

# **AN INTEGRATED APPROACH TO REDUCE URBAN TRAFFIC CONGESTION**

**José M. Viegas**

Professor, Technical University of Lisbon (Portugal);  
Chairman, TIS.PT, consultants in Transportation Innovation and Systems  
[viegas@tis.pt](mailto:viegas@tis.pt)

**Lecture at the  
Institute for Transport Policy Studies  
Tokyo, 30 July 2001**

**A SYNTHESIS  
BASED ON PERSONAL EXPERIENCE FROM  
  
SEVERAL EUROPEAN PROJECTS  
AND DIRECT POLICY ADVICE  
  
TO GOVERNMENT AGENCIES  
AND TRANSPORT OPERATORS**

# FROM PLANNING OF SUPPLY TO MANAGEMENT OF DEMAND

# URBAN TRAFFIC CONGESTION AND THE SUPPLY SIDE

- ❑ For many years, the dominant, almost exclusive, form of *fighting traffic congestion was by building new infrastructure*
- ❑ As this was being done, *built-up density in the core was also growing, and urban areas were sprawling*, counting on the new infrastructure (in fact, exploiting it to the limit)
- ❑ In many cities, *the possibility for more infrastructure in central areas seems exhausted*:
  - *solving bottlenecks*
  - High hopes placed on *Intelligent Transport Systems*

# THE PRESSURE KEEPS GROWING

- ❑ ***Growth of available income***
  - higher car ownership
  - more leisure trips
- ❑ ***Additional capacity also induces additional traffic***
  - short-term with more trips
  - mid-term with urban sprawl and higher densities overall in the center
- ❑ In parallel with congestion, ***severe environmental problems*** exist
  - On air quality (but there are good hopes in this direction)
  - On landscape and spatial disruption through more construction

# FAILURE OF PLANNING

- ❑ The fact is (our own) *technical studies have always underestimated growth of demand*
- ❑ So, *solutions based on supply are self-saturating*
- ❑ The *planning system by itself has not been capable* to cope with the technical uncertainties and political pressures

# NEED FOR DEMAND MANAGEMENT

- ❑ Today, in the cities of developed countries, *most adults could have a car available* for any given trip
  - but if the majority decides to do so, we get total collapse of circulation
- ❑ We are being forced to *manage quality* of service not only through better (higher) supply but also *by managing demand* through signals that change perceptions and influence behavior.
- ❑ These *signals are mostly economical but can also be organizational or regulatory* (for instance access limitations)

# A NEW STRATEGIC VISION OF THE URBAN MOBILITY SYSTEM

(beyond demand management,  
also integrated organization and supply)

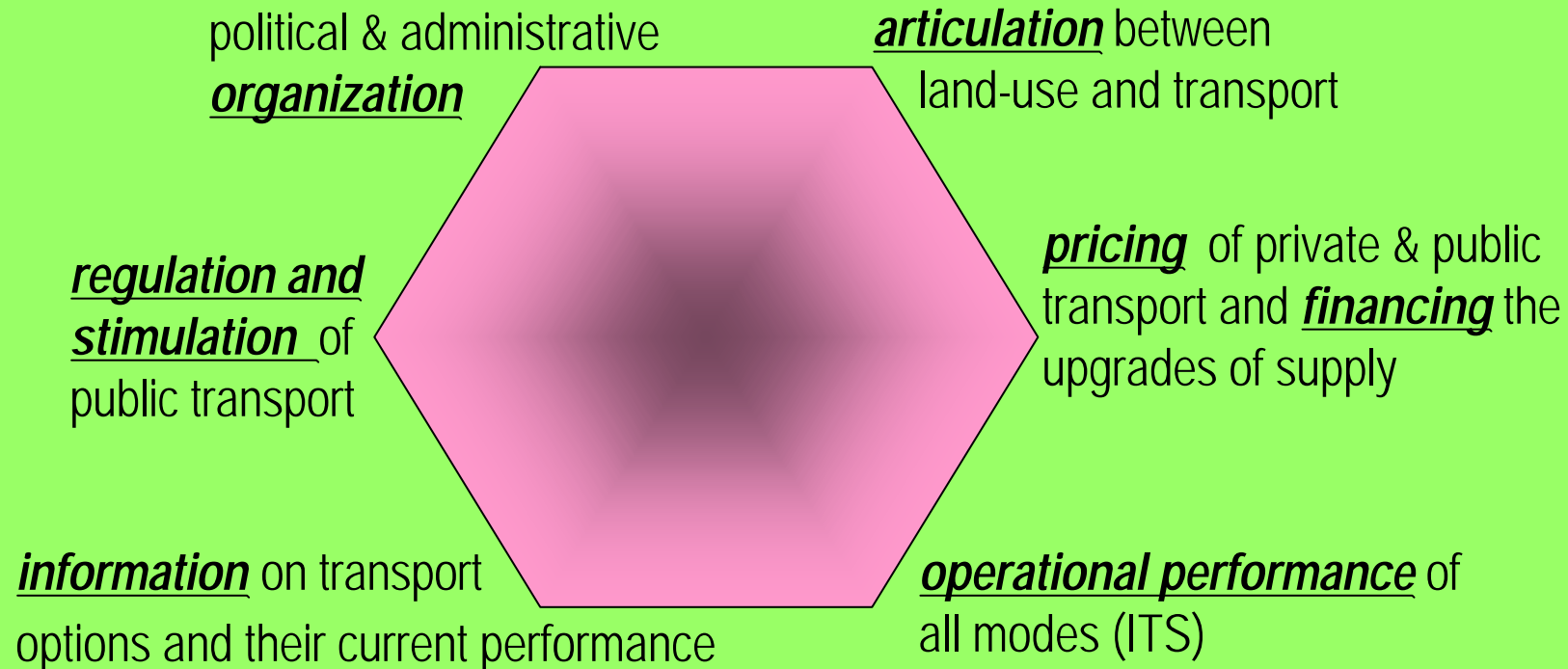


# PUBLIC and PRIVATE TRANSPORT: ALLIES INSTEAD OF OPONENTS

- ❑ With existing high levels of motorization, *it no longer makes sense to expect / force most people to travel only by public transport*
  - but we have to avoid that they travel only by car (as many do)
  - *it makes sense to expect all people to travel sometimes by car and sometimes by public transport*, depending on locations, time and trip motives
  - the supply side (infrastructure, services, prices and information) for private transport and for public transport has to *create conditions for these choices to be made in a sensible manner*,
- ❑ This implies that *urban mobility management has to be unified, covering all modes*, and upgrading the standards of one mode when the other is not fit for the job

# COORDINATED CHANGES ARE NEEDED IN SEVERAL DIMENSIONS

- *Adoption of this type of policy has implications on:*



- *Most cities are still far from adopting this approach*
- *Clear need for adoption of new strategic vision for urban mobility*

# ON ARTICULATION BETWEEN LAND-USE AND TRANSPORT

- ❑ This produces *effects only mid- and long-term*, but it is essential to control pressure and ensure sustainability
- ❑ *Selective densification, organized around stations of* public transport network, especially the heavier modes
  - promote choice of public transport + walking
  - include *land-use in decision process for new public transport fixed links*
- ❑ It is not only a question of having many inhabitants and jobs around the stations, but *also many urban functions and facilities*
  - big variety of existing functions prevents effective solution at any given station, go for concept of *network of urban functions, available in closely linked stations*

- ❑ Urban sprawl discouraged through transport prices

# ON THE REGULATION OF PUBLIC TRANSPORT

- ❑ *A strong and competent Public Authority* is needed
- ❑ *Operators may be public or private.* But in either case,
  - they must be subject to (direct or indirect) ***competitive pressure*** towards productive efficiency
  - they must be ***encouraged to suggest and experiment innovations and adaptations*** to the services provided (continuous quality improvement)
  - they must be subject to ***independent evaluation of consumer satisfaction***

# ON THE TARIFF REGIMES OF PUBLIC TRANSPORT

- ❑ In many cities, Public Transport considers only two types of clients:
  - *permanent users*, with monthly cards
  - *occasional users*, with single tickets (much more expensive and with high transaction costs)
- ❑ Joint vision of the urban mobility system *raises the importance of regular, but not permanent, users of public transport*
- ❑ Attractive tariff systems must be developed for these users, possibly recurring to fidelity schemes like in airlines
- ❑ *This requires*
  - *total tariff integration* within the public transport system
  - *price regimes that stimulate alternate use of private and public modes*
  - *very high standards for integration of information* across all modes (public and private)

# ON THE SEGMENTATION OF PUBLIC TRANSPORT

- ❑ Where individual preferences are highly valued, it is very difficult to achieve good market acceptance with a single type of product.
- ❑ On public transport, *segmentation has to be made through a range of complementary services on top of that common basis*
- ❑ Each client chooses the *basic package* best adapted to his regular needs and has the *possibility to pick up additional services* whenever he needs them
- ❑ Two types of examples of these additional services could be:
  - *other upmarket mobility services* like taxi rides, short-term car leasing (car sharing), private car parking, etc.;
  - *value added information services*, like alert for arriving public transport services, reservation for downstream services after a transfer, etc.

# **TAKING FULL ADVANTAGE OF THE POWER OF PRICES**

# PRICES, THEIR FUNCTIONS AND LEVELS

- ❑ ***Prices have multiple functions:***
  - Cost recovery (stability of supply)
  - User's expression of choice among alternatives (willingness to pay)
    - Demand management when facing capacity constraints
    - Market segmentation
- ❑ ***More important than computation of "optimal prices" is the identification (and consistent adoption) of "pricing signals" that favour evolution towards an Urban Mobility System of Higher Quality***
- ❑ ***This not only favours social acceptability but also gives higher chances of success*** when pursuing evolving goals in systems of high complexity and subject to strong political pressure



# BASICS OF URBAN ROAD PRICING

- ❑ Mobility being an essential right, and necessary to access many urban functions, ***prices and their variations must not be seen as***
  - an instrument of social exclusion
  - an unfair restriction of choices
- ❑ Use of prices as demand drivers recommends ***charging at place and time of consumption, with variable prices according to level of congestion*** (this promotes efficient use of road space)
- ❑ ***Pricing scheme may be different*** from one city to another
  - charging only for parking is effective only in first years
  - cordon pricing is easiest to apply
  - distance-based pricing is preferable

# PROMOTING EQUITY AND INTEGRATION

- ❑ Since driving in urban areas has had no access charge in the past, ***equity problems may occur***:
  - ***vertical equity***: some drivers may feel excluded
  - ***longitudinal equity***: have to pay for what was free;
- ❑ Proposal of a scheme with a ***free monthly mobility ration for all local taxpayers*** (credited on their smart-card):
  - access by car is still free, but in limited quantity (ration)
  - access above that limit (ration) must be paid
  - ration is also valid for riding on public transport
- ❑ ***Modal integration and substitution is promoted through pricing***
  - not only ration, but also public transport tickets and car access charges beyond the ration, are all denominated in “mobility pulses”

# PROMOTING EFFICIENCY AND FAIRNESS

- ❑ ***Price differentiation*** is easy
  - driving at congested areas and times is more expensive per km than in not congested areas and times (more mobility pulses per km)
  - driving is always more expensive than riding public transport (per km)
- ❑ ***Trading of mobility rations between citizens*** may be allowed
  - signal: reducing some mobility may bring you benefits
  - this increases overall efficiency
- ❑ ***All vehicles must pay***
  - including public transport, taxis and deliveries
  - possible exception only to emergency vehicles
  - if desired, the basic price per vehicle.km can be dependent on level of emissions of the vehicle

# ENSURING ADEQUATE CONTROL OF THE MOBILITY SYSTEM

- ❑ There are basically *four inter-related control variables*:
  - the amount of the free ration;
  - the basic price per km driven above that limit;
  - the ratio of basic prices per km between private and public transport
  - the ratio of prices per km in congested and uncongested conditions
  
- ❑ These values and their relations must be regularly adjusted to keep *quality of all vectors of the mobility system* under control
  - by keeping control of the volume and fluidity of road traffic;
  - and of the speed, frequency and density on board public transport

# APPLICATION OF REVENUES

- ❑ Revenues generated must primarily be *applied to feed-back into the improvement of the mobility system*
  - above all, *to improve integration of the mobility system*
  - *possibly, but not necessarily, to increase capacity and quality of service* (in any of the vectors of the mobility system)
  - It may be adequate to dedicate *some funds to induce land-use transformations that favor more sustainable forms of mobility*
  - if, at a certain moment, revenues are found excessive, *a reduction of fixed vehicle charges* might be the correct solution

# CONCLUSION

- ❑ ***Reducing Urban Traffic Congestion is possible, but***
  - it requires a ***unified vision of Urban Mobility***, and a ***Quality approach*** to its management;
  - it implies ***coordinated action in multiple domains***, as shown above, and ***continuous monitoring*** (as is always the rule for complex and sensitive systems)
  - ***in a democratic regime this has great difficulties***, as different stakeholder groups still maintain very much short-term, one-sided visions, and “miss the big picture”
- ❑ So, we have to be ***convincing and determined***, until this unified vision becomes adopted by some political leaders and shared by many stakeholders !

**THANK YOU FOR YOUR ATTENTION !**