Better Streets for Better Cities:
Summary and key recommendations*

MORE
Multimodal Optimisation of Roadspace in Europe

*MORE: Multi-modal Optimisation of Roadspace in Europe: www.roadspace.eu

Foreword

Throughout Europe, we are witnessing a growing commitment to achieving more sustainable, liveable, and pleasant public spaces. Cars take up a significant amount of public space in our cities, which makes the challenge of reallocating public space to favour sustainable transport modes and street activity all the more crucial.

Against this backdrop, the results and the recommendations developed within the EU-funded **MORE** project could not be more relevant. The toolbox of local authorities, to create more liveable places and reduce the dominance of private vehicles is growing, with new instruments, processes and practices being piloted by forward-looking cities. The ones developed and tested by the **MORE** project, and outlined in this publication, will support cities in the process of generating and assessing new design options, while at the same time engaging citizens in the actual street redesign process.

Reconciling the different demands and functions of busy urban streets is definitely no easy task, especially in our ever-changing urban ecosystems with increasing, multiple and conflicting claims for urban space. However, the good news is that cities are in charge of the street space, and can decide what and which modes and functions they want to prioritise, by allocating more space to them or taking space away. Only by listening to all those who experience streets every day and by understanding the strategic and political importance of street space allocation, will our roads and streets become more than just corridors to move people and goods, and become real *places* for people.

Karen Vancluysen
Secretary General,
POLIS Network

Contents

A. Introduction to MORE

Today's high levels of air and noise pollution, congestion, and road traffic collisions can reduce economic efficiency and negatively impact the health and wellbeing of urban populations.

As a result, cities are now beginning to recognise the need to look seriously at how to make better of use of urban street space and networks, to meet this wide range of policy objectives through a more flexible use of streetspace. The efficient design of street space favouring multimodality and sustainable transport modes becomes increasingly essential.

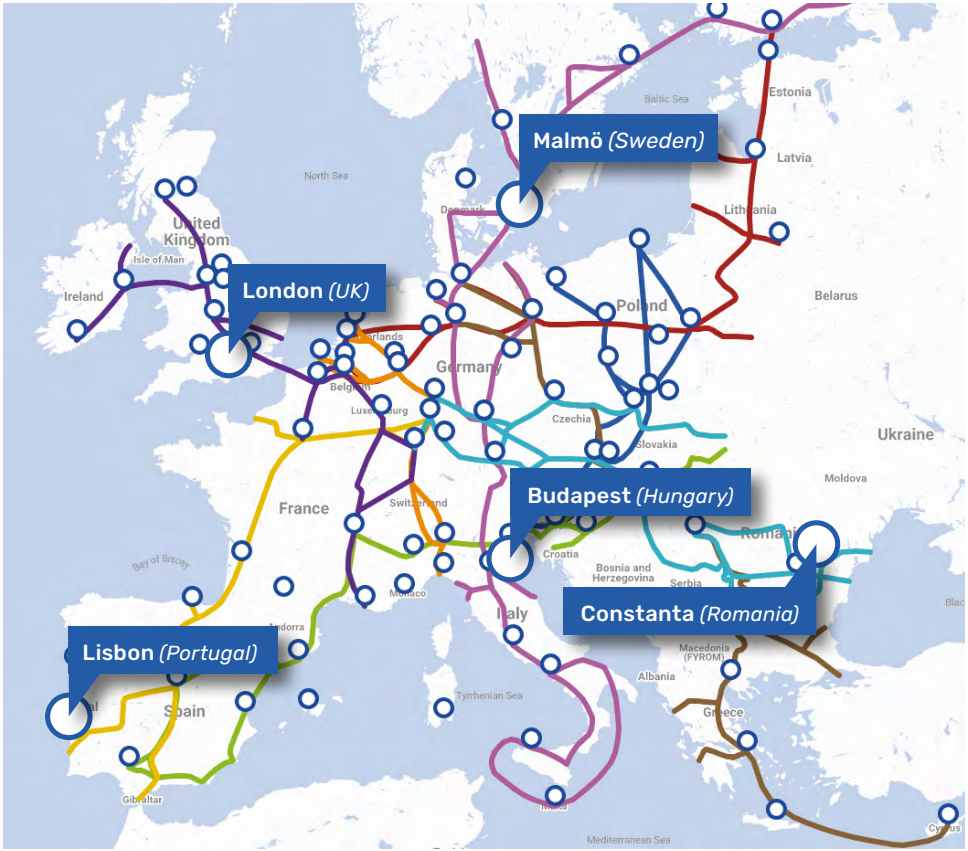
Against this backdrop, **MORE** has developed an easy-to-apply complete street re-design process, with supporting design tools, that has been implemented on challenging street sections in five urban nodes of the Trans-European Transport Network: Budapest, Constanta, Lisbon, London, and Malmö - recognising that most trips using the Trans-European Transport Network (TEN-T) begin and end in urban areas.

The project has developed a comprehensive and objective approach to the planning, design, and management of existing streetspace on major urban routes – both to address the problems experienced now and as they might arise in the future. It considers the impacts on all street uses – both those moving along the street and those for whom the streets is a destination, taking into account the cities' economic, social, and environmental objectives.

This document provides anoverview of the 3.5 year **MORE** project, highlighting the concepts and principles, and the steps and tools that comprise the street redesign process. It illustrates the applications in each city and summarises the **MORE** cities' insights into their experiences, lessons learnt and tips for embarking on such a journey.

The **MORE** consortium comprised a multidisciplinary team of 18 European partners: the five cities, three universities (with skills ranging from engineering and economics to political science), five private sector companies, and five organisations representing cities and specific street user groups.

MORE City Partners: Five Urban Nodes on the TEN-T European Road Network



Key

The TEN-T Corridors

- Rhine-Danube
- Orient/East-Med
- Baltic-Adriatic
- Mediterranean
- Rhine-Alpine
- Scandanavian-Mediterranean
- North Sea-Mediterranean
- North Sea-Baltic
- Atlantic

The Five MORE urban nodes, in relation to the TEN-T network.

MORE operational objectives

1. Identifying and synthesising **'good practice'** in urban road planning, design, operation, and management.
2. Developing a **conceptual framework** for supporting urban street redesign.
3. Developing a comprehensive set of cross-modal and cross-sector **performance indicators**.
4. Investigating **organisational/institutional** arrangements (including regulation, administrative processes and funding).
5. Identifying **opportunities and threats** arising from new transport and non-transport **technologies** and **emerging digital eco-systems**.
6. Developing **future scenarios** as inputs to Design Briefs.
7. Developing interactive tools for **stakeholder engagement**, to contribute to the Design Brief and to the co-creation of design options, using both physical 'planning for real' and web-based tools.
8. Developing web-based tools to assist in the **generation of design options**, drawing on existing case study experience and using combinatorial algorithms to develop new whole-street design options.
9. Developing an **enhanced simulation tool** (based on PTV **VISSIM**) capable of simulating the actions of all street users and providing outputs in the form of the agreed performance indicators.
10. Developing a set of **comprehensive appraisal tools** for assessing the streetspace design options, using the simulation outputs from the simulation tool.
11. Applying the developed concepts and tools on **radial case study corridors** in five European cities, to demonstrate their applicability and to derive 'optimal' design solutions.
12. Conducting an overall **assessment of the case study corridor exercises**.
13. Developing **guidelines** for optimal streetspace allocation on major urban.
14. **Disseminating** results widely through European-level and national organisations.

B. Challenges and Opportunities
The importance of the urban streetspace

Urban streetspaces lie at the core of city planning and city life, from social, economic, environmental, and political perspectives. They provide a place to socialise and to move people and goods. However, the challenges, pressures, and conflicts increase as cities grow and new modes and patterns of demand arise.

Corresponding to around 80% of the public space in our cities and towns, the importance of roads and streets in daily life is undeniable. It is where most people experience the city, as residents, commuters, shoppers, or visitors. Roads and streets have several uses, from moving people and goods to supporting social, economic and community activities.

The problem cities face is that most streets have been designed to give priority to the needs of the motorcar; policy now prioritises sustainable mobility, liveability and placemaking – so street layouts do not reflect or support these policy priorities.

Busy urban nodes and their streets are now experiencing a more diverse and changing set of circumstances, creating new demands from many sides. The increasing pressure for more space from these competing demands makes streetspace an ever more valuable and desirable asset. It stresses the need to redesign street to address these challenges and opportunities, in a flexible and dynamic manner.

Examples of Street User Groups:

Private Cars

Shared Cars

EV-car

Buses and trams

Pedestrians walking along and crossing the street

Private Bikes

Shared bikes

Vans and trucks

E-Scooters

People taking part in street activities (sitting, chatting, watching, etc.)

Conflicts over streetspace have been increasing, as street uses are becoming not only more diverse but also more intense. As a result, it is not uncommon to see users' fighting' for space and taking over space allocated to other uses, creating stress, disruption and safety risks.

Disruptions and Safety Risks

Vehicles parked on the footway or bus stops

Shop front displays disrupting the movement of pedestrians

Cyclists and motorcyclists riding on the footway

Cars and vans using road lanes that are restricted to buses or cyclists

Pedestrians crossing the road outside designated crossing facilities

Sudden emergencies and crises, such as the COVID-19 pandemic, can amplify some of these challenges and conflicts arising in the streetspace, quickly shifting priorities and accentuating inequalities in the use of the public space. However, it can also present opportunities for more radical streetspace reallocation.

Our urban streets are where many of the interrelated high-level policy challenges worrying cities worldwide are materialised and locally felt by its users and the broader population. Challenges include growing mobility levels, disruptive new technologies, decarbonization, environmental balance, equity, public health, economic vitality, and quality of life. This highlights how complex and crucial urban streetspaces are both to the delivery of urban policy objectives and to the vitality of cities and the TEN-T network. They embody urban life and enable the constant flows of people and goods across cities and countries.

Future street requirements

How will the characteristics of street uses change by 2030, or by 2050? How will users' lifestyles differ from today's street users? And how will this relate to the demand and supply for transport, and the functions of urban streetspace? We might not have all these answers, but it is essential that today's planning considers and anticipates the needs of tomorrow.

Future changes in demographics and lifestyles, economic growth, or shifts from one economic sector to another, will go hand in hand with new technologies and services. As these new digital and mobility technologies and services emerge, new users and uses will arise, resulting in new demands and opportunities. To accommodate these changes, new physical and digital street infrastructure will also be necessary. Giving future uncertainties, an element of flexibility in design and management will be required, along with a more dynamic approach to streetspace allocation – taking advantage of new sensing technologies.

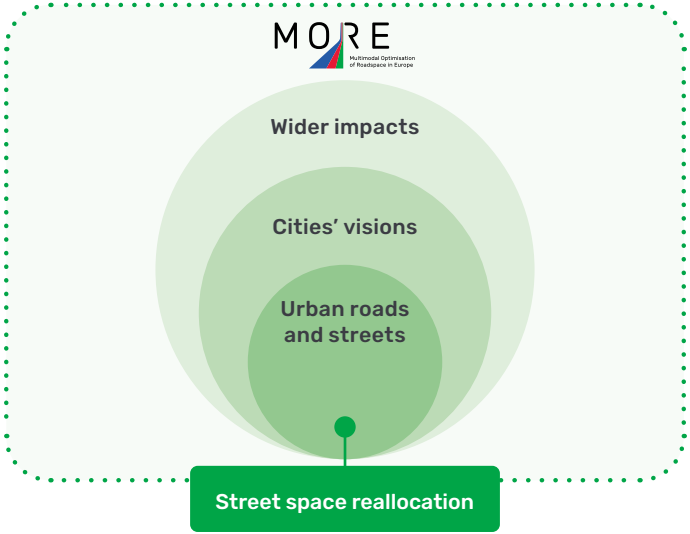
New elements have already started to populate our streets and will continuously increase their presence and reshape habits and spaces. And undoubtedly, just as these disrupters have appeared, others will too, demanding evermore flexibility and adaptability from our streets, both in the physical and digital domains.

- Micro mobilities
- Shared mobilities
- Mobility as a Service
- Connected and automated road transport
- Footway robots
- Sensors (In-vehicle systems, traffic status detection, incident detection)
- Positioning systems
- Unmanned Aerial Vehicles (UAVs)
- Data infrastructure and data analytics

Looking beyond the street

While **MORE** focuses on the development of comprehensive street redesign processes, to help cities reallocate streetspace to meet current and future challenges, this needs to be embedded and understood within a wider context – reaching out to align with cities' visions and taking into account wider policy considerations.

Wider Considerations beyond the street



Promoting economic aspects in streetspace allocation

- Increasing accessibility of customers and freight vehicles to stores (e.g. by providing loading spaces, bus stops, smooth access to train stations, and parking areas) promotes the **local economy** and can counter the tendency for the decline of physical stores in commercial streets.
- The provision of good-quality street infrastructure for pedestrians, and places to rest, can also increase the **attractiveness** of those streets for customers, increasing footfall, sales, and rental values.

Enhancing social and equity aspects

Reducing points of conflict and removing physical or visual obstructions improves **traffic safety**, decreasing the probability of collisions, injuries, and fatalities. It also reduces **community severance**, reducing perceptions of the street as a barrier and the feelings of disconnection and isolation, especially among older people.

Allocating for space for active modes, green areas, and outdoor activities:

- Promote **physical activity**, reducing propensity for obesity, heart diseases, and other physical and mental health problems.
- Promote **social interaction** and **social cohesion**, facilitate chances of encounters and interactions.
- Increase the number of people using the street, increasing perceptions of **personal security**, and possibly reducing crime incidents.
- Increase **wellbeing.**

Highlighting environmental aspects

Non-motorised modes, green spaces, and high-quality places for people:

- Reduce **noise and air pollution** levels.
- Improve the **visual environment**, producing a more pleasant experience for residents and visitors.
- Reduces heat island effects, improving the **local climate**.
- May lead to modal shift, reducing **energy consumption and CO_2 emissions** from for transport.

Using pervious surfaces and space for surface water run-off, protects **soil and water** and reduce flood risks.

C. MORE Concepts and Principles

The concepts and principles developed or adopted by MORE underpin the street redesign process and the comprehensive supportive tools, applied in all the different contexts of the **MORE** cities.

Some concepts build on previous studies, while other concepts have been developed by **MORE** project partners.

Roads vs streets

MORE makes a clear distinction between urban 'roads' and 'streets' and focuses on the design and management of busier urban streets.

ROADS - are generally found in the outer sections of an urban road network (closer to TEN-T interface) and on the key radial routes; they are designed for higher speed, and are wider, and whose main function is accommodating the free movement of motor traffic and with no direct frontage access

STREETS – accommodate a much wider range of street uses and user groups. They have lower speed limits, pass through residential or commercial areas, and support non-motorised modes, social and economic activities, parking/loading and multiple pedestrian crossings.

The **MORE** city partners have each selected a radial' feeder route' from the TEN-T network to the city centre, which comprise a mixture of (i) road sections, typically in the outer parts of the city, and (ii) street sections, in the inner and central areas. The detailed redesign work has focused on a 'stress section' along the feeder route, which represents the part of the feeder route facing the greatest challenges, now and in the future.

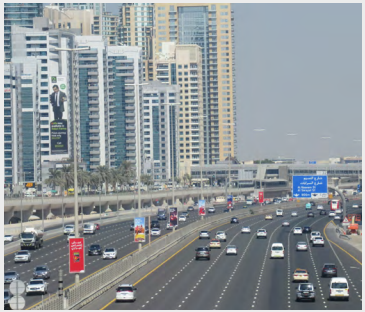
Movement and place functions of streets

Cities have been experiencing paradigm shifts in their urban mobility political priorities over many decades, starting with a focus on accommodating as much car traffic as possible – which has fundamentally affected the ways in which we plan and design urban streets.

The EU-funded project **CREATE*** developed a conceptual model that identified three stages of urban mobility policies priorities in cities, starting with accommodating the motor car.

*www.create-mobility.eu

Three stages of urban mobility policy priorities in cities



Stage 1
(car-oriented city) - C

- **Car use:** increasing
- **Political priority:** car mobility
- **Typical interventions:** building new roads and streets, provision of car parking, segregation of modes

Stage 2
(sustainable mobility city) - M

- **Car use:** levelling out
- **Political priority:** public transport and non-motorised modes.
- **Typical interventions:** improvement of public transport and walking/cycling infrastructure

Stage 3
(city of places) - P

- **Car use:** declining
- **Political priority:** place-making
- **Typical interventions:** traffic restraint, improving the quality of streets and public places.

The 'City of Places' stage is now the prevailing trend in many cities, which is encouraging a fundamental redesign of streets to give more of the available space for place-related activities and less for general traffic. This latest paradigm shift has also brought a new approach to road and street classification. The Movement and Place approach (derived from the EU 'ARTISTS' project[1]) evaluates a street's movement and place functions in its broader urban context, taking into account the competing needs of a wide range of street users. In addition, it provides a simple way of recognising the varying mix of functions across the network and for assessing the degree to which individual urban roads and streets currently perform their allotted functions.

- Streets as conduits for **movement** (by all modes of transport) – providing links to other locations as part of wider transport networks. The focus is on 'people' and 'goods', using all kinds of transport modes. So performance indicators are defined in terms of people and goods movement – not vehicle movement per se
- Streets **as places** of activity (e.g. socialising, or street markets), on the public street and in the adjoining buildings (ranging from residential to retail, office and leisure activities), and as destinations in their own right; this recognises the need for kerbside stopping, parking and loading, to support the place function.

Classifying streets under the two independent dimensions of Movement and Place better reflects the reality of how traditional urban streets operate, and was adopted by the Roads Task Force in London, who adopted a three-by-three classification. This has been used by the **MORE** cities on their feeder routes.

[1] Jones, P., Boujenko, N., Marshall, S. (2007) *Link & Place: A Guide to Street Planning and Design*. Landor Publishing, London

Taking explicit account of Place:

Street classification applied by TfL as recommended by the Roads Task Force.

With three levels of 'Movement' (of people) and three levels of 'Place'.

This form of street classification ensures that:

- The movement requirements are balanced against a wide range of place-related functions
- All street users' needs are identified and appropriately taken into account
- All the different street types found in urban areas are recognised and accepted
- There is a closer dialogue between the different professions involved in street planning and design.
- Street planning, design, operation and maintenance strategies meet the specific functions of each street.

'Street family types' applied in London. Source: Jones et al (2018)

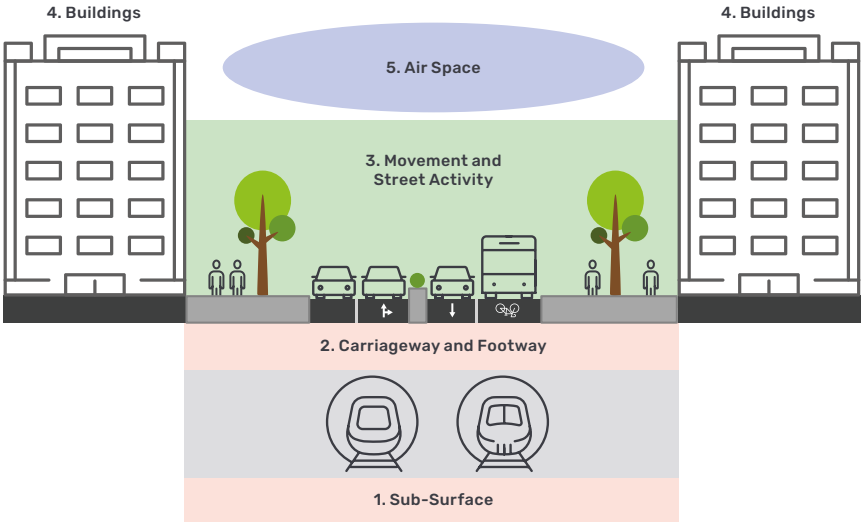
Streets as ecosystems: street elements and system flows (people/goods, CO2, finances)

Recognising the complexity of uses and users associated with the various movement and place functions, plus the far-reaching challenges and opportunities that urban streets face, the MORE project has holistically conceptualised urban streets as 'ecosystems'.

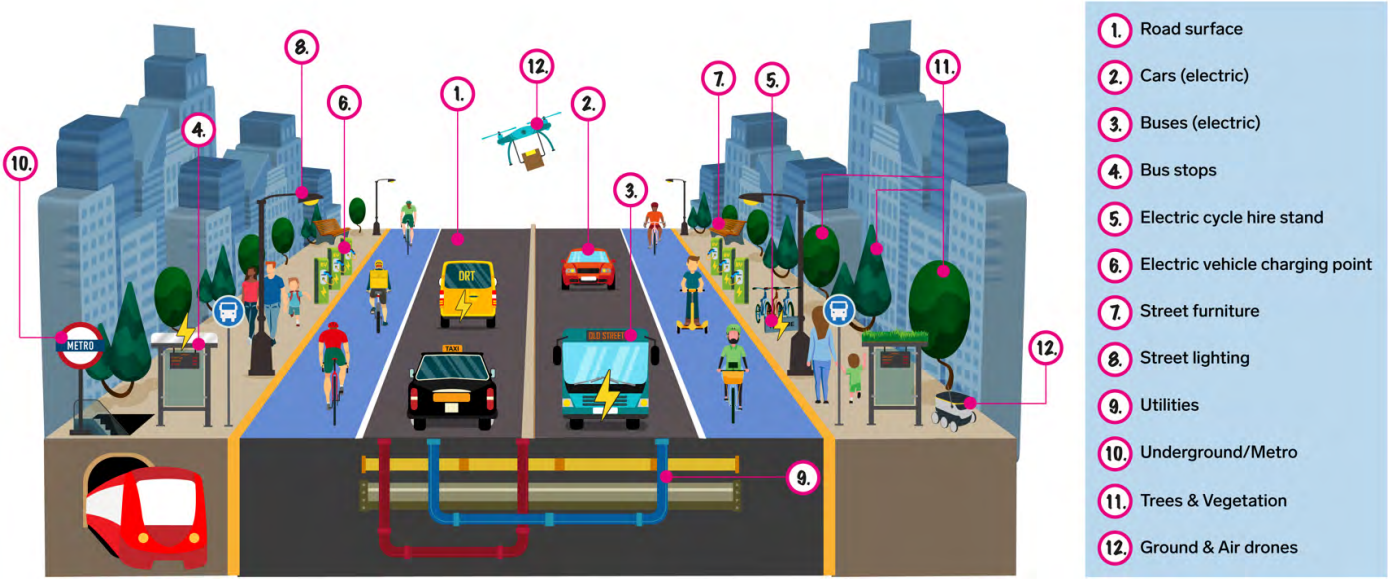
That is, as multi-functional, multi-users and multi-level spaces, extending in cross section from one building line to the other – rather than by considering each use separately. The street ecosystem is multi-layered. It includes not only the surface carriageway and footway and the adjoining buildings, but also the sub-surface facilities – metro systems, car parks, utility cables and so on - and also the potential use of the airspace above the corridor for drone and other technological developments.

As an ecosystem, streets are linked and interact with all their parts (e.g. uses and users) and their environment, i.e. cities and networks. Therefore, these links and interactions must be constantly observed, strengthened, and renewed to ensure their prosperity and success.

Key components of the Street Ecosystem



Carbon-emitting sources and sinks on Future Streets



Design optimisation and flexibility

Depending on the local context, culture and political priorities, the differing trade-offs between a street's Movement and Place functions will result in a considerable variety of ways in which space is allocated – one size will not fit all.

This variety increases when we introduce a time dimension: street users' needs may vary considerably by time of the day, day of the week, and even by season. Therefore, space allocation may need to be altered temporally to accommodate these varying demands, in order to get the best out of the limited streetspace available. In the current and future street ecosystems, optimising and flexing street design is essential to accommodate the varying patterns of demands.

Strategies such as using kerbside parking spaces for restaurant dining (tables and chairs) at night, or allowing unrestricted parking in loading bays during the evening are just some examples of adapting to different patterns of user needs at different times.

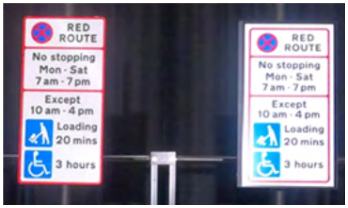
Meanwhile, advances in technologies, such as vehicle and street sensors and LED traffic regulation signing, open up possibilities of using space much more flexibly and dynamically – allocating space to patterns of usage closer to real time – recognising that this also raises many more technical and regulatory issues that would need to be resolved.

Nevertheless, the need for flexibility in street design and management should be addressed, so that streets may respond more appropriately to both current and future needs. Providing tools and structured processes to address this is also part of the mission of **MORE**.

Trials comparing dynamic LED signing versus conventional signs and road markings

Normal Light

Bright Light



Low Light

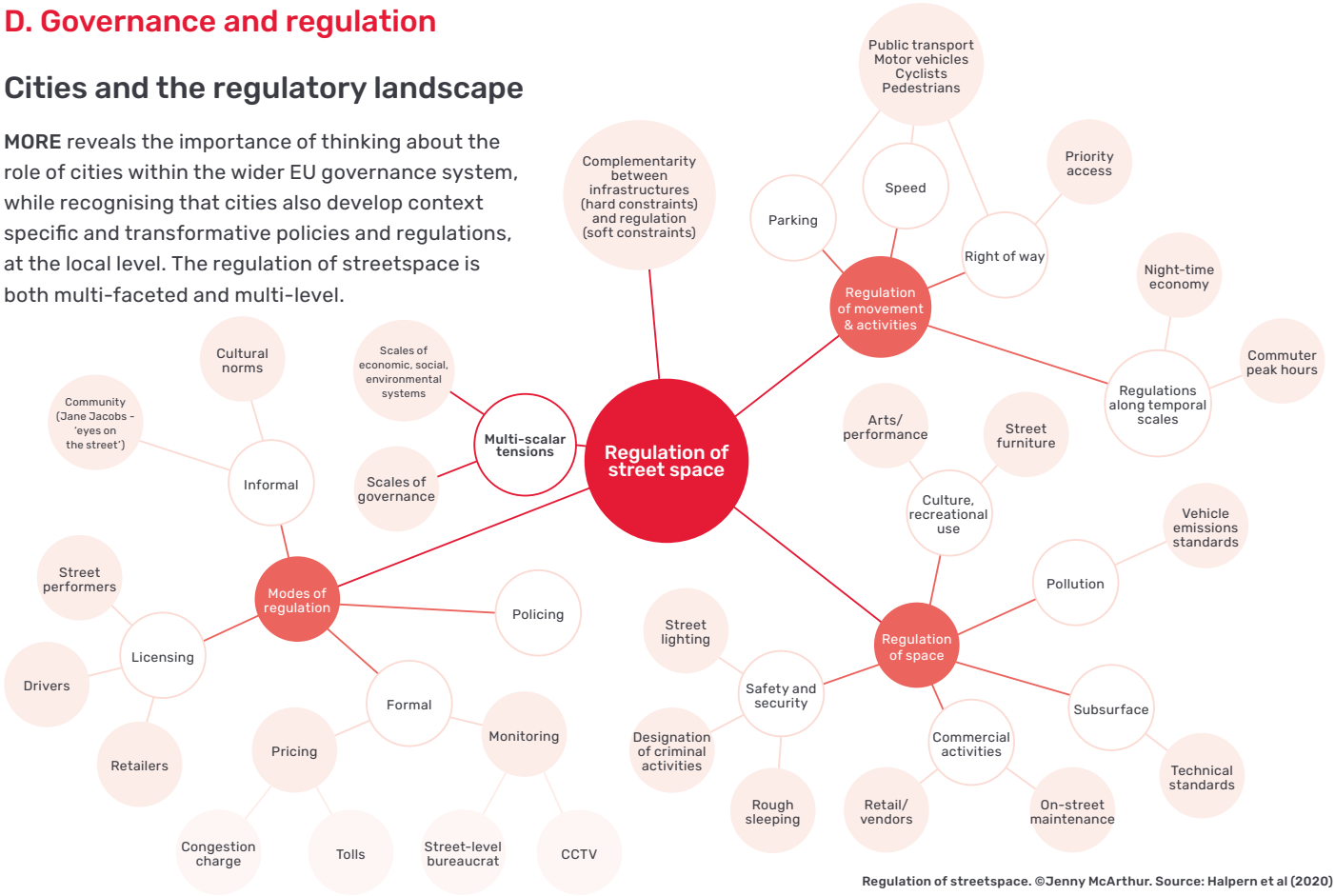
Physical vs. LED signs

Red and white line LED. Trials comparing dynamic LED signing versus conventional signs and road markings.

D. Governance and regulation

Cities and the regulatory landscape

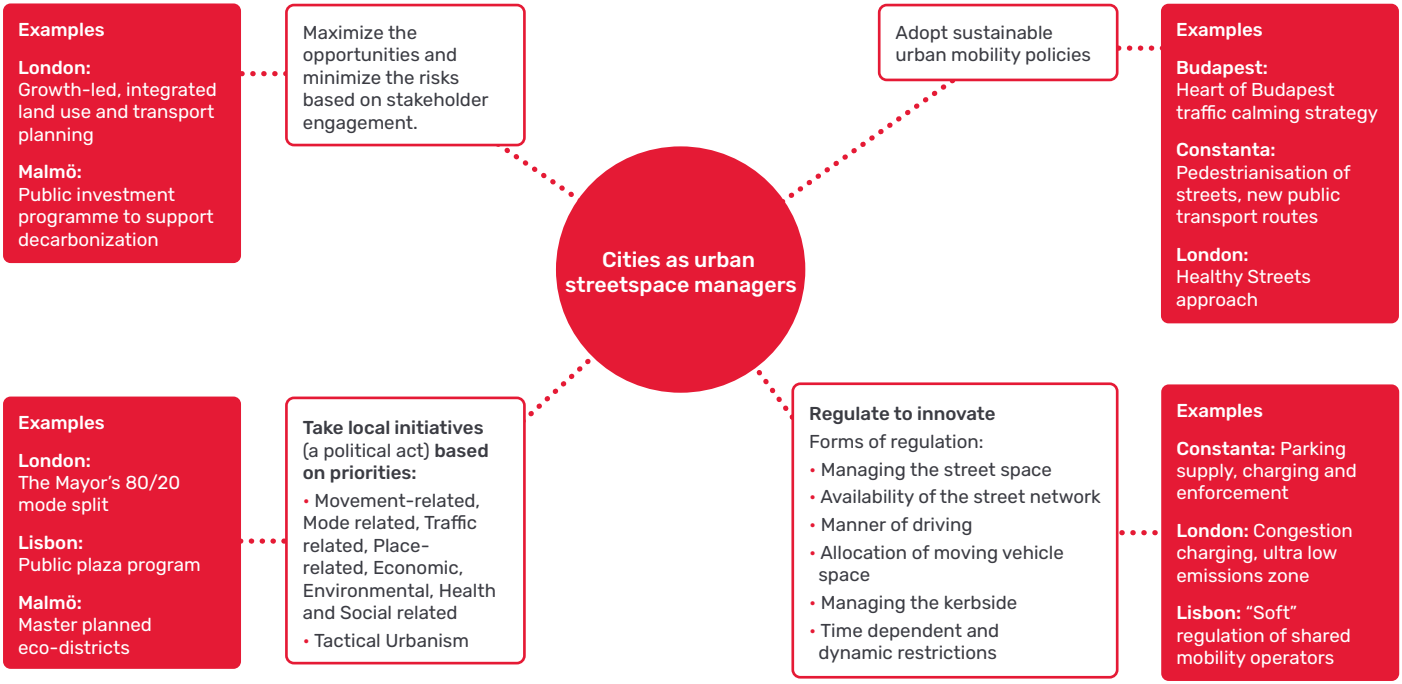
MORE reveals the importance of thinking about the role of cities within the wider EU governance system, while recognising that cities also develop context specific and transformative policies and regulations, at the local level. The regulation of streetspace is both multi-faceted and multi-level.



Regulation of streetspace. ©Jenny McArthur. Source: Halpern et al (2020)

Cities play a central role as urban streetspace managers in addressing and overcoming these various challenges, contestation and resistance, often in creative ways. Using their 'on the ground' experiences and expertise, they develop context-specific policy initiatives which, in turn, enables them to actively seek national and EU legislation changes, and to increase their role as rule-making authorities.

The MORE cities examples



Drivers/dimensions/factors that strengthen cities:

MORE has found that cities can rise to the challenges of streetspace design and management in five ways.

Leadership and policy narrative	Champions: Policy entrepreneurs, integrated transport agency, newly formed department
Administrative structures and capacity building	Accumulate policy resources, competing for national and EU funds, partnerships with private sector
Design Standards and Indicators	Using national guidance materials on urban street design. Context specific design, no “one design fits all solution”; Guidance and performance indicators need to be further developed
Dialogue with citizens and stakeholder groups	Formalized space for dialogue between a variety of stakeholders (public, technical experts, elected officials, etc.)
Standard setting and international networking	Engagement with international working groups on standards and norms for cyber security, artificial intelligence, digitization of streets, surveillance technologies

Policy measures in the city's armoury

The allocation and management of streetspace and capacity can be achieved through a combination of three broad types of policy intervention: physical, regulatory, and pricing measures.

- **Physical** measures determine whether any provision for a particular street use is made or not and, if so, how much of it and where (e.g. providing a purpose-built cycle lane, adding street benches, etc.).
- **Regulatory** measures control access (either to parts of the carriageway, the footway or the kerbside), by determining when, where and what activities can take place in a given location, at what times. Access may be granted based on several different sets of criteria. For example, by regulating:
    - The type of **person** that can use a parking bay (e.g. resident, disabled person)
    - What **activity** is permitted (e.g. 'no access, except for loading')
    - What type of **vehicle** is permitted (e.g. buses only)
- **Pricing** measures are used to regulate demand (e.g. setting a parking charge to ensure that, on average, there is a 10% vacancy rate), encourage compliance with minimum environmental standards (e.g. charging non-compliant vehicles to enter a Low Emission Zone), and/or to raise revenue (e.g. tolled bridge crossing). There is increasing interest among cities in the potential for 'monetising the kerbspace'.

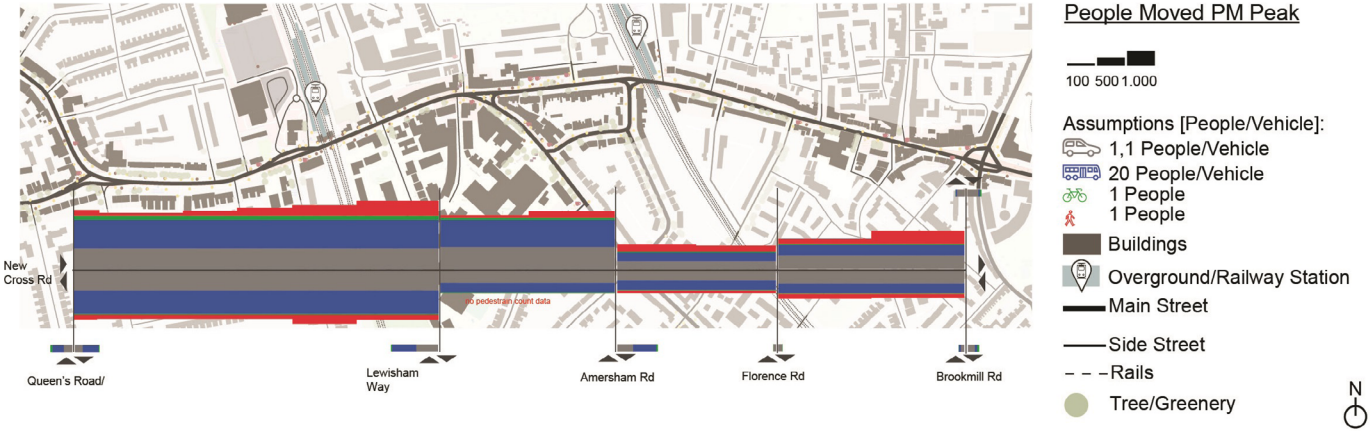
These three categories of measures may be applied, in combination. For example, in the case of parking, policy outcomes may be achieved through a combination of: limiting the total number of parking spaces provided (physical); restricting the duration of a parking act (regulation), and charging per unit time for using a parking space

The **MORE** option generation streetspace interventions tool lists 210 physical, regulatory, and pricing measures that could be implemented on streets, to accommodate user needs and contribute to policy objectives.

E. Street life in the MORE cities

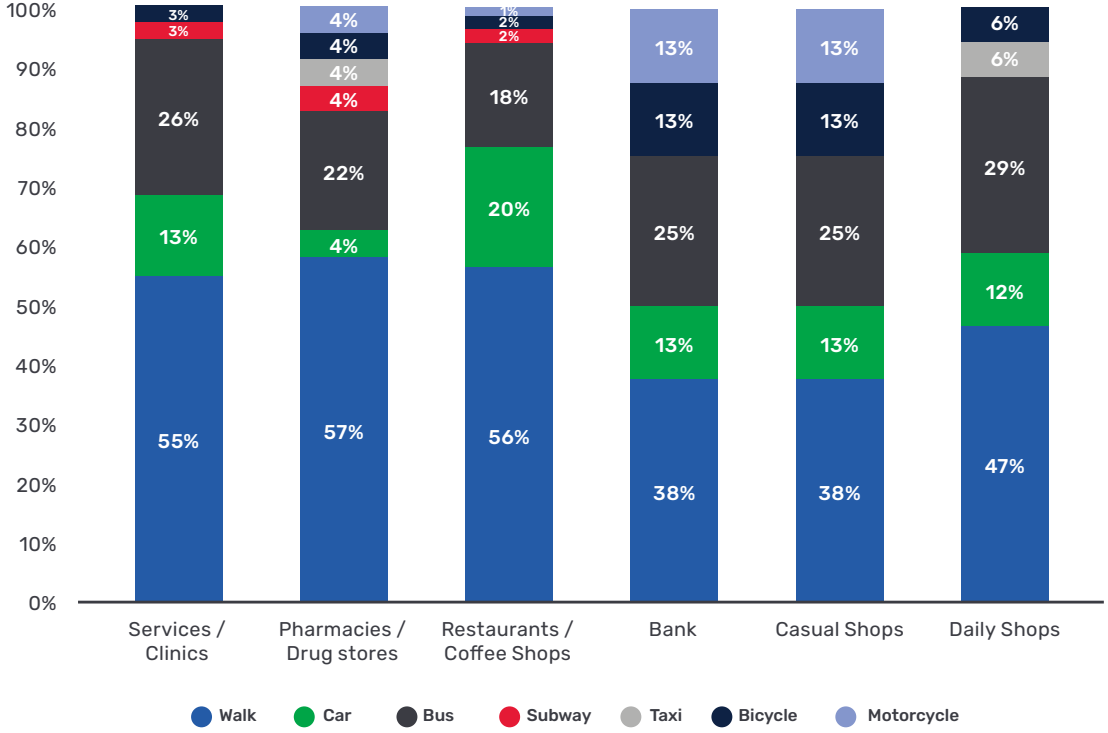
Streets as movement conduits: London

‘Stress section’ flows, in the evening peak



Source: Map created on the basis of the OpenStreetMap-Contributors (2021); People Moved on basis if TfL

Modes of transport used to reach different facilities



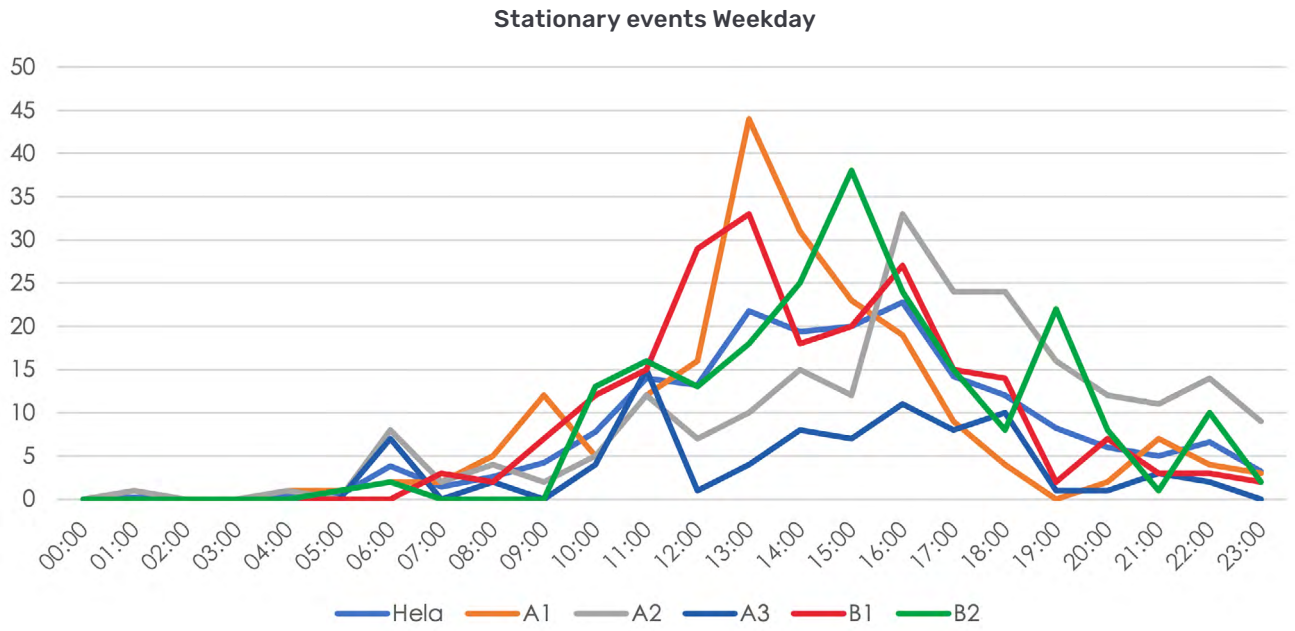
Modal share, by type of destination. Source: Curtis et al (2020)

Streets as places: Budapest

'Heatmap' of place activity along the 'stress section'

Source: Map created on the basis of © OpenStreetMap-Contributors (2021) and on data from City of Budapest

Average number of stationary events per hour during weekdays: Regementsgatan zones, Malmö



F. The MORE tools and street redesign process

MORE improves the decision-making process for street (re)design and streetspace (re) allocation by adding new dimensions to a process that is typically more focused on vehicle movement performance (e.g. speeds, travel time, or delays) than on person movement or place-related activity.

Gaps in the current street design and space allocation processes include:

- Little attention is paid to the comprehensive generation of design options, including new street design elements and innovative ways of using streetspace
- Consultation is often very limited and excludes key stakeholder groups and sections of the public
- Simulation modelling does not fully represent all street activities
- The scope of assessment can be narrow, due to lack of comprehensive and context-specific appraisal tools
- Such gaps are more serious, with the advent of new mobility services and technologies

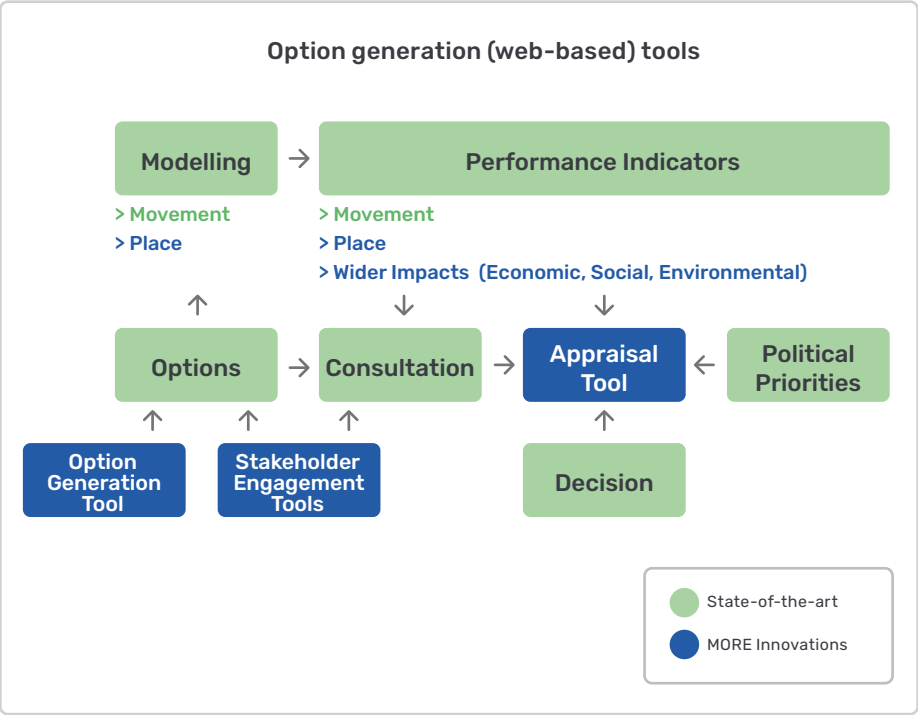
MORE addresses these gaps by offering a complete co-creation engagement process for street (re)design and space (re) allocation; and has provided tools to assist cities in the various stages of the process. It can help cities to better consider the needs of multiple users and optimise the street system's efficiency.

MORE tools

MORE has developed or refined tools to assist with most aspects of the street design process, as shown in **blue** below.

These include:

- New option generation, stakeholder engagement, and appraisal tools
- Refinements to existing microsimulation models; adding detail to place activities and adding place-related performance indicators



Option generation (web-based) tools

– Reduce number of traffic lanes

Description | Examples and evidence | Effect on street uses | Effect on policy objectives

Source of image: Paulo Anciaes

Type of policy: Space allocation

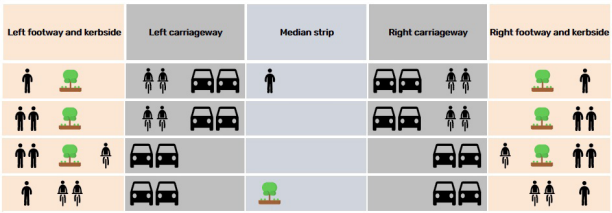
Also known as road diet. Removal of one or more lanes for general traffic, in one or both travel directions. This reduces the space for the movement of private motorised vehicles - bus lanes are not usually affected.

The space released is assigned to other uses, e.g. a median turn lane, cycling infrastructure, a walkable/green median strip, a wider footway, and parking space. It also reduces crossing distance for pedestrians.

This requires complimentary measures to reduce conflicts at junctions and to ensure that buses (moving or approaching stops) and cyclists are not negatively affected, in terms of delays and safety.

The reduction of lanes is suitable in built-up areas and roads with moderate traffic volumes and high volumes of pedestrians (including pedestrians crossing the road).

One of the aims of this measure is to reduce traffic speed. Central lines may be removed to further reduce speed. The measure should ensure that there is a separation between the road carriageway and footway.



Total road width (m)	Width of Design Elements (m)								Capacity per 75m² of roadspace		
	Walking	Place activities	Green area	General purpose	Bus lane	Cycling	Parking/ loading	Tram line	Movement (people)	Place activities (people)	Parking/ loading (vehicles)
29	6	0	3	12	0	6	0	0	170	20	0
29	6	0	3	12	0	6	0	0	170	20	0
29	6	0	3	12	0	6	0	0	170	20	0
28.5	4	0	1.5	12	0	9	0	0	155	10	0

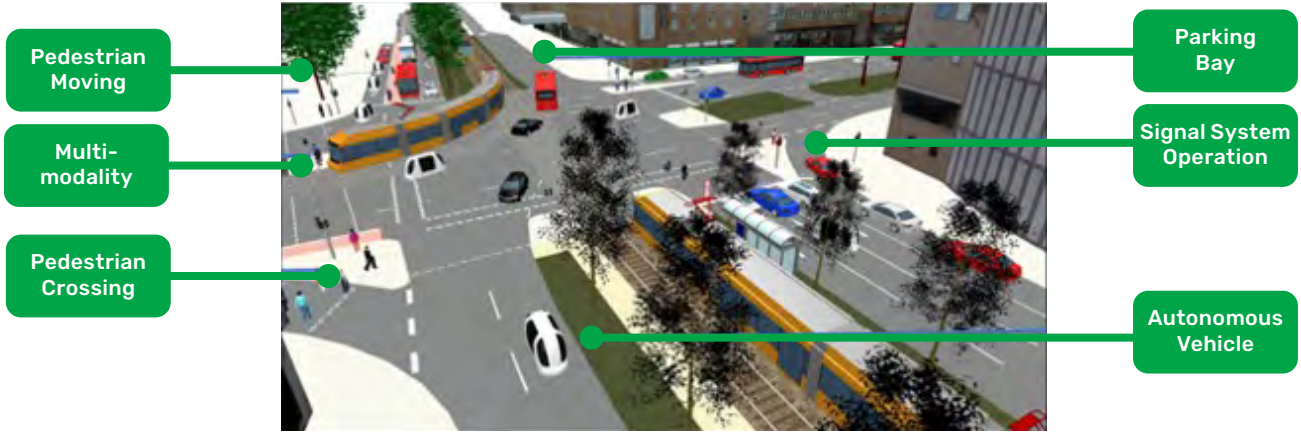
Constanta street design tool results for the left arm of the junction (I. C. BRATIANU BOULEVARD direction to A2 motorway)

Stakeholder engagement tools

Location of issues raised by stakeholders on the ‘stress section’ in Lisbon, using web-based tool **TraffWeb**.

Part of the **MORE** physical toolkit: blocks representing some street design elements (e.g. benches and loading bays) at a scale of 1:200. Designs are then converted into **LineMap** for digital editing and display.

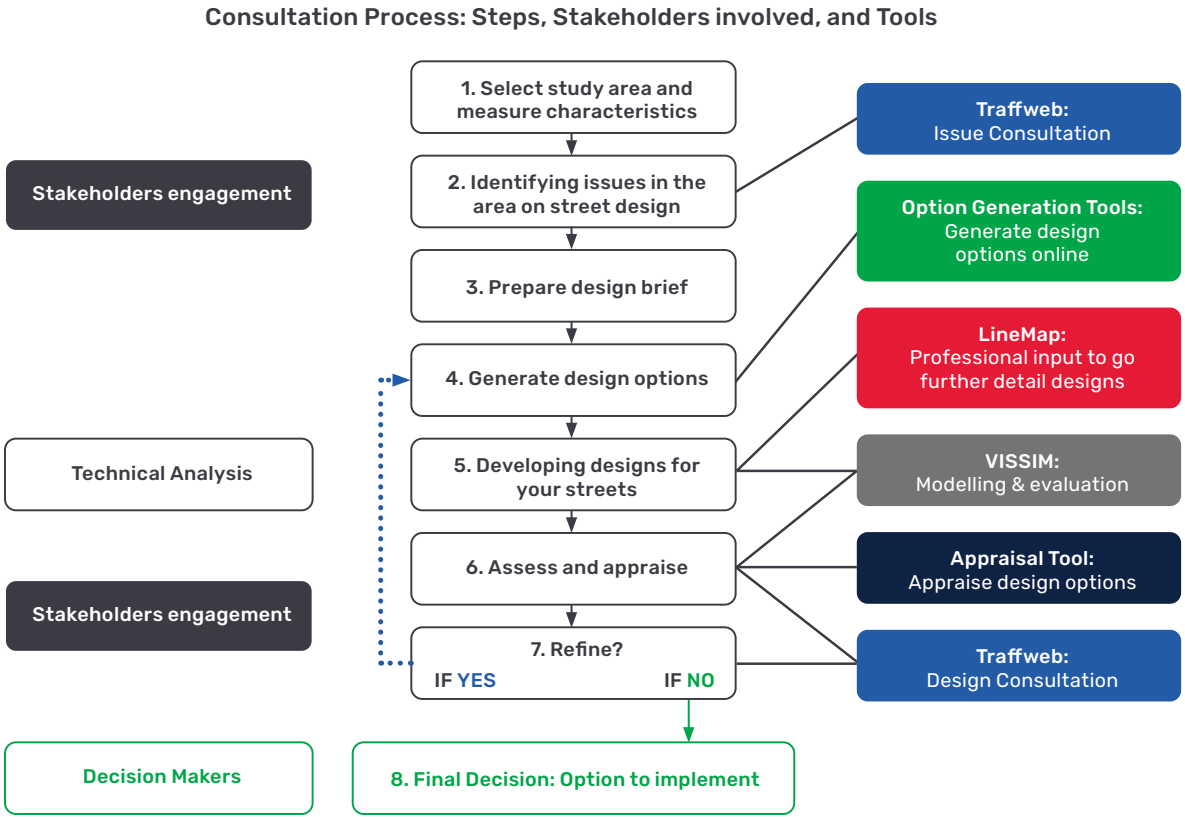
Micro-simulation tool enhancements



Appraisal web-based tools

Performance indicator	Unit	Option 0 (Do nothing) *6 traffic lanes*	Option 1 *Widen pavements*	Option 2 *Add green median*
Implementation cost	€		135,700	90,500
Maintenance/year	€	4,000	24,426	24,426
Link function				
Pedestrians				
Space	Width available	12.0	18.0	12.0
Volume	Flow	3812	5131	5131
Speed	Average speed (km/h)	4.0	5.0	5.0
Travel time	Average travel time (minutes)	30.0	24.0	24.0
Delays	Average delay (minutes/vehicle)	2.0	2.0	
Reliability				
Trip quality	% of unsatisfied users	0.09	0.45	0.1
Cyclists				
Space	Width available (dedicated space)	0.0	0.0	0.0
Volume	Flow	4697	5014	5014
Speed	Average speed (km/h)	12.0	12.0	12.0
Travel time	Average travel time (minutes)	10.0	10.0	10.0
Delays	Average delay (minutes/vehicle)	1.0		
Reliability				
Trip quality	% of unsatisfied users	0.03	0	0.0
Micromobility				
Space	Dedicated space (yes/no)	No	No	No
Volume	Flow			
Speed	Average speed (km/h)			
Travel time	Average travel time (minutes)			
Delays	Average delay (minutes/vehicle)			
Reliability				
Trip quality	% of unsatisfied users			

MORE street (re)design process



Step 1: **Select study area and measure characteristics:** The process starts with a city selecting a street section to be treated and collating all available data, from traffic counts to kerbside activity, air and noise quality.

Step 2: **Issues identified from the public consultation:** The engagement process starts with **Traffweb** to identify issues from an online public consultation. These are captured and digitalised for future analysis.

Step 3: **Prepare a design brief:** Identify the objectives to be met, synthesise what is known about street performance and issues to be addressed, set out a comprehensive street redesign and stakeholder engagement process; for future street designs, carry out a scenario-building exercise.

Step 4: **Generate design options:** Generate high-level street design options using the Option Generation Tools. This helps to consider the initial trade-offs that will be necessary for reallocating street space.

Step 5: **Applying designs options:** Firstly, by using the Physical Toolkit (Blocks and Acetates) during 'Design Day' group workshops (with transport experts, businesses and the public), exploring design options on street plans at a scale of 1:200. Then convert designs digitally using the **LineMap** tool and review by professionals for their feasibility.

Step 6: **Assess and Appraise:** The Road Design Dynamic Micro-Simulator, PTV **VISSIM**, is applied to provide a microsimulation-based assessment of street use, comparing the base situation and alternative design options. The **Appraisal Tool** is then used to assess the benefits and drawbacks of street design options across a wide range of performance indicators. This helps a final decision to be made based on transparent objectives and trade-offs.

Step 7: **Refine:** Options can be uploaded for public and stakeholder consultation using **Traffweb**. Depending on the responses, it might be necessary to iterate back to the option generation stage, to develop further designs.

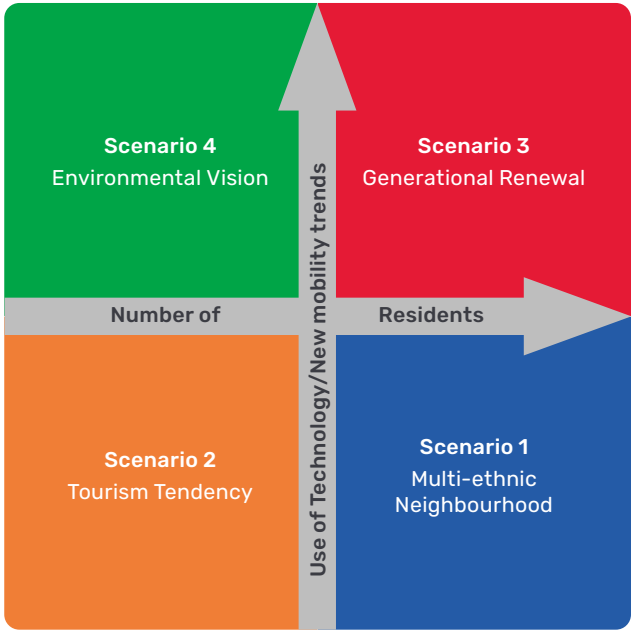
Step 8: **Final Decision:** Selection of option to implement. The final step sees decision makers being in an informed position to select which design option has the best case for taking forward.

Developing scenarios to explore future conditions

Given the uncertainties of the demands that might be placed on city streets in the future, each city developed a set of scenarios, to explore future possibilities and to 'stress test' the future designs that they developed.

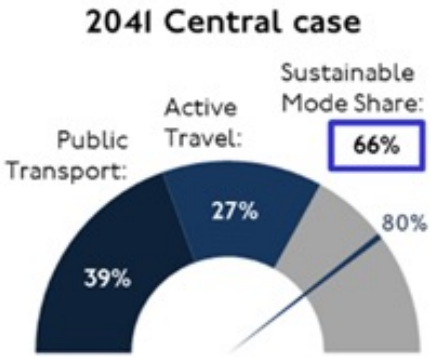
In the case of **Lisbon**, four scenarios were developed, based on demographic, employment and technology differences:

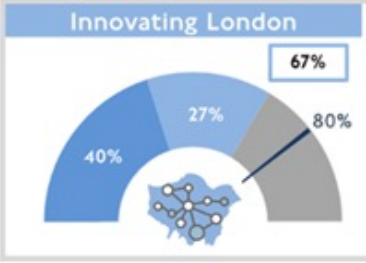
- **Scenario 1:** based on tourism growth, which will help to redefine existing commerce and services in the section and its impacts on demography and economy.
- **Scenario 2:** relies on success of some housing policies and the emergence of some clusters of technologic start-up companies in the zone's area of influence, which will attract a younger generation to live in the section.
- **Scenario 3:** assumes a similar composition that has happened in surrounding neighbourhoods, with a significant immigrant population moving to this section, changing the type of commerce and rejuvenating the area.
- **Scenario 4:** considers the hypothesis of large restrictions to ICE vehicles circulating in the city centre and its surroundings and the progressive transformation that can occur in the economy and demography in this area.



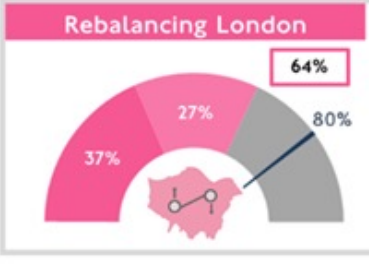
London developed three scenarios, based on different 'stories' of the future:

- **Innovating London:** London reinventing itself as a young, urban innovator, where technology changes how people live and work, but leaves some people behind.
- **Rebalancing London:** a more equitable, but ageing society with lower economic growth, that focuses on self-sufficiency and liveability as world power moves East.
- **Accelerating London:** an ever-growing, expanding London which acts as the beating heart of the world financial system, but struggles to deliver a high quality of life for all.

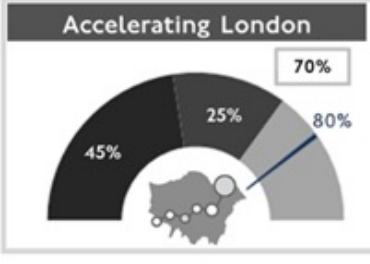




Relatively high PHV usage in Innovating London means that sustainable mode share is difficult to achieve despite lower car trips. Innovating London shows the need to get PHV and shared mobility right.



The sustainable mode share is lowest because of the low density travel in outer London and lower rail commuting mode share. A lot of local trips are convenient for car use.



High density living drives sustainable mode share but there is not as much active travel. People feel that walking is wasting time.

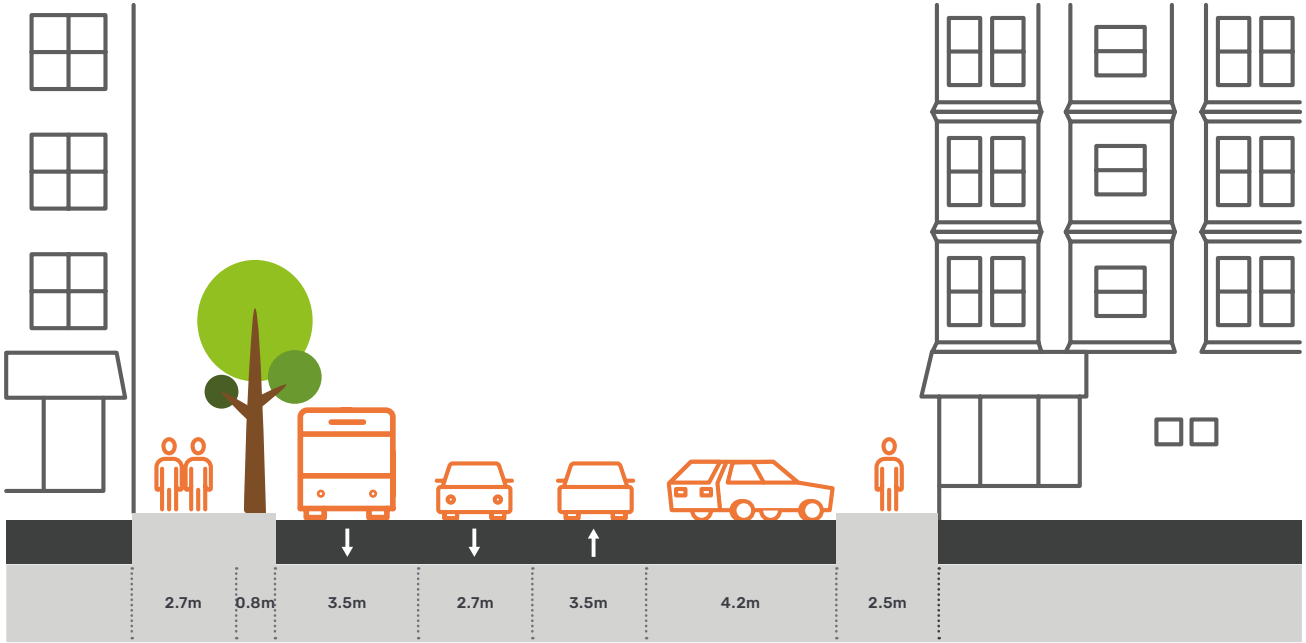
Malmö developed three scenarios, based on different policy priorities:

Mobility	Sustainability	Liveability
General traffic (movement)	Bicycle (movement and parking)	Slow movements
Loading and parking	Public transport	Place-oriented street furniture
Public transport	General traffic (movement)	Trees and greenery
Bicycle (movement and parking)	Loading and parking	Parking and loading
Pedestrian movements	Pedestrian movements	Pedestrian movements
Trees and greenery	Trees and greenery	Outdoor seating and meeting places
Outdoor seating and meeting places	Place-oriented street furniture	Bicycle (movement and parking)
Place-oriented street furniture	Outdoor seating and meeting places	Public transport
Slow movements	Slow movements	General traffic (movement)

G. Design options and city reactions to the (re)design process

Generating design options

Lisbon street design – prioritising pedestrians, buses, and greenery



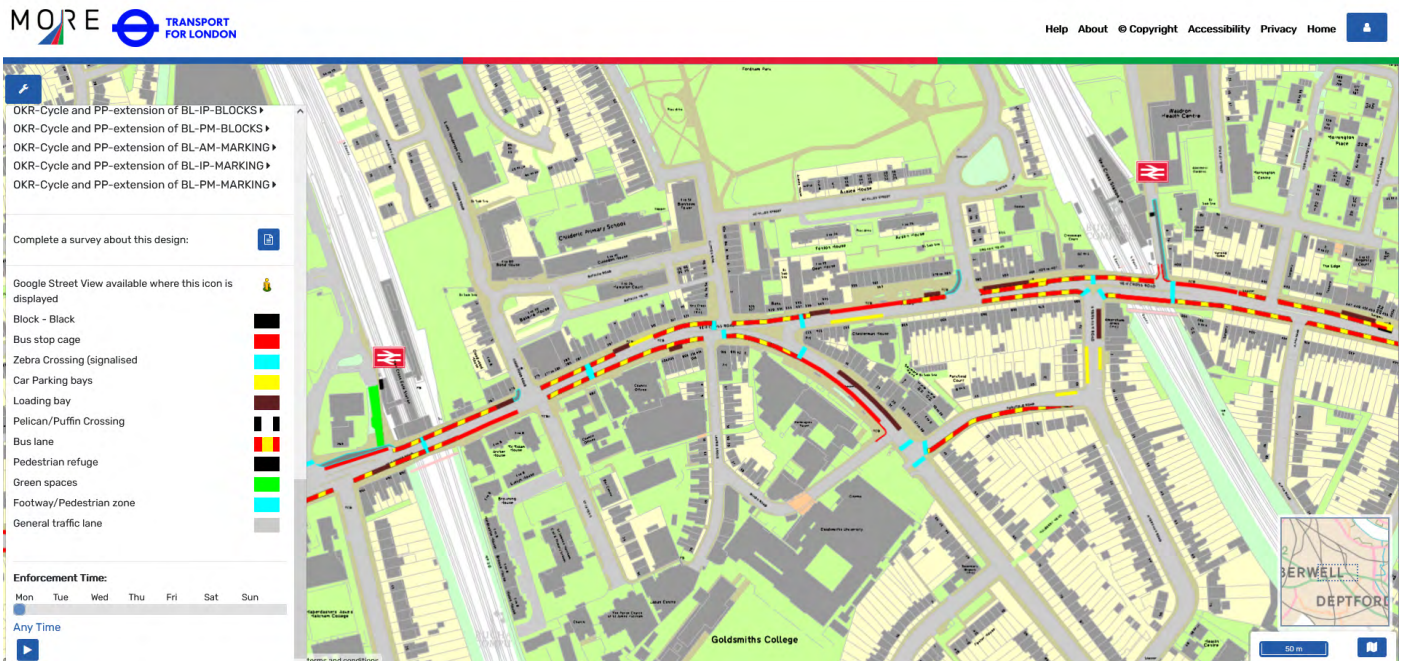
Proposals:

- Transform right lane in the east to west side in a bus lane.
- Remove one lane in the west to east side
- Significant sidewalk enlargement and plantation of trees in one side
- Remove parking from one side and transform parallel parking in diagonal parking in the other side

Expected negative impacts:

- Road capacity should be enough for efficient traffic flow in both ways in the morning peak, but maybe is not enough at afternoon peak.
- Parking would remain in the side with lower traffic volume, which may induce traffic volume in neighbouring streets.
- Diagonal parking may lead to some accidents initially
- The buses will have a positive impact, although there are several right turns, so those spaces may be occupied by other vehicles.

Street redesign for London ‘stress section’, using LineMap ‘block’ format



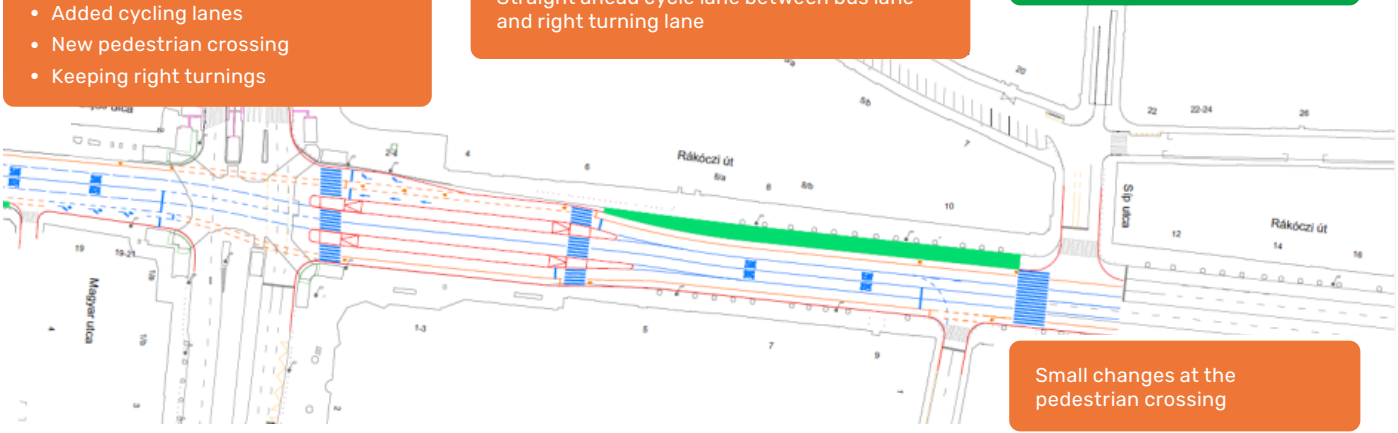
Design for ‘Urbanistic approach’ scenario in Constanta

Changes at the junction

- Reduced traffic lanes
- Added cycling lanes
- New pedestrian crossing
- Keeping right turnings

Bus stops at new location, between the bus lane and the traffic lane
Straight ahead cycle lane between bus lane and right turning lane

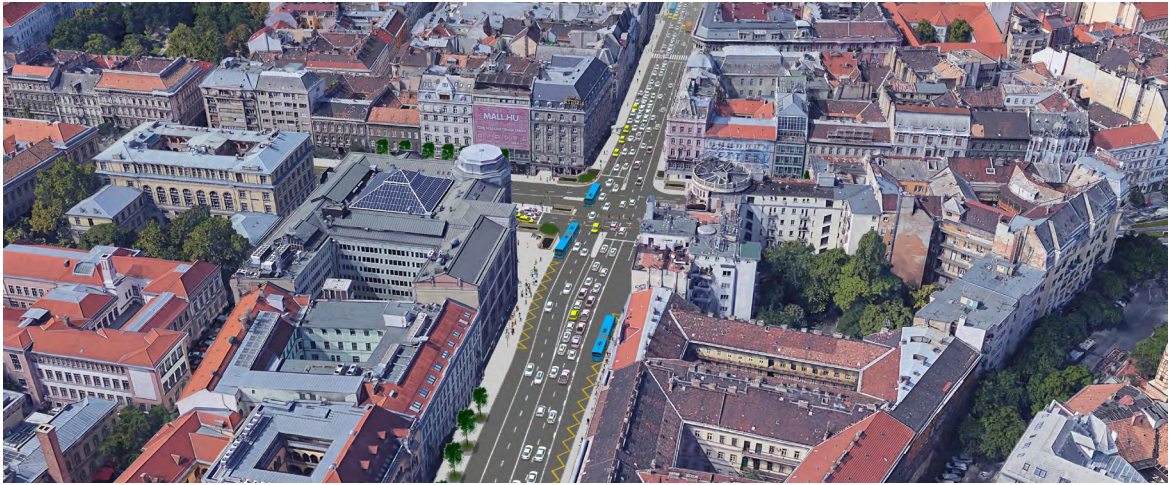
Parklets with new function and greens

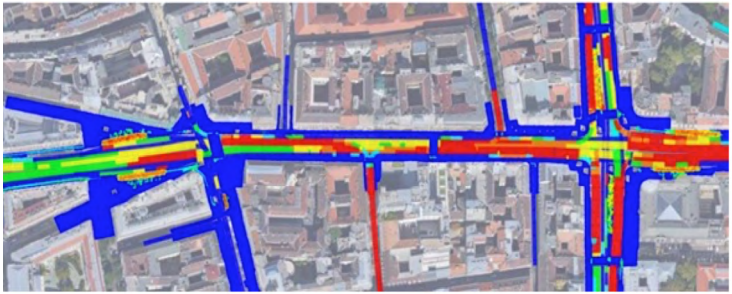


Small changes at the pedestrian crossing

Modelling design options

Budapest: simulation of current conditions

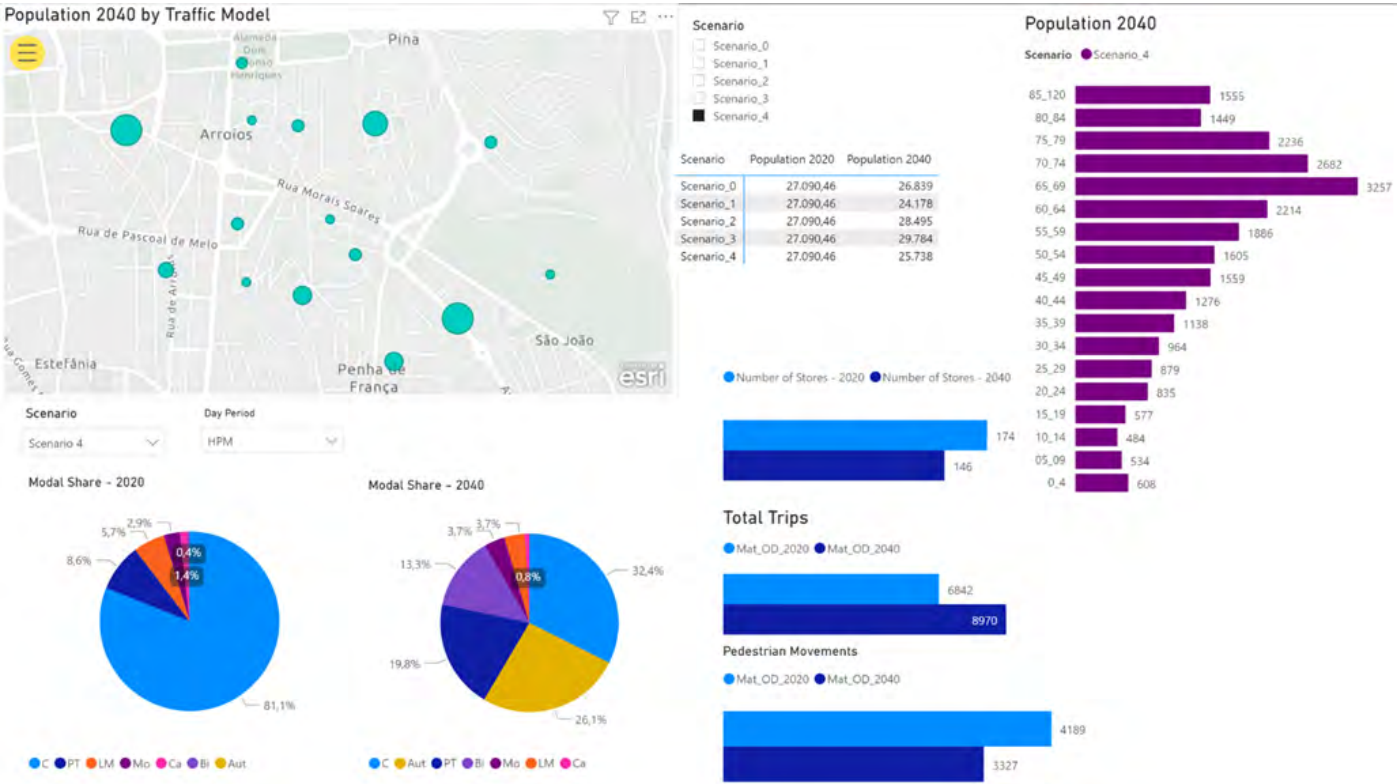




Color Scheme
Links (Segments)
Attribute: Density (Current, 95% percentile, All) [veh/km]

- ≤ 8.000
- ≤ 14.000
- ≤ 23.000
- ≤ 34.000
- ≤ 45.000
- ≤ MAX
- undefined

Lisbon: Forecast demographics and trips for Scenario 4 (Environmental vision)



Scenario	Population 2020	Population 2040
Scenario_0	27.090,46	26.839
Scenario_1	27.090,46	24.178
Scenario_2	27.090,46	28.495
Scenario_3	27.090,46	29.784
Scenario_4	27.090,46	25.738

MORE city reactions to the design process and tools

- Required that practitioners view the street from different perspectives and as a holistic system
- Led to increased and richer public participation that was fully embedded in the process and, for most cities, the first attempt at design co-creation
- Brought together a much wider range of professionals than are normally involved in street design, and fostered cross departmental cooperation
- Provided a comprehensive design process, supported by the right set of tools
- The Interactive sessions, using blocks and acetates, produced good results, both with the public and practitioners; stakeholders could better explore potential solutions, looking at the street as a whole
- The exercise resulted in some good, new and different street design ideas
- Led to the generation and consideration of a wider range of design options than would normally be the case
- Highlighted the need to pay greater attention to pedestrian movements and to place-making and street activities
- Uncovered deficiencies in the availability of non-vehicle data, and in not giving full weight to place-related benefits when appraising design options
- Showcased new ways of working to produce innovative and context-specific street designs
- Showed that it is possible to question the current standards of traffic planning and to change to new and future realities

The various physical and web-based engagement tools are now being used in other contexts by some cities; as Malmö noted: “the project was a catalyst for change within the city”.

Tips from the MORE cities - what is it important to consider?

- Allow adequate preparation time and resources to collect and collate the necessary data; comprehensive data is essential (e.g. including kerbside stopping, pedestrian flows and street activities).
- An upfront commitment and willingness of the city to engage fully in the whole street (re)design process is essential; here recognising the role that street design can play in helping the city achieve its hi-level policy objectives is very helpful
- Consider the different types of regulations needed to implement the desired street designs and management strategies – at national/regional/local levels – and identify what can or cannot be achieved.
- Rethink internal administrative frameworks and organisational structures, to support this more holistic view of street planning, design and management; the time needed for legal and organisational procedures should not be underestimated.
- Appropriate human resources need to be allocated, covering a range of specialist skills; capacity building is important to be able to apply these new tools and processes.
- Multimodal micro simulation modelling, in particular, requires special skills and attention; it adds new levels of complexity, for many cities, but also deeper levels of understanding about how streets perform.
- Fully engage street users; they can best articulate their needs and know a lot about how their streets operate.
- Citizens should also understand the co-creation process: it is not only about wanting but also about listening.
- An open dialogue with stakeholders is a big step forward for many cities: it can seem a daunting and time-consuming task, but it can help to reach a consensus in contested busy streets, with competing demands.
- Listening to other professionals, leaving preconceived ideas behind and being open to other perspectives is the most successful approach to take.
- **MORE** requires a different mindset to apply this new and comprehensive street (re)design process, and the supporting tools.
- Know and adapt the process to your local context; it will not happen overnight.
- It is always possible to improve; do not be afraid to test and prototype
- Rehearse different futures; do not underestimate potential impacts of new technologies and street uses
- Think in broad and strategic ways; street design is much more than just traffic lanes

H. Key MORE recommendations and outputs

Recommendations

1. Adopt the **MORE** comprehensive and rigorous approach to urban street planning and design, when addressing the more complex and contested situations
2. Classify urban networks in terms of both their Movement and Place functions
3. Consider the street as an interactive 'ecosystem', with strong links between its component parts
4. Avoid developing solutions for one specific user group: review all user needs and redesign whole streets, from one building line to the opposite one
5. Build extensive stakeholder engagement into the process, from problem definition and option generation, right through to option appraisal and decision taking – move beyond passive consultation
6. Reorganise governance arrangements, to enable better coordination of actions among the various organisations with street responsibilities
7. Be 'pro-active' rather than 'reactive' when regulating for new street-based modes: define acceptable 'performance envelopes' for different parts of the street that new mobility product designers would need to comply with
8. Explore the possibilities for time-specific and dynamic space allocation, making full use of the increasing number and variety of sensors, including using LED traffic signs and road markings, in the most pressured areas
9. Where possible, 'future-proof' designs to be responsive and adaptable to future pressures (e.g. ageing population and new technologies) – since major redesigns usually only happen once or twice in a century
10. As streets become more digitised and connected, take action to minimise cyber-security risks
11. Develop appraisal methods that fully recognise and value the Place components of street design
12. Consider the role that street planning and design can play in supporting high level, wider urban policy objectives (e.g. economic development, or wellbeing), at EU and national levels
13. In particular, the EU's Net-zero Carbon Strategy (see also OECD, 2021) and its Efficient and Green Mobility Package, prioritising active mobility
14. Seek to align strategic TEN-T and urban node policy goals and operational practices

Key outputs

- Up-to-date intelligence on street user guides, policy objectives and performance indicators (Deliverable 1.2)
- Comprehensive analysis of institutional and organisational factors (D 2.1), the urban traffic regulatory framework (D 2.2) and the dynamics of streets as 'contested' spaces (D 2.3)
- Looking to the future: future and emerging technologies (D 3.1), likely future user needs (D 3.2) and the role of scenario planning as part of vision development and dealing with uncertainty (D 3.3)
- An overall, comprehensive street re-design process, for current (D 5.1) and future (D 5.2) street conditions, applied and in the five **MORE** city 'stress' sections; and an overview of cross-city findings (D5.5).
- Reports on city applications, for current (D5.3) and future (D5.4) conditions.
- A suite of design tools developed to assist in applying parts of the street re-design process, comprising:
- The generation of street design options, covering both selecting suitable street design elements, and exploring potential combinations in street cross sections (D 4.5)
- Web-based tools to enable people to comment on problems/issues and design options, and to take part in developing those options, using both digital and physical methods (D 4.6)
- The micro-simulation of patterns street uses that would be expected to occur under the different design options that have been developed, covering the full range of Movement and Place activities (D 4.7)
- The appraisal of the alternative design solutions from three perspectives: policy priorities, economic appraisal (cost-benefit analysis) and a comprehensive multi-criteria analysis (D 4.8)
- A comprehensive overview of the potential for new technologies, in the areas of vehicle design and operation, network control, and advances in digitisation and material sciences, as a context for exploring future conditions, including some specific **MORE** trials (D 5.6), including gating and LED road signs and road markings.

MORE
Multimodal Optimisation of Roadspace in Europe

The MORE Consortium

MORE, led by University College London, brings together an 18-partner consortium of universities, European cities, street user representative groups and private sector companies.

Contact

For further information on **MORE**, please contact:
Peter Jones | peter.jones@ucl.ac.uk
University College London, Project Coordinator

Follow **MORE**: **@MORE_H2020**
Join the **MORE** Linkedin group:
MORE-Streets as Ecosystems
www.roadspace.eu

* This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 769276. The sole responsibility for the content of this document lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither INEA nor the European Commission are responsible for any use that may be made of the information contained therein.

Document designed by **Threerooms**