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Fusion Mobility: Linking cycling to new technologies
Scientist for Cycling Sessions at Velo-city 2018
Rio de Janeiro – Friday, 15 June, 11.40 am – 12.40 pm
future technologies
human surprises

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Paper in the S4C proceedings!
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**Fusion Mobility** is an Active Mobility based systemic approach for future multimodality and inclusive cities.

Future Mobility thus is not intended to reduce complexity, but to respect complexity and systemic interactions.

*Fusion Mobility* was introduced and discussed the first time at the 8th Travel Demand Management Symposium at NTU Taipei, September 27, 2017

*Fusion* – “the process or result of joining two or more things together to form a single entity”.

Active mobility

Active Mobility

building block 1
Access to Life
Accessing Life in Cities through Children

Active Mobility

Child Friendly Cities Initiative
unicef
for every child
Active Mobility

Hybrid E-Mobility

Passive Mobility
prioritising?

active mobility
active mobility agenda
Prioritizing Active Mobility (AM)?

1. Integrated, seamless transport works better
2. Reducing external costs as congestion etc.
3. Striking overall socio-economic benefits

Economic benefits on cycling – S4C sessions at Velo-city 2018, Rio de Janeiro.

Prioritizing Active Mobility (AM):

1. Integrated, seamless transport works better
2. Reducing external costs as congestion etc.
3. Striking overall socio-economic benefits
4. SDG contributions of Active Mobility
5. A human need – a human right + scale
6. Demonstrating the positive impact of AM

Cities for people are on this way ahead – prioritizing Active Mobility.

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TakeAway 1 – **Priority for Active Mobility**

There are many good reasons and evidence behind prioritising AM; and AM, and in particular cycling, contributes greatly to the UN SDGs (14 of 17 Global Goals), outlined in particular by the Active Mobility Agenda.
building block 2

public space
building block 2
public space

2
mneun

Public Space
From Sydney, Australia – Photo credit: https://www.pps.org/reference/phototips/
Sign at the Como Lake, Italy – Photo credit: M. Neun, 2018.
Democratizing Public Space:

1. Access for all
2. Cities for people starts here
3. Reallocation of a rare public resource
4. Enabling AM first – liveability and quality of life!*

Democratizing Public Space:

1. Access for all
2. Cities for people
3. Reallocation of a rare public resource
4. Enabling AM first – liveability and quality of life!

Jan Gehl and Manfred Neun signing the PUMA Charter on Active Mobility as witnesses in Gdansk, Oct 8; 2010.
Democratizing Public Space (PS):

1. Access for all
2. Cities for people
3. Reallocation of a rare public resource
4. Enabling AM first – liveability and quality of life! ¹
5. Cities are inherently evolutionary, in constant transformation – diversity of PS is a basic character. ²
6. Reorganizing Public Transport and combined mobility services for ‘Quality of Life’ in all AM zones. ³

Cities for people are on this way ahead – by democratizing Public Space.

building block 3

theEcoMobility hierarchy

Photo top left: Shia LaBeouf and his girl friend Karolyn Pho at the Ventura Boulevard in Los Angeles
building block 3

theEcoMobility hierarchy

Photo top left: Shia LaBeouf and his girl friend Karolyn Pho at the Ventura Boulevard in Los Angeles
building block 3

theEcoMobility hierarchy
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building block 3

the EcoMobility hierarchy
The EcoMobility hierarchy:

“EcoMobility means subsidiarity in urban mobility and transport. It presents a bottom-up approach to setting a priority order for the individual choice of transport modes as well as for urban planning and investment”.

The current EcoMobility hierarchy:

1. Walking
2. Cycling and wheeling (travelling strollers, trolleys, etc.)
3. 'Passenging' (using public transport)
4. Car-sharing (including ride sharing, hailing etc.)
5. Individual motorized transport

AM-cities are taking these aspects into account – by following the EcoMobility hierarchy.

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1 ‘The Urban Idea 2017: EcoMobility definition – as introduced by ICLEI 2017’, update; http://www.theurbanidea.com/EcoMobility.html
The EcoMobility hierarchy
As explained in the 'Reverse Pyramid'¹:

¹ Example from: https://ciudadesquecaminan.wordpress.com/2013/01/08/que-haces-cuando-dejas-la-bici-caminar/2017’
The EcoMobility hierarchy

EcoMobility means is not only an approved best-practice tool, but also supported on evidence from EcoMobility TOD and TDM.

TOD (“Transit Oriented Development”) as it is an established approach in urban development that optimizes urban concentration to walkable distances to public transport (PT). Furthermore it highly depends on PT-logistical and AM-infrastructure development. We also see here a high TOD-internal development and an increasing diversity of approaches.

TDM (“Travel Demand Management”) as developed with strategies that result in more efficient use of transportation resources also has great promise in the use of ITS.  

1 ‘The Urban Idea 2017: EcoMobility definition – as introduced by ICLEI 2017’, update; http://www.theurbanidea.com/EcoMobility.html
2 ICLEI 2017. ‘The Kaohsiung Strategies for the Future of Urban Mobility.’ Adopted at 4 October at the Third EcoMobility World Festival and EcoMobility World Congress 2017, Kaohsiung
Ride Sharing Initiative – A convenient app for college students to be able to carpool with each other to destination in an efficient manner – Photo credit: https://devpost.com/software/ride-sharing-tifgvo
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Photo credit: Cycling Today
shared capacities

Carsharing
shared capacities

SUCCESS
Vice-President of India, Shri. M Venkajah Naidu at the World Bicycle Day 3.06.2018 in New Dehli
shared capacities
shared responsibilities


Photo credit: https://jumpbikes.com/
Enabling Shared Mobility:

Shared Mobility can be understood mostly as a hybrid solution in between private (active and passive) vehicle ownership and public transport; demand driven and transport capacity building oriented by sharing the vehicle (car, bike, vans, …) or travel (ride sharing), plus sharing costs.

1. **A shift away from personally owned modes of transport towards mobility services**

2. **The fastest growing type of shared mobility worldwide is public cycling**

3. **Shared mobility has a high potential to grow public transport.**

Increased shared mobility by public modes will contribute to better transport efficiency according to all sustainability dimensions.

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1 ‘See in particular TAAS or MAAS (Transport or Mobility as a Service), but also the risks about.'
Bamboo bicycles inspired by the design of traditional bicycles, are the most recurrent way of using bamboo.

Future Vehicles and Infrastructure

Building block 5
future
surprises

Future Vehicles and Infrastructure
future vehicles + infrastructure
future vehicles + infrastructure
future vehicles + infrastructure
future
vehicles
+ infrastructure
Integrating space and infrastructure for current and future vehicles and interlinked services

*Future vehicles* will show a much broader variety of formats, with self-driving cars, driving-assisted vehicles, light vehicles, many hybrids on various criteria and many types of bicycles, e-bikes as pedelecs and speed-pedelecs, two- and four-wheelers.

*Infrastructure* for all modes of transport is a basic need, if we would like to have functioning multi-modality, ITS etc.

This building block is to achieve a well-balanced infrastructure delivering access for all people and the frame for future vehicles. The increasing variability of vehicles and infrastructure can lead towards vehicle-orientation, but it is here the people centricity of FM can act as a corrective.
Integrating space and infrastructure for future vehicles and interlinked services – segregated and mixed –
Connected Mobility

building block 6
Increase the value of multimodal data

Information and Data  Transport On Demand  E Ticketing  Operations
Connected Mobility
Connected Mobility
Connected Mobility for all means of transport and mobility services

Connected mobility is about digitising transport with data exchange and connecting people and vehicles for multimodality and seamless transport.

In this field we can see a fast, complex and far-reaching development, where we are now at a crossroads, with either the car industry and private sector occupying this field, or an integration of all players and possibilities by modelling new ITS scenarios.

Under the “Active Mobility first!” precondition, Fusion Mobility is suggested as the frame when integrated and connected means of transport will functioning as mobility ecosystem for people.

It is important that these fast emerging new technologies that are data and AI driven, with big data operations for optimised services is orientated towards the idea of putting people first, not vehicles.
Connected Mobility for all means of transport and mobility services – 2 –

Let us stress again ‘Mobility for all’ – for young and old, and also the SDGs. In particular with the move towards self-driving vehicles this must be taken seriously as a great challenge and as a great opportunity as well.

When car ownership is reduced significantly, people are able to becoming more flexible, and in well-structured and developed mobility systems even more independent, from the car, the high car costs, and also not being captivated in traffic jams.

> More about in # 5. Perspectives!

As essential we also have to stress data safety for people and for systems.¹

all the building blocks

Connected Mobility
Shared Mobility
Future Vehicles and Infrastructure
Active Mobility
EcoMobility
Public Space
how can we make the system work?

Active Mobility
Connected Mobility
Future Vehicles and Infrastructure
Shared Mobility
Public Space
EcoMobility
Systemic interaction

correlate them – one by one!

Active Mobility

Connected Mobility

Future Vehicles and Infrastructure

Shared Mobility

Public Space

EcoMobility
measure them — comparable!
The radar plot is showing a fictitious example of two situations (two cities, before-after, etc.)
future

perspectives
Fusion Mobility is a great opportunity as it brings a change of perspective for researchers and practitioners:

- from technology centred to people centred,
- from fractioned departments in GOs and in research on transport and urban development to social-inclusive urban and regional systems.

Let us therefore stress **accessibility** as a criterion for people centred achievements ...
future perspectives

… questions on accessibility as a criterion for people centred achievements:

- Is the technical improvement of vehicles and transport solutions bettering transport accessibility for all people? Or is it increasing class dominated hierarchies?
- Do we understand that increased energy consumption with additional technical solutions can also hurt accessibility for all?
- Are we aware that electrification of a non-sustainable transport system does not better the system significantly, nor does it automatically give more people better access?
Preconditions for a developed and fully interacting Fusion Mobility system – to overcome the fragmentations in research and decision making, and creating a holistic system:

1. The six building blocks [BB-1 … BB-6] are not automatically interconnecting, they must be set into an interacting context.
2. To compare different situations in urban and transport development, or also just to identify one, we must be able to measure each of them, and a comparable scale for all the six must be developed.
1. The six building blocks [BB-1 … BB-6] are not automatically interconnecting, they must be set into an interacting context.
2. To compare different situations in urban and transport development, or also just to identify one, we must be able to measure each of them, and a comparable scale for all the six must be developed.
future

challenges
future

challenges

from AI

artificial intelligence
future
challenges
from AI
artificial intelligence
future challenges from AI artificial intelligence
Professor Stephen Hawking and Elon Musk have both warned that AI could end mankind.
Can the Fusion Mobility concept help contributing to this challenging constellation?
1. What will happen, if the parameters will be created inside Connected Mobility only?
1. ... if the parameters will be created inside ... only?
2. And what, when the other ‘BB’ will be respected?
**Future perspectives for research etc.**

**Fusion Mobility**
*is the game changer –*

- For further research,
- for decision makers
- and for society
For IST the integrated approach for a systemic mobility concept is not starting from zero. From TDM and TOD research it is known that there are numerous capacity building capabilities when unleashing the full potential of active modes. From energy scenarios we know that saving energy can be the most effective role in future energy use. And taking into account the additional benefits of Active Mobility as mentioned above, with health benefits as the number one, this is indispensible for the increasing problems of our sedentary society.
Let’s call it the ‘Fusion Mobility Outline’ – the radar plot diagram analysing e.g. two different situations to be compared.

1. As guidelines to overcome a segregated world of transport and beyond.
2. A tool for audits - thereby also a step forward in “New mobility policies: from transport departments to mobility networks” will be supported significantly.
3. A tool to improve sustainable development by future investments.
This concept of a ‘Fusion Mobility Outline’ tool needs further research and improvement:

1. New individual scales for all ‘Building Blocks’ in must be developed, also empirically by case studies in cities.
2. The tool then must be approved with a second series of case studies/facility studies.

The windfall profit might be that new research in the field of active modes can be adopted to this FM concept, and so leveraging cycling related research.
The concept of a *Fusion Mobility* was drafted not only in respect of complexity and the human scale, it is targeting the far-reaching consequences of the Anthropocene – the men made geological era.

1. We are responsible for what is going on in mobility and in our cities. Sustainable development is possible.
2. We are responsible to take seriously into account what we know and can make better.

Therefore a holistic view on the systems we create is an urgent need – and we are able to do so.

Let us therefore accept Sustainability and Active Mobility as transformative values, and *Fusion Mobility* as a tool to guide the work in progress.
Fusion Mobility delivers a systemic approach that put people first — all people — when using new technologies.
Photo: M. Neun, June 2018 from the world famous painting ‘DANCE’ (1909) from Henri Matisse– MomA, New York City.
fusion mobility – future is now

thank you

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Scientists for cycling