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Sustainable Urban Mobility Plans (SUMPs) and Urban Sustainable Islands (USIs)

Proposal for legislation to enhance the mobility of vulnerable users (pedestrians and cyclists) by improving the SUMPs through the implementation of USIs on the local road network of cities.

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Abstract

High accident rates involving soft mobility – i.e. vulnerable road users (pedestrians and cyclists) – are a critical aspect in urban areas. The reasons are manifold: pedestrians and cyclists coexisting with any size of motor vehicles, vulnerable users being at least 50 times more at risk than motor vehicles, technical rules for roads conceived primarily for motor vehicles.

This article describes a possible ideal solution to this problem based on the reorganization/reclassification of urban roads in two levels: a main urban road network for motor vehicles and a local urban road network for vulnerable users. The local urban road network is to be organized in a number of USIs, with pedestrians coming first and motor vehicles being 'unwelcome guests'. On the other hand, the main urban road network is to be used by motor vehicles to move from one side of the city to another, whereas pedestrians and cyclists can travel only on protected and reserved routes (e.g. cycle-pedestrian paths).

It has been estimated that depending on the size of the city and the structure of the road network, 25% to 50% of the urban road network should be reserved to the main road network, while the remaining percentage could be designed as USIs.

This solution has been devised by some members of AIIT Latium and presented as a proposal for legislation in the field of mobility planning, to be included in the technical annexes to the Sustainable Urban Mobility Plans (SUMPs). Ultimately, a kind of third generation Urban Mobility Plans.

Keywords: Urban Planning, Sustainable Mobility, Soft Mobility, Vulnerable users, Main Urban Road Network, Local Urban Road Network.

1. Foreword

The Sustainable Urban Mobility Plans (SUMPs) are the most up-to-date planning schemes at European level to address the problems of urban mobility.

SUMPs represent the development of the Urban Mobility Plans (UMPs), to which the European Commission added the concept of "sustainability" in its broadest technical, social, environmental and, thus, economic sense. According to the Italian legislation, UMPs shall be regarded as mobility system plans containing the set of interventions on

road and public transport infrastructures, interchange parking, technologies, vehicle fleet, management of transport demand also based on mobility managers' inputs, traffic control and management systems, information to users, logistics and technologies employed to reorganize the delivery of goods within the cities.

All these aspects are included in the SUMPs and, as far as non-infrastructural short-term actions are concerned, they also fully fall within the already existing Traffic Urban Plans (TUPs).

Therefore, SUMPs can be considered as third-generation TUPs, with the USIs being their focal point and one of the tools for their preparation.

The extensive use of pedestrian/cyclist routes thus becomes the new characteristic of the third-generation TUPs, which can be prepared using the USIs on a large scale, over the whole city. In this context, USIs are identified as areas not crossed diametrically by motor vehicles, almost exclusively used by pedestrians, cyclists and for parking, and including local roads only.

Despite being already included in the regulations on mobility planning, the USI tool and the Road Functional Classification (RFC) are rarely used by technicians and remain largely unknown among users. They have instead great value and could be powerful tools to significantly change users' behaviour.

To understand the extent to which the deployment of the USIs is useful in creating more liveable cities, take the case of Rome. According to analysis and traffic simulations, only 15% of the approximately 5,000 km of roads running within the GRA-Grande Raccordo Anulare (ring road) should be reserved to the main road network, i.e. 750 km of well-organized roads would be enough to serve public transport and private vehicles.

This means that the remaining 85%, namely 4,250 km of roads, can be used to significantly improve the mobility of pedestrians and cyclists in Rome.

If we consider that such percentage decreases as the city size decreases, more generally it can be affirmed that in cities with more than 30,000 inhabitants, above 50% of the urban road network can be used to implement USIs.

Making 50% of the city more liveable is a significant achievement, also considering that the actions needed are quite simple and cost-effective – only requiring appropriate road signs. Environmental advantages can also derive from reduced distances travelled by private motor vehicles, which means longer distances travelled by pedestrians and cyclists.

To increase these benefits it is also important to improve the urban quality in terms of street furniture and urban green spaces.

2. Main goals of the proposal

The USIs are so-called because of the fact that motor traffic travels on the main urban roads, which encompass the 'Islands' and guarantee 'Sustainable' internal areas, made up of liveable local roads.

This proposal is not only aimed at guaranteeing liveable areas. It can help start an actual renewal of the cities, since it includes the renovation of urban suburbs – which would be treated as central urban areas – and significant improvements of public spaces to be reserved for pedestrians, green areas and vehicle parking.

3. Pedestrian Priority Zone

USIs consist of a set of local roads reserved for pedestrians, cyclists and vehicle parking and encompassed by the main urban roads network, which is in turn reserved for public

transport and private motor vehicles. One of the most important tools to organize traffic within the USIs are the Pedestrian Priority Zones (PPZs). PPZs have the following traffic rules:

- 30 Km/h speed limit (Zone 30);
- specific traffic scheme mainly consisting of one-way streets heading in opposite directions or wide/tight-U-shaped one-way streets so as to prevent motor vehicles from crossing USIs diametrically (see Figure 1);
- pedestrians have the absolute right-of-way over all types of vehicles when crossing, bearing in mind that pedestrians must cross perpendicular to the carriageways;
- paid parking on public roads, with discounts for residents, if necessary.

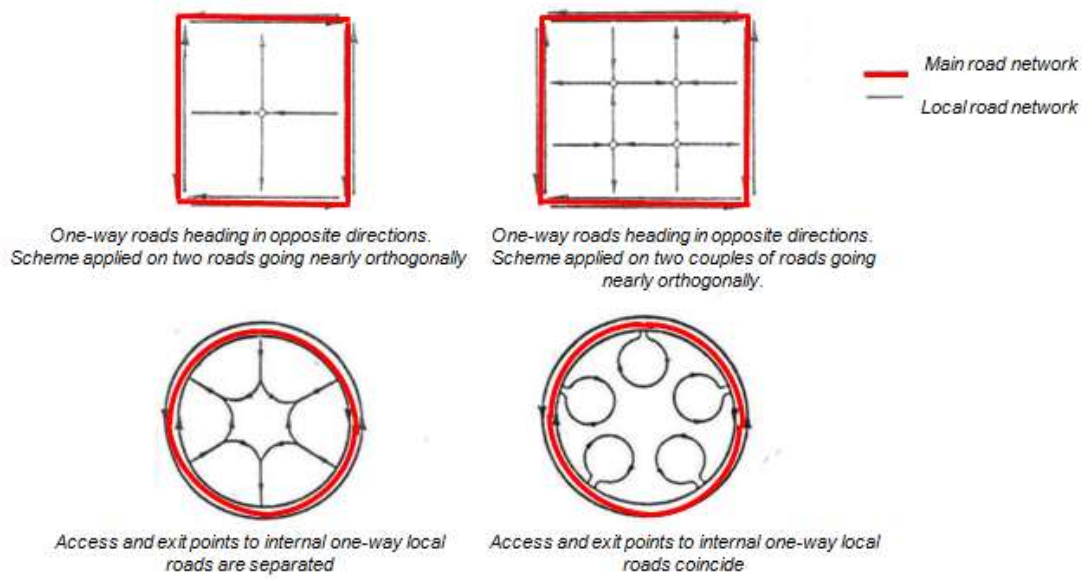

Figure 1 - Examples of traffic schemes within USIs

The first rule (30 km/h speed limit) – set according to the RFC – is the main tool to make it clear to drivers that they must behave differently. It should be noted that the RFC along with the technical specifications annexed to the SUMPs (Regolamento Viario) are the basic means to reduce traffic congestion and improve road safety. As a matter of fact, traffic congestion depends on the fact that urban roads serve different categories of road users and purposes, so it is necessary to separate these 'elements', i.e. general traffic flows from vehicles approaching/leaving parking sites, public transport from private motor vehicles, fast vehicles from slow vehicles, motor vehicles from pedestrians and cyclists. In some cases, this separation can be regulation-based rather than physical.

The third rule (right-of-way for pedestrians) is essential to make cities more liveable, especially taking into account the growing number of elderly pedestrians, who need to choose the shortest possible route when, for instance, zebra crossings are installed too far.

Therefore, it is really important to consider that the third rule can be implemented only if two other fundamental road safety conditions exist: reduced speed and reduced traffic flow. Reduced speed is guaranteed by the first rule, namely the 30 km/h speed limit, whereas reduced traffic flow is guaranteed by the second rule, i.e. the traffic scheme

preventing motor vehicles from crossing USIs diametrically. This traffic scheme only allows motor vehicles to easily arrive and depart from the USI – which, moreover, is small enough to have no motor traffic flowing internally.

Obviously, if necessary, the priority given to pedestrians can reach the maximum level through the implementation of Pedestrian Zones.

4. Measures to facilitate cycling

Along with the above-stated strategies to improve pedestrian mobility, SUMPs approach also includes a fifth rule aiming to foster cycling. This rule concerns the possibility for cyclists to cross USIs diametrically, departing from the traffic scheme mentioned in the second rule.

Practically speaking, it means implementing contra-flow bicycle lanes, or, if appropriate, two-way cycle tracks.

PPZs would then be transformed into Pedestrian and Cyclist Priority Zones (PCPZs), with specific cycle routes crossing the whole city diametrically. The 30 km/h speed limit would apply for cyclists as well. To allow pedestrians/cyclists to go safely from one USI to the next, protected crossings should be implemented at junctions with the main road network, normally through traffic light systems.

5. Further rules to organise USIs

In addition to the five rules already listed, USIs can be organized through other two rules, which are already adopted in central urban areas:

- Limited Traffic Zones (LTZs), which can be entered at specific hours by entitled categories of users and vehicles
- Pedestrian Zones (PZs), already mentioned, which are accessible only to pedestrians and emergency/city service vehicles.

However, LTZs and PZs are more difficult to implement compared to the other rules, due to the fact that parking must be organized – partly (in case of LTZs) or totally (in case of PZs) – outside those areas, thus requiring motor traffic to be carefully organized also in the surrounding areas (area of influence of the measure implemented).

As a matter of fact, an appropriate use of traffic models and a well-organized main urban road network are also essential to ensure free-flowing traffic and compliance to the second rule – preventing motor vehicles from crossing USIs diametrically.

The seven rules above explained offer an extensive array of solutions to organize traffic within the USIs. In fact, regardless the specific measures which can be taken (e.g. different parking fees or different hours to enforce the measures), 127 combinations of rules can be implemented (without repetitions). This variety can meet the most diverse needs the cities or the different areas of the same city have. However, it is essential to always guarantee the first rule, i.e. the 30 km/h speed limit.

6. Dimensions of the USIs

Respect of the 30 km/h speed limit by drivers/cyclists depends on the road length subject to that limit, and it decreases as this length becomes excessive. Generally, 300 mt are considered an “acceptable” length, also by pedestrians to walk to/from their destination to/from parking sites (placed inside the USIs) or public transport stops (placed on the main road network outside the USIs).

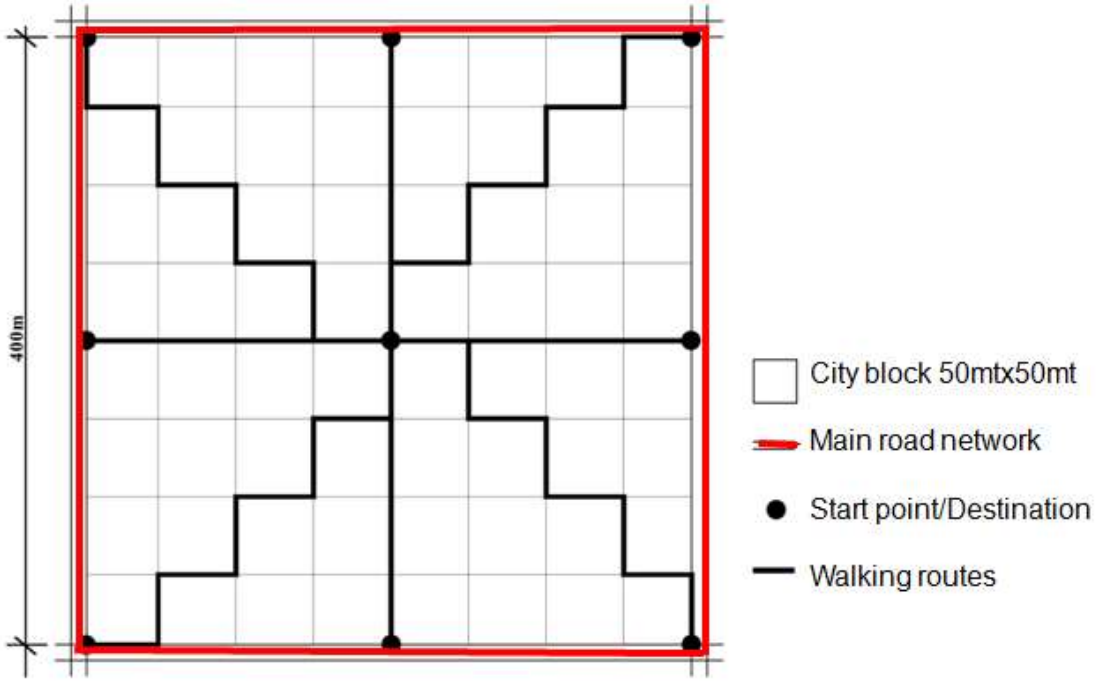

Figure 2 - Maximum and minimum walking distance

As a consequence, provided that the main road network enclosing an USI is arranged for bidirectional traffic, the maximum side length of a USI should not exceed 400 mt to allow pedestrians to reach their destinations inside the USIs by the shortest walking route. Thus, walking distances from the external main road network to the USI's centre would range between 200 mt and 400 mt. Such measures are based on a model considering a cluster of 8 x 8 city blocks, measuring 50 mt x 50 mt, each inclusive of the internal streets' width (see Figure 2).

Keeping maximum walking routes within 300 mt on average should encourage drivers to quit driving their car from starting-point-to-destination and use it only to go from USI-to-USI. Such a different scheme would sensibly contribute to change people's approach to the use of car in cities.

7. Traffic schemes preventing motor vehicles from crossing USIs diametrically

Ideally, internal USIs' traffic flows should be forced into one-way streets changing to opposite one-way direction at each city block junction. This system, which is already largely applied in Italian city centres, should be adopted extensively in the whole city, including suburban districts.

Assuming that the USIs are made up of 3 × 3 city blocks, having 2 North/South- and 2 East/West local streets each, by applying such scheme, the central block is encircled by one-way streets (See Figure 3). It should be noted that the junctions at each of the 4 corners of the central block have 2 converging traffic flows and 2 diverting traffic flows and no intersection at all among flows. Such traffic scheme helps improving road safety, and it is applicable also to USIs with more than 4 local roads, provided that the mentioned opposite one-way streets system is fully implemented.

Such traffic scheme also strongly discourages drivers from crossing the USIs, as this would imply a longer route. While driving straight forward in a dual-way route would allow drivers to cross the USI by simply passing along 3 city blocks, the opposite one-

way streets system forces drivers to pass along at least 5 city blocks, turning 4 times inside the USI.

Further advantages of the described system – in addition to better road safety and reduced traffic congestion inside the USIs – are easier parking and possible conversion of public spaces into pedestrians, green areas and parking sites. One-way local streets only need one carriageway, also at junctions.

In case of dual-carriageway local roads inside the USIs, the scheme can be adopted by leaving one of the 2 carriageways free for parking, provided that this part of the road is closed at junctions and has intermediate access points.

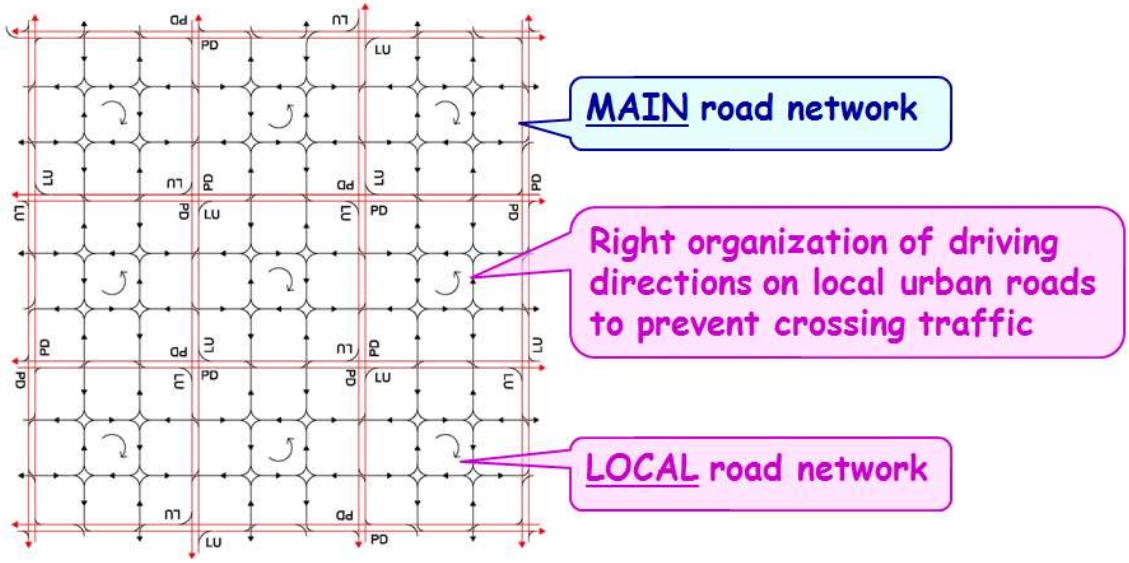

Figure 3 - Ideal traffic flows design

In case of dual-carriageway local roads, recovery of space can be even more significant, especially at internal junctions. As a matter of fact, junctions between dual-carriageway roads require hundreds of squared metres space, while for junctions between one-way streets only dozens of metres are needed.

To completely prevent motor vehicles from crossing the USIs diametrically, it is also possible to prohibit motor vehicles coming from an USI's local road to cross the main road network for entering the adjacent USI (see table 3). This means that on a 4-way road intersection among 2 local road arms and 2 main road arms, in order to exit / enter an USI it will only be allowed to turn right/left onto the main road network.

On the contrary, at the same road junctions between local roads and the main road network, protected crossing paths will be available for pedestrians and cyclists to permit these users to smoothly walk/ride to adjacent USIs. Dedicated protected crossings can be ruled by traffic lights on demand so as to maximize traffic flow continuity.

8. Additional planning features for USIs

Are also to be carefully planned: a) traffic management of the main road network; b) specific needs of public transport- goods- and emergency vehicles; c) traffic management of roads in low traffic areas and of local roads with large carriageway; d) the first project phase of the SUMPs and their adoption.

9. Conclusions

A "compact city", made up of a cluster of quiet USIs interlinked by the main road network can be seen as the new frontier of traffic management.

The "new" SUMPs represent a multimodal mobility planning for the whole city and a tool to overcome the traditional traffic management approach based on contingencies and sporadic, scattered measures. The USIs concept requires a systematic approach to traffic planning, including the 30 km/h speed limit on all local roads, which applies whether they are located in central areas or in the suburbs.

The "new" SUMPs also have significant impact on cities, as peripheral USIs can boost the renewal of suburbs.

Finally, the USIs scheme is a new, balanced and sustainable approach to urban life that -thanks to redesigning of public/green spaces and traffic flows in an "island layout"- would guarantee high standards of road safety and accessibility for all and encourage motorists to drive from-USI-to-USI rather than from starting-point-to-destination.

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