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Walking and urban planning (n. 173)

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Abstract

A main feature of cities through history has been the problem of facilitating the movement of people going about their daily life.

Thus, when people lived under transport reliant on pedestrian and animal power alone, urban settlements were limited to a size accessible on foot. Proximity was then an axiom and, even in larger cities (e.g., U.S. cities), life was conducted in a relatively restricted space and, consequently, the physical environment of towns and cities was developed for less demanding traffic modes than today.

Proximity was not just a matter of rationality, backward technology or demography, but also to save energy. Although human locomotion on inclined surfaces has been little studied, it is known that walking speed varies according to the slope and people walk so as to minimise physical effort. Moreover, facilities for pedestrians were already planned and realised in ancient times.

The paper analyses the main obstacles to walking and shows how planning can influence pedestrian movement. The main features of the crucial integration between mobility and urban planning are also discussed and illustrated through some examples.

Biography

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Full Professor of Town and regional planning at the University of Brescia. His main field of research is the relationship among urban planning and mobility. He has worked in several EU funded projects concerning urban management and safety and the promotion of measures for Vulnerable Road Users. Invited expert of the European Transport Safety Council, he chaired the WP on Evaluation of National road safety policies. He is expert member of the OECD Working Groups on Pedestrian safety, urban space and health and Cycling safety.

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Walking and urban planning

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Introduction

Cities have always been places of contrast. Created as a safe and secure place against enemies and natural threats, they have often become traps for their inhabitants. Lessons from history show how different cultures have tried to make urban space an asset by shaping it to the needs of the population or by answering the demands of economic, military or political powers; one aspect of cities through history has been the problem of facilitating the movement of people going about their daily life.

Thus, when people lived under transport reliant on pedestrian and animal power alone, urban settlements were limited to a size accessible on foot. Proximity was then an axiom and, even in larger cities (e.g., U.S. cities), life was conducted in a relatively restricted space¹ and, consequently, the physical environment of towns and cities was developed for less demanding traffic modes than today.

Proximity was not just a matter of rationality, backward technology or demography, but also to save energy. Although human locomotion on inclined surfaces has been little studied, it is known that walking speed varies according to the slope and people walk so as to minimise physical effort.

The combined effect of proximity and conservation of energy is at the heart of several urban schemes. In the central European hills, morphological constraints induced citizens to design road layouts to follow contour lines, thereby leading to elongated settlements. The fascinating slow-curved medieval streets of Siena are among the best examples: whilst the main roads follow the contour lines, the secondary links across contour lines have been realised with stairs, minimising the amount of human power required to move around!

Facilities for pedestrians were already planned and realised in ancient times. Pathways in Roman towns were conceived to be safe and comfortable, even though animal-powered chariots were the only danger. An example of this is the amazing discovery of the raised pedestrian crossings of Pompeii, the Italian city buried by the eruption of Vesuvius!²

Thus, from history, some fundamental issues of planning pedestrian spaces can be identified:

- accessibility and proximity are a pre-condition and necessary planning criteria;
- energy-saving should be a fundamental criterion of transport choice;
- design according to climatic conditions is relevant both for walking and sojourning;
- safe mobility has been a concern long before the automobile era.

(1) So narrow was the space where people used to live, that a great majority of past generations spent all their life in a very limited geographic area.

(2) For more examples of design for pedestrians, see, among others: Elvik, R., Høye, A., Vaa, T., and Sørensen, M. (2009). *The Handbook of Road Safety Measures*. Emerald Group Publishing Limited, Bingley UK.

The evolution of these lessons is easy to discover by examining the great variety of the world's urban settlements, but the present effects of such attitudes is *all* but easy to discover. Nevertheless, the link between urban space (either planned or unplanned) and movement is unavoidable.

The relationship between urban planning and walking trends

When looking at available mobility data (of which there is little relating to pedestrian movement), walking has not disappeared from statistics, but its priority is affected by several factors. Some of them are related to psychological elements and to the way societies are structured. The era of the private car has completely changed town design worldwide. Some urban settlements have been planned explicitly assuming the use of the private car (see Figure 1). Furthermore, general increases in personal income have led to increases in the rate of car ownership and, therefore, the irrational use of motor vehicles at the expense of pedestrian movement.

Other features are less evident. For example, acceptable walking distance increases with the size of the core city (Orfeuil, 1997). When distances appear greater, facades are longer, streets wider and people accept a longer trajectory to reach their final destination. This is true foremost for walkable distance, but also applies to the travel time. Conversely, in small and less densely settled villages, especially when no facilities are provided, people are less likely to accept long trips. Although perhaps a paradoxical result, use of the car, even for short trips, can be shown. Other variables influence such behaviours, primarily parking facilities, which are highly expensive and rare in the big city centres.



Figure 1 Lakewood – Los Angeles County (U.S.A)

With regard to planning, some general key points affecting walking are now elaborated upon.

The effect of “urban distances” as determined in urban planning

Speed versus distance

The low speed (and consequently the longer time needed) for pedestrian trips over a given distance influences both walking trip length and the number of trips taken. As mentioned earlier, unfavourable topography also affects walking.

Experiments conducted by Margaria (1938) show that the “average citizen”, so defined as a male, in good health and untrained, chooses a walking speed according to slope, as shown in Figure 2, with an optimal speed on flat ground of 4 km/h, with observed speeds varying linearly with slope. Furthermore, energy efficiency is worse when moving either upwards or downwards, leading to an elliptical shaping of urban settlements, with the major axes along lines of least slope, therefore achieving maximum energy efficiency.

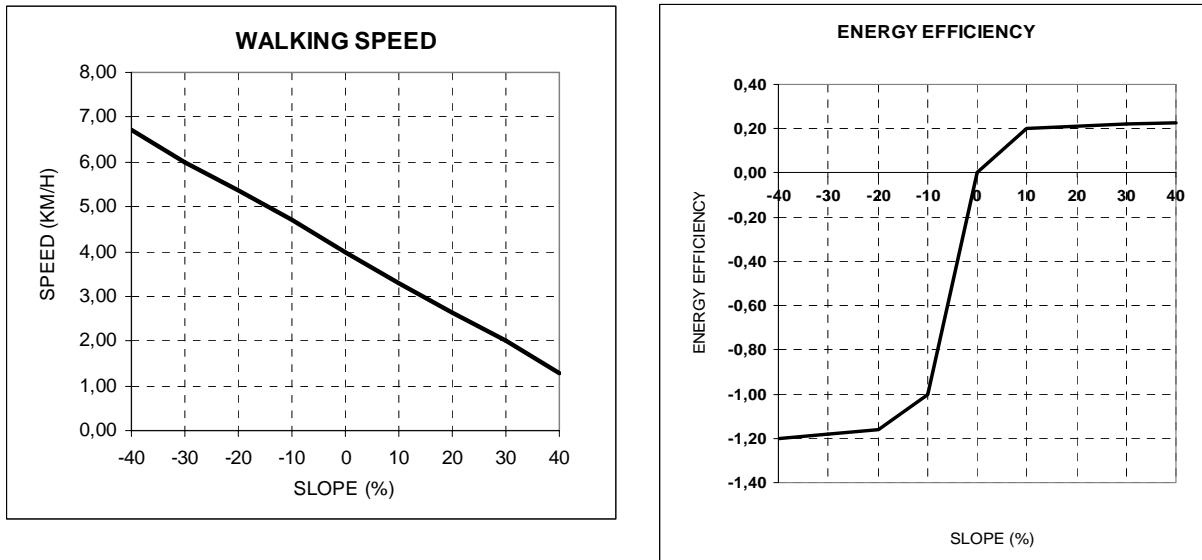


Figure 2 Walking speed with the maximum energy efficiency in relation to slope and maximum energy efficiency versus slope (Margaria, 1938)

Sprawl versus proximity

As a result of the application of functionalism (footnote no. 3), the distances between homes, work and other places have grown with the availability of rapid and convenient transport. When the introduction of private cars made it possible to cover longer distances, this separation became more radical. Some references speak in a positive way of the liberalisation of locations, but the other side of the coin is the loss of proximity, leading to people walking less because there are no destinations within walkable distance (see Figure 3). Some of the characteristics of sprawl are:

- the relatively less expensive transformations in rural areas make sprawl more cost-efficient than urban renewal;
- low density is better appreciated by high income communities and sometimes defended for landscape preservation;
- shopping malls can be easily reached by car and parking facilities are greater and free;
- services are concentrated for economic reasons (scale economy).

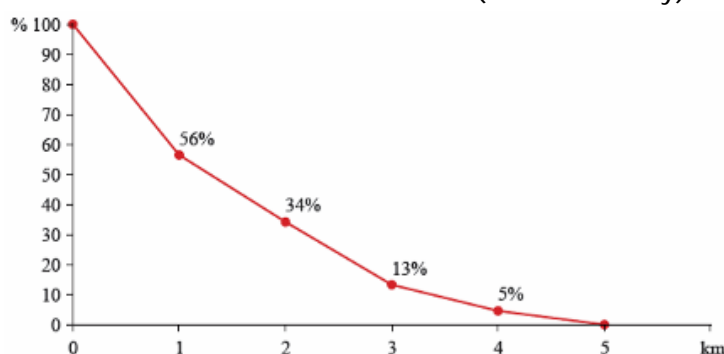


Figure 3 Pedestrian trips by distance (%), Germany 1989 (Krag, 1993)

Time, today, may be more crucial than space; time saving is, therefore, a key factor influencing transport choice and must be considered when possible future transport modes are being evaluated. Controlling the space/time relationship in planning is thus crucial to restoring high levels of pedestrian mobility. To cope with the ever-busy routine of daily life, most present-day trips are multi-scope journeys, with the means of transport chosen for the longer section of the trip (i.e. mostly private car).

Public space and building location and amenity

Public space location, orientation and microclimate

The size of public space and its proximity to pedestrian paths is an incentive to walk. It is known from environmental psychology that humans favour an accessible, varying, safe and comfortable environment. For example, a study by Badiani (2005) examined the benefits of green areas along a walking route to a public transport stop. Microclimate (where climate may change considerably over a short distance) also affects the presence and sojourning of humans, particularly with people becoming accustomed to air-conditioned, comfortable environments in homes, offices and cars. Thus, climatic conditions seem to affect walking trips, both in number and length. There is evidence of a paradoxical effect of favourable weather conditions resulting in less walking in the Southern European countries.

Building location in relation to public space

The positioning of buildings adjacent to pedestrian paths is also important in terms of typology, morphology, length and continuity of façades, maintenance, etc.. For example, both young and adult pedestrians seem to prefer more small blocks and small buildings in a block, than long continuous façades. Older people feel comfortable and secure when a continuous built façade can help prevent unexpected attacks from “coming from around the corner”. This demonstrates a contrast between the ‘barrier effect’ and permeability of space that is rooted in the complexity of space and planning. Figure 4 exemplifies an analysis of building façades and open perspectives along pedestrian paths.



Figure 4 An example of analysis of building façades along pedestrian paths (Source: Badiani, 2005)

Building types, access and uses at the ground level

Urban morphology with a high connectivity can provide shortcuts for pedestrians, which are often crucial for walking trips.

By way of contrast, 'tree-like' street layouts (e.g., "culs de sac" and no continuity) increase walking distances and serve as a barrier. Open ground floors can give more space to pedestrians, as in some historic cities, as well as increasing the level of security of public space. To find building access along a path also allows a potential presence of people in adjacent public space.

Legibility of urban environment

An easily readable urban form can heavily influence the ability of people to comfortably negotiate an urban environment. Unlike the availability of road maps and, increasingly, GPS in cars that continues the tradition of facilitating the way for drivers, pedestrians have generally less information when starting a trip in unfamiliar surroundings, with factors such as footpath conditions, width, maintenance, continuity, visibility, lighting and comfort largely unknown before setting out.

Social control

Urban shape, continuity and discontinuity of façades, also influence the level of 'natural surveillance'. The risk of personal attacks is often perceived as greater than the one deriving from road accidents, so social control, through the presence of social activities, shops, restaurants, mixed uses, etc., usually managed as traffic attractors, are seen as positive influences on this aspect of urban design. Ground floor transparency is another key feature to promote natural surveillance. A consequence of providing an environment allowing high levels of social control is that ease of pedestrian access must be provided, with great efforts being made in Europe to calm road traffic in high density urban areas to ensure safety.

Pedestrian safety

Walking is a dangerous activity. More than half (sometimes up to three-quarters) of road injury accidents occur in urban areas, with vulnerable road user (pedestrians, cyclists and moped riders) fatalities from impacts with cars constituting some 25% of all road deaths.

Even though the total number of fatalities has decreased since 2001 in most European countries by around 36% (ETSC, 2009), the high ratio of fatal- to all-injury accidents in urban areas, along with the safety of vulnerable road users in general, still remains a major concern.

Traditional black spot treatments address 'clustered' accidents, with analysis of the location and type of crash events leading to the identification of characteristics of recurrent accidents. However, not all accidents are clustered at black-spots, with the remaining casualties (sometimes accounting for 50% or more of the total in the case of pedestrian crashes) distributed throughout the area under consideration and requiring area-wide treatments.

The need for integration of mobility and urban planning

Separation of urban and mobility planning have been the general rule through most of planning attempts to include cars in cities, such as Athens' Charter 3, SCAFT Guide (University of Göteborg, 1968), OECD, (1979) or Buchanan Report.

(3) The Athens Charter was the result of the International Conference on Modern Architecture (4th CIAM), an organisation founded, among others, by Le Corbusier. The 4th CIAM Conference was held onboard a ship that sailed from Marseilles to Athens in 1933. The proceedings have become a most famous book, the Athens Charter. Both the conference and the resulting document concentrated on "The Functional City". CIAM IV laid out a 95-point program

Nowadays and after a number of promising experiences, many examples of best-practice can be identified where the integration of urban and mobility planning has been applied, but in many countries it is still an ongoing process. Higher levels of integration require several key issues to be addressed, leading to better outcomes. These include transport network, urban structure, traffic management practices, planning policies, transport policies, parking strategies, public transport local public opinions, employment, social policies, town image and environmental concerns.

These issues relate to political processes that are critical to urban development and hence the safety of the road network (Fleury, 1998). There is now considerable effort put toward combining the planning of land use and transport in many European countries, driven mainly by concerns about airborne emissions and other forms of pollution. This justification can often be used as a catalyst for change and may lead to fewer car trips that can benefit road safety and vulnerable road user comfort.

It is worth reflecting on what could be the strategic levers to start those different processes that will, ultimately, create a safer town. Several ideas are today included in the up-to-date concept of sustainability and could influence the management of urban public space in European towns in the 21st century. One of the main concerns is urban quality (i.e. architectural quality, quality of materials, etc.), but also matters of public interest where safety plays a key role, leading to a better civilisation and a new concept of 'citizenship'. It seems that the same emphasis given to the housing demand after the Second World War is nowadays put on the preservation of the environment in general, but primarily of the urban environment through public space and common heritage. Urban public places, in the meantime, become more and more the space for mobility, where the greatest proportion of space has been provided for the private car. In the remaining space, alternative modes of transport to the car, namely, public transport networks, cycling lanes and pedestrian facilities must be developed.

As housing demand has been the lever of urban development, reserving significant portions of urban public space, mobility management and road safety can influence decision-making in town management. Nevertheless the two dimensions are quite different: housing demand involves private land with citizens 'competing' for space. Mobility management and road safety issues involve mainly competition to occupy public space. The solution of this conflict between personal interest and the collective good must then be at the heart of the application to local problems of comprehensive policies, with pedestrian policies able to be used as a lever to emphasise public good as a driver for dealing with conflicts in the use of space.

When considering the development of urban areas, three main phenomena occur:

- the building of city extensions (urban sprawl), consuming new land but easier for implementing mobility networks and also pedestrian-friendly schemes;
- the reconstruction of cities, through brown-field regeneration, taking into account the relationships between administrators and developers;
- the new implementation of transport networks in existing urban infrastructure.

Most countries are facing these phenomena, with different levels of experience in these three cases. It is valuable to consider what elements might be universal and what elements depend more on regional circumstances. As a first attempt to define possible recommendations, the following table compares the traditional urban approach to the transport planning scheme (see Table 1).

for planning and construction of rational cities, addressing topics such as high-rise residential blocks, strict zoning, the separation of residential areas and transportation arteries and the preservation of historic districts and buildings. The key underlying concept was the creation of independent zones for the four 'functions': living, working, recreation, and circulation. Some of these concepts have been widely adopted by urban planners, but mainly that of separating urban functions, rather than the inflexible approach to road hierarchy.

Table 1 Comparison of urban planning and transport planning

Urban planning	Transport planning
Improving the knowledge of spatial relationship patterns	Deepening the knowledge of urban environment of significance to transport services and related areas
Assessing the possibility of restoring proximity, i.e., reconsider urban extension and functional zoning	Assessing the potential for urban traffic generation
Restoring functional mixité (tertiary functions)	Structuring common transport stops following urban planning criteria, as vicinity or quarter functions
Taking urban quality into serious consideration by applying sustainability concepts	Assessing and monitoring negative externalities of mobility in urban environment
Promoting urban transformations only when linked to collective transport facilities	Linking budget policies to the delivery of public transport facilities
Promoting co-operation between public and private interests for urban regeneration	Introducing a transport tax to build public transport service

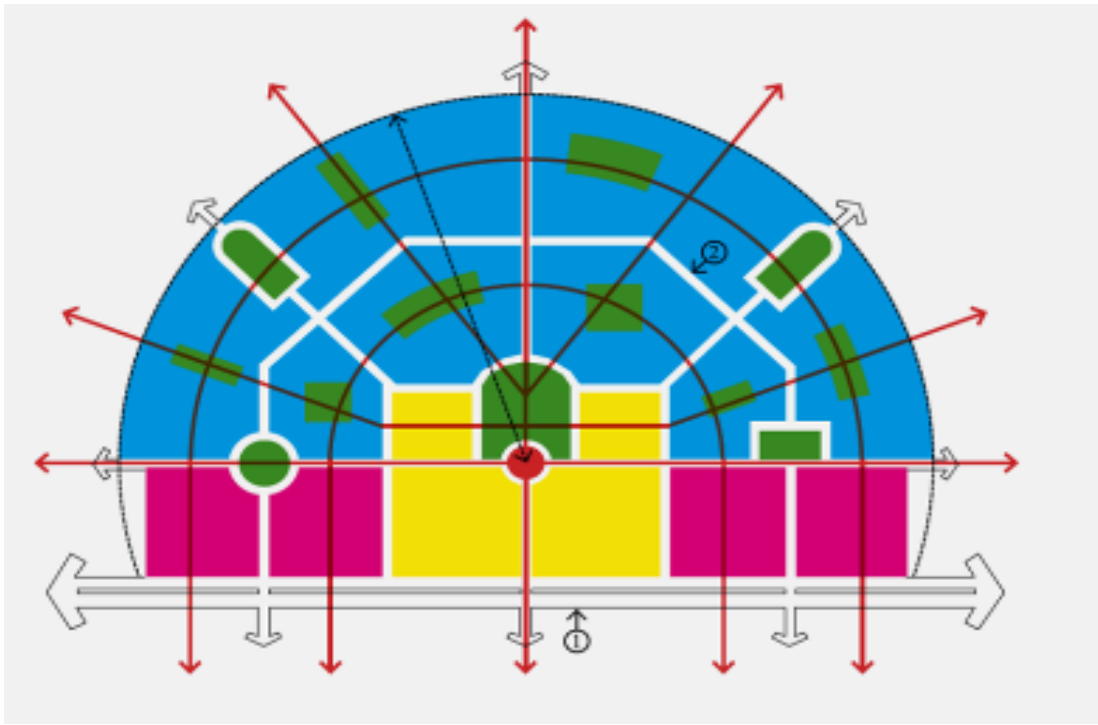
A new land use development model is needed

During recent years many authors and organisations have highlighted the environmental and social implications of sprawl and “zoning” in land use planning⁴; despite this being still the predominant trend in developing countries. However in the U.S, where this practice has been dominant since the sixties, new ideas such as “New Urbanism”, “Growth Management”, “Smart Growth”, “Transit-oriented Developments” and “Car-free cities”⁵ are coming to illustrate new possibilities for integration of transport and land use planning. In most of them, the key primers for pedestrian-oriented urban land use are: linking urban development to transit provision, maximising metropolitan accessibility with public transport and designing land use and activities in close proximity to one another (see Figure 5 and Figure 6).

Another relevant issue when considering walking as a transport mode is the creation of a truly effective pedestrian network, linking the entire city and providing accessible, comfortable, safe and attractive infrastructure including, where needed to overcome level differences, public elevators or escalators (see the Urban Master Plan of the city of Donostia-San Sebastian, Spain in Figure 7).

(4) An interesting approach is that of the main U.S.A. environmentalist association, “The Sierra Club”: <http://www.sierraclub.org/sprawl/>

(5) See: <http://www.newurbanism.org/>, <http://www.smartgrowth.org>, <http://www.transitorienteddevelopment.org> and <http://transitorienteddevelopment.dot.ca.gov/>

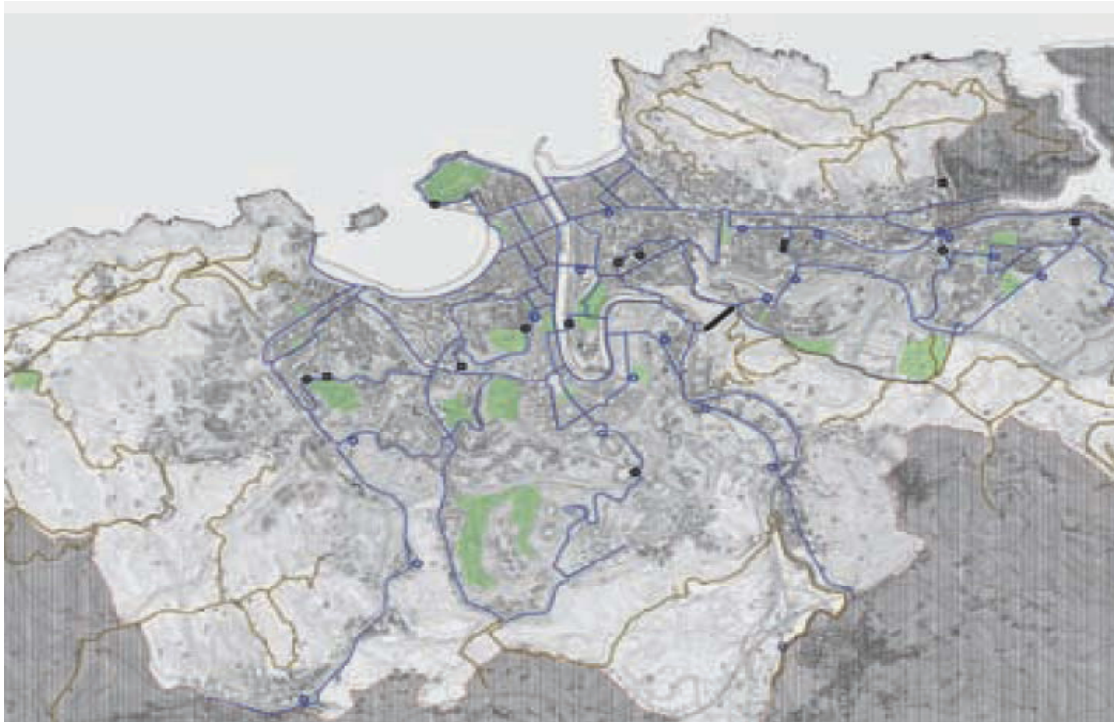


Legend: residential area (light blue); industrial area (red); retail area (yellow); parking (green); pedestrian paths (red arrows); 600m length (double black arrows); arterial road (1); distribution road (2); public transport stop (red dot).

Figure 5 A generic model of an area-oriented to public transport with a pedestrian network (Pozueta, Lamiqiz & Porto, 2009)



Figure 6 TOD scheme (City of Ottawa, Transit oriented development Guidelines, City Council, 2007)



Legend: main urban pedestrian paths (blue); main ex-urban pedestrian routes (brown); stations (blue circles); lifts (black squares); free spaces (green)

Figure 7 Basic pedestrian network and public escalators (10) in the Urban Development Master Plan of Donostia-San Sebastian, Spain (Pozueta, Lamiquiz & Porto, 2009)

Proposals for utilising the planning process to encourage walking

Through land-use planning and urban design, major improvements to the conditions for pedestrian movement can be made (i.e., to create an accessible, comfortable, safe and attractive environment), as well as to enhance pedestrian safety in the urban environment.

The first and main requirement is that of planning towns by taking into account the pedestrian movement as the most important and, as a consequence, the needs of pedestrians:

- a pedestrian network must be created in cities at the same time as the road network and with the same priority, and must connect between and within districts and city centres;
- a pedestrian network can be created by providing a set of continuous public spaces designed to join the main pedestrian generators (i.e. facilities, retail areas, offices, transit stations, etc.) throughout the entire city, connecting as many streets as possible⁶.

The need for car use must be reduced through gradual but permanent restoration of the proximity of urban functions:

- when restructuring cities, the common challenge is to regain the proximity in the existing quarters of the city;

(6) See the concept of Main Pedestrian Network (MPN) in Pozueta J (2000) *Red de Itinerarios Peatonales Principales*. A number of different public spaces can configure this network, such as pavements wider than 6 metres, pedestrian boulevards bigger than 8 metres and, of course, pedestrian streets, plazas, etc.

- the density around public transport stations should be increased when planning the networks, thereby generating capital gain for developers through an increase in land value and using part of the capital gain to develop better services and pedestrian facilities; this approach can be expected to further increase urban density through taxation incentives (i.e., lower taxes for development that targets urban renewal more so than urban extension);
- implementing transport services through the use of transport taxes; trials of such an approach have already been conducted in several contexts;
- assessing both quantitatively and qualitatively the whole-of-life costs of new urban extensions in order to stimulate administrators to develop new policies;
- reducing the number of car parking places while improving public transport facilities.

Pedestrian safety must be at the top of the political agenda:

- the Urban Safety Management (USM)⁷ scheme should be implemented to assess holistically the problem of death and injury risk for walking;
- a 'strategy setting' and 'sharing interests' approach should be applied⁸. This is an approach that looks at the urban environment from global safety and comfort viewpoints, targeting them as the core strategies for any action. Aside from the results it generates, this strategy is effective in keeping safety issues on the political agenda and is an easy means of communicating priorities (DUMAS, 2001). It can also be vital in gaining financial support for the implementation of safety programmes and packages of measures. Local administrators should have a clear understanding of the historical context of their city as well as the consequences of their strategies for the future, with pedestrian mobility and safety among the top issues on the political agenda. In the 'sharing interests' strategy, the common goals of different policies are intended to be achieved through combined efforts. The forming of such coalitions could be especially successful in alliance with environmental (OECD, 1997) and well-being policies (UNICEF, 1996).

Both strategies require, among others, long-range comprehensive action programmes, reliable organisational structures, monitoring procedures and information transfer, and the role and responsibilities of all actors involved to be established (DUMAS, 2001). Furthermore, in some cases when the interest in safety is low or missing, complementary strategies can act to assist, such as the case of noise reduction, pollution control or health.

Improving safety, initially, along walking routes to schools is one way to gain early consensus on road safety measures.

Comfort, security and attractiveness must be planned, designed and maintained

- urban regeneration should focus on accessibility, taking into account the particular needs of people with mobility impairments;
- the personal security of pedestrians should be assessed when designing new zones;
- high standards of maintenance of pedestrian paths and public spaces is a vitally important, if often neglected, requirement for safe and comfortable walking: citizens and stakeholders must be actively involved in defining the quality needs and priorities for walking, and in the monitoring and on-going assurance of agreed levels of quality.

(7) Urban Safety Management (USM). See: IHT (1992), *Guidelines for Urban Safety Management*, Institution of Highways and Transportation, London.

(8) Strategy setting and participation (sharing interest) are two pillars of many planning approaches.

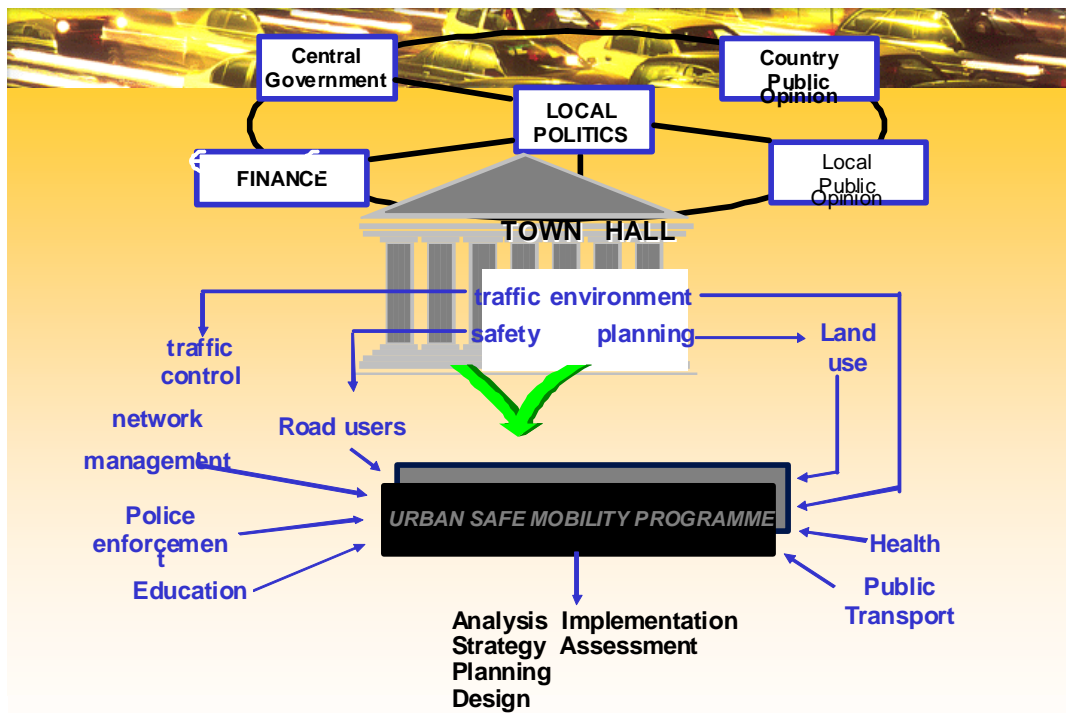


Figure 8 Urban safety management scheme (DUMAS, 2001)

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