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Parting Thoughts

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Urban Transportation Planning

MIT Course 1.252j/11.540j

Fall 2006

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Scope

- Systemic Approach
- Little Numbers
- Transport and Beyond
- Focus on ...
- The Future ... and the Past
- Critical Challenges
- Your Contribution!

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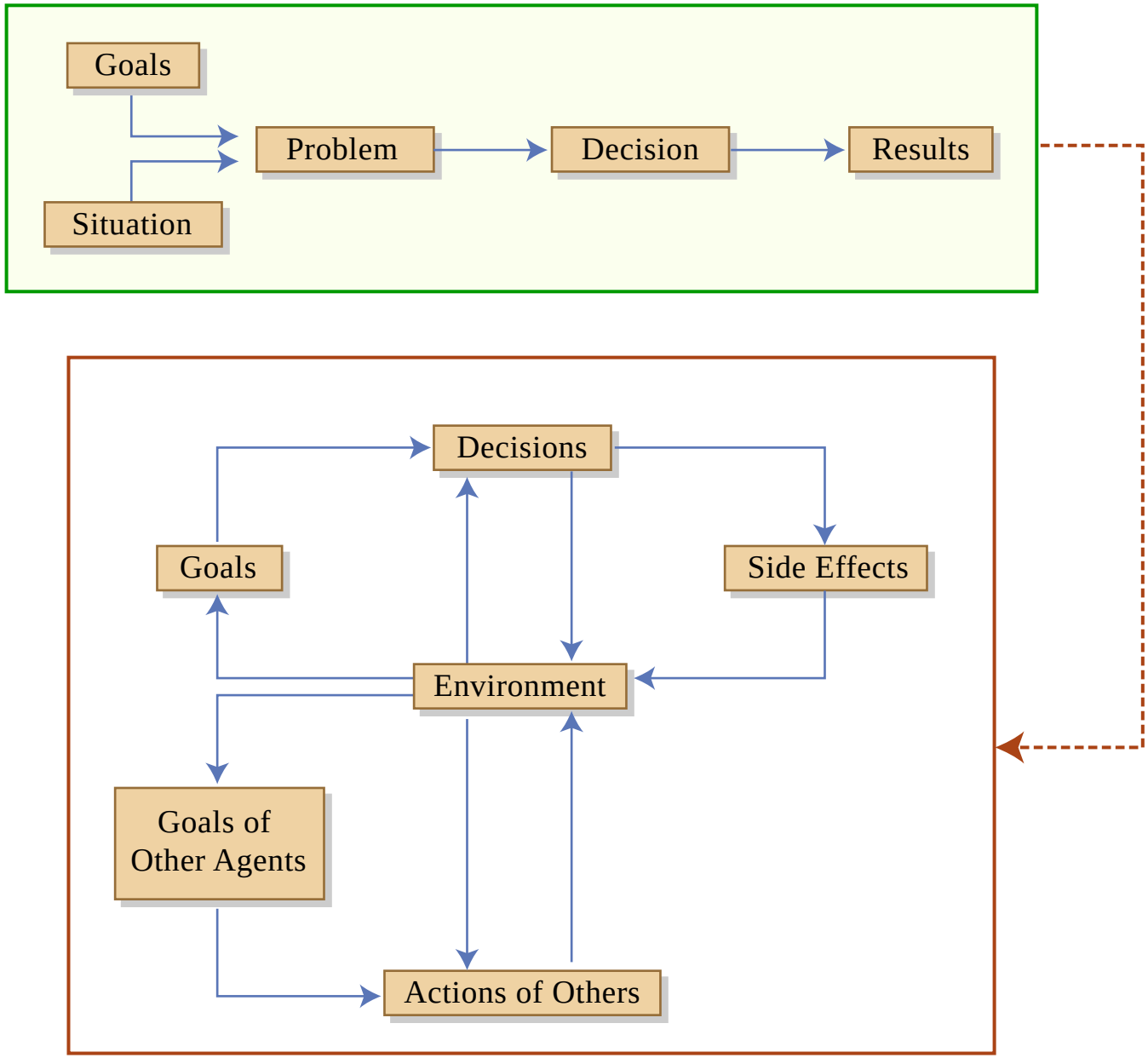
Systemic Thinking: an infinite game



From: *Business Dynamics*, by John Sterman

Figure by MIT OCW.

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Processes take time to reach a new equilibrium and then...
The Learning is always found in the past!

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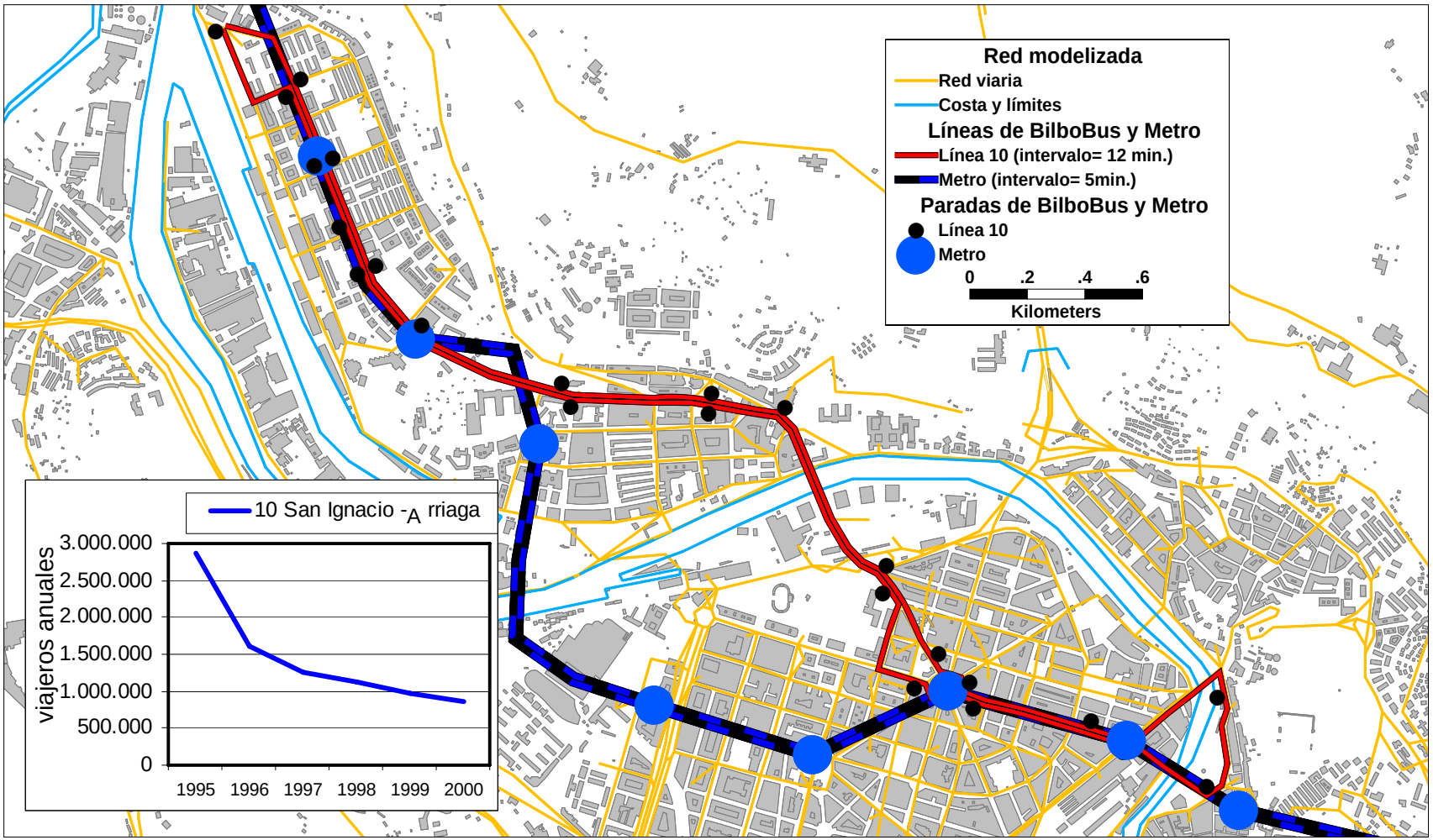

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The 12 Steps Planning Method: Checklist before Take-Off

1. Scan the environment, review history, identify trends, project future conditions
2. Define problem(s)
3. Develop solution(s)
4. Identify relevant actors, institutions, primary roles and interests
5. Consider implementation
6. Predict outcomes, benefits, costs, impacts
7. Consider operation and maintenance of facilities, services
8. Evaluate alternatives
9. Choose course of action
10. Build constituency, consolidate allies, convert enemies
11. Implement
12. Operate and maintain

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Little Numbers are essential!

- Vehicle throughput in uninterrumpted flow:
  - Speed-density curves

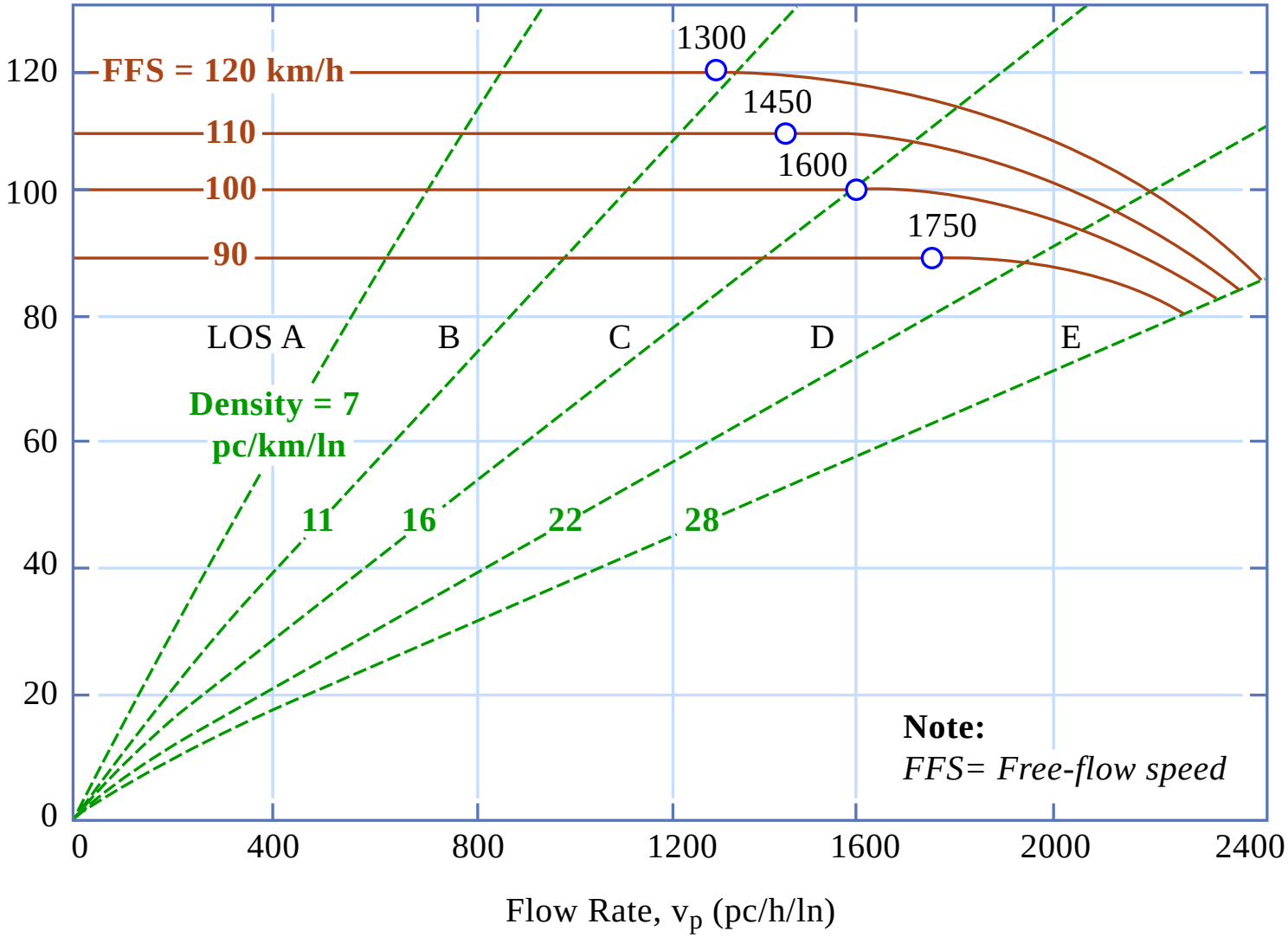

Figure by MIT OCW, adapted from the Transportation Research Board, "Highway Capacity Manual 2000".

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Little Numbers are essential!

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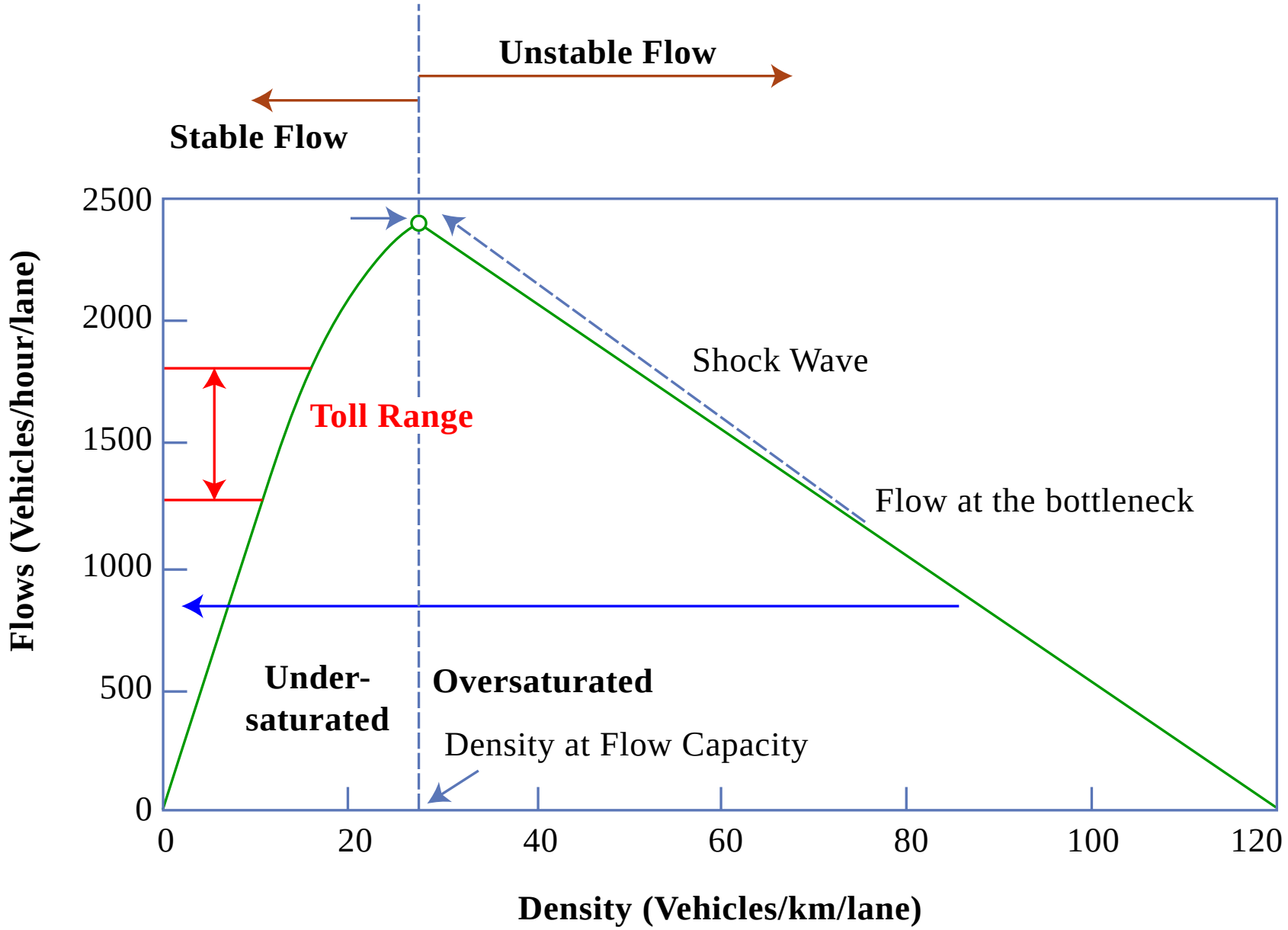

Figure by MIT OCW.

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Little Numbers are essential!

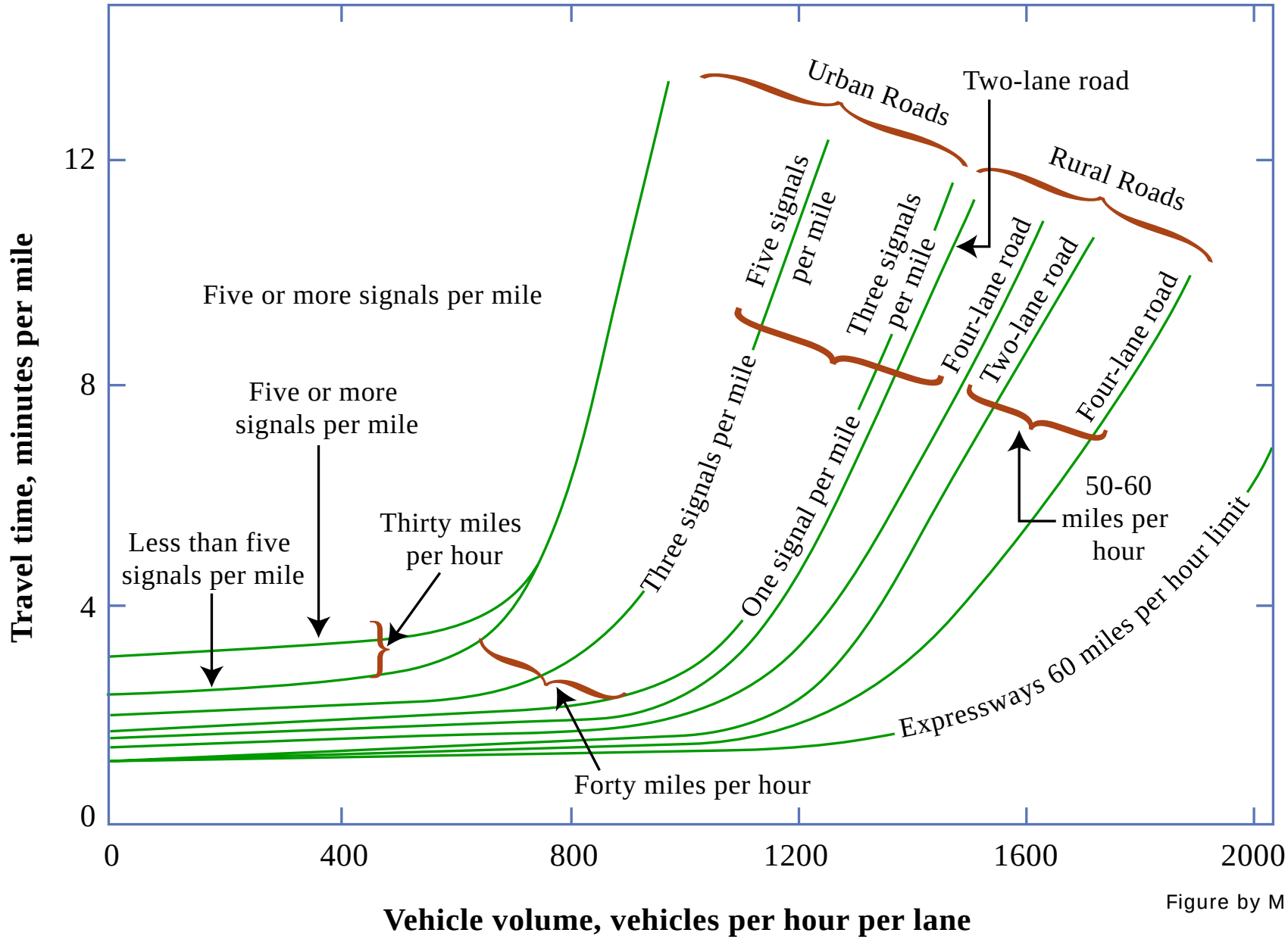

Figure by MIT OCW.

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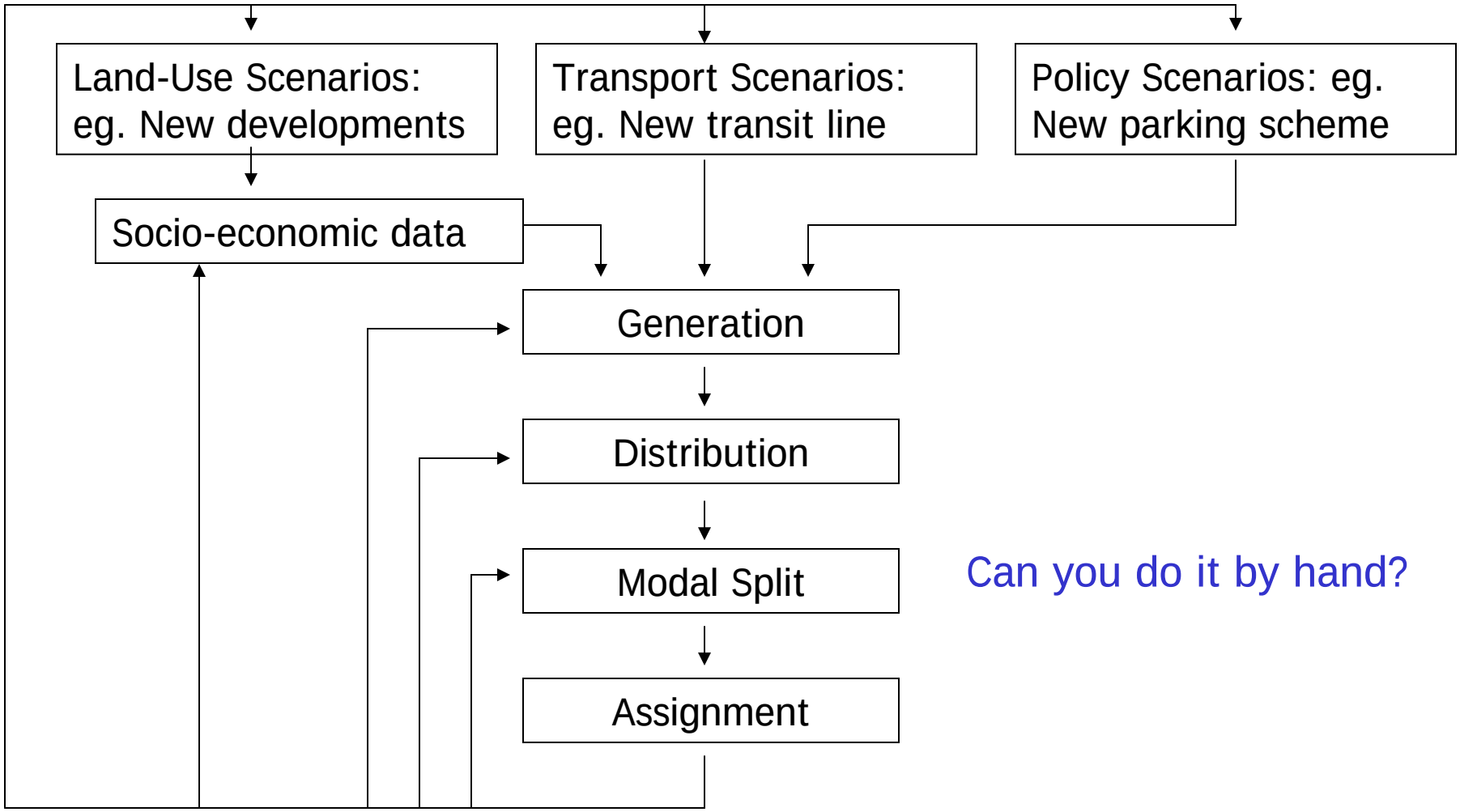
Little Numbers are essential!



Can you do it by hand?

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Little numbers – even if you use models!

- How many trips per person?
- How long is the average trip?
- What is the modal split?
- How many cars per hour per lane?
- How many miles per automobile?
- How many traffic deaths?

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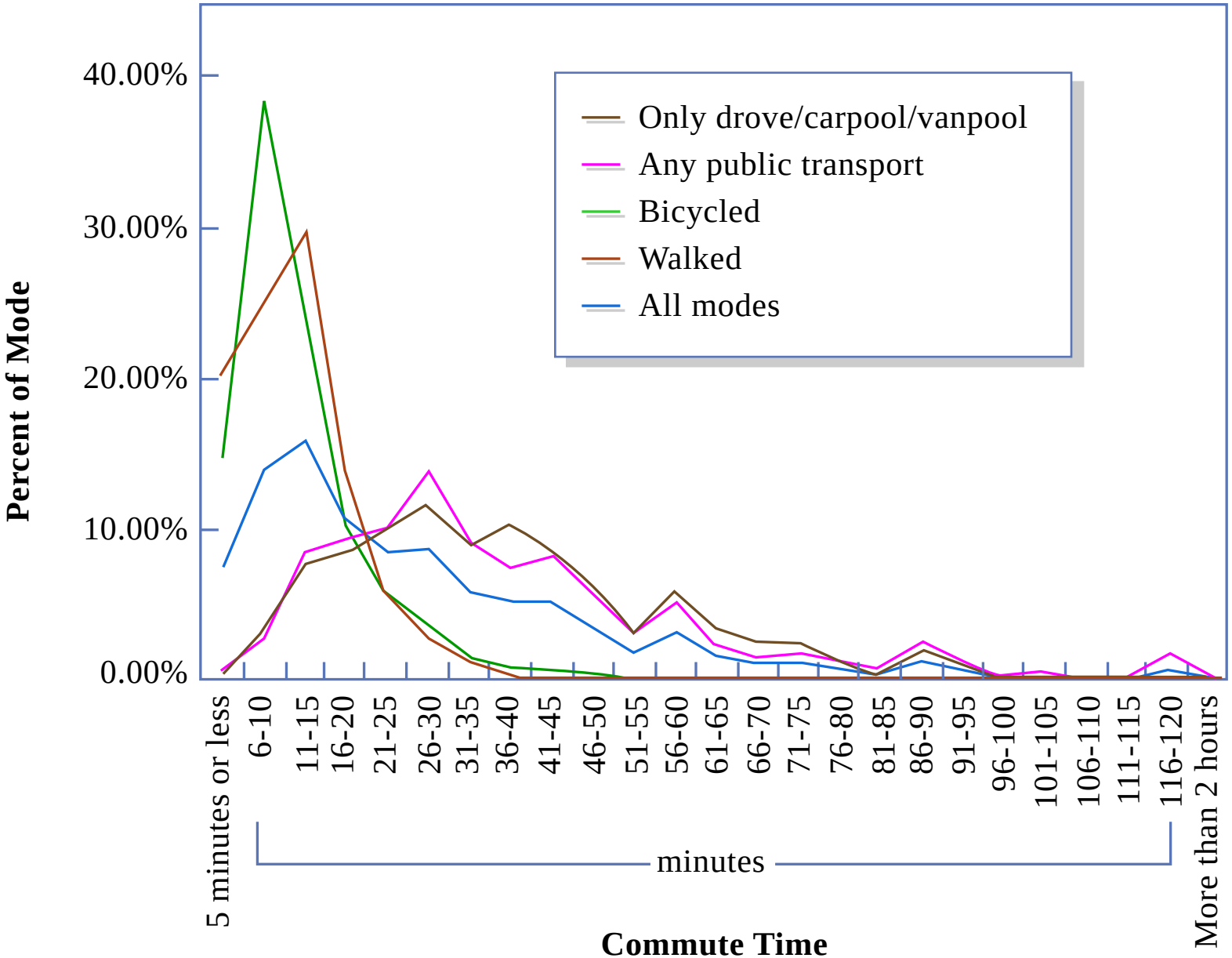
Little numbers – even if you use models!



2006 MIT Commuter Survey By David Block-Schachter

F.Salvucci & M.Murga

Figure by MIT OCW.

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Some comparative *little* numbers

	Car on city streets	Car on Freeway	Bus LRT on Mixed Traffic	Semi Rapid Transit	Rapid Transit
Vehicle occupancy	1.2	1.2	40-300	40-600	140-2,200
Speed (km/hr)	**20-50**	**60-120**	**5-20**	**15-45**	**25-70**
Veh/hr	600-800	1500-2200	60-80	40-90	10-40
Capacity (pers/hr)	**720 to 1,050**	**1,800 to 2,600**	**2,400 to 20,000**	**4,000 to 20,000**	**10,000 to 72,000**

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By the way, GIS information also qualifies as *Little Numbers*

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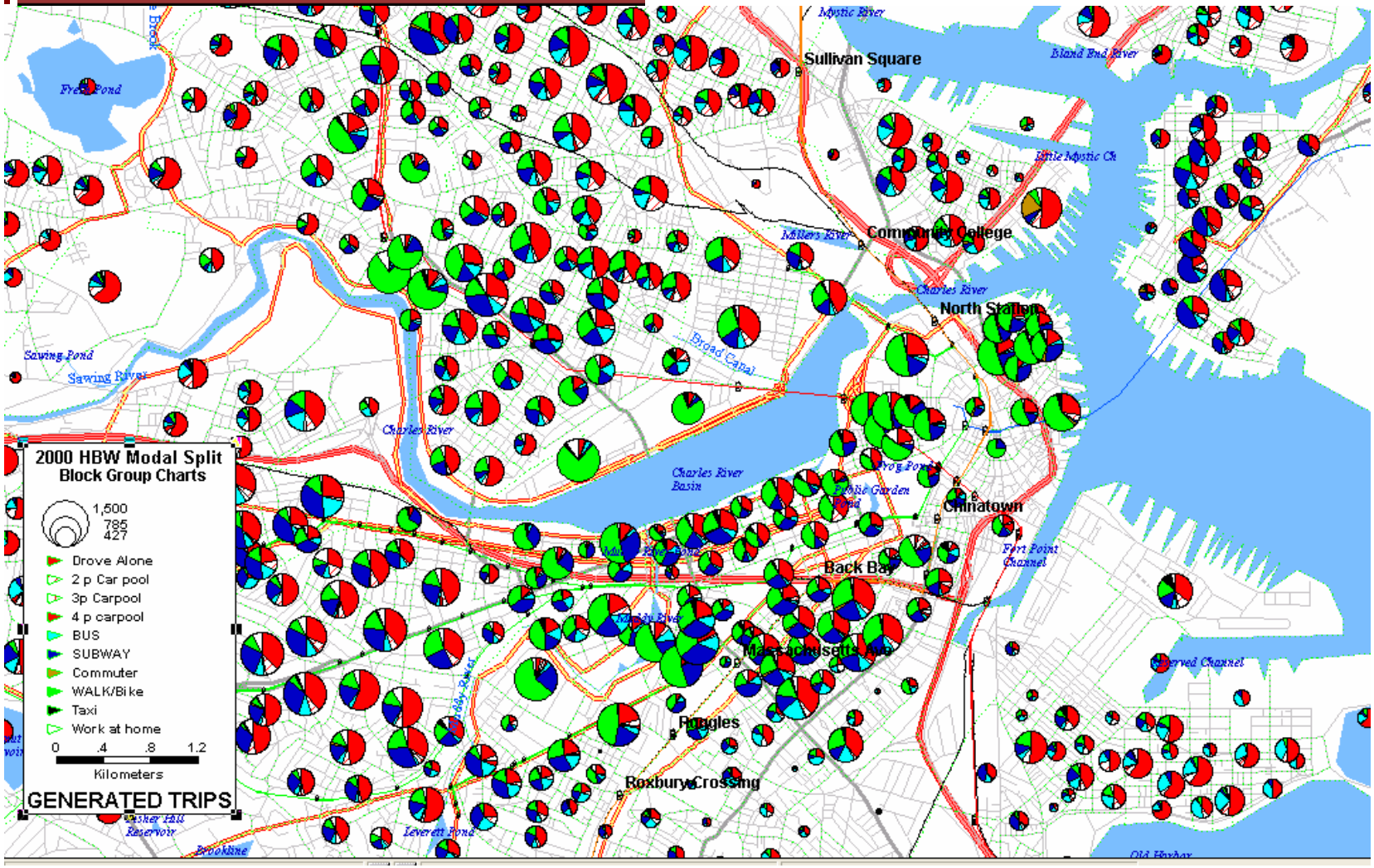

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Beyond Transport: Activities

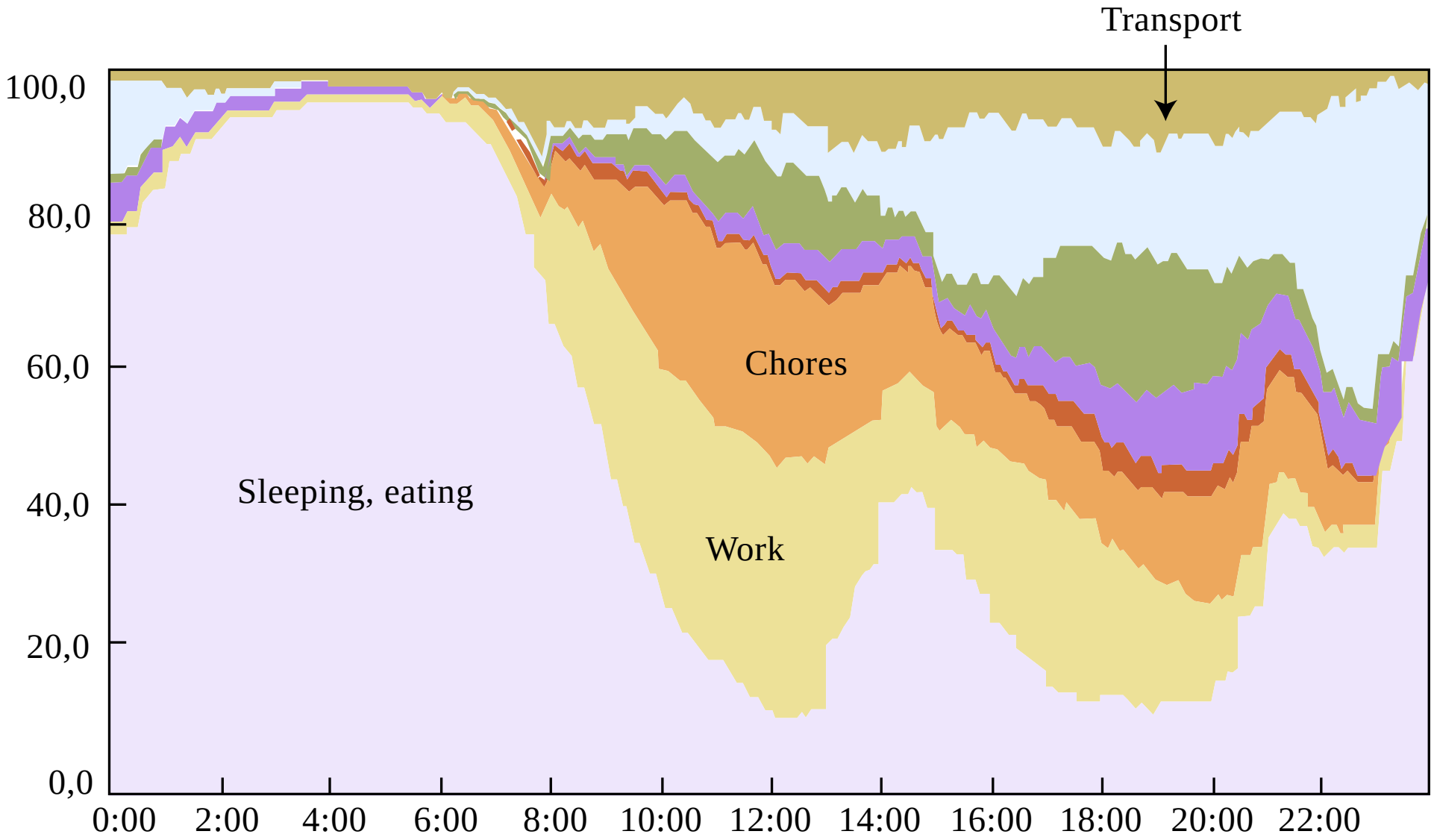

Figure by MIT OCW.

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"The Future of Operations Research (OR) is Past" by Russell Ackoff **1979**

1. First, there is a greater need for decision-making systems that can **learn and adapt** effectively than there is for optimizing systems that cannot.
2. Second, in decision making, account should be taken of aesthetic values-stylistic preferences and progress towards ideals because they are relevant to **quality of life**.
3. Third, problems are abstracted from systems of problems, messes. Messes require **holistic treatment**. They cannot be treated effectively by decomposing them analytically into separate problems to which optimal solutions are sought.
4. Fourth, OR's analytic problem-solving paradigm, "predict and prepare," involves internal contradictions and should be replaced by a synthesizing planning paradigm such as "**design a desirable future and invent ways of bringing it about"**.
5. Fifth, effective treatment of messes requires **interaction of a wide variety of disciplines**, a requirement that OR no longer meets.
6. Sixth and last, all those who can be **affected by the output of decision** making should either be involved in it so they can bring their interests to bear on it, or their interests **should be well represented** by researchers who serve as their advocates.

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Where to focus on?

- Transportation solutions to current problems like congestion, a bitter pill
- The *systems* view aligns transportation proposals with higher goals
- You will have to be creative in the use of your tools and approaches
- Search for a higher goal beyond transport symptoms

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Focus on ....

... Economic development

- Look at American and European cities with subways...
  - When were those systems built?
  - Have they shaped those cities?
  - How should we then evaluate their contribution???

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Focus on... Quality of Life

- When traffic is tamed, a good walking environment results
- Walkers enjoy a wide range of sensory experiences
- When most people drive, the buildings end up lacking the detail and relief that people need and enjoy
- People attract more people

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Quality of Life: Generic Recommendations

- Upgrade Squares and Plazas
- Rehabilitate wide streets
- Develop transit
- Reduce through traffic
- Enhance Park Lands
- Create pedestrian and bike networks
- Mixed uses for day and night livability
- Attract residents
- Foster markets, cafes and educational institutions
- Improve ground floor frontage
- Organize public activities and events

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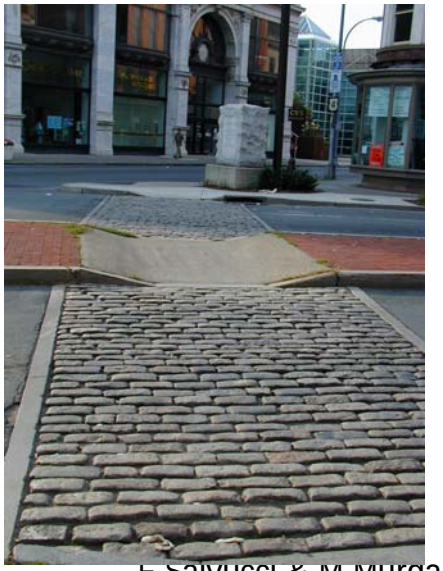
But if you only fix the transportation ...

- ... A beautification program -- without people as in Troy, NY



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People attract People!

Public Spaces = leveling the playing field

Stadt luft macht frei!

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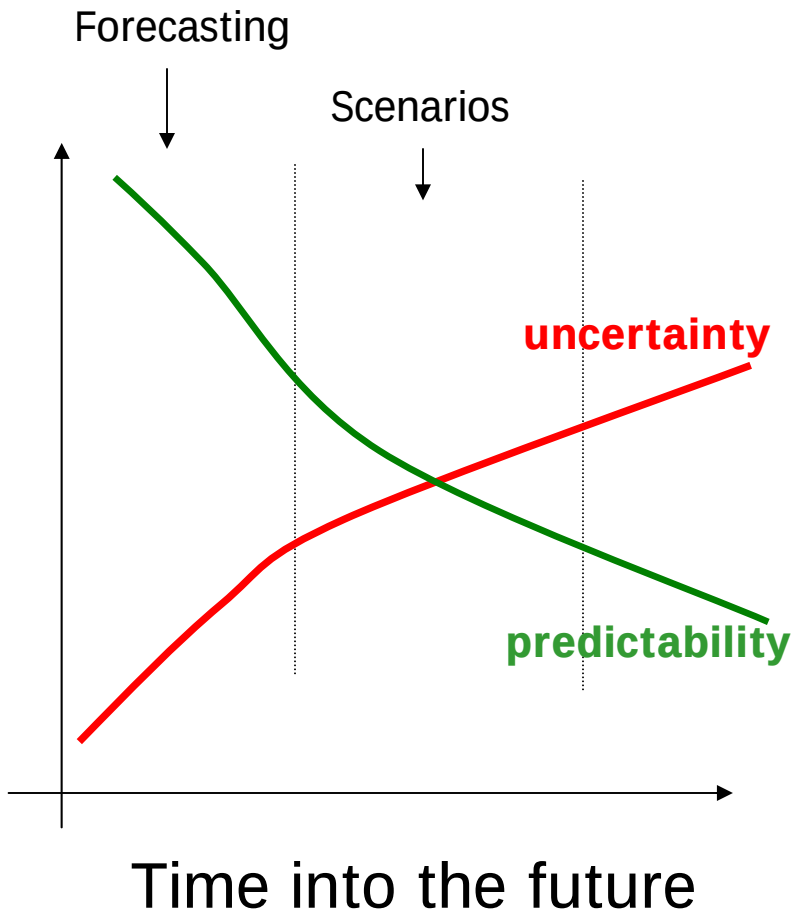
Be comfortable with an uncertain future

- Forecasting:
  - Short term extrapolation:The future on the basis of the past
  - Applicable to slow incremental change
- People believe that *today's status quo* will remain
- Scenarios, to accept pattern breaks, and to improve our decisions!



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Be comfortable with the Future and with the Past

- Scenario Planning a must
  - Test several futures for robustness of decisions
  - Identify key variables YOU can influence

- Back-casting equally a must
  - All lessons are in the past
  - A humbling experience before you "predict" the future

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Future Trends and Challenges

- Globalized (or Flattening) World
- Climate Change
- Road Safety
- Road Congestion
- Aging of society
- Increasing income gaps
- Physical separation based on income

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Future Trends and Challenges

We need new sustainable models of development – other than letting the automobile shape the future of our lives

It cannot be based on ***do as I tell you***, instead ***do as I do***

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Road Congestion as a Transportation Challenge
The latest word from Anthony Downs

You need the "thousand cuts" approach or a package with a myriad of proposals feeding on each other

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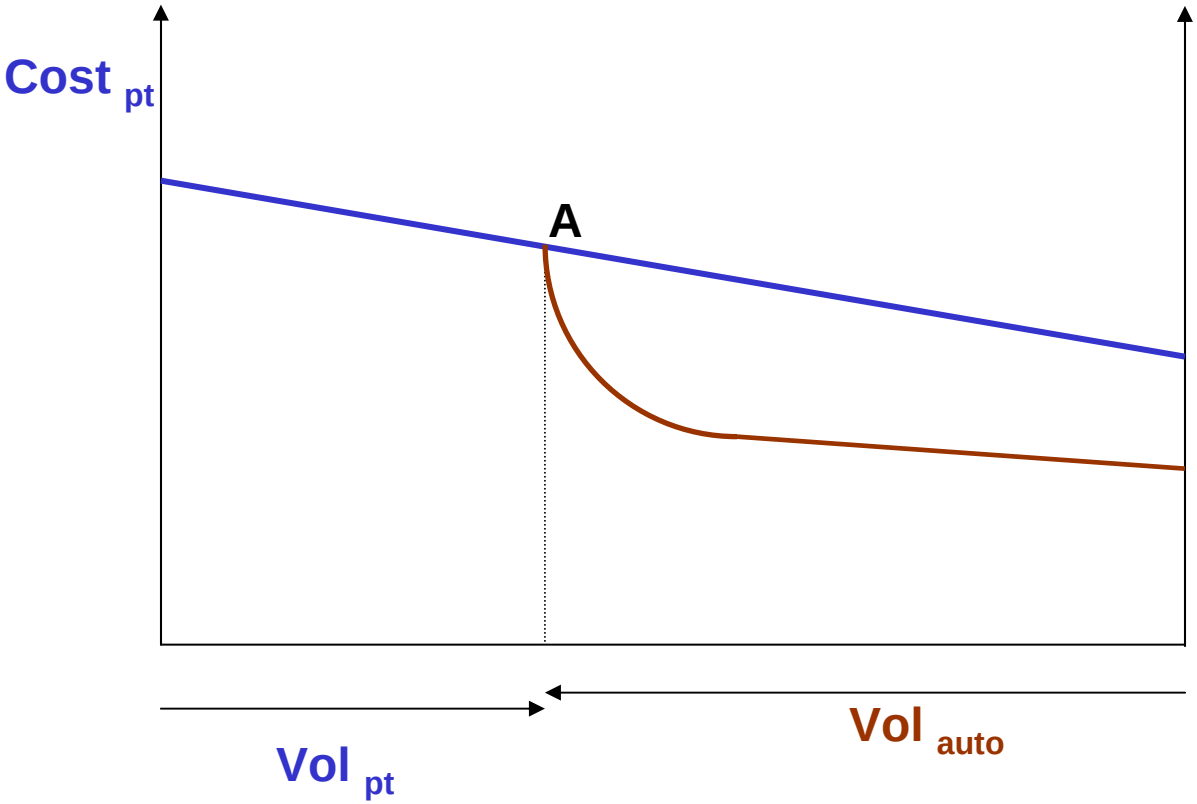
Road Congestion as the Policy Driver



Adapted from "Transport in Santiago" presentation by Dr. Diaz-Jara at MIT

A represents an assumed equilibrium point between auto and transit

Point **A** is really a "policy trigger point", rather than an "equilibrium point", as it leads to build extra highway capacity

Road Congestion as the Policy Driver
Highway Capacity Expansion Strategy

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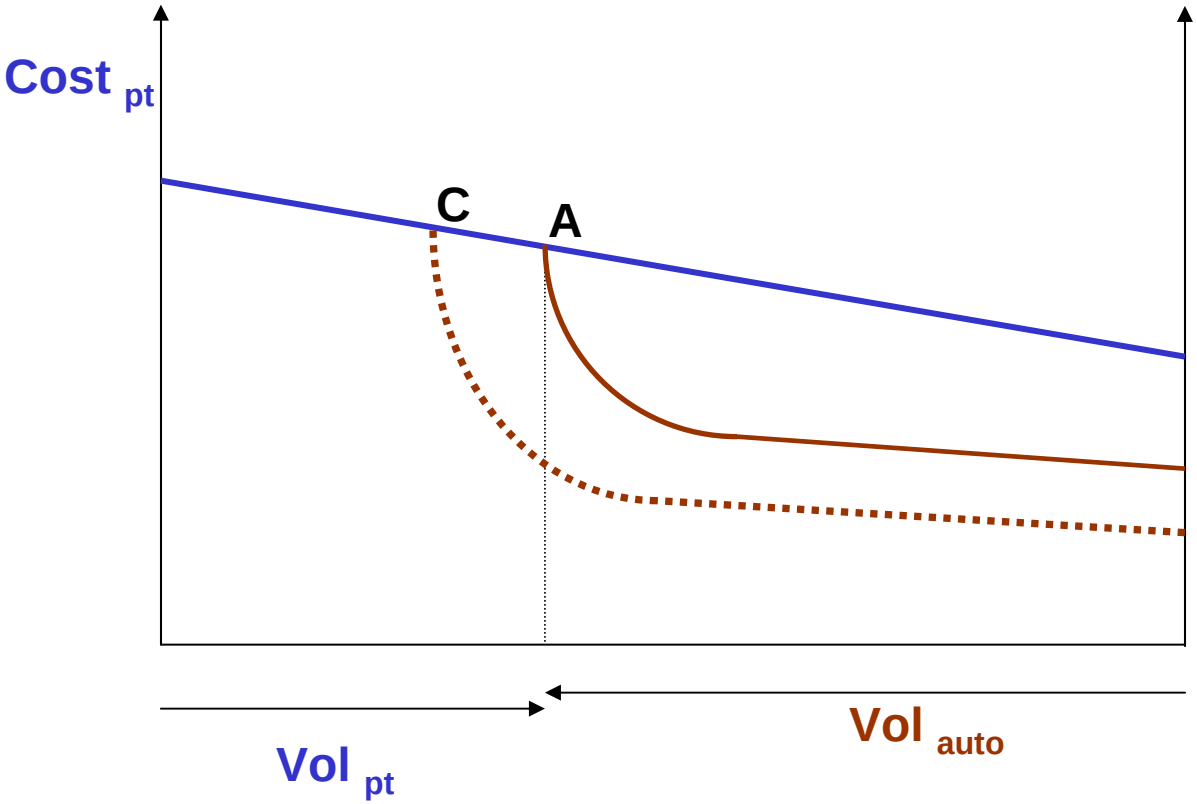

Adapted from "Transport in Santiago" presentation by Dr. Diaz-Jara at MIT

As the fight against congestion translates into extra highway capacity - as shown by the dotted brown line-, this process ends up in a new congestion point at **C**

This point **C** may become again another "policy trigger point" under economic growth conditions

Road Congestion as the Policy Driver Highway Capacity Expansion Strategy

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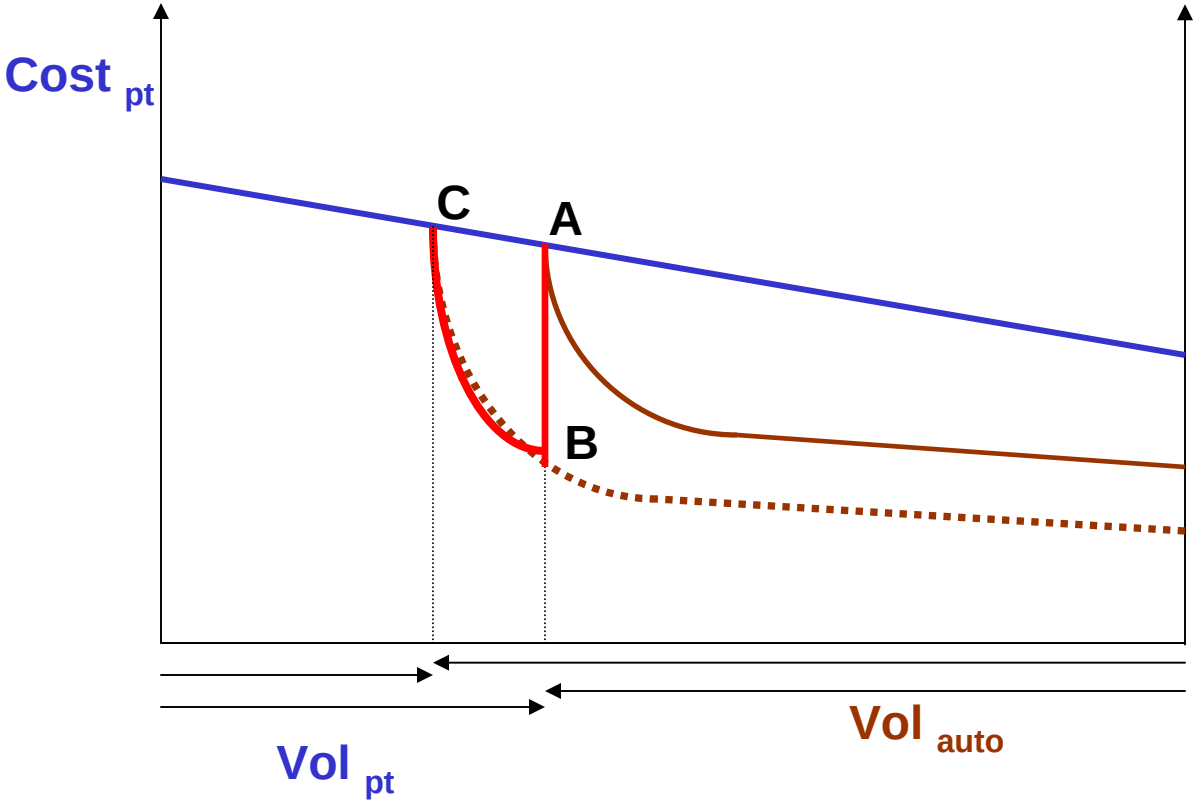

Adapted from "Transport in Santiago" presentation by Dr. Diaz-Jara at MIT

The way from point **A** to point **C** spans a few years during which induced demand and further development causes a new congestion point at **C**.

The path from **A** to **C** goes initially through point **B,** which often encourages higher automobile ownership ratios given the improved highway LOS.

This process ends at **C** as a no-win situation, because not only transit loses part of its market share, but costs increase for both transit and the automobile

Road Congestion as the Policy Driver
Transit Capacity Expansion Strategy

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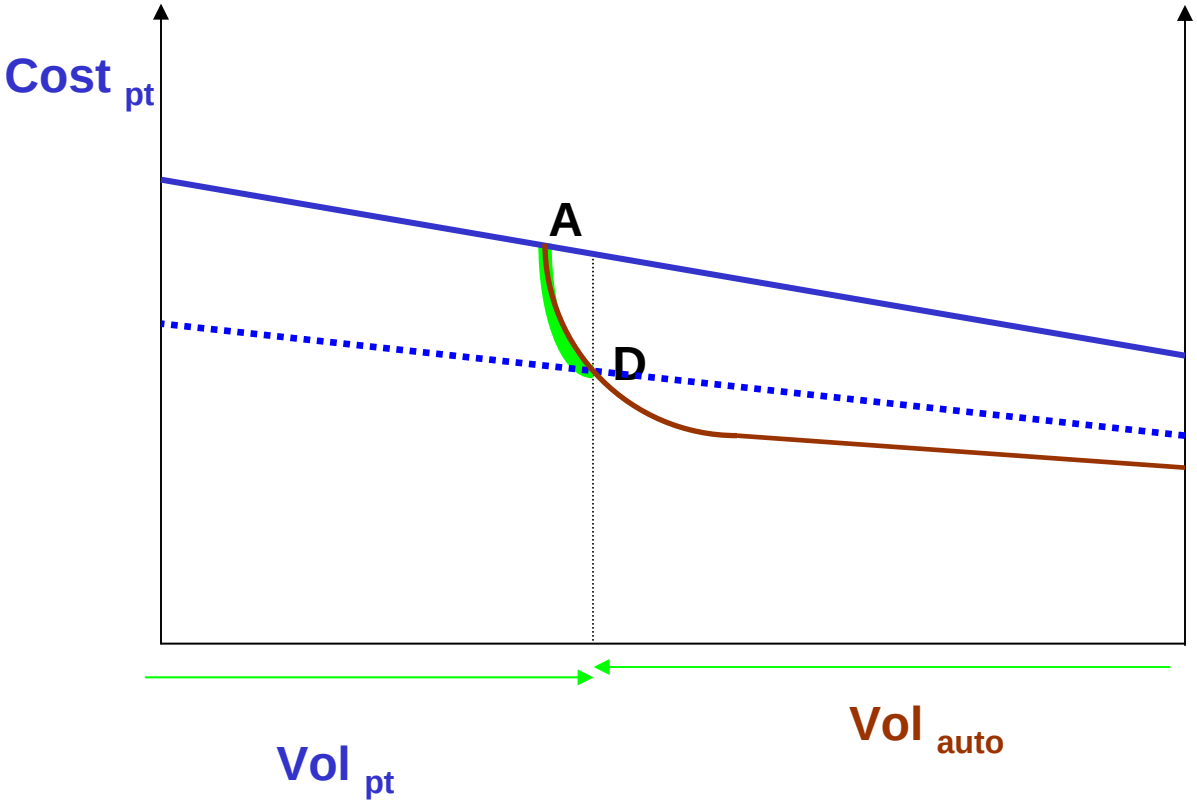

An alternative process to the **A**-**B**-**C** path implies a more aggressive role for transit, by responding to congestion with a dramatic increase in transit capacity as represented by the blue dotted line.

Adapted from "Transport in Santiago" presentation by Dr. Diaz-Jara at MIT

The new path from **A** to **D** in green, assisted by other policy measures, results in a more desirable and sustainable outcome with lower costs for all. At the same time, point **D** is an equilibrium point given its more "acceptable" level of congestion

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New Indicators for Transit

- Transit makes high density central city possible
- Even in the US with transit serving only 2% of all person trips, it is critically important in shaping the big cities
- The home to work commute in Boston (and in other American cities like Chicago, New York, San Francisco..) shows the critical role of transit in its downtown
- The downtown job density makes it impossible to rely solely on the automobile
- Boston's Bump Factor

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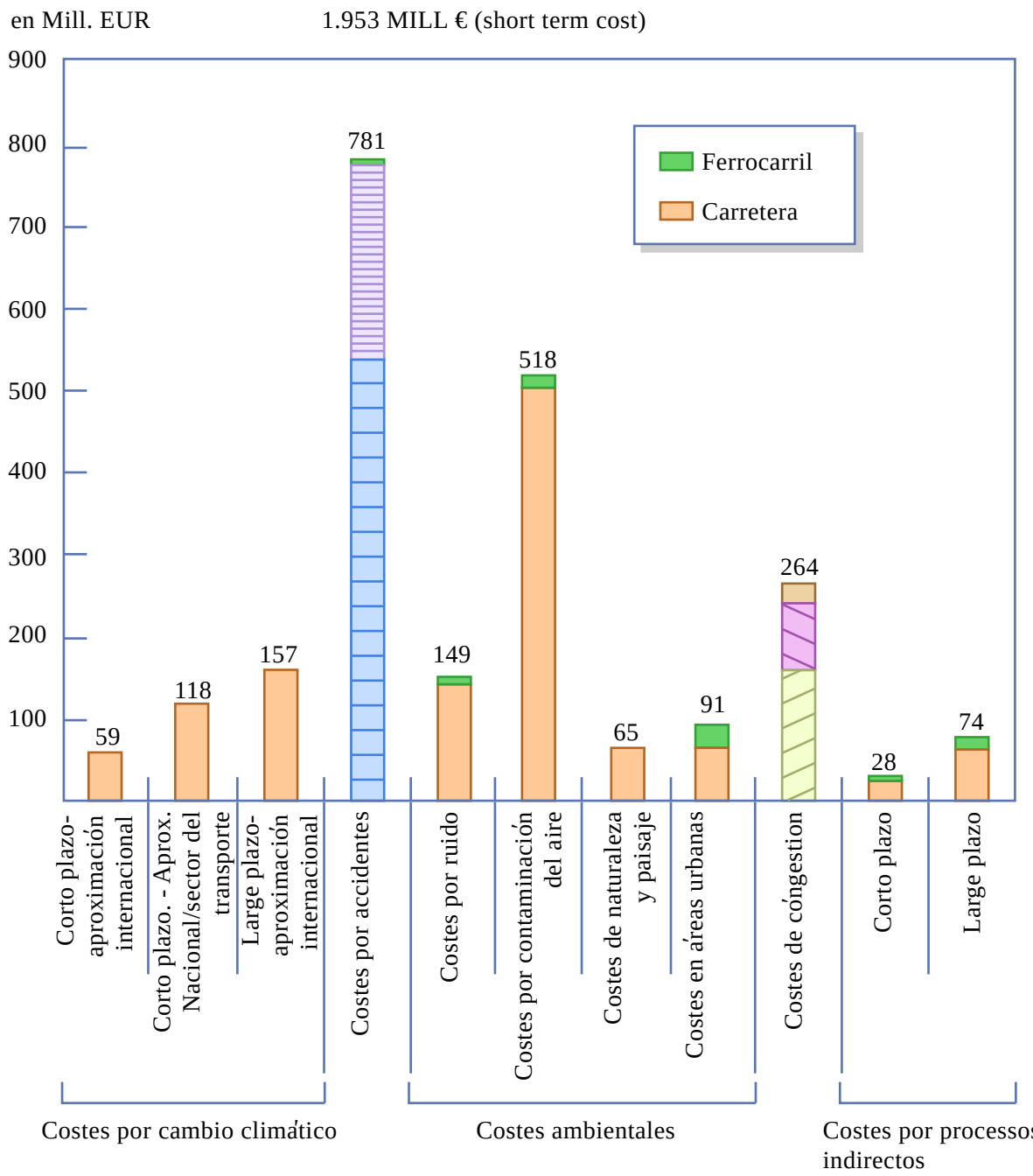
External Costs: €1.95 bill in the Basque Country



This translates to roughly
€ 930 /person/year or
€ 2,600 /family/year

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External Costs: Unit Costs for C-B Evaluation

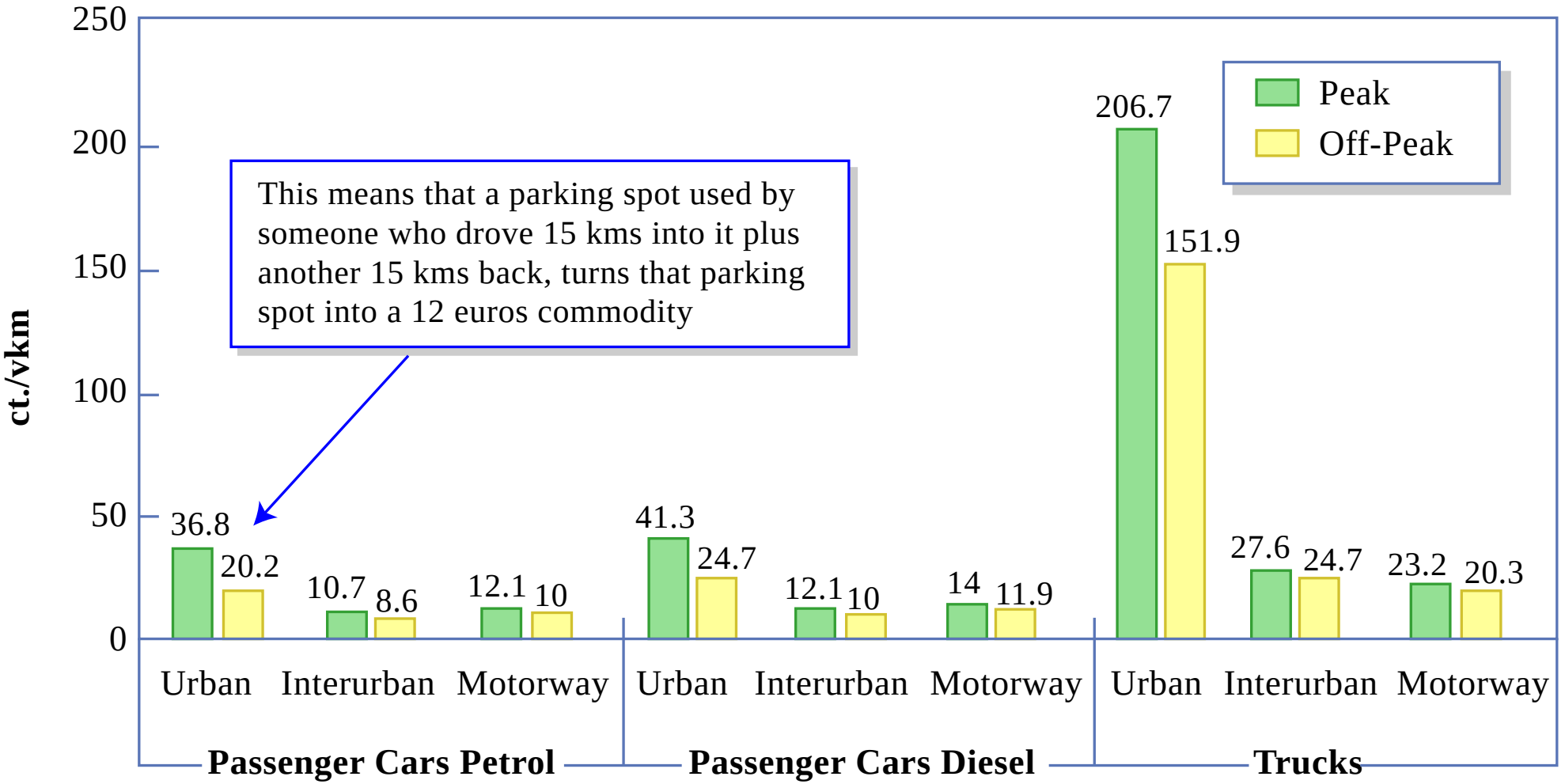

Figure by MIT OCW.

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Your contribution

Of all the kinds of work I can imagine the hardest work of all is thinking -- and that's why most people just don't do it."

Henry Ford in his highly original "My Philosophy of Industry" published in 1929

You will be surprised how often you can make meaningful proposals with a bit of thinking plus some creativity

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Your contribution

- Planning ... and processes
  - The 12-step process
  - Reality checks between expectations and realities

- Short term and long term
  - Observe, observe ...
  - You do not need to serve as Secretary of Transportation to change the world around you ... although it will help

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Big Projects... and Little Projects

Even a small improvement in a light-regulated traffic intersection may become a **beacon for the needed change**

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Demonstrate and visualize!

See: The Boston Globe Nov 2004

Use “before” and “after” case studies, databases like the “Millenium Database, locate the area in a trend line...

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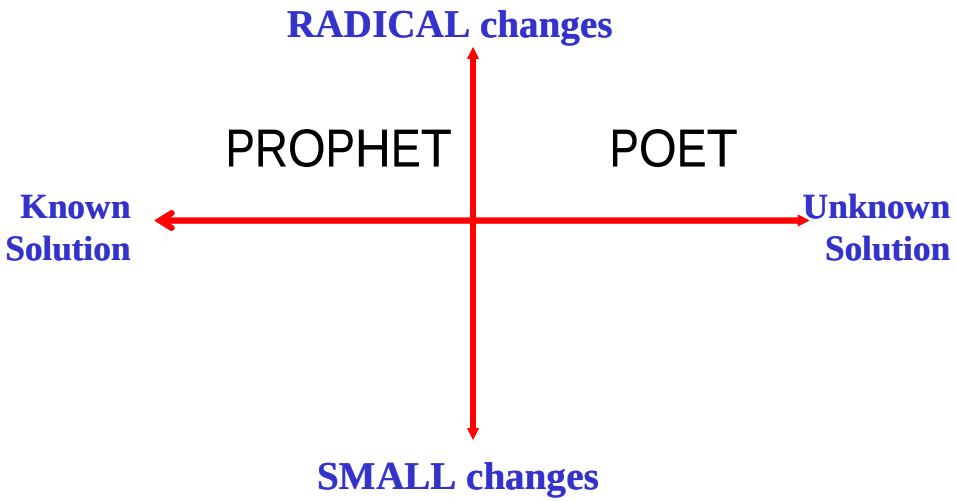
Your contribution



- It is easy to end up sounding like a “Prophet” when just selling one single measure: ie. parking policy
- You will need to behave as a “Poet” by embracing contradictions and ambiguity, but focusing on higher goals like urban quality, economic development ...

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When contributing, remember that...

1. Every change is hard to implement
2. You should start with the easiest job
3. You need allies
4. You have to minimize risks
5. Technical competence is a must
6. Do not propose isolated measures, but packages
7. Focus on short term results to jumpstart the process
8. But don’t forget to plant a few seeds
9. Everyone sees things differently, and that
10. Success is hard to measure

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A thought by Ortega y Gasset for solo flying

"El menesteroso de una ciencia, el que siente la profunda necesidad de la verdad, se acercará cauteloso al saber ya hecho, lleno de suspicacia, sometiéndolo a crítica; más bién con el perjuicio de que no es verdad lo que el libro sostiene"

Sobre el estudiar y el estudiante (Primera lección de un curso)

Ortega y Gasset, 1933

Once you are faced with an immediate problem, you will ponder, challenge and enrich our findings and solutions, as that is the only way to learn!

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Final thoughts

- Be on the lookout for all the lessons from the past
- Do measurements and keep those records for future reference, and updates
- Come up with new metrics for the actual contribution of transportation projects
- You can manage only what you measure
- Do challenge the status quo... and dare to be creative!

Good luck!