to it. The term "map" indicates a location within a thematic domain.

According to [12] and [13] knowledge maps pursue the following goals:

- Localization of knowledge and skills within a company
- Transparent organization of knowledge
- Creation of a common context in a visual model
- Visualization of structures, dependencies and connections
- Identification of gaps and weaknesses in the knowledge base
- Assistance in the process of searching and finding knowledge for individual employees or teams
- Facilitating and accelerating access to knowledge

Also here, it becomes obvious that the knowledge map concept is of great importance in the environment of companies that have a special interest in preserving and transferring knowledge. Knowledge maps offer great potential for knowledge management. Their use is suitable wherever a large stock of knowledge is to be managed and prepared in a way that is accessible to users. This includes libraries, Wiki applications, or even idea collections. In principle, a knowledge map can be drawn analogously with pen and paper. With a constantly growing or constantly changing knowledge base, a computer-aided and dynamic approach is recommended.

3.1.2 Types of Knowledge Maps

There are different types of knowledge maps, which are adapted to the individual requirements of the information they refer to. They differ graphically and in content.

In [14], Martin J. Eppler dicusses pragmatic ways of classifying knowledge maps to give an overview of their application contexts and formats. Eppler provides a classification of knowledge maps based on a number of key questions - Why, What, for Whom and How? This classification is very detailed and extensive. The following enumeration shows the classification according to "Why", which highlights the intended purpose of a knowledge map: [14]

1. Knowledge creation maps: illustrate the planned steps to develop a certain (organizational) competence or create new knowledge (i.e., a technology road map)
2. Knowledge assessment or audit maps: illustrate the evaluation of certain knowledge assets graphically, for example, by a 22 matrix (axes: current ability and future importance)
3. Knowledge identification maps: provide a graphic overview on knowledge assets (experts, patents, practices) and points to their locations/coordinates
4. Knowledge development or acquisition maps/learning maps
    a. Learning overview and learning path maps
    b. Learning content structure maps
    c. Learning reviewing/repetition maps
5. Knowledge transfer, sharing, or communication maps: show who transfers knowledge to whom
6. Knowledge application maps: show which knowledge is necessary for carrying out certain processes or steps in a single process
7. Knowledge marketing maps: can be used to signal competence to the public in a certain domain

The TInnGO knowledge map best meets the definition of point 3, a Knowledge Identification Map. The users should be able to identify the knowledge available on the platform with a quick look and access it in a targeted way.

3.1.3 Examples of Knowledge Maps

In the following, 3 practical examples are presented and emphasis is placed on their design features. The knowledge maps presented here have made an important contribution to the development of the knowledge map for the TInnGO Observatory.

Knowledge Map KnowHow@ÖV

The **Verband Deutscher Verkehrsunternehmen – VDV (Association of German Transport Companies)** offers a website (https://knowhow.vdv.de/) for the purpose of training and further education of employees in the public transport sector, which provides access to a large archive of regulations and standardisation documents in the field of public transport. The knowledge on the platform is available in numerous documents which can be accessed in two ways - by entering keywords in a search field, or exploratively by using an interactive knowledge map.

The knowledge map initially offers five subject areas to chose - Publications, Notifications, Learning units, Educational offers and Others. The topics are displayed in nodes, which can be unfolded and extended by clicking on them. By selecting a node, the relevant subcategories are displayed.
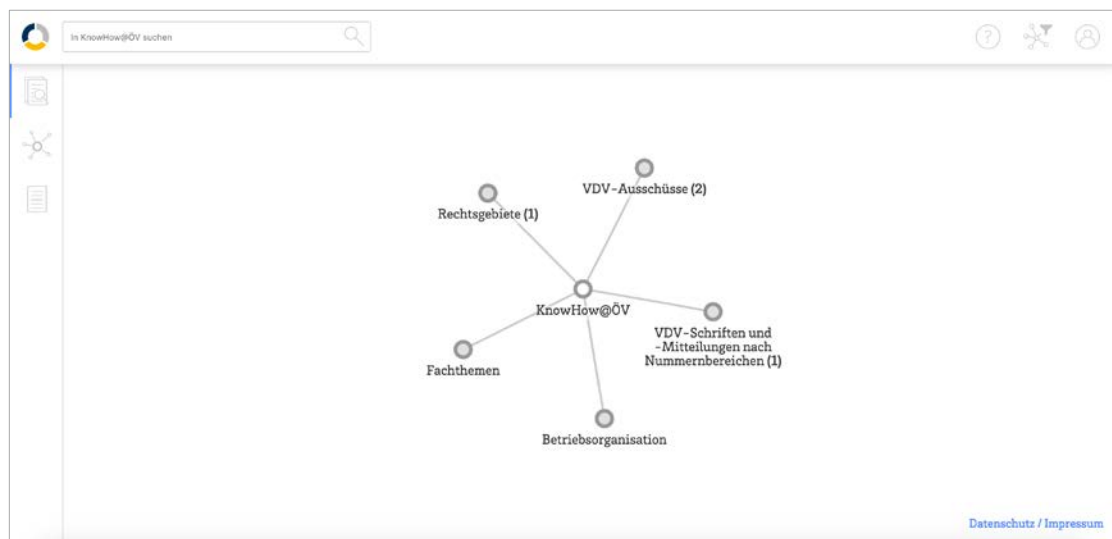

Figure 17: Knowledge map on the Homepage of the VDV Academy

On the left side of the knowledge map there is the context area, shown by Figure 18**, where the following information are displayed: the results of the search using the search bar, information about the selected node, and the metadata of a selected document. The documents are color-coded according to the category they are assigned to.**
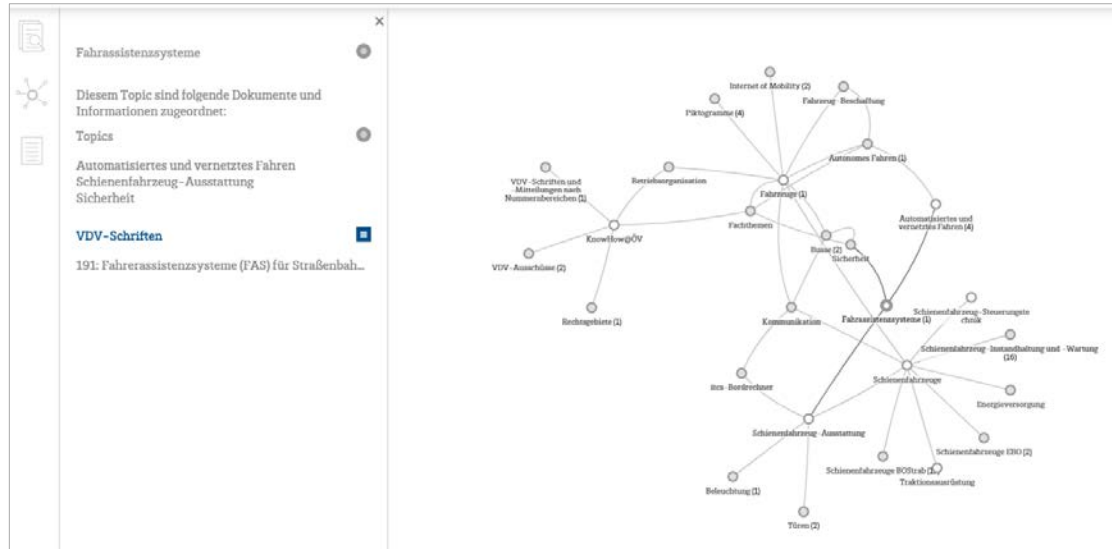
Figure 18: Knowledge map (right) and context context area (left)

A short example illustrates how it works: A user is interested in the *equipment of rail vehicles*. In the knowledge map, he selects the topic *technical subjects*. By clicking on the respective node, the subcategories open - again in the shape of nodes. The user continues to click on the subnodes that open. He chose: *Vehicles − Rail Vehicles - Railway vehicle equipment - Driving assistance systems*. Clicking on the last element, the context area on the left side of the screen shows details about the contained documents and the user can access the full documents.

When a node is clicked, its sub-nodes and their connections to each other are displayed as edges. At the same time, all edges that are connected to the selected node are highlighted. In the context area on the left side, additional information about the selected element is displayed as well as a list of available documents which can be opened with a double click.

In the header area further display and filter options are available. Different start views can be selected here. Furthermore, the sub-nodes that are contained in the selected node are displayed in the context area, which the user can also click here instead of using the knowledge map.

If any documents are stored for a selected node, they are also displayed here and can be accessed.

The strength of this knowledge map lies in the structuring and cross-linking of different topics. Connections become clear and the user gets a feeling for the underlying complexity. At the same time, however, the complex presentation is the biggest weakness, as the overview can be lost quickly and reorientation is needed quite often. It is possible to close individual nodes/node groups manually to reduce complexity. In addition, the context area provides additional help when navigating through the knowledge map.

The knowledge map was developed with vis.js. This is a JavaScript framework, with which, among other things, network visualizations on websites can be created.

Wikipedia Map

The Wikipedia Map is a web-application created by the developer Luke Deen Taylor. The application can be accessed on https://luke.deentaylor.com/wikipedia/.

The knowledge map shows and clarifies the relations between individual Wikipedia articles.

In a search field, one or more keywords can be entered or a random article can be searched as well. A Wikipedia article matching the term entered is searched for and represented in the form of a node in the knowledge map. If this node is clicked on, the algorithm scans the first paragraph of the respective Wikipedia article and automatically adds the keywords referring to further articles to the knowledge map. The data basis here is all English-language Wikipedia articles available at the time of the query.

Figure 19 **shows an example. Here** Bill Gates **was entered as search term. Initially, only a single node is displayed in the middle of the Map. By clicking on it, the node expands and all hyperlinks contained in the first paragraph of Bill Gates' Wikipedia article are displayed as sub-nodes on the knowledge map.**
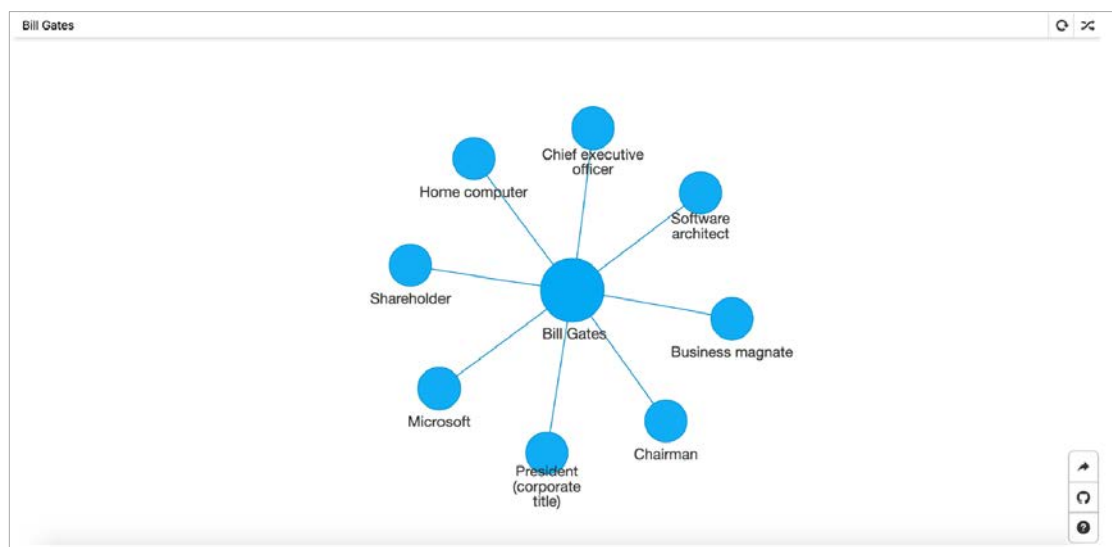

Figure 19: Wikipedia Map - Example scenario: Initial view after entering the search term

Then, for example, the sub-node Microsoft **is selected. Again, the links in the Microsoft article are displayed as nodes and the relations are displayed as edges on the knowledge map.** Figure 20 **shows a click on** Alphabet inc. **and** Sundar Pichai. **Now it can be clearly seen that the map shows the links to already existing nodes in addition to the new elements. For example,** Sundar Pichai **and** Bill Gates **each have an edge that connects them to the** chief executive officer **node. Finally,**

the user moves the mouse over the *Sundar Pichai* node. This way the existing elements that are related to the selected element are highlighted in yellow and bold.

Figure 20: Wikipedia Map - Example scenario: Search path highlighted by thick edges

The arrangement of nodes and edges is based on the mass-spring model. If a node is added or moved, the positions of the other elements is recalculated and moved accordingly.

Clicking a node not only show its sub-topics, but also centers it in the display. This ensures that the newly generated elements are always within the user's field of view.

Furthermore, all sub-topics are highlighted in bold and blue. A double click opens the corresponding Wikipedia article in a new browser tab. If the user moves the mouse over a node, the links to the originally entered term are highlighted. The initial node catches the user's attention due to its large design and supports the orientation.

The knowledge map invites to explore Wikipedia articles and their connections. The strength is in the presentation of connections between individual topics. The fact that only the links contained in the first paragraph of an article are displayed in the map makes the visualization look clearer and less complex, but there is also the danger that certain connections are lost in this way. The blue color and the black text appear monotonous at first glance, but the yellow path highlighting, creates a complementary contrast. This in turn contributes to the distinguishability of the different elements. The map also provides the function to select several terms as starting points which makes it easier to compare selected topics.

However, the visualization is not free of errors. During the calculation it happens sometimes that knots and edges occur several times. Also, subtopics are not available for every article, even if there are links to them available in the Wikipedia article. The framework used to create the graph is, as with the VDVAkademie, vis.js.

Open Knowledge Map

Open Knowledge Map is a non-profit project with the goal of making scientific knowledge more accessible to all. It is a research tool for exploring scientific topics and their connections.

In contrast to list-based research methods, the Open Knowledge Map summarizes the content of the results and creates a structured topic overview. The web application is available at: https://openknowledgemaps.org/.

The start page consists of an input field and some filter options to narrow the search results in terms of time, relevance and document type. Furthermore, a specific knowledge base can be selected for the search.
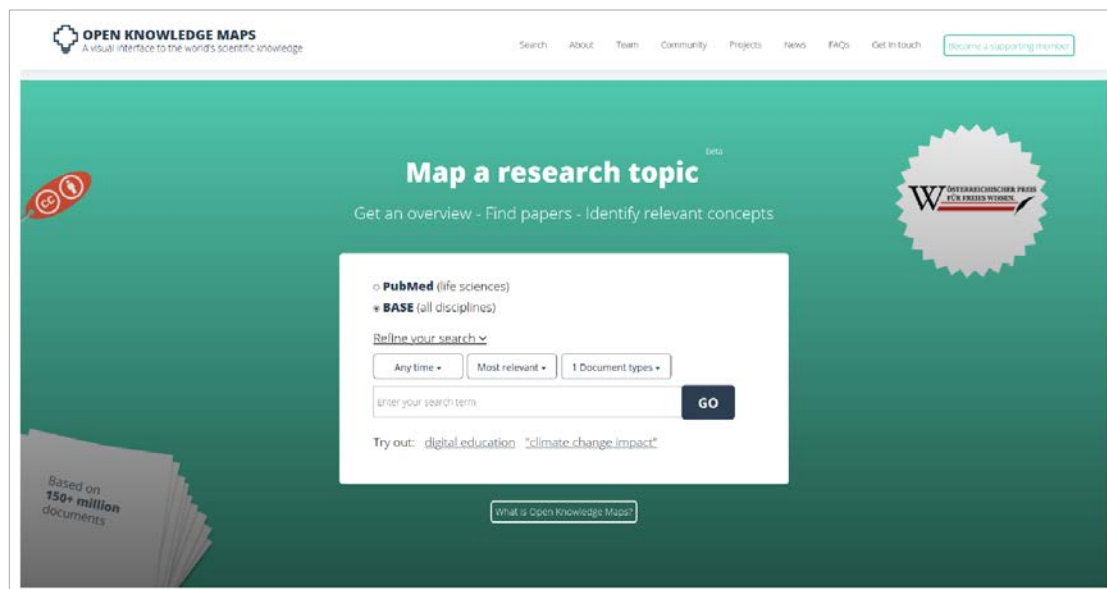
Figure 21: Open Knowledge Map – Homepage (**https://openknowledgemaps.org**)

Once a search term is entered, the page automatically creates a knowledge map in a new browser tab. On this web page a visualization area is located on the left side of the page where the knowledge map is displayed and a context area on the right side.
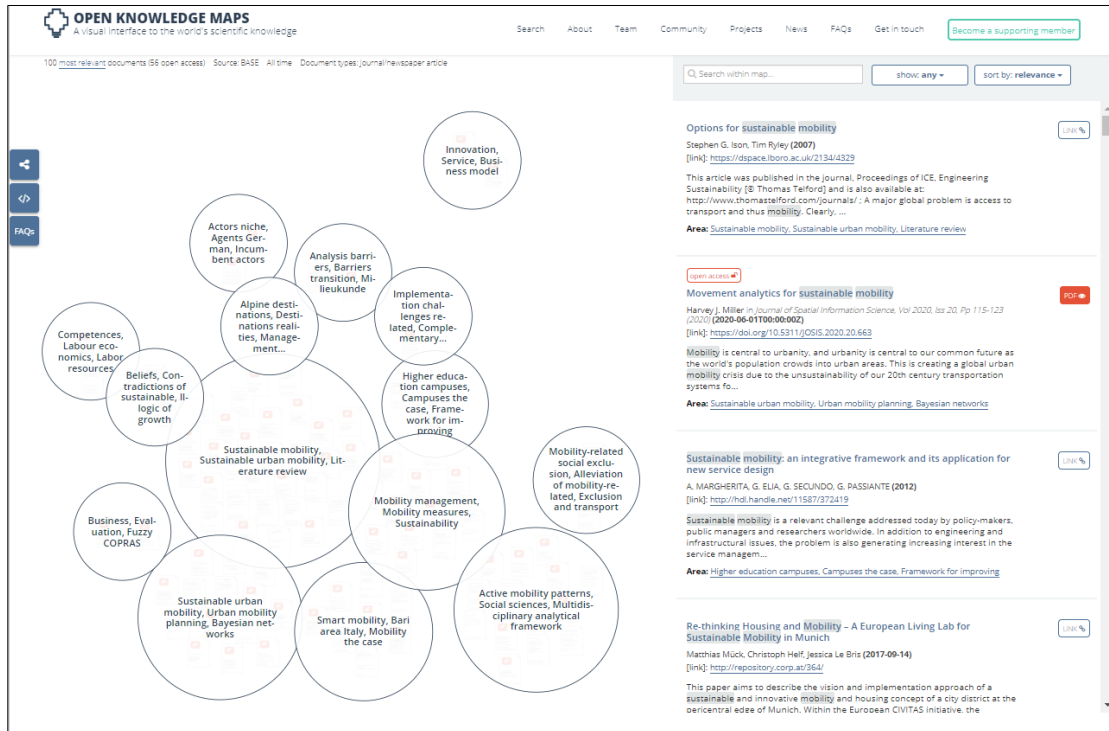
Figure 22: Open Knowledge Map – Example Scenario: Search for *sustainable mobility*

The header of the visualization area shows information on the search results, like the number of documents found, how many of them are freely accessible, and the search parameters set by the user. Below the header the knowledge map is displayed.

In the context area, the documents that are displayed in the map are listed. The header of the context area provides a search function for the knowledge map, as well as a sorting and filtering function by type, relevance, author, title, and year.

The knowledge map itself contains numerous bubbles of different sizes, each containing one or more terms. The position of the bubbles depends on their relationship to the surrounding topics. The larger the relationship between topics, the closer they are together. Overlaps are possible. The size of the bubbles depends on the number of articles they contain.

If the user clicks on a particular bubble, the view changes and the selected bubble will be enlarged. The related papers are now displayed, represented by A4 page symbols.

If the user moves the mouse over an article, further information is displayed, such as author, date and in which journal the article was published.

In contrast to the examples presented above, the Open Knowledge Map has no edges.

The relationships between the bubbles/elements are represented by the distance between them.

The algorithm groups scientific articles by their common words. Only the most relevant 100 results are considered in the knowledge map to limit the complexity. The interaction with the

visualization is limited to detail and context techniques. By mouse-over, as well as clicking, further information about the selected paper can be displayed. It is not possible to move or to modify the elements in any way. The zoom function is limited to two levels. Using the mouse wheel does not cause any events. The context area can be hidden with a mouse click. In summary, this knowledge map offers a new approach to knowledge research.

The identification of cross-topic areas of knowledge provides fresh impulses in the search.

Due to minimal interaction possibilities, the map appears static, but this facilitates clarity. The font colour is black or blue, Open Access articles are marked red. The bubbles consist of a black circular border with a white background. This makes the map look very homogeneous.

The possibility of colour-coding individual groupings is not used. Among other tools, D3, a data visualization framework for JavaScript, was used to create the knowledge map.

3.2 The TInnGO Knowledge Base

As already described in Chapter 1.2 and 2.4, within the TInnGO Project a knowledge base is created on the TInnGO Observatory, which provides access to several good practice examples, reports, guidelines, case studies etc. in the field of Gender and Diversity Smart Mobility.

The respective content is identified, analysed and prepared by the hubs primarily in the respective national context. For the preparation of these content elements, the hubs were provided with templates which contain criteria for analyzing and summarizing the information they found. (see chapter 1.2, Figure 5)

The knowledge base is under development and is continuously enhanced and refined on the basis of feedback from the hubs and their stakeholders. Currently, the knowledge base, which can be accessed on the site http://transportgenderobservatory.eu/ via *Resources*, offers a section for *Reports*, containing project results, guidelines etc. and a section for *Initiatives* containing good practice examples and campaigns.

Figure 23 shows the *Reports* section. The various content elements are currently stored in a kind of folder structure and can be browsed through, but also filtered by keywords. Figure 24 shows the Initiatives section analogously. If an article is called up, the assigned tags are displayed and the user can find related examples by clicking on these tags.
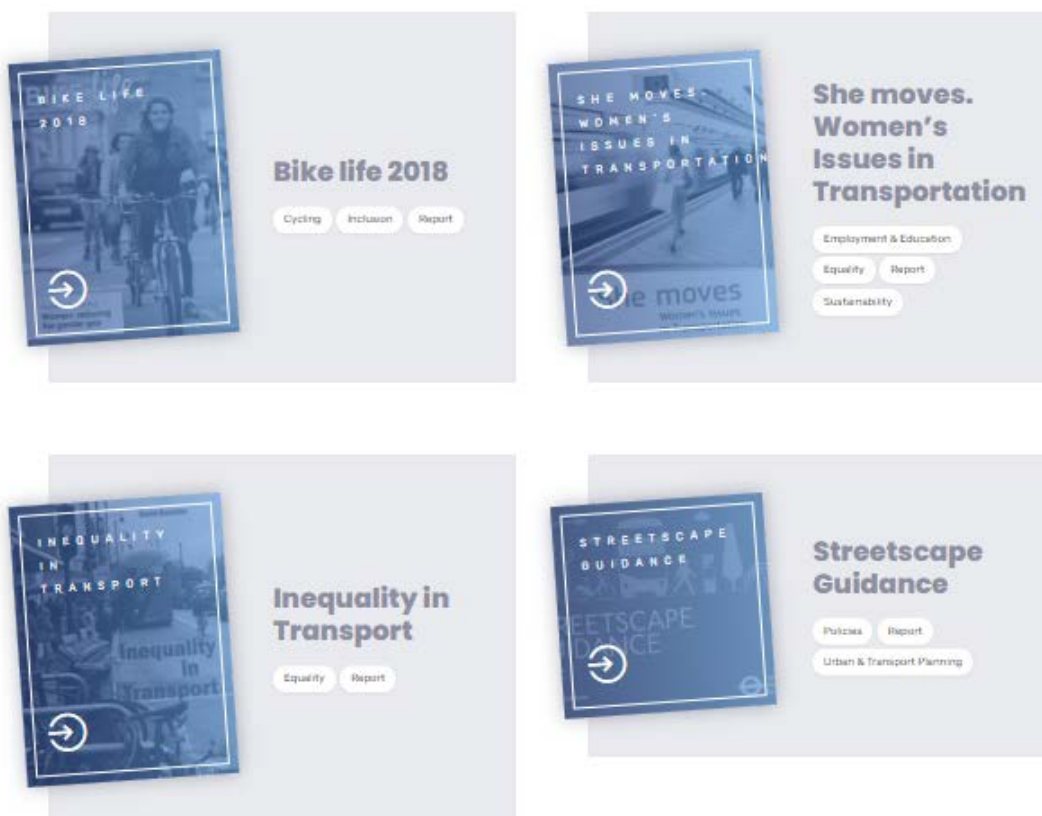
Figure 23: The Reports section on the TinnGO Knowledge Base

Figure 24: The Initiatives section on the TinnGO Knowledge Base

3.3 The TInnGo Knowledge Map

3.3.1 Requirements for the TInnGO Knowledge Map

The main requirement for the knowledge map to be developed is a user-friendly, self-explanatory and stable interface. The functional scope should be limited to the core functions and must allow the users for a flexible and efficient exploration of the knowledge elements. The use of colours should be minimal and only be used to direct the users' attention.

The innovative approach lies in the possibility of a multi-directional access, meaning that the user will be able to access the content in consideration of different perspectives and information interests. The knowledge map will be built up dynamically depending on the user's choice. Basis for this are the developed classification levels. (see chapter 2.4)

As the analysis of different knowledge map examples in chapter 2.3 made clear, knowledge maps typically consist of a visualisation area, in which the knowledge map itself is displayed, and a context area, which in part provides additional information, contains filter functions and allows access to individual documents. This structure will also be used for the TInnGO knowledge map. The node and edge representations should be uniform. The user should know at any times where he or she stands in the knowledge map, therefore the selected element/node and the corresponding path to the starting node should be marked in colour. The user should also be able to see already in the knowledge map how many elements are assigned to each node. Some knowledge maps show this information by varying size of the respective node. However, even here the clear presentation quickly suffers, which is why a simple numerical representation will be used for the TInnGo knowledge map.

As the example of the KnowHow@ÖV knowledge map, presented in chapter 2.3 shows, it is possible to mark relations between related elements. However, there is also the danger that the knowledge map becomes quickly confusing because too many connections are displayed. In the TInnGO knowledge map these relationships will be covered by the approach of multi-directional access. Related elements can be identified here by selecting the appropriate starting point. This may take some time to get used to at first, but results in a clearer presentation and reduces the computing load.

Since the Observatory is to stay in the long term and be enriched with knowledge by the later users, the knowledge map must be able to adapt and expand accordingly. However, some limits have to be set here, as the unrestricted allocation of tags impairs the functioning of the knowledge map and can also quickly make it very confusing.

The knowledge map should also work on mobile devices and must therefore be scalable for different screen sizes. Furthermore, it should be avoided that additional software must be downloaded to use the application. The use of the map should be easy and barrier-free for all users.

3.3.2   Aspects of technical implementation

For the operation of the TInnGO website and the Observatory, the content management system Wordpress is used. The knowledge map is implemented by using the plug-in visjs (https://visjs.org/), which is a browser based visualization library. This framework offers all necessary functions for the creation of the knowledge map. The placement of the nodes and edges within the visualisation is done automatically by the included algorithms by following preset rules (e.g. hierarchy rules or physical force descriptions).

The visualisation is based on the mass-spring model, also known as force-directed layout. This is a method for drawing undirected graphs. It uses an algorithm to simulate a force system that automatically calculates the position of nodes and edges. The nodes are masses that repel each other, the edges act as springs that attract the connected nodes. Two physical forces act on each pair of connected nodes: the force of attraction by the edge and the force of repulsion between the knots. The library also provides mechanisms for grouping, highlighting, adding, hiding and filtering elements, and the use of detail and contextual techniques (e.g. zoom).

All content elements must be assigned with the appropriate tags, which enable later positioning in the knowledge map. The basis for this tagging approach is the classification presented in Chapter 2.4. Each article/content element must be assigned to the appropriate values in the categories G&D Goal, Outcome, Field, Section, Content Type when being entered. At least one value/tag must be specified per category. For example, an article is given the tags Equality, Services, Public Transport, Safety and Guideline.

The performance of the knowledge map depends mainly on the computing effort of the algorithm used. To minimise the calculation time, efficient algorithms with low calculation iterations have to be used. On the other hand, the end devices used should have sufficient computing power, which is no longer a problem with the performance of today's computer systems.

3.3.3 Assignment of content elements

When entering articles, the developed classification appears and users must select at least one tag in each classification level that describes the respective content element. Several tags can be selected in each category. The article is then later linked to several positions in the Knowledge map. In addition, the user has the possibility to propose additional tags, which must first be checked and approved by the administrators. This is intended to prevent the creation of too many tags that overlap or double, which could quickly make the knowledge map very confusing for the user. For the later planned independent operation of the Observatory by the community, a suitable solution is still needed, which could look similar to how Wikipedia is operated, namely that corresponding articles and tags must be checked by other users before they are released.

GENDER & DIVERSITY GOALS	EQUALITY	ACCESSIBILITY	INCLUSION		PARTICIPATION	SUSTAINABILITY
OUTCOME	PRODUCTS		SERVICES		PROCESSES	
FIELD	Public Transport		Private Transport		Shared Mobility	
SECTION	#Education & Training	#Awareness	#Development	#Design	#Employment	#Safety & Security	#etc.
CONTENT TYPE	Policy/Administration Documents	Research Projects/ Publications	Good Practices	Data Sets	Guidelines	Campaigns

Figure 25: Tagging of articles on the basis of the developed classification

3.3.4 Structure and functionality of the Knowledge Map

The TInnGO knowledge map is structured in 3 sections. The selection area of the starting point (top), the visualisation area (left) and the context area (right)

In the upper selection area the user can choose the starting point of the knowledge map according to the classification levels presented in chapter 2.4. For each option the user can view a short explanation of what is meant by this category. For this purpose, it is just a click on the small info symbol beside each element. The starting point selected in Figure 26 in this case is the category *Field*. After a click on the *Go button*, the knowledge map in the visualisation area (left) is built up according to the user's specifications. Now all elements belonging to the classification element *Field* appear, in this case the categories *Public Transport*, *Private Transport* and *Shared Mobility*. In brackets one can already see how many elements are assigned to the corresponding category. The numbers shown in the picture are placeholders that were automatically assigned by an algorithm.
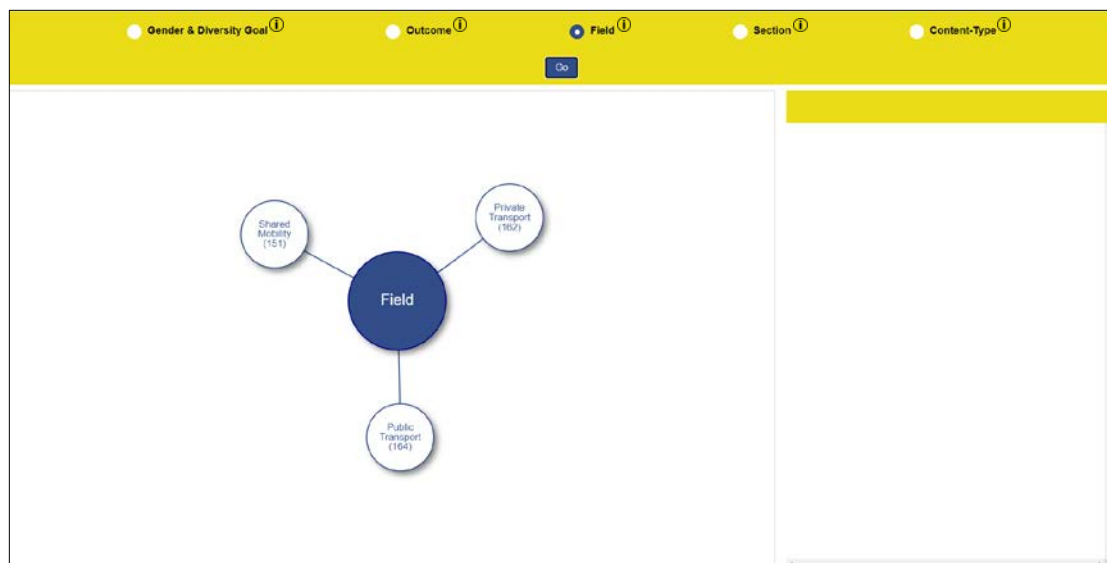

Figure 26: The TinnGO Knowledge Map – Selection of the starting point

In the next step, the user selects an area that attracts his interest. In Figure 27 the user has clicked on the node *Public Transport*. The corresponding node is highlighted in colour and all elements of the classification level *Section* that are connected to the node *Public Transport* are displayed. In the context area, links to all knowledge elements/articles contained in the *Public Transport* section are now displayed and can already be selected here. By clicking on an element here, the corresponding article is opened in a new browser tab in the background. However, the list on this selection level can still contain a great number of elements.
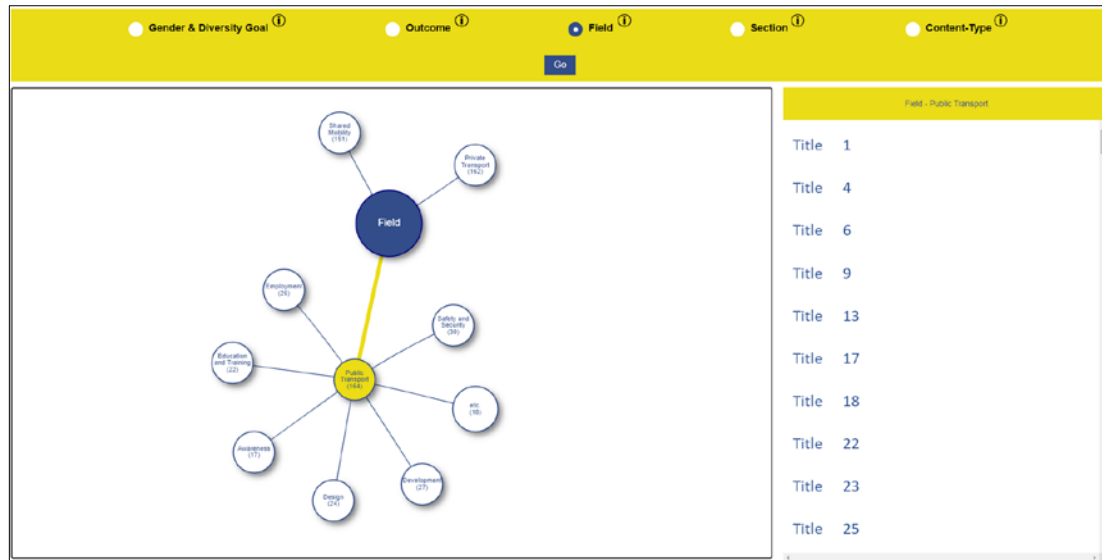
Figure 27: The TinnGO Knowledge Map – Selection of nodes and functioning of the context area

According to the particular search interest, the user then selects a further node. In this case (Figure 28) the category or *Section* element *Employment* was chosen. The items displayed in the context area have been filtered now and only those tagged with *Employment* and *Public Transport* are displayed. The user now has two options: to call up elements directly in the context area and display them as in the previous step, or to further refine the search. By selecting/clicking the *Employment* node, further sub-nodes are opened in the visualisation area, in this case the content elements that are assigned to the classification element *Content Type* (in addition to *Public Transport* and *Employment)*.
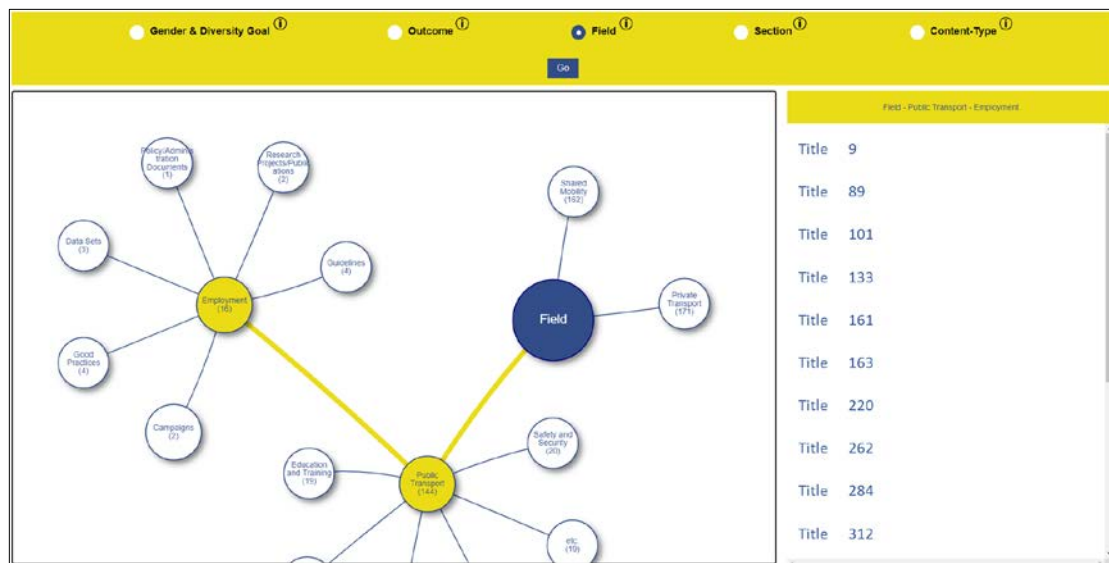

Figure 28: The TinnGO Knowledge Map – Browsing through the knowledge elements #1

In Figure 29**, the user has selected the Good Practice sub-node. The selected node is highlighted and the once again filtered selection of relevant knowledge elements is displayed in the context area.**
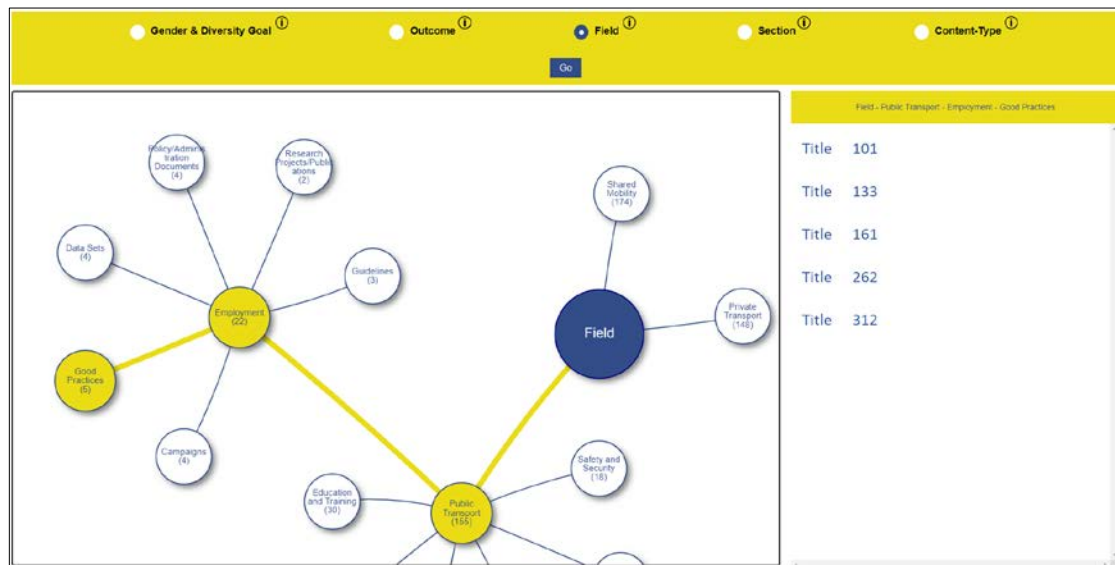

Figure 29: The TinnGO Knowledge Map - Browsing through the knowledge elements #2

The KM goes to a maximum depth of 3 levels in order to preserve the overview, which otherwise gets lost very quickly. In addition, the results shown in level 3 are already greatly reduced. Especially in the case of the Observatory, where the amount of entries will not exceed a few hundred, this is quite sufficient.

Up to a depth of 3 levels from the main node, however, any number of elements can be opened at the same time. This means that KM does not have to be restarted when it reaches the end of a path. The user can simply click on other nodes. The nodes arrange themselves automatically and try to avoid collisions as far as possible. By selecting or unfolding several elements, a map is created that provides an interesting overview and quick access to the elements. The KM can be moved with the mouse and scaled with the scroll wheel. Due to the limitation to 3 levels, the overview remains largely intact even with many unfolded elements, as Figure 30 shows.
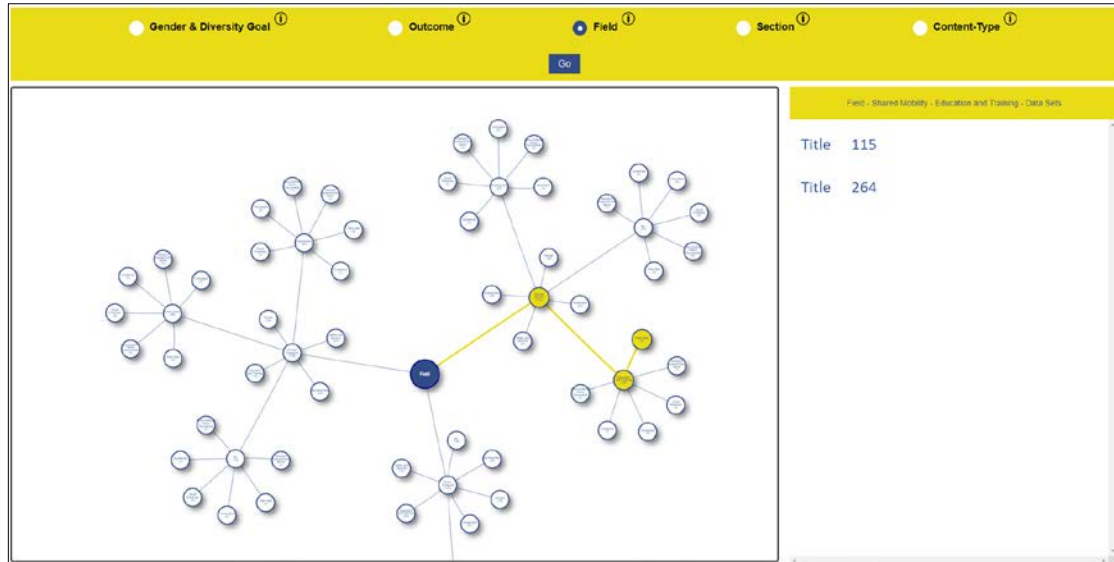
Figure 30: The TinnGO Knowledge Map - High number of simultaneously opened elements

As already described, the user can choose between 5 different starting points for the entry or for the build-up of the knowledge map. Figure 31 shows the different starting points and the specified sub-nodes for each of them.
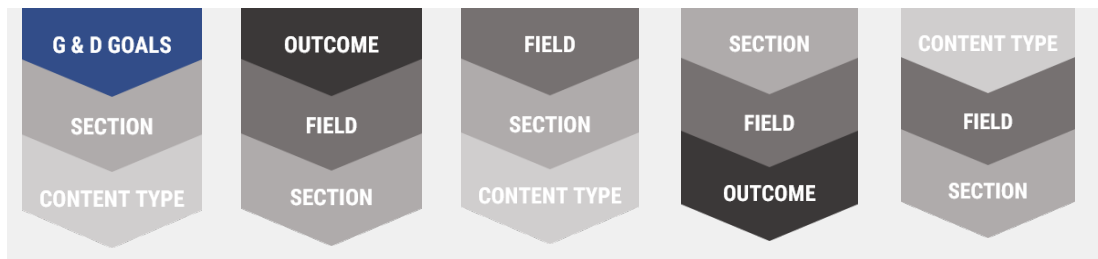

Figure 31: Entry points to the knowledge map and the sub-nodes displayed

The practicability of this approach will be further evaluated in the course of the project together with project partners and users and the approach will be continuously refined.

4 Summary and Conclusion

The development of a knowledge map is laborious and associated with numerous challenges. However, a functioning knowledge map provides users with an interesting and efficient way to explore big knowledge assets. A knowledge map is a kind of graphical index that sorts and relates knowledge elements on a map. It does not contain the knowledge, but refers to it.

In this Deliverable the development of a knowledge map is described, which is to be used on the knowledge and information platform, developed in the TInnGO project, the so called Observatory. Usually, knowledge maps are developed for existing knowledge pools, mainly in the corporate context. In the case of the TInnGO project, the knowledge map and the knowledge base are developed parallel. The provision of content to the platform is done by the various project hubs, which identify and prepare relevant knowledge in the field of Gender and Diversity Smart Mobility in their respective national context to put it to the knowledge base of the TInnGO Observatory.

Essential for the development and functioning of the knowledge map is a classification/categorisation of the knowledge elements representing the subject area. This classification builds the core of the knowledge map and ensures that the individual knowledge elements are assigned a specific place in the map. It sets the rules for the tagging procedure of the individual elements, which is most important as an unsystematic enrichment of knowledge ultimately leads to a confusing knowledge map that offers no added value for the user.

The classification was carried out on the basis of the materials collected by the hubs (guidelines, reports, good practices, etc.). It became apparent that the subject area of Gender and Diversity Smart Mobility is very broad and diffuse. This is particularly because some examples are only indirectly connected with the topic of mobility, but their underlying basic principles of gender and diversity can be transferred very well to the mobility area and possible projects.

The iterative development of the knowledge map in the project has led to a multi-level classification, which was presented in chapter 2.4. On the one hand, this multi-level classification ensures that the knowledge map branches out well later on, means there is a balanced ratio between knots and assigned elements and that the search interest of the user can be narrowed down step by step. If the tags/categories would be unsorted and all keywords assigned to only one large "container", a high number of categories and related knowledge elements would already be displayed in the first node of the Knowledge Map. This could be confusing for the user and prevent the Knowledge Map from reaching its full potential. Especially for the TInnGO Observatory, which is intended to be operated by the community after the end of the project

period, it is important to ensure the clarity of the map despite the growing number of knowledge elements.

The multi-level classification supports a multi-directional access to the information from different user perspectives and information interests, meaning, users can chose a starting point (e.g. *Gender goals* or *Content type*) according to their search interest for the exploration of the content elements in the map. The Knowledge Map is then generated on the basis of this selection.

In the design of the map, the findings of a good practice analysis were taken into account. From these, the structure and basic functions of the map were derived and requirements for the design were defined, e.g. the minimal use of colours, which are only used to direct the user's attention.

The Knowledge map was implemented by using the open source library Vis.js (https://visjs.org/), a library that is maintained and constantly developed by an active community. Numerous good practice examples are based on this software tool. Due to the use of JavaScript, it also offers a high level of compatibility for the integration into existing platforms. In the further course of the project the Knowledge Map will be integrated on the Observatory, tested and iteratively refined with the project partners and later users.

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