

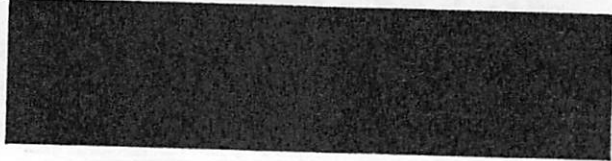


Metropolitan Bilbao Transit System: A Three Point View

Mikel Murga – P.E., MITE

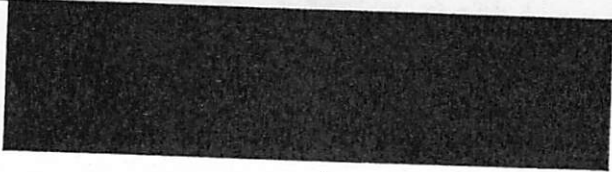


- A metropolitan area of one million undergoing massive renovation of both its economy, its transport system and its urban landmarks
- Its tight urban structure may be its best asset
- Its mobility profile includes a significant percentage of walking trips in downtown areas
- A trend towards suburban sprawl and employment is today its main threat

- 
- A very complex network of rail and bus services with many operators under different levels of the Administration
 - Bilbao Metro is the future backbone
 - Transit demand equals 450,000 daily rides, (2/3 are captives) representing roughly less than 20% of the overall mobility
 - Many coordination measures still lacking

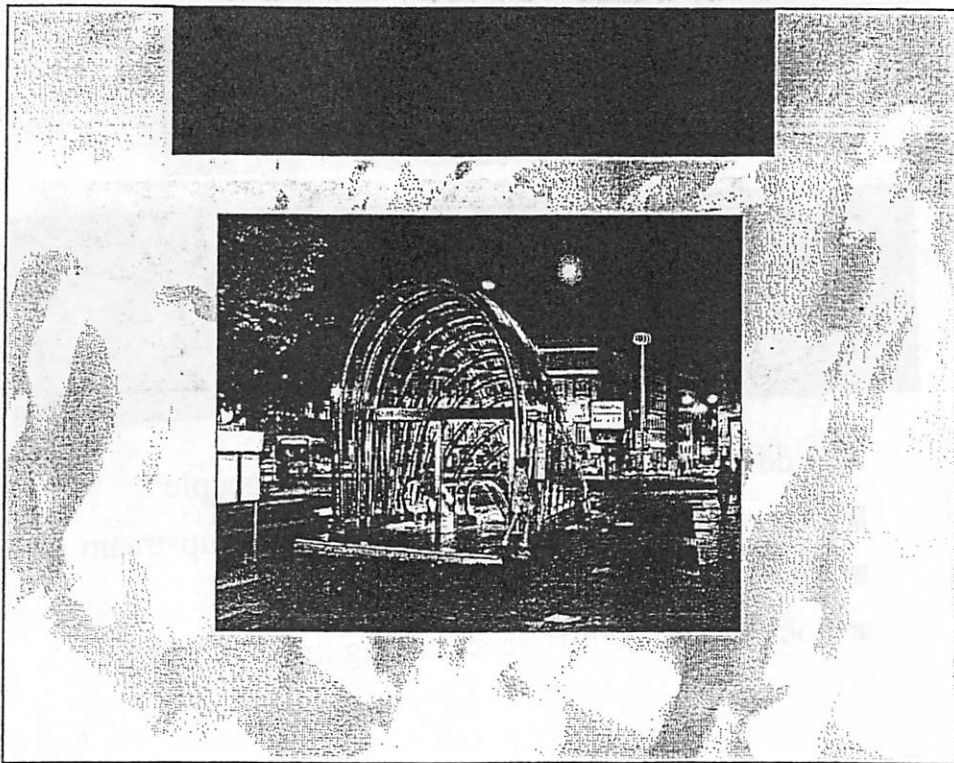
LEBERO

3

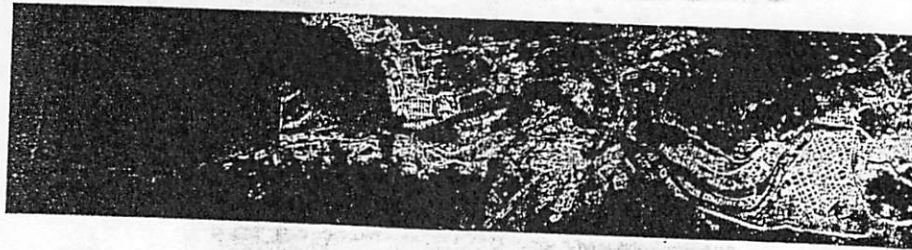
- 
- No magic bullets; our goal a diversified and complex transport system
 - Investing public funds is the easy part
 - Any major transit project should be taken as a unique opportunity to transform the city
 - The new ITS technologies if smartly applied could contribute towards the needed global vision of the transport system

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- A virtual tour of Metropolitan Bilbao
- In search of a new economic base
- Mobility profile
- The sprawl threat



- A conurbation of close to one million people
- City of Bilbao, 400,000 people, 10 miles upstream
- Two hilly ridges along the river
- Socioeconomic differences along the two banks

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700 years of a medieval port city



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8

A commercially thriving Old Quarter pedestrianized more than 10 years ago to become the biggest urban shopping mall



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9

A certain human scale at the "new" city



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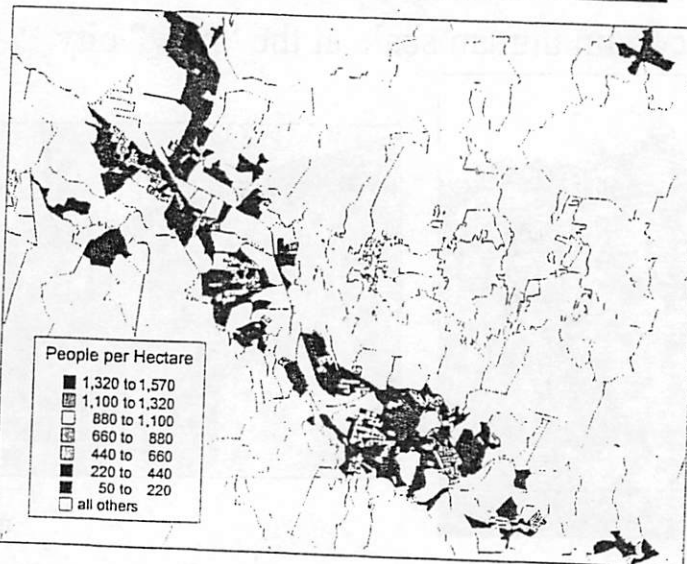
10



- Rather high residence densities
- Mixed uses throughout

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11



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12



The river's left bank is dotted with low-income housing serving the nearby industrial complexes

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13



A mostly residential right bank with higher motorized mobility profiles

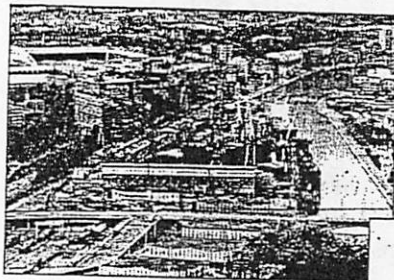
LEBER®

14

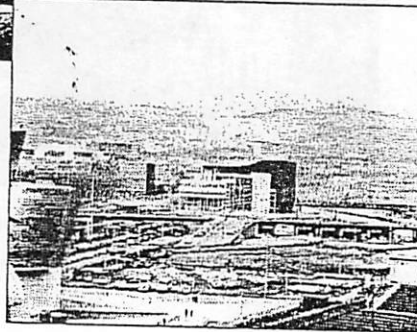
- 1990's, we hit the bottom:
 - ◆ The old economic model was being dismantled
 - ◆ The unemployment figures were very high
 - ◆ Terrorism was not helping either
- A new image and new symbols were needed:
 - ◆ From a decaying industrial center to a new and modern service center
 - ◆ Cultural activities as a catalyst
- Our fiscal autonomy was essential to provide the needed financial funds

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From an old shipyard
into a new Congress
and Music Center



LEBER®

16

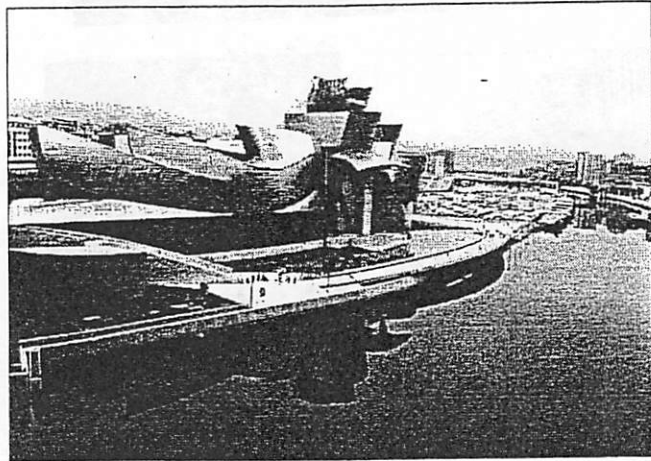


From the old steel mills
to new projects along
a renovated riverfront



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17

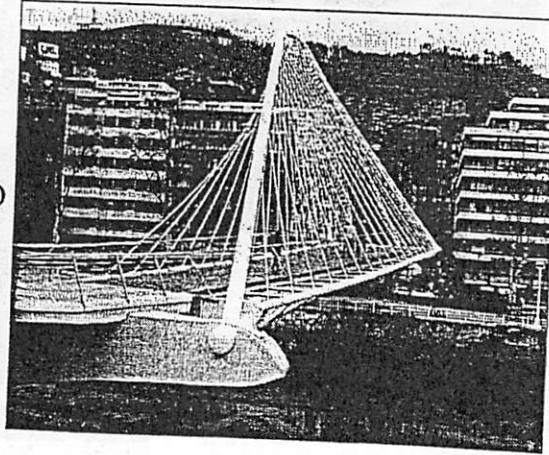


The New Guggenheim Museum by Frank Gehry

LEBERG

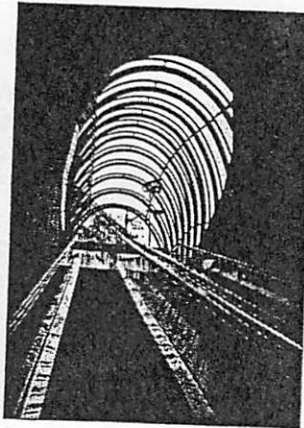
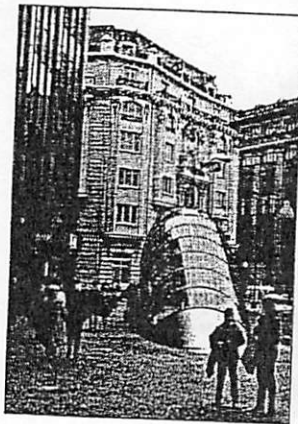
18

A new pedestrian
bridge by Santiago
Calatrava



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19

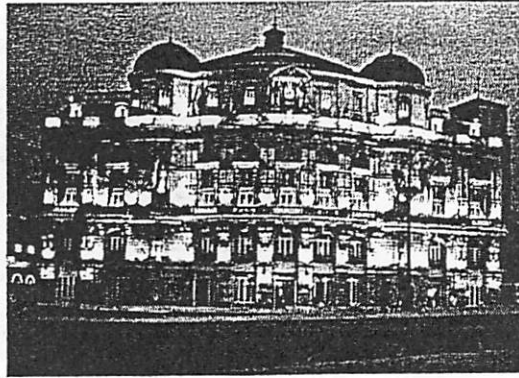


The Bilbao Metro stations by Sir Norman Foster

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20

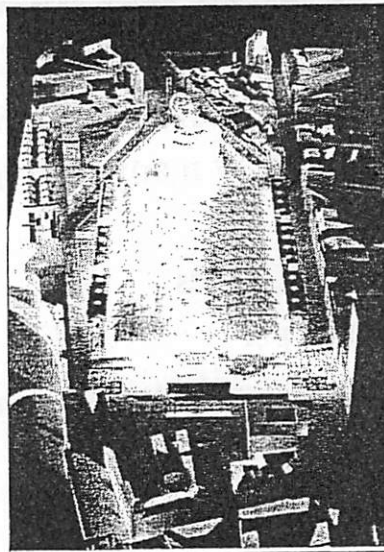
The renovated Arriaga Theater



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21

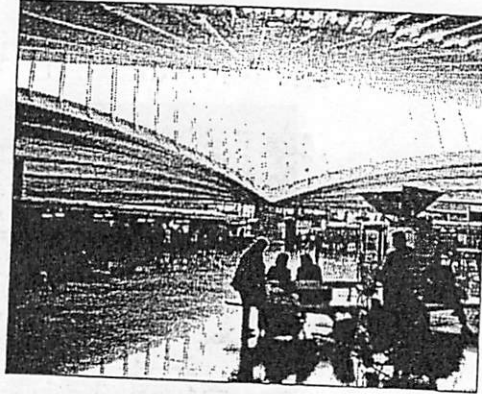
The Intermodal
Station Project
by Michael
Wilford



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The new airport terminal
by Santiago Calatrava



Plus many other big names in architecture: Cesar
Pelli at Abando, Isonozuka at Aduanas,...

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23

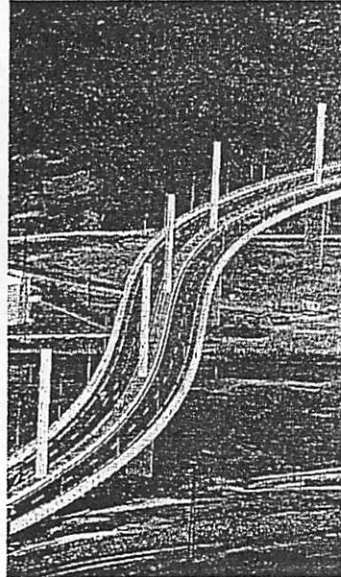
■ That investment frenzy has been
accompanied by many new infrastructure
projects:

- ◆ Many new bridges
- ◆ New outer port
- ◆ New toll facilities: Artxanda tunnel, Lamiako underground pass

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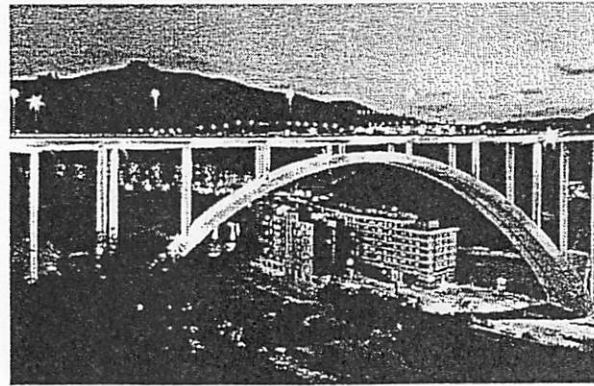
24

The new stayed
bridge at Muskiz



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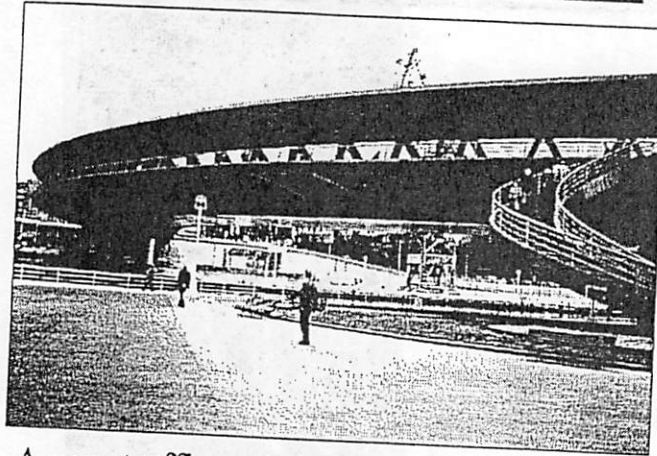
25



The award winning Miraflores bridge

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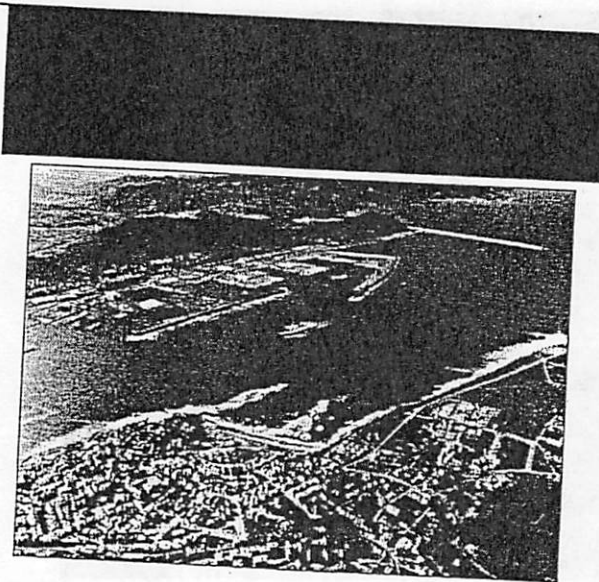
26



A new traffic and pedestrian bridge by the new Congress and Music Palace

LEIBERT

27



All port activities are being moved to this deep sea outer facility, with new road and rail access and a s-o-a Traffic Control Center

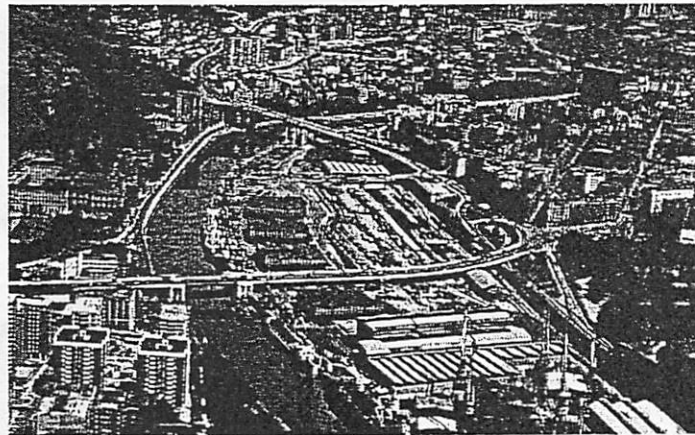
LEIBERT

28

- The port activities are being moved away from Bilbao
- New areas of opportunity: From shipyards to cultural and congress centers
- The national railways, RENFE, served the riverfront and its industrial activities. Again a new opportunity for redevelopment

LEBERIT

29



Only a few years ago, a decaying container port

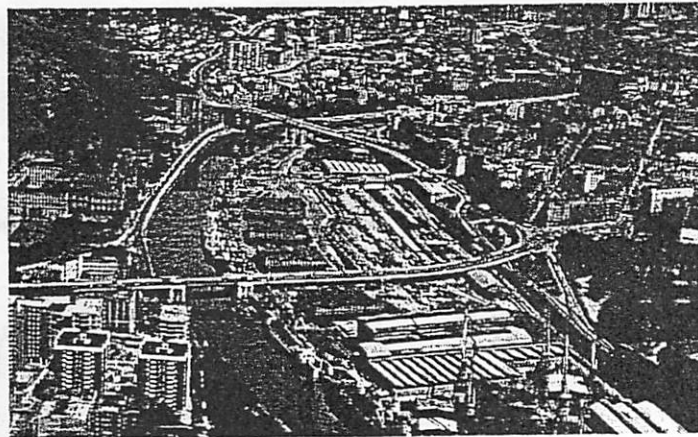
LEBERIT

30

- The port activities are being moved away from Bilbao
- New areas of opportunity: From shipyards to cultural and congress centers
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LEDBET

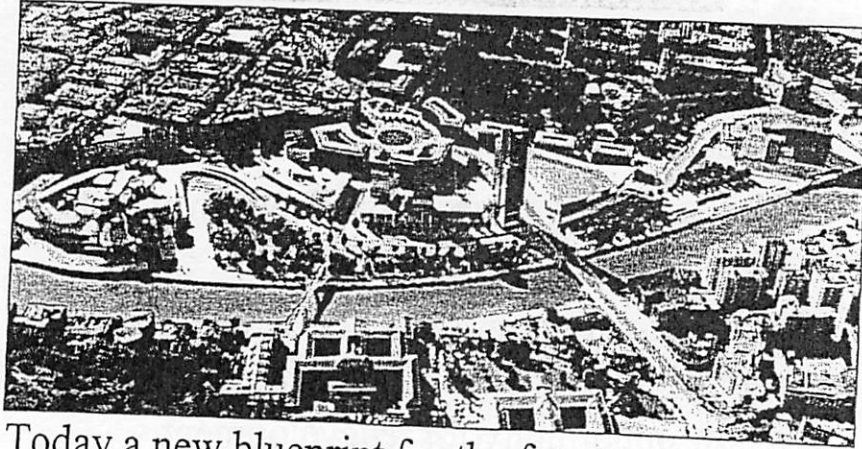
29



Only a few years ago, a decaying container port

LEDBET

30



Today a new blueprint for the future

(with some debate)

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31

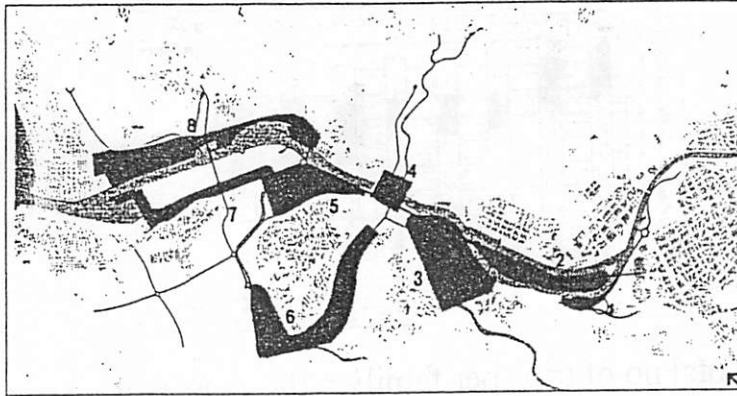
From heavy
rail to Light
Rail (under
construction)

Plus a new
riverfront
promenade



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32



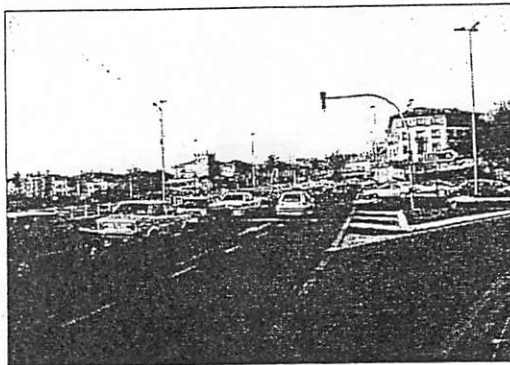
The new "areas of opportunity" presently under development along the old industrial riverfront

LEBER®

33

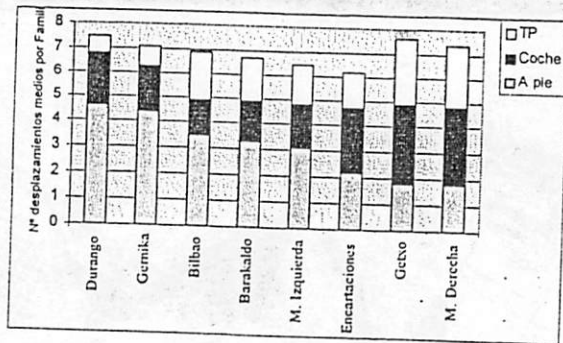


In the last 30 years, we have gone from 0.2 to 1.4 automobiles per dwelling



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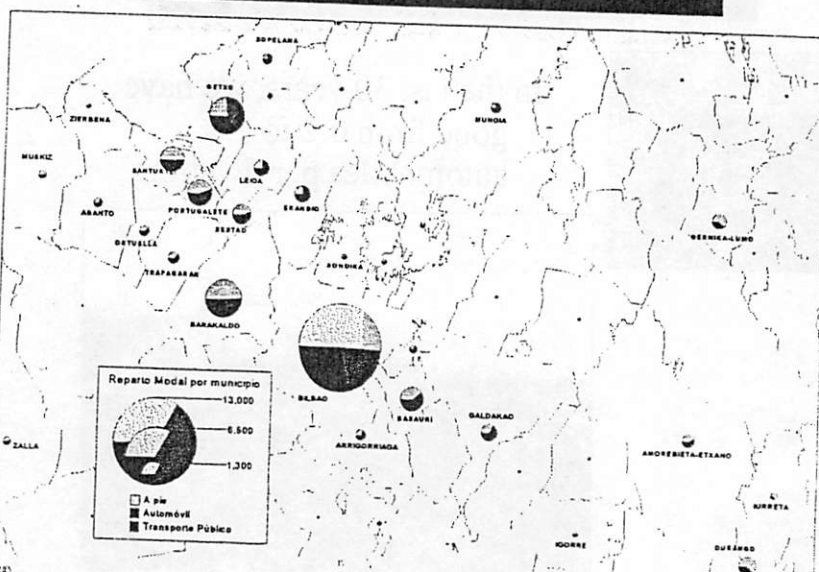
34



- Total no of trips per family rather constant
- Main difference is the no of walk trips

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35



LEHERA

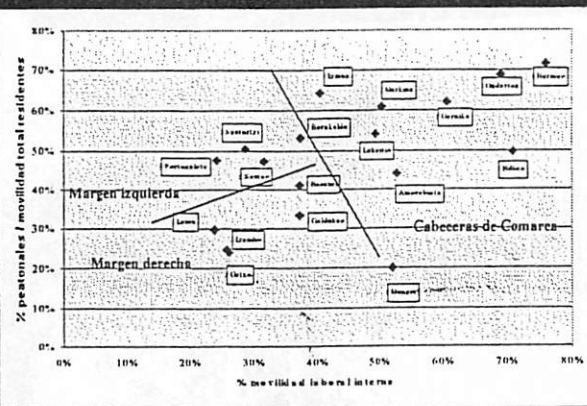
36

■ Two kinds of mobility:

- ◆ Internal or confined to the municipality:
 - n 50-60% of trips on foot
 - n HBW represents no more than 30% of all trips
- ◆ External or extra-municipal:
 - n 95% motorized trips
 - n HBW represents 50-60% of all trips
- ◆ The ratio of internal to external is a direct function of the ratio between a town job supply and the number of employed residents

LEBERO

37



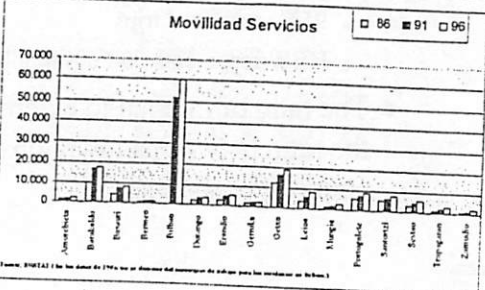
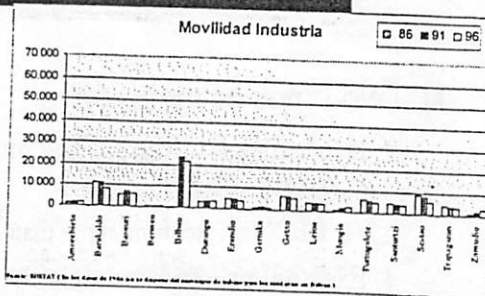
- A 50% ratio between jobs and residents, means walk trips amount to 50% of all trips
- A clear difference between capitals and suburbia

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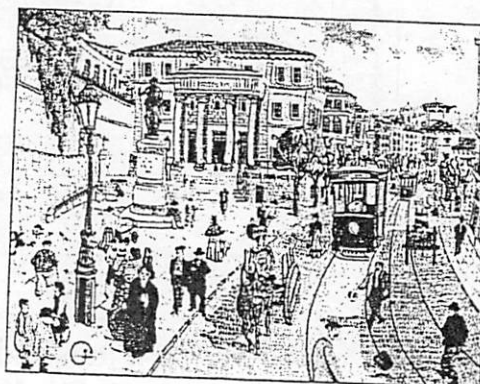
- That unique balance between jobs and residents is being threatened by the *New Economy*

- Most service jobs are being concentrated in Bilbao

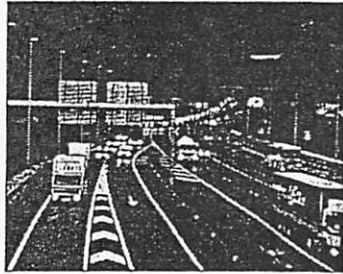


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The metropolitan area unique modal split is also threatened by the move towards the suburbs

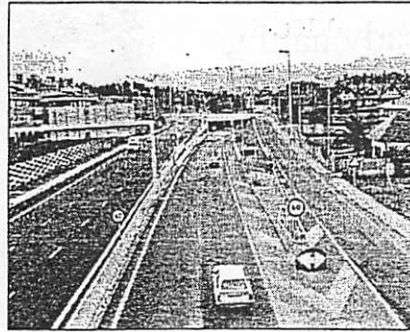


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In fact, it is hard to ignore the induced demand effect of new highway projects ...

...as they help move dwellings and jobs away from traditional urban centers



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- Growth of automobile ownership
- A house in the countryside... And a suburban job
- Shopping Malls
- Are we heading towards *Edge Cities*??

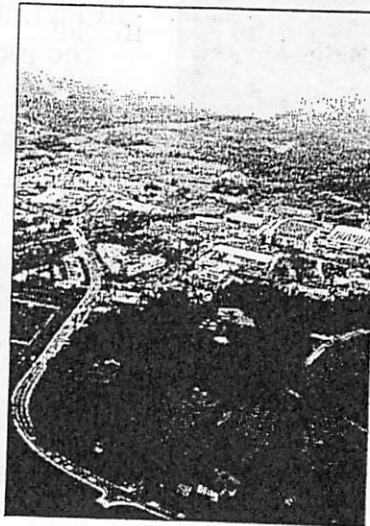
LEBERG

42

■ New Technology Parks

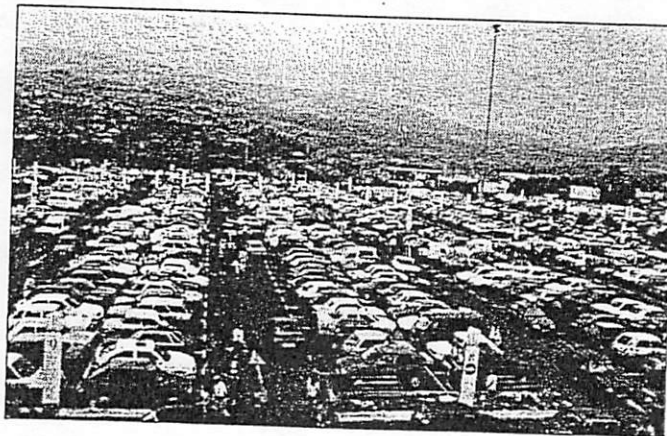
■ Nowadays it is already hard to park there and...

■ ...Now they asking for transit



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Shopping malls and transportation??

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- Bilbao has become a trendy name because of its many renovation projects and new hallmarks
- Its tight urban structure may be its best asset
- Its mobility profile includes a significant percentage of walking trips in downtown areas
- A trend towards suburban residence and employment is today its main threat
- The disruption of traditional job-to-residents balance increases directly the percentage of motorized trips

LEDER

45

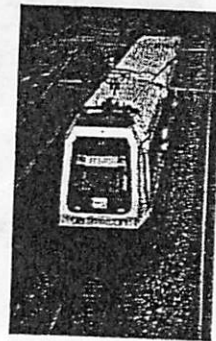


- A complex network
- Rail Systems
- Bus networks
- Demand served
- *Work under construction*

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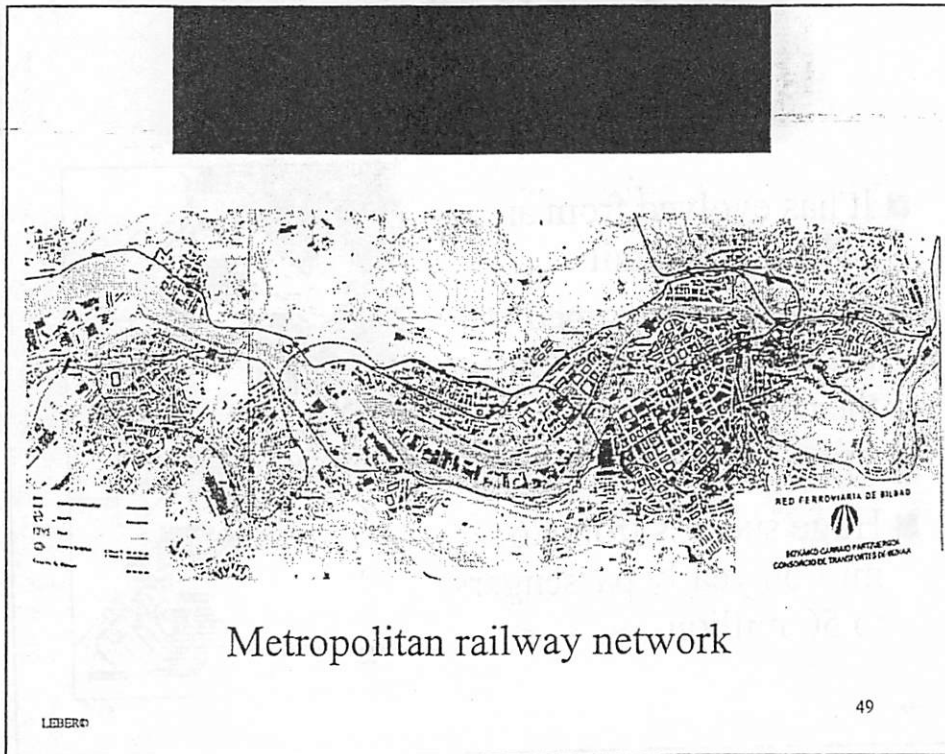
- Metropolitan Rail Service:
 - ◆ Bilbao Metro
 - ◆ RENFE (State Railways)
 - ◆ EuskoTren (Basque Railways)
 - ◆ FEVE (State narrow-gauge railways)



- Bus Service:
 - ◆ BilboBus (operated by Bilbao City Hall)
 - ◆ BizkaiBus (operated by the Provincial Govt)

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48



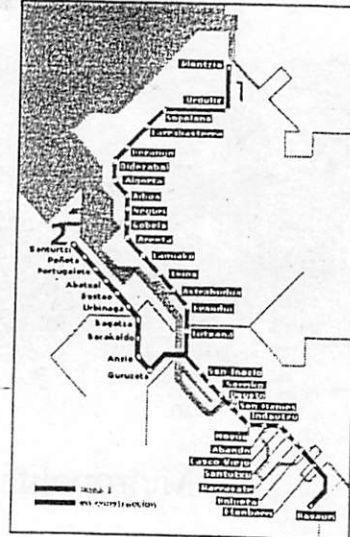
Proposals are made and contested; charges and countercharges are hurled; simplistic solutions are proposed with sublime assurance, as if one new mechanism, or the construction of some type of transportation used in another city, would suddenly solve all the problems.

Roger L. Creighton "Urban Transportation Planning"
University of Illinois Press (1970)

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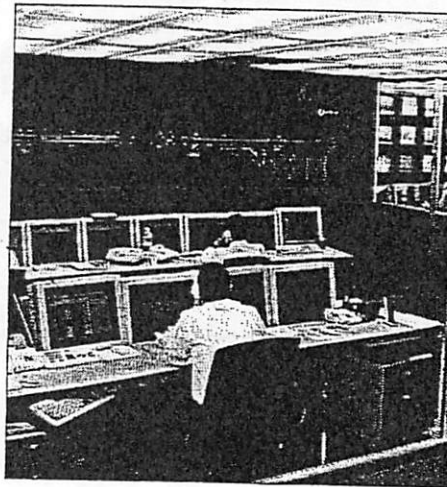
- It has evolved from an old suburban rail
- Radial system aimed at the jobs and services of the capital
- Three zone tariff system
- Huge success from 26 million yearly passengers to 50 million



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- ATO: Automatic Train Operations
- Video surveillance in all stations and tunnels
- A firm anti-vandalism program
- Flexibility for special events

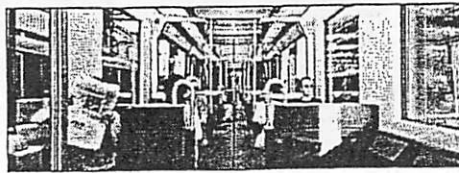


metro bilbao

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- State-of-the-Art system regarding comfort, safety, security and automatism
- Very efficient management system
- Farebox recovery ratio approaching 92%!

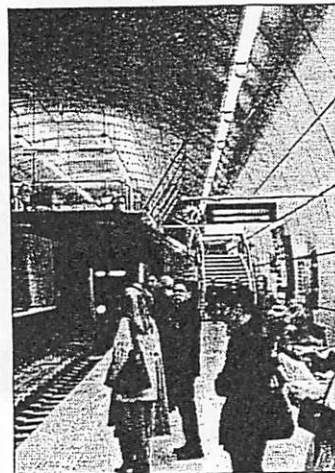


metro bilbao

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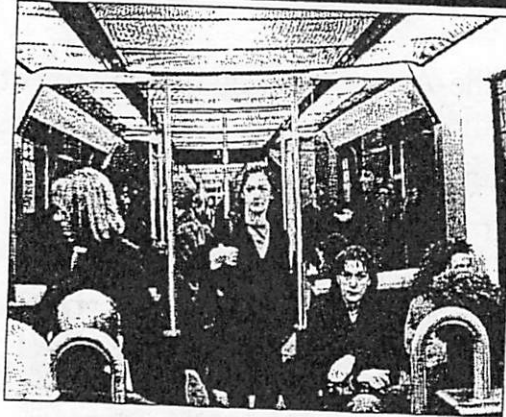
- Most of the demand served has come from other transit modes.
- And from pedestrians within downtown Bilbao
- Overall car traffic has not decreased



metro bilbao

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- Two thirds are captives
- Just like in Madrid, Brussels, Amsterdam...

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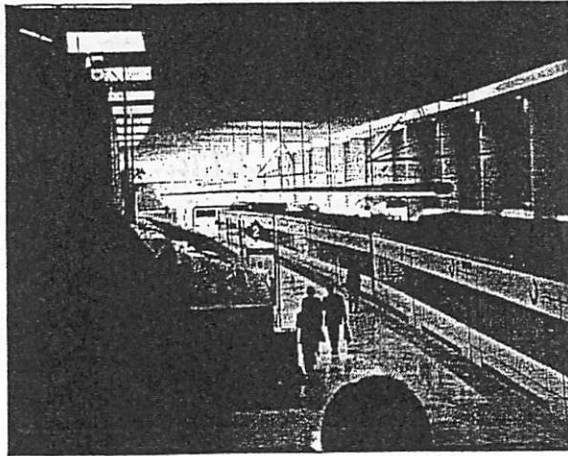


Our experience shows that P&R whether
planned or unplanned will become a de facto
reality near Metro stations

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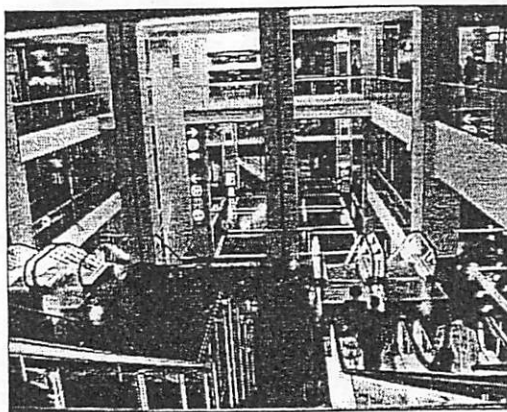
The Metro
Effect:
locating
new urban
stations less
than 1500 ft
apart



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57

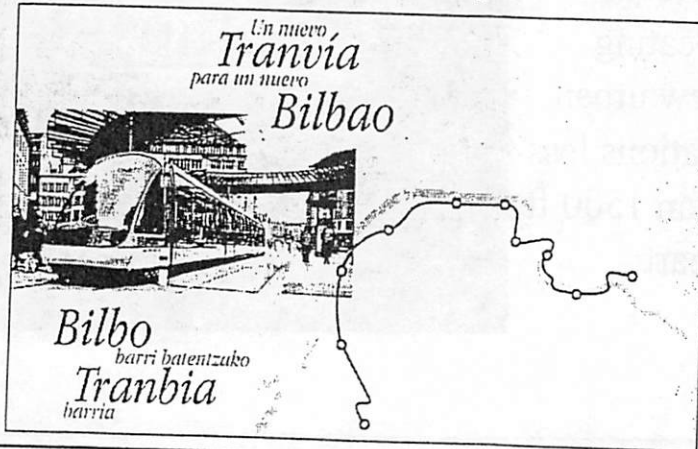
The refurbished
Abando
station boasts
a thriving
commercial
center to turn
it into a more
vital place



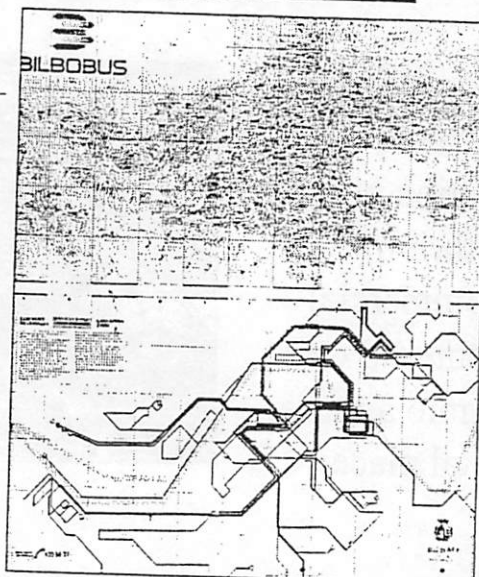
LEIBER

58

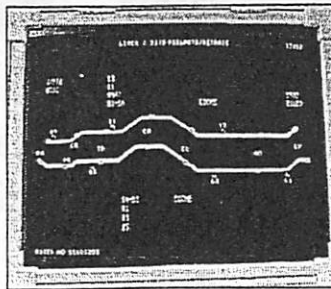
The new transit culture led to a first LRT line
along the riverfront by the Guggenheim
It could eventually play a metropolitan role



Bilbao Bus
Network
(BilboBus),
dense and
unchanged by
the new Metro
operations



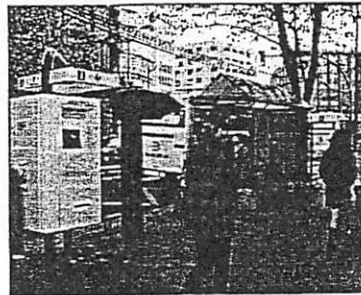
Real time information on bus operations to manage the fleet, through fixed beacons and direct phone contact, being upgraded into GPS



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This real time information is being shared with riders to decrease the anxiety of waiting

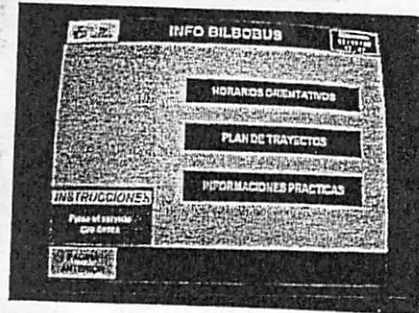
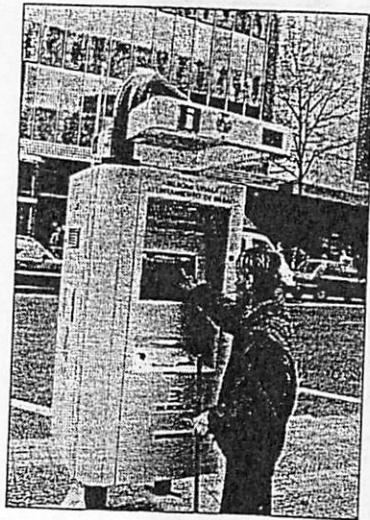


| | | |
|------|----------------------|----|
| 2155 | BILBO / BILBO | 12 |
| 2156 | ITIAL / ZARRAZA | 10 |
| 2157 | ESTOLAZA | 48 |
| 2158 | OTARRIOAGA | 12 |
| 2159 | LA PENA | 03 |
| 2160 | ATXURI | 03 |
| 2161 | PLISKIZ (B. J. P. N) | 12 |

#10 COE IIRVCO/BALIZTATU GABE 17H37

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As a PR effort, some trip planning kiosks are being provided

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63

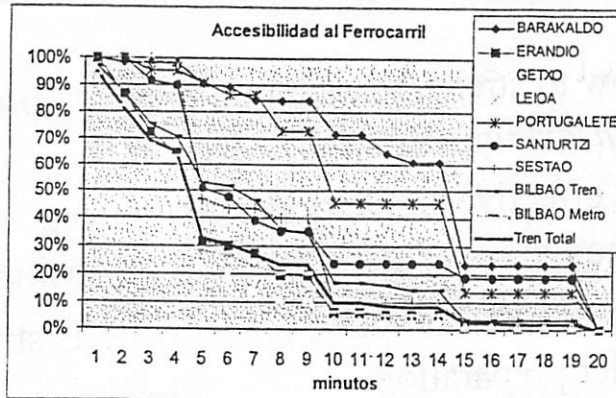
■ Some yearly figures: (million passengers)

- ◆ Metro: close to 50
- ◆ RENFE: 22
- ◆ EuskoTren: 8
- ◆ FEVE: 2
- ◆ BilboBus: 25
- ◆ BizkaiBus: 33

■ Roughly 450,000 daily trips or 20% of the total metropolitan mobility

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- Access time to rail stations:
 - ◆ RENFE vs Metro: Two different realities
 - ◆ Towards higher quality

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- Intermodality, a dangerous concept:
 - ◆ Several interchange facilities:
 - Abando: RENFE-Metro-FEVE-Buses-LRT
 - San Mamés: RENFE-Metro-LRT-Coaches
 - Bolueta: Metro-EuskoTren
 - ◆ ...But average trip below 20 minutes
- Two different languages being spoken:
 - ◆ LOS "E" for morning rush hour car traffic
 - ◆ 55 million passengers being "served" every year

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- How to strengthen the role of the *Transport Consortium*
- No effective single ticket system yet, although some steps have already been taken
- The official source of pre trip info is still under preparation

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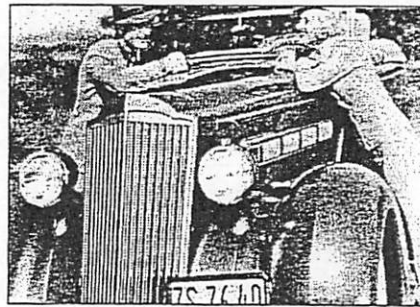


- The Automobile: A servant turned master?
- What have we accomplished?
- Public Spaces
- Intelligent Transport Systems
- A Process, not an End-State Plan

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69

- Yes, in Bilbao we are very proud of our new Metro and we love it.
- But we love even more our cars
- After all, our traffic congestion usually is not yet that bad



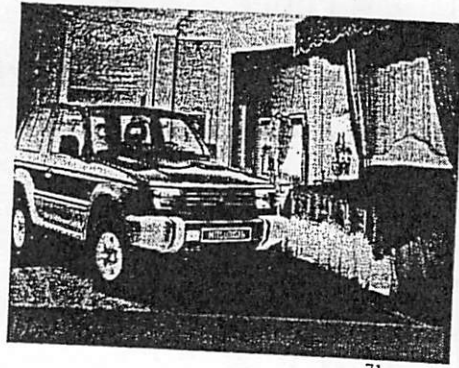
LEBERG

70

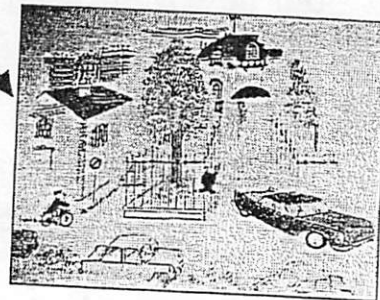
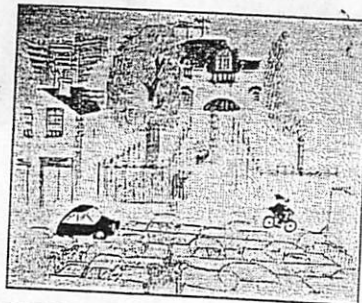
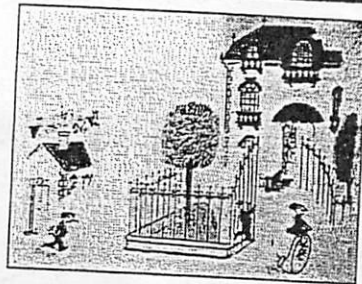
- In Europe too, we have suburban sprawl and a tendency to rely too much on the automobile



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71



By French cartoonist M.Sempé

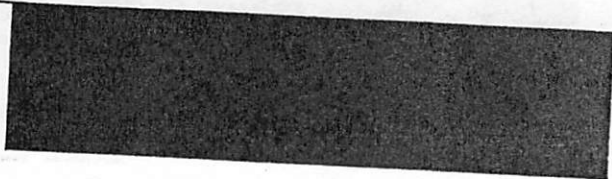
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72

- Every major transit project (as every road scheme) is announced as “the solution”
- Today is easier than ever to quickly produce results from any fancy planning package
- It is harder though to see the opportunities which open if the right process is engaged

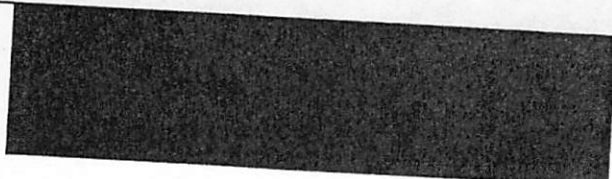
- We need different policy scenarios both:
 - ◆ For structural changes (e.g.: job to residence equilibrium)
 - ◆ For management options (e.g.: parking policy)
- Transit demand = **parking policy** plus **land use** activities (density, mixed uses...)
- The bus vs rail debate
- Separate estimates for choice and captive riders

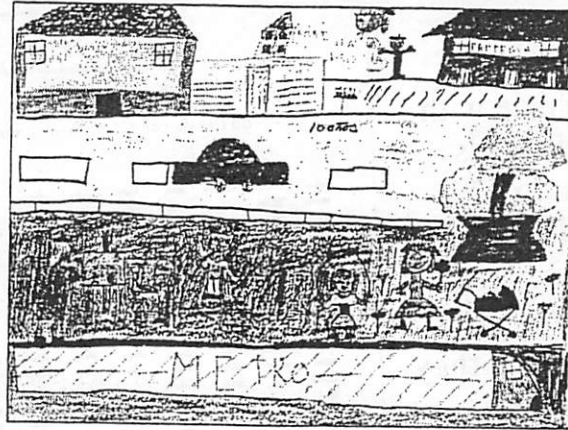




“It is wonderful when a calculation is made, how little the mind is actually employed in the discharge of any profession”

- Dr. Samuel Johnson

- 
- Today's metropolitan reality shows:
 - ◆ 772,000 automobile trips
 - ◆ 450,000 transit trips
 - ◆ 1,095,000 walk trips
 - ◆ 140,000 mixed trips or by other means
 - Those numbers mask important differences among towns
 - However we have (hopefully) initiated a new process of looking at the car-city nexus



We all had great expectations with the new Metro. Not only our children!

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77

- Hopefully, we have started a new process
- On the other hand, the Metro represents our only reliable future transport capacity
- Those who ride the system, do so (sometimes) in style
- As we feel somehow guilty, we are changing (slowly) a few things

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A transit vehicle with say **230 riders** is equivalent to **177 automobiles** with an occupancy ratio of 1.3 people per car... **provided they are all choice riders**



Un tranvía con 230 pasajeros equivale a



177 Turismos con un índice de ocupación de 1.3 Personas/Turismo

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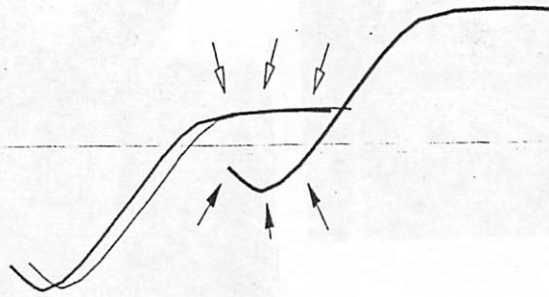
79

- The acid test on transit is to examine:
 - ◆ The % of patrons: captive vs choice riders
 - ◆ Total transit trips per capita
 - ◆ Transit share of the overall motorized mobility market
 - ◆ The growth of city traffic
 - ◆ Downtown parking supply vs number of jobs
 - ◆ The impact on the real estate and retail markets

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- As leaders with vision like former Strasbourg Mayor Ms Catherine Trautmann have pointed out, transit may become an excellent excuse to change our mental model regarding the car-city nexus



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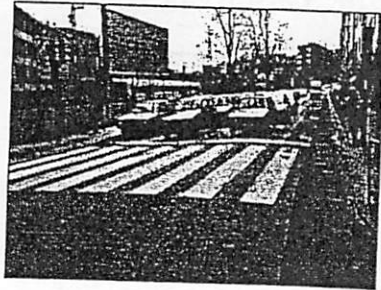


We always have at least two paths: (a) the obvious solution which fits our mindsets, and, (b) what observation of daily reality reveals

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Getxo led the way with some remarkable changes
around the Metro stations – *starting small*



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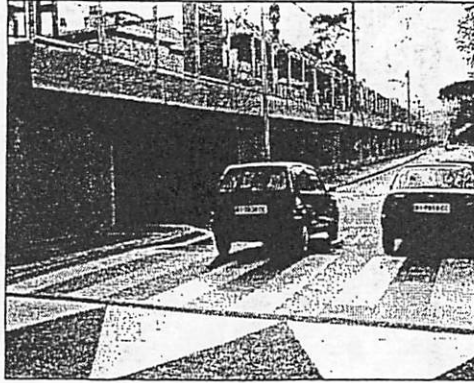
83

Before you stepped into traffic.
Today the traffic has been
detoured



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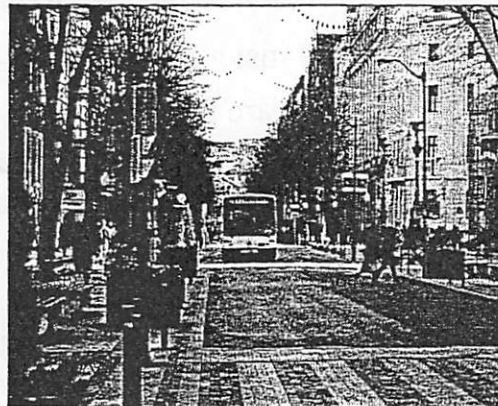
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Both the Metro passengers and the immediate vicinity have benefitted by traffic calming measures around stations

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Bilbao has now started a strong program in favor of public transport and pedestrian activity

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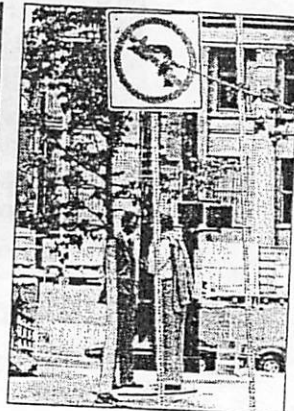


The new schemes go now beyond that Metro stations

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87

Why?? Because transport is just a mean to an end.
Because what we want really are **more livable places**



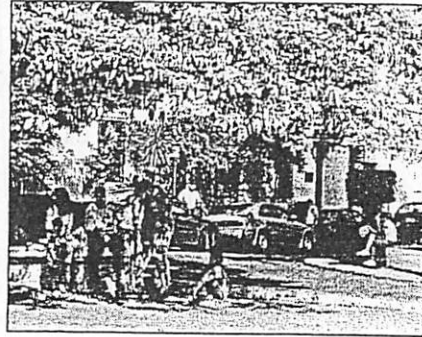
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88

We should be able to build upon what we already have



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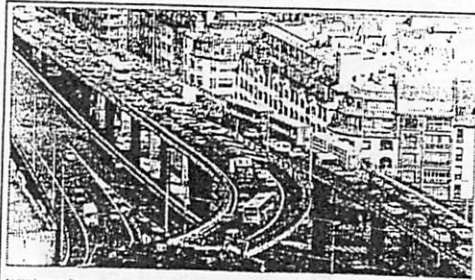
Today we still witness this in spite of our new Metro



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- Growing pressures on the road system, despite heavy investments in transit
- Need to have a global vision with indicators
- Time to adopt supply and demand management policies



La circulación en Estación Atravesada ha crecido mucho más rápido de lo que se esperaba, dice ayer Isaac Díaz.

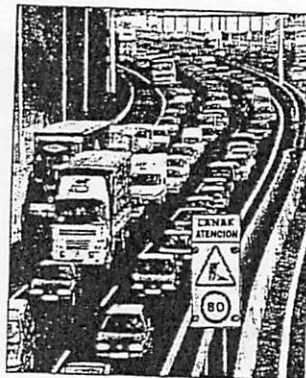
La Diputación hace una llamada desesperada para evitar el colapso total de la circulación

La bonanza económica origina el mayor aumento de tráfico de la década

PROBLEMA SIN PRECEDENTES
 La Diputación de Barcelona pide un presupuesto extraordinario a la Generalitat catalana para que intervenga a favor de la circulación. El problema es que el tráfico en la zona de la estación de Atravesada ha crecido mucho más rápido de lo que se esperaba, dice ayer Isaac Díaz.

Saturation on A-8 led us to suggest an 80 km/hr limit. Results?

- Accidents reduced 60%
- System Management as a New Credible Policy, instead of a "Predict and Provide" new road space



- Not against cars, but in favor of city life
- The automobile has to be curbed within urban centers to favor the majority who walks
- A committed will to protect, increase and improve the transit rail network
- A growing awareness that Intelligent Transport Systems may contribute to mitigate traffic problems and to create a global transport vision



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93

- The process does not aim to restrict the car per se, but to create new uses for that space

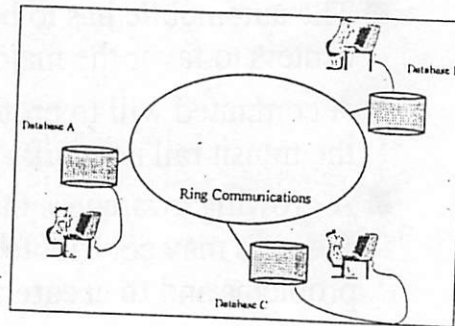


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94

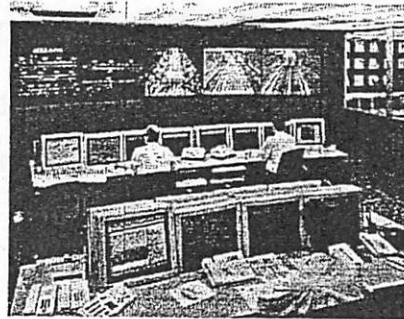
ITS serves 3 critical functions for the region:

- ◆ **Information**
- ◆ **Communications**
- ◆ **Integration**



- ITS tools easy to buy... but difficult to integrate
- They require organizational changes and new networking schemes
- Existing technological, political and jurisdictional barriers have to be addressed
- ITS itself has to be integrated into conventional planning

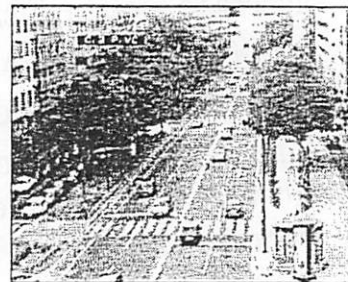
- Create a program of multi-modal indicators: i.e. common LOS across modes
- Integrate existing ITS subsystems
- Integrate ITS into conventional planning
- Disseminate real-time information as a first step towards demand management



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Working towards real-time information on traffic, on public transport, parking availability and on environmental indicators

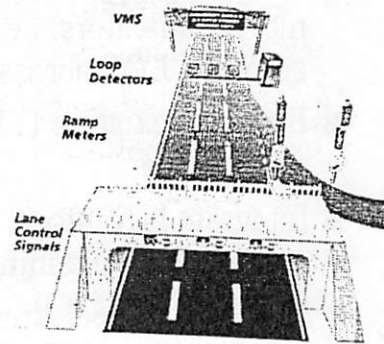


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98

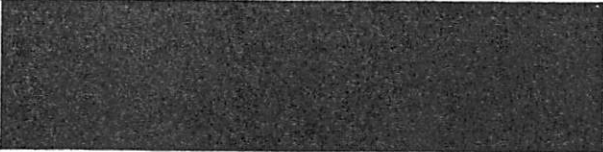
ITS is not only a technical issue but a new frame for:

- Voluntary cooperation
- Seeing the big picture
- Bringing others into the decision process
- Adopting necessary new policies



- 1.- The main issue is not transport, but the quality of the daily life of our citizens.
- 2.- Transport is not an end by itself, but just the means for access to work, education and other services
- 3.- All this leads us to focus attention on the protection of our historical patrimony: our cities and towns
- 4.- A major transit project is not by itself a magic bullet. However it may serve as an excellent excuse to improve city life and better serve the needs of their citizens ... including all types of public transport

- 
- 5.- A global observatory of overall mobility is essential to retain a proper perspective. This observatory should serve as a feedback mechanism, providing real time info on throughput and LOS across modes
 - 6.- Technology is never neutral (i.e. ITS deployment favoring either car navigation, or more sustainable modes, or even more balanced and competitive urban centers)
 - 7.- Planning is hard but starting the right process of change may be even harder, although far more effective
 - 8.- From a simple end-state plan towards a serendipitous process, full of surprises, but with clear end goals

- 
- “El estudiante es un ser humano ...a quién la vida impone la necesidad de estudiar las ciencias de las cuales él no ha sentido inmediata, auténtica necesidad”
 - “Enseñar no es ... sino enseñar la necesidad de una ciencia”
 - “En el mejor caso ... le gusta, le atrae, le parece bonita, le promete triunfos en la vida. Pero nada de esto tiene que ver con la necesidad auténtica que lleva a crear la ciencia”

- “El menestoroso 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”
- “Hombres (y mujeres) así son los que constantemente corrigen, renuevan, recrean la ciencia”

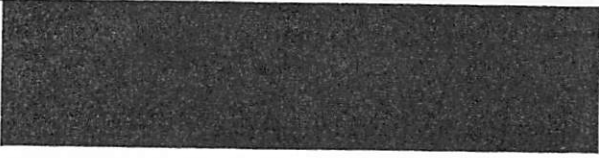
Sobre el estudiar y el estudiante (Primera lección de un curso)

Ortega y Gasset, 1933

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103





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