

# TeMA

Journal of  
Land Use, Mobility and Environment

This Special Issue contains a collection of sixteen extended papers from the XXV Living and Walking in Cities International Conference. It is a bi-annual occurrence aiming to gather researchers, experts, administrators, and practitioners and offer a platform for discussion about mobility and quality life in urban areas-related topics, specifically on vulnerable road users. The aim is to exchange ideas, theories, methodologies, experiences, and techniques about policy issues, best practices, and research findings.

TeMA Journal offers papers with a unified approach to planning, mobility and environmental sustainability. With ANVUR resolution of April 2020, TeMA journal and the articles published from 2016 are included in the A category of scientific journals. From 2015, the articles published on TeMA are included in the Core Collection of Web of Science. It is included in Sparc Europe Seal of Open Access Journals, and the Directory of Open Access Journals.

*Special Issue 1.2022*

**New scenarios for safe mobility  
in urban areas**

# TeMA

Journal of  
Land Use, Mobility and Environment

*Special Issue 1.2022*

## NEW SCENARIOS FOR SAFE MOBILITY IN URBAN AREAS

**Published by**

Laboratory of Land Use Mobility and Environment  
DICEA - Department of Civil, Architectural and Environmental Engineering  
University of Naples "Federico II"

TeMA is realized by CAB - Center for Libraries at "Federico II" University of Naples using Open Journal System

Editor-in-chief: Rocco Papa  
print ISSN 1970-9889 | online ISSN 1970-9870  
Licence: Cancelleria del Tribunale di Napoli, n° 6 of 29/01/2008

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*Special Issue 1.2022*

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print ISSN 1970-9889, e-ISSN 1970-9870

DOI: 10.6092/1970-9870/8649

Selection and double blind review under responsibility of "Living and Walking in Cities 2021" Conference Committee.

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## New scenarios for safe mobility in urban areas: emerging topics from an international debate

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### Abstract

The paper presents the emerging topics of the international debate for safe mobility in urban areas with an innovative interpretation. This is the bibliometric mapping of the most recurrent concepts (keywords) of almost 80 scientific publications. The paper framework moves from the issue of the "sustainability" of cities to the "safe" and "innovative" city through a mobility lens. In Europe by 2030 cities have to become climate-neutral and some main urban strategy to achieve this result is focused on transport and mobility sectors. The interpretation of the bibliometric mapping results leads to highlighting the shortcomings of some topics within the scientific debate. The Qualiquantitative Data Analysis was applied to set the interdependency among research fields and better understand the interrelation among the different topics. The key concepts of 'time' and 'innovation' don't emerge clearly as an object of research and they will be included in future reflections about the transformative capacity of the city through sustainability and in the development of city strategies.

### Keywords

Sustainable development; Lexicometric analysis; Urban and mobility strategies.

### How to cite item in APA format

Pezzagno, M. & Richiedei, A. (2022). New scenarios for safe mobility in urban areas: emerging topics from an international debate. *Tema. Journal of Land Use, Mobility and Environment*, 243-251. <http://dx.doi.org/10.6092/1970-9870/8649>

## 1. Introduction

The City is the centre of the international debate from a different point of view. Urban areas are home to most of the world population, generate more than 60% of global GDP, and contribute to about 70% of carbon emissions from global final energy use (UN-Habitat, 2020).

«Cities are increasingly complex and multi-dimensional urban systems that are central to human life on our planet» (Popescu, 2020). Cities to reach sustainability need to focus more on Global Agenda and Sustainable Development Goal (SDG). Innovation is a critical issue for our society in order to improve sustainability and quality of life in urban areas. “Advanced urban services” have to combine new technologies, new methodologies with conventional forms of city development (Popescu, 2020). One crucial aspect of life quality in cities is safe mobility.

There are several “safety” considerations to be done for built-up areas. Overall, 54% of road traffic fatalities in 2018 occurred on rural roads, 38% in urban areas and 8% on motorways. EU-wide, around 20 people per 1 million inhabitants died on urban roads in 2018. «The rate differs significantly from one Member State to another. It is generally below the EU average in most northern and western EU countries. In contrast, in Bulgaria, Croatia, Cyprus, Greece, Malta, Poland, Portugal and Romania, more people were killed in urban areas than on rural roads» (European Commission, 2019b). 38% of the fatalities still occur in urban areas where vulnerable road users’ account for 70% of road deaths. Within urban areas, pedestrians (and not car occupants) account for the largest share of victims: almost 40% of the fatalities are pedestrians, 12% are cyclists and 19% are users of powered two-wheelers. This means that 70% of total fatalities are vulnerable road-users. While road deaths fell by more than 20% between 2010 and 2018, the number of cyclists killed increased by 6% in urban areas (European Commission, 2019b).

Looking at urban areas for every person killed in road crashes, about five more suffer serious injuries with life-changing consequences. Serious injuries are often more costly to society because of long-time rehabilitation and healthcare needs.

Regarding road safety in Europe, the target of the halving of death for crashes between 2010-2020 was not reached. The *Commission's Strategic Action Plan on Road Safety* and the *EU road safety policy framework 2021-2030* set out ambitious road safety plans to reach zero road deaths by 2050 (i.e. Vision Zero) (European Commission, 2018, 2019a). EU road safety policy framework 2021-2030 aims to 50% fewer deaths and 50% fewer serious injuries by 2030. It must underline that the performance gap between the Member States has narrowed significantly since the year 2000, but there are still proportionally four times more road deaths in the worst-performing country than in the best one. Disparities among countries remain huge. Some countries have made enormous progress: Greece, Spain, Portugal, Ireland, the three Baltic countries (Latvia, Lithuania and Estonia) and Croatia recorded higher-than-average reductions (between 30 and 40%) of road fatalities (European Commission, 2019a). EU “Safe system” philosophy proposed in EU mobility strategy is mainly focused on: Vehicle safety, Infrastructure and Road user behaviour (human factor) (European Commission, 2018).

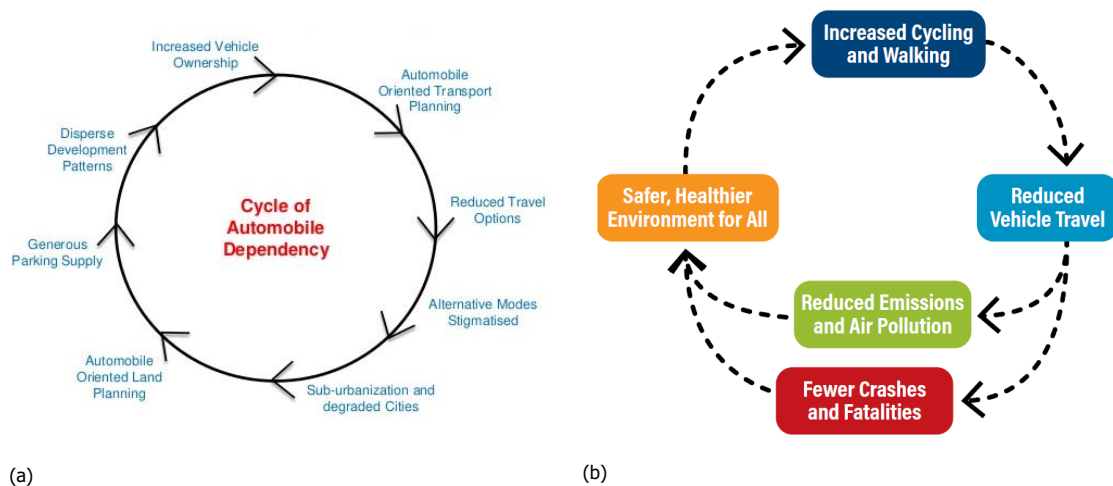
By 2030 there will be at least 100 climate-neutral cities in Europe. In order to achieve this result, some main urban strategy is focused on transport and mobility sectors. All large and medium-sized cities could put in place their own sustainable urban mobility plans by 2030. Their objective put on: sustainable mobility, smart mobility and resilient mobility (European Commission, 2020).

However, mobility is not the only challenge for this kind of “Innovative city”:

- innovation Communication Technologies (ICT) offers solutions to address the problems of urban mobility and traffic control;
- ICT for data acquisition, storage, and processing help city managers to analyze complex and interdependent systems;

- multidimensional modelling help to build smart urban mobility systems, fully integrated, shared uptake, and collaborative mobility services;
- digital data mapping favour intra-urban differentiation in urban mobility analysis;
- boosting innovation and active mobility in urban areas (walking, cycling, new micromobility solutions).

Urban mobility has societal and environmental implications and the inefficiency of private cars (vehicles that often contain a single passenger) is a serious concern. The solution cannot be only “greening” private transport but is fundamental to break the loop of car-oriented cities shifting to safer, more attractive, sustainable and equitable options (Fig.1).



**Fig.1 (a) Automotive Dependency and Sprawl (Litman, 2021) and (b) Environmental and Health Benefits of Safe System Approach (World Resources Institute & Global Road Safety Facility, 2018)**

The Nine Criteria for Livable Urban Design of Soft city (Sim, 2019) put in the centre the walkability. At least other important suggestions could be useful to build safe mobility in urban areas (Sim, 2019):

- the allocation of public space for mobility in cities needs to be addressed putting the pedestrians first;
- when we don't have enough space, speed must be slowed down (to 30km/h!);
- more investments on safe and pleasant footpaths, and attractive urban spaces;
- the development of the full potential of the active modes of transport, cycling and walking have to be taken seriously in urban mobility policies, including in transport planning allocation of space and budget;
- neighbourhood regeneration is a great opportunity to connect people to one another, and to all the aspects of life around them.

Institutions play a decisive role in fostering the transformative capacity of a city, which upholds the efforts that cities make in their transformative journey. Technology by itself will make a city neither smarter nor more livable, but it is the city *governance* that puts the technological advancement at the service of the citizen» (Popescu, 2020).

The city capacity to absorb new knowledge and innovation (i.e. “transformative capacity”) is related to the collective effort made by different public and private actors working together (Castán Broto et al., 2019; Popescu, 2020).

Communities must plan, regulate and price new mobilities to prevent problems and maximize benefits. There is considerable uncertainty concerning new mobilities’ benefits, costs and equity impacts. Some new mobilities support, and others contradict social equity goals. Therefore all urban stakeholders have to be involved to reach an efficient governance process.

In order to highlight the research topics emerging from the international debate on “New scenarios for safe mobility in urban areas” 78 papers presented in “Living and Walking in Cities 2021” Conference were selected for lexicometric analysis to identify the recurrent and most used keywords. The Qualiquantitative Data Analysis



was applied to set the interdependency among research fields and better understand the interrelation among the different topics.

## 2. An international debate: the “Living and Walking in Cities 2021” Conference

The XXV International Conference “Living and Walking in Cities 2021” (LWC2021) ([www.lwc.unibs.it](http://www.lwc.unibs.it)) proceedings investigation is of interest because the goal of this event is to gather researchers, road users, administrators, technicians, city representatives and experts to discuss problems that affect safe mobility in urban areas. As a matter of fact, the conference attracts practitioners and researchers to discuss on policy issues, best practices and research findings across the broad spectrum of urban and transport planning. The conference covers international issues, national and local policies and also project implementation at the local level.

The LWC2021 Conference took place in Brescia on 9<sup>th</sup> and 10<sup>th</sup> September 2021 and was structured in 3 Plenary Sessions and 11 Parallel Workshops.

The Conference was structured in 3 mainstream topics presented in the first Plenary session:

- safe mobility for innovative cities;
- transport system and infrastructure;
- urban planning.

The titles of Parallel Workshops corresponding to the Mainstream topics are presented in Table 1.

<b>LWC2021 Mainstream topics</b>	<b>Parallel Workshops</b>
Safe mobility for innovative cities	Urban space re-design to improve sustainable mobility Post-pandemic response for resilient cities Urban mobility systems Big data, ITS, and MAAS Driving behaviour in urban environment
Transport system and infrastructure	Active mobility networks, public transport, and multimodality E-micromobility system Accident analysis and road safety interventions
Urban planning	Sustainable, safe, and resilient urban spaces Active mobility and urban redevelopment The “15-minute” city time-space design

**Tab.1 Mainstream topics and Parallel workshops of the LWC2021 Conference**

### 2.1 How do you analyze a scientific debate? One possible approach

One way to analyze an international debate linked with a conference could be the lexical point of view.

The analysis could be carried out using VOSviewer software that creates bibliometric maps from a text (or bibliometric data). The software is useful for bibliographic research but also to deepen correlations between words in a big text. Van Eck explains briefly that given a corpus of documents is possible through VOSviewer identify the main topics (van Eck et al., 2010). This is done using a technique called “probabilistic latent semantic analysis” (Hofmann, 2001). «Given the main topics, we then identify in the corpus the words and phrases that are strongly associated with only one or only a few topics. These words and phrases are selected as the terms to be included in a term map» (van Eck et al., 2010). Using this software it is possible to realize “distance-base maps” of items (keywords) of a text. «Distance-based maps are maps in which the distance between two items reflects the strength of the relation between the items. A smaller distance generally indicates a stronger relation» (van Eck & Waltman, 2010). In distance-based maps, it is easy to identify related item clusters.

The VOSviewer software permits the creation of different maps through the following views:

- density view. «Each point in a map has a colour that depends on the density of items at that point. That is, the colour of a point in a map depends on the number of items in the neighbourhood of the point and on the importance of the neighbouring items. The density view is particularly useful to get an overview of the general structure of a map and to draw attention to the most important areas in a map»(van Eck & Waltman, 2010);
- cluster density view. «This view is available only if items have been assigned to clusters. The cluster density view is similar to the ordinary density view except that the density of items is displayed separately for each cluster of items. The cluster density view is particularly useful to get an overview of the assignment of items to clusters and of the way in which clusters of items are related to each other» (van Eck & Waltman, 2010).

## 2.2 Bibliometric mapping of the LWC2021 Conference debate

VOSviewer was set to map only words recurrent more than 60 times in the text, collected for the research, composed by all the proceedings of the LWC2021 Conference (in course of publication in different journals). After cleaning the elaboration of the software from the so-called "empty words" for the research (such as 'university', 'study', 'aim', 'number', 'paper', 'figure', etc.) and from the names of the cities in the case studies that are necessarily repeated several times in the papers, VOSviewer produced the maps of the items/keywords of the debate shown in Figure 2 (Density map) and Figure 4 (Cluster density map).



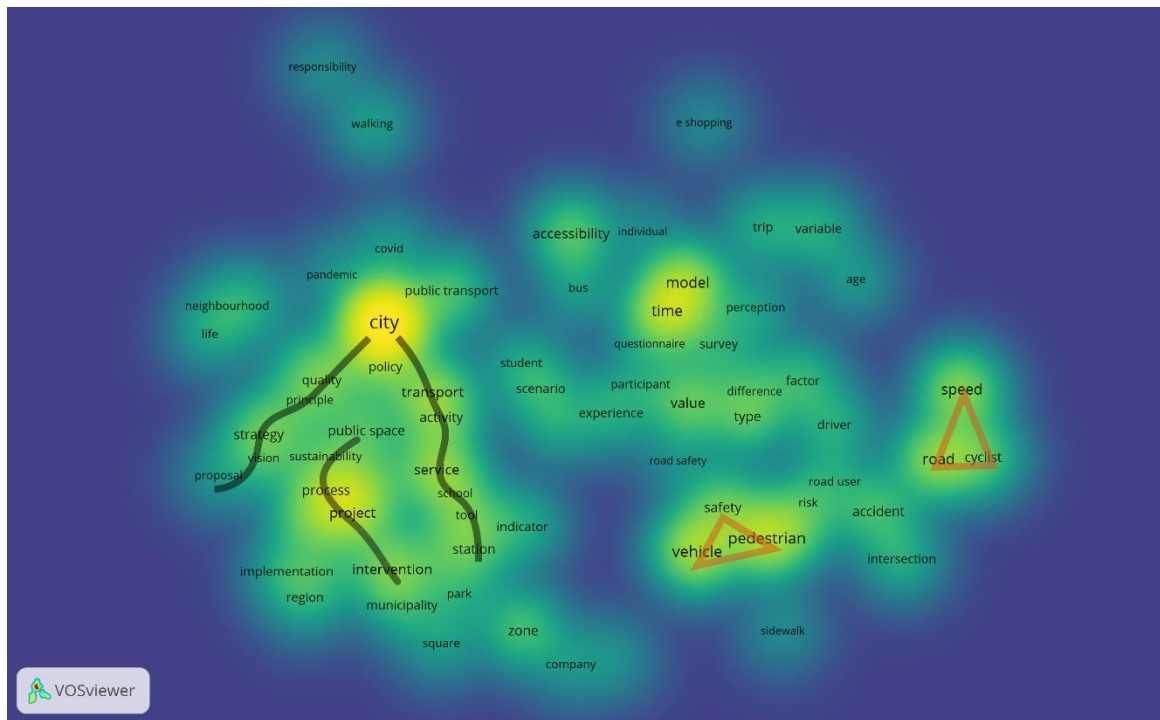
**Fig.2 Density map of the LWC2021 Conference Proceedings keywords (elaboration of VOSviewer software)**

Furthermore, several trends and cores of keywords are clearly visible in Figure 3. The main trends are:

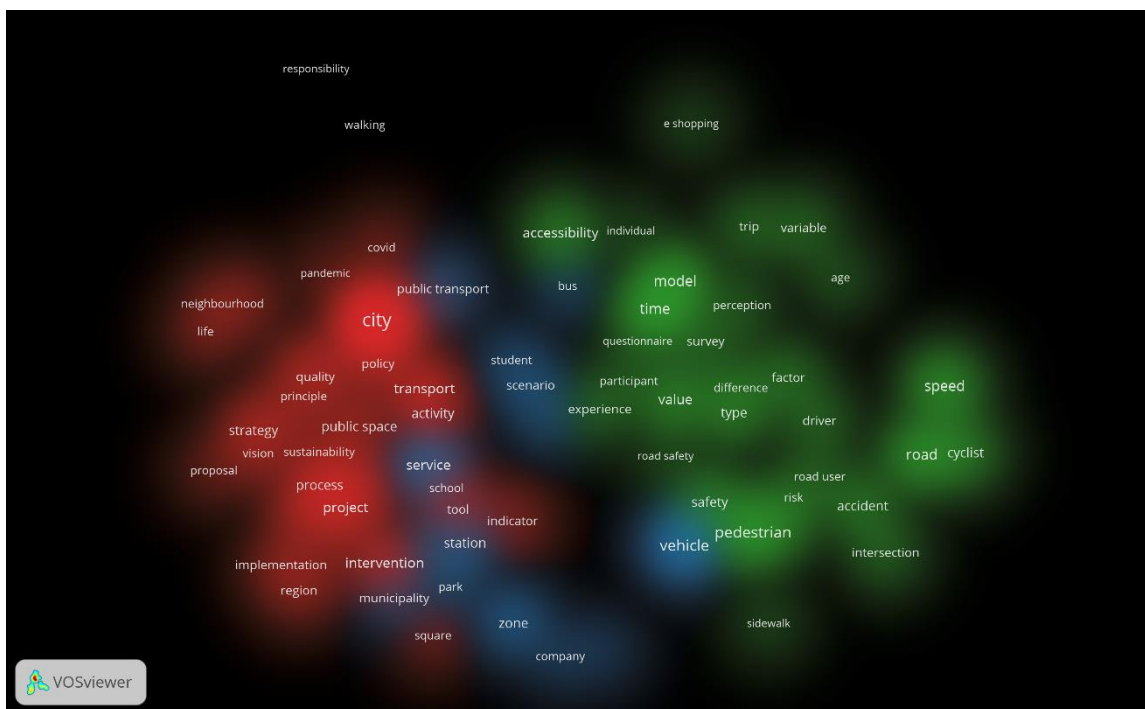
- 'city' linked to 'policy, transport, activity and service';
- 'city' linked to 'policy, quality, principle, strategy, vision, proposal';
- 'public space' linked to 'sustainability, process, project, intervention'.

The main cores are safety-vehicle-pedestrian, speed-road-cyclist, model-time and process-project.

These relationships among the keywords make evidence of the main ongoing researches under discussion in the international debate.

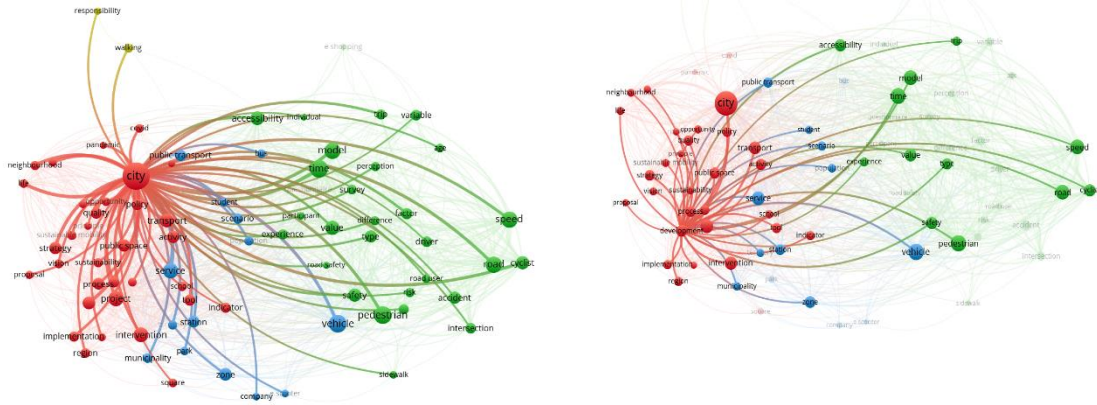


**Fig.3 Density map of the LWC2021 Conference Proceedings keywords (elaboration of VOSviewer software) with tendence lines**

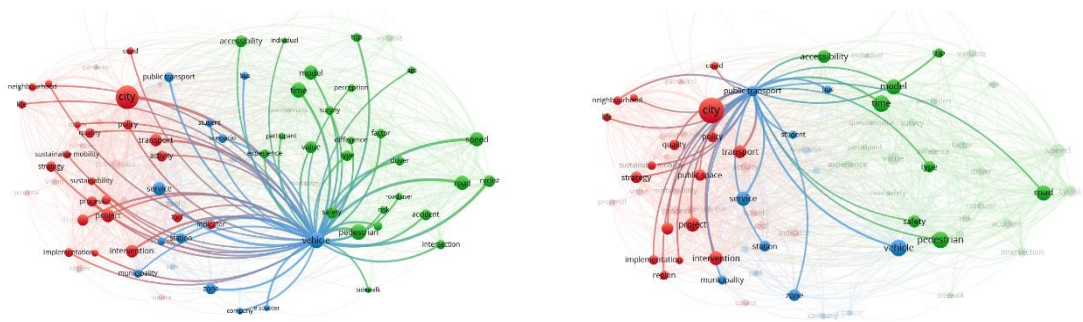


**Fig.4 Cluster density map of the LWC2021 Conference Proceedings keywords (elaboration of VOSviewer software)**

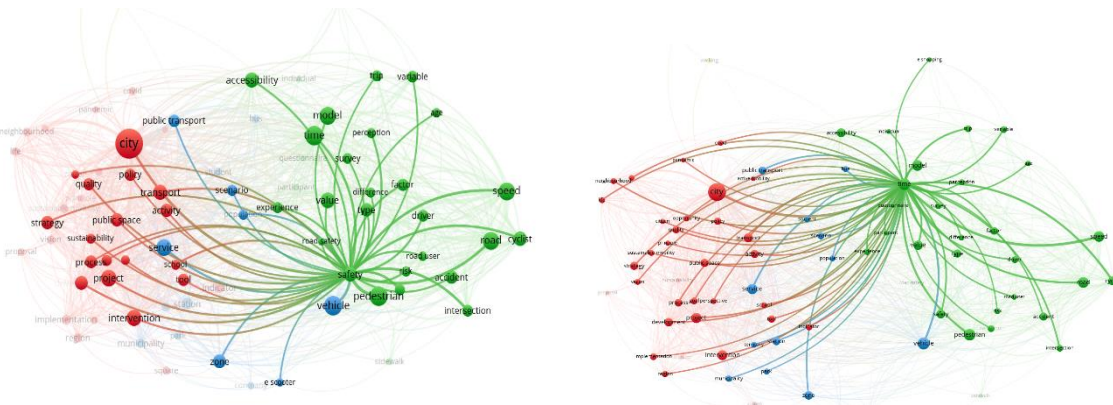
The three main clusters showed in the Figure 4 concern the items 'city' and 'development' (fig.5(a) e fig.5(b)), 'public transport' and 'vehicle' (fig.6(a) e fig.6(b)) 'safety' and 'time' (fig.7(a) e fig.7(b)) gives a wider idea of the subtopics and of possible interdisciplinary connections.



(a) (b)  
**Fig.5 (a) Network of the items 'city' and (b) Network of the items 'development' (elaboration of VOSviewer software)**



(a) (b)  
**Fig.6 (a) Network of the items 'vehicle' and (b) Network of the items 'public transport' (elaboration of VOSviewer software)**



(a) (b)  
**Fig.7 (a) Network of the items 'safety' and (b) Network of the items 'time' (elaboration of VOSviewer software)**

The most used words, or keywords, are:

- city, vehicle, time – as just said – area and pedestrian, repeated more than 500 times;
- speed, model, road and service, repeated more than 400 times;
- intervention, value, transport, accessibility, cyclist and safety, repeated more than 300 times;
- development, zone, accident, public space, strategy, process, station, public transport, policy, quality and tool, repeated more than 200 times;
- intersection, driver, indicator, behaviour, trip, experience, scenario, survey, municipality, site, population, vision, neighbourhood, walking, sustainability, perception, school, risk, sustainable mobility, park, student, bus, square, covid, road user, map, age, repeated more than 100 times.

The relevant but less used words are: e-shopping, road safety, active mobility, responsibility, e-scooter, integration and proposal (with less than 100 repetitions).

### 3. Conclusive remarks

The word 'time' is pervasive, but in the papers, it does not emerge clearly as an object of research. From the cluster vision emerges that 'time' is a fundamental element for the development of mobility strategies in the urban environment, but this topic needs to be further investigated in particular in connection with MAAS.

The word 'innovative' or 'innovation' does not generally appear in the papers. Safety in mobility doesn't seem to be considered an innovative approach. The idea of innovation is almost exclusively associated with the vehicle (declined in an electric vehicle, autonomous vehicle, moto vehicle) or with smartness (applied to the city or networks). The word 'innovative' or 'innovation' seem to be exclusively connected to technical or technological tools and not linked to the method of city development and transformation.

This lack of knowledge can influence the real "transformative capacity" of a city also in reaching the EU targets. The drivers for innovation are the awareness of road accident costs, of the different forms of active mobility, of the importance of quality of life and of the importance of an efficient multimodal public transport development.

The main barrier seems to be the lack of consciousness about the real meaning of "innovation" applied to the city. An "Innovative city" is not necessarily a smart high-technological developed city but a city that uses its transformative capacity in relation to site-specific problems.

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## Image Sources

Fig.1 (a): Automotive Dependency and Sprawl (Litman, 2021);

Fig.1 (b): Environmental and Health Benefits of Safe System Approach (World Resources Institute & Global Road Safety Facility, 2018);

Fig.2 – Fig.7: Elaboration by authors using VOSviewer software.

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