# Rethinking “sustainable” transportation as bike-bus modal integration


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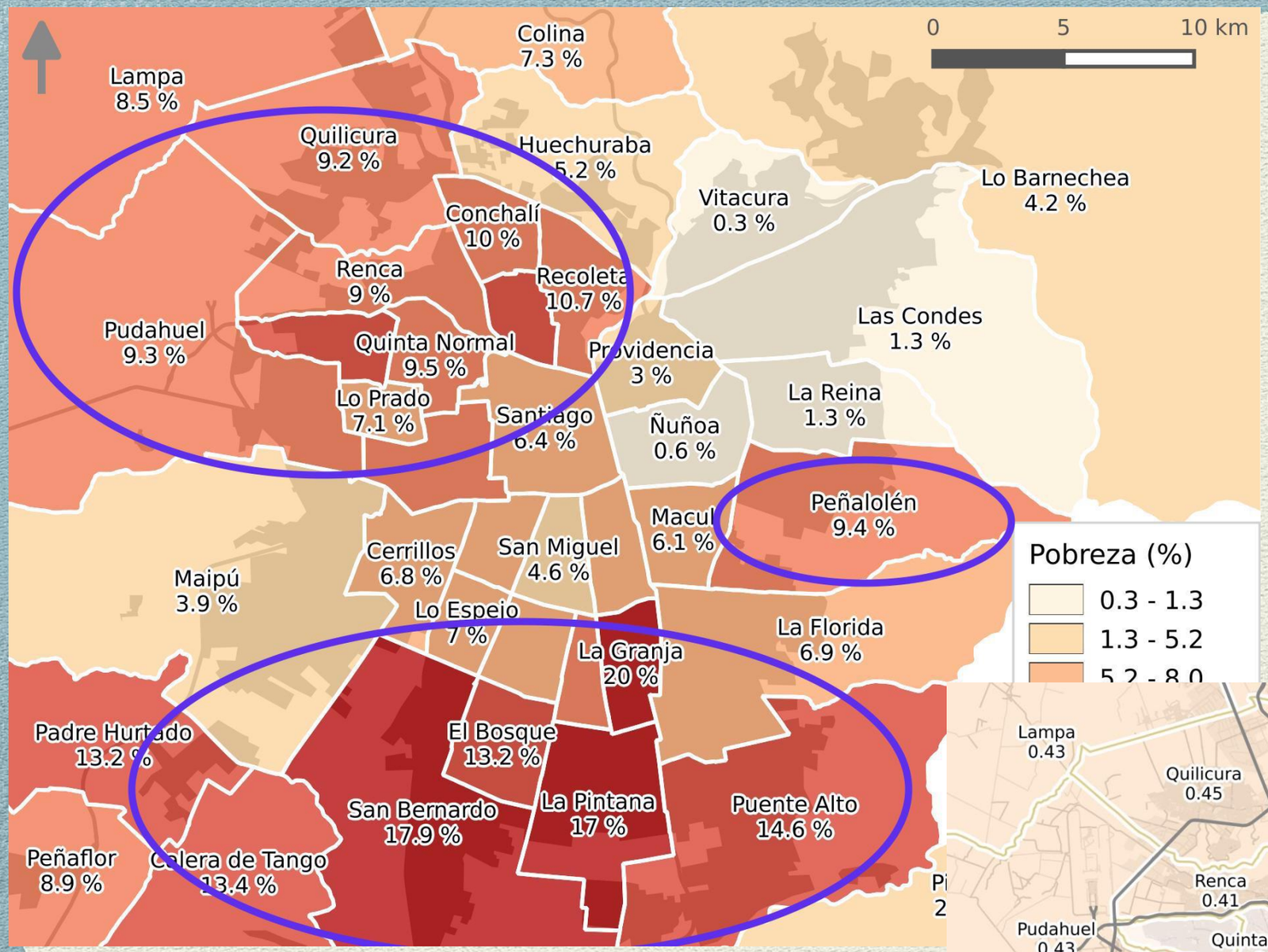
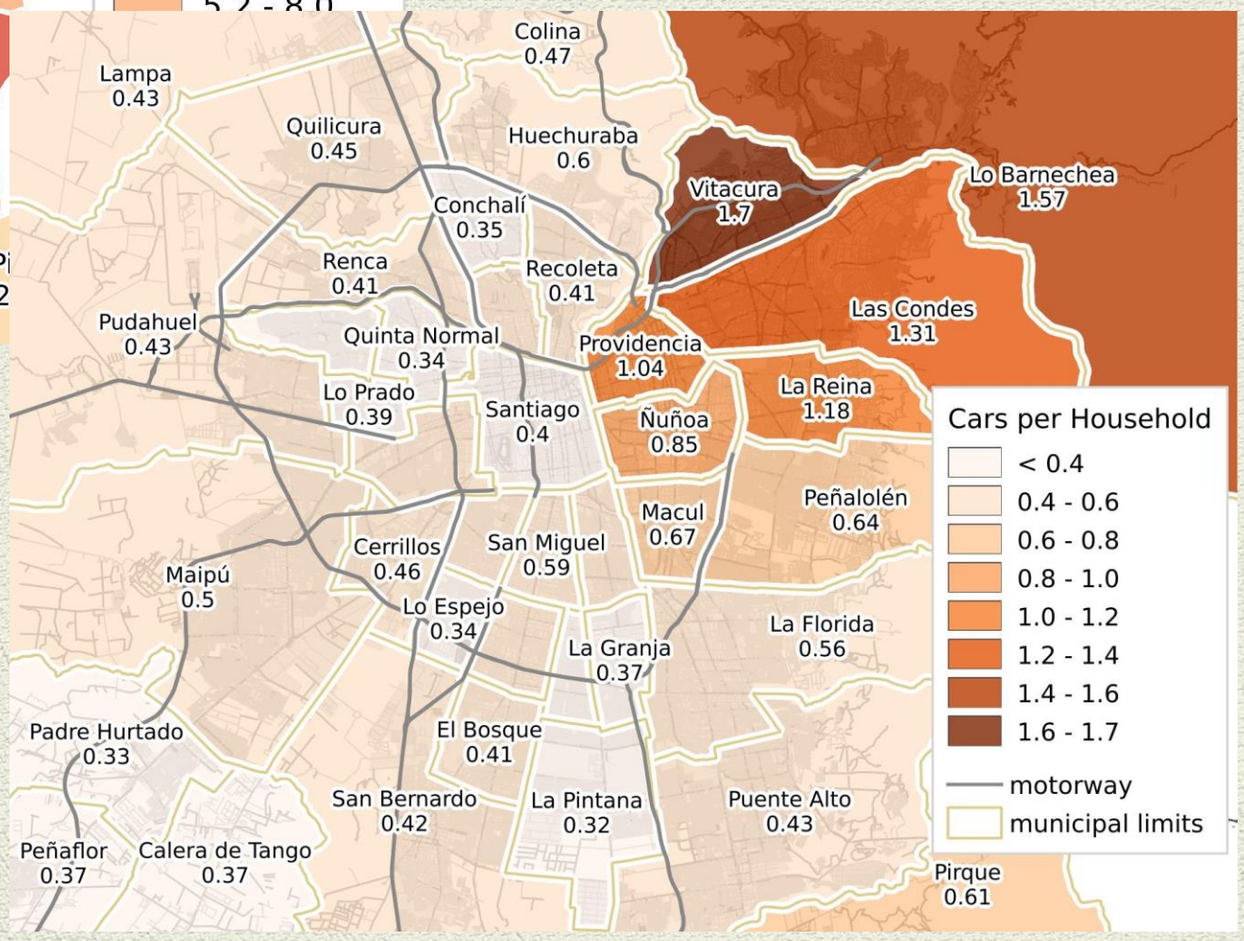
# International research/action collaboration, Chile-India-US

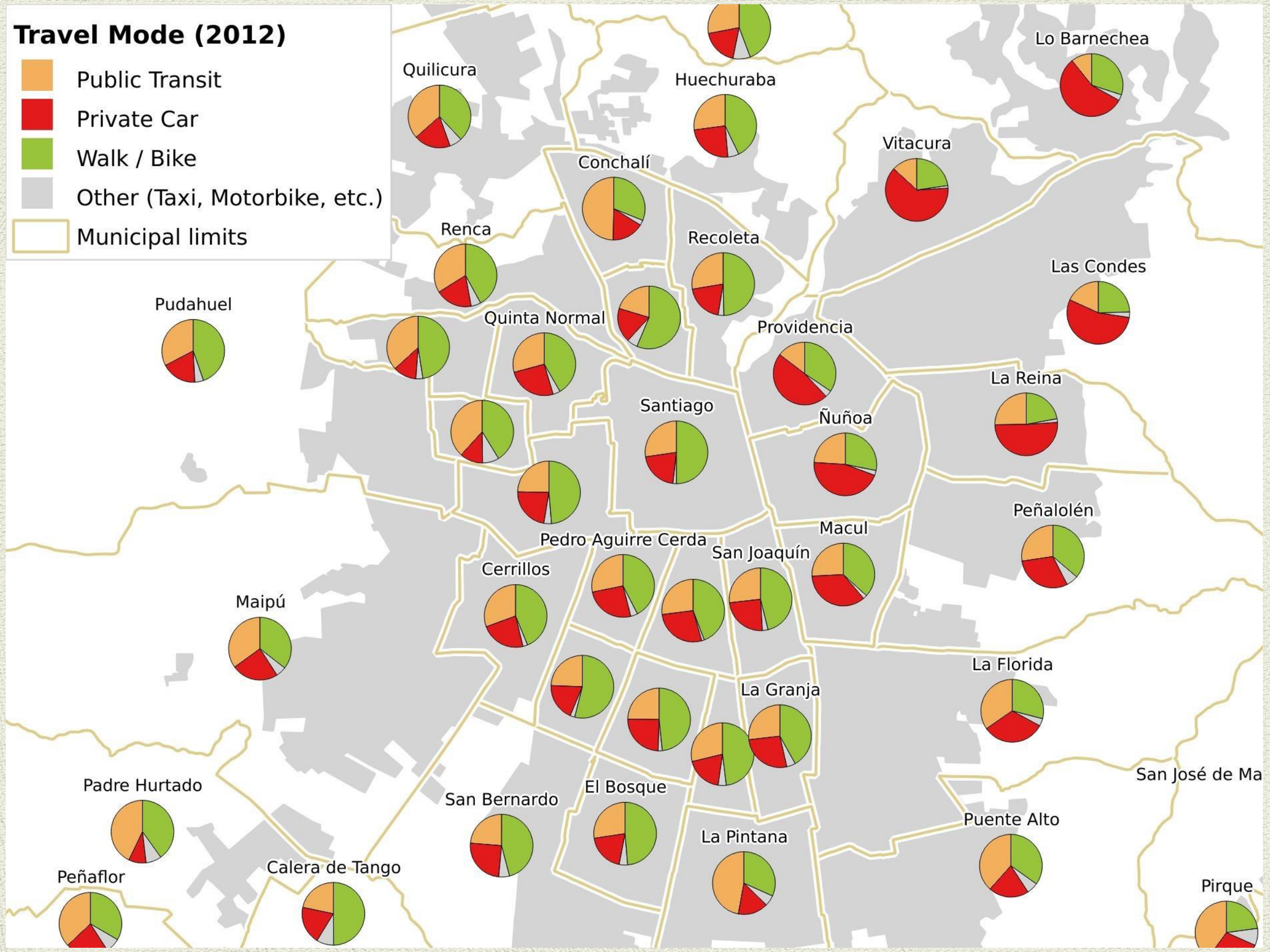
1. Reviewing and redefining "social" sustainability
2. Principles of "inter"modality and bike-bus focus: Santiago data to ground our thinking
3. Examples of research: a modal share tool for planning and participatory workshop to bring cyclists/bus drivers together
4. Final reflections

# 1. Reviewing and redefining “social” sustainability and transport

# Sustainable transport: majority modal share

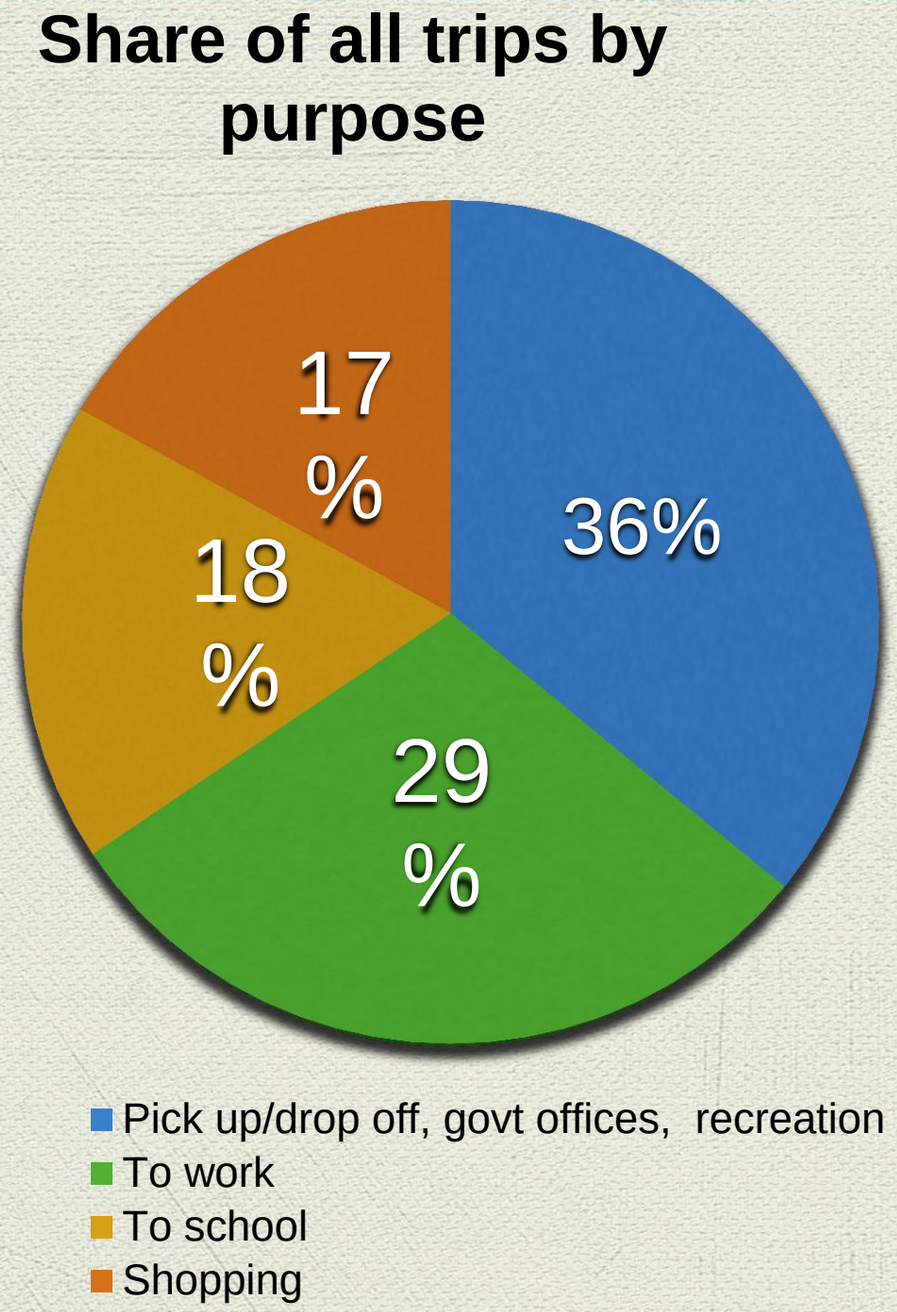

0
5
10 km
Colina
7.3 %
Lampa
8.5 %
Quilicura
9.2 %
Huechuraba
5.2 %
Vitacura
0.3 %
Lo Barnechea
4.2 %
Conchalí
10 %
Renca
9 %
Recoleta
10.7 %
Pudahuel
9.3 %
Quinta Normal
9.5 %
Providencia
3 %
Las Condes
1.3 %
Lo Prado
7.1 %
Santiago
6.4 %
Ñuñoa
0.6 %
La Reina
1.3 %
Peñalolén
9.4 %
Macul
6.1 %
Cerrillos
6.8 %
San Miguel
4.6 %
Maipú
3.9 %
Lo Espejo
7 %
La Florida
6.9 %
La Granja
20 %
Padre Hurtado
13.2 %
El Bosque
13.2 %
San Bernardo
17.9 %
La Pintana
17 %
Puente Alto
14.6 %
Peñaflor
8.9 %
Calera de Tango
13.4 %
Pi
2
Pobreza (%)
0.3 - 1.3
1.3 - 5.2
5.2 - 8.0


Colina
0.47
Lampa
0.43
Quilicura
0.45
Huechuraba
0.6
Vitacura
1.7
Lo Barnechea
1.57
Conchalí
0.35
Renca
0.41
Recoleta
0.41
Las Condes
1.31
Pudahuel
0.43
Quinta Normal
0.34
Providencia
1.04
La Reina
1.18
Lo Prado
0.39
Santiago
0.4
Ñuñoa
0.85
Peñalolén
0.64
Macul
0.67
Cerrillos
0.46
San Miguel
0.59
Maipú
0.5
Lo Espejo
0.34
La Florida
0.56
La Granja
0.37
Padre Hurtado
0.33
El Bosque
0.41
San Bernardo
0.42
La Pintana
0.32
Puente Alto
0.43
Peñaflor
0.37
Calera de Tango
0.37
Pirque
0.61
Cars per Household
< 0.4
0.4 - 0.6
0.6 - 0.8
0.8 - 1.0
1.0 - 1.2
1.2 - 1.4
1.4 - 1.6
1.6 - 1.7
motorway
municipal limits


Travel Mode (2012)
Public Transit
Private Car
Walk / Bike
Other (Taxi, Motorbike, etc.)
Municipal limits
Quilicura
Huechuraba
Lo Barnechea
Vitacura
Conchalí
Renca
Recoleta
Las Condes
Pudahuel
Quinta Normal
Providencia
La Reina
Santiago
Ñuñoa
Peñalolén
Macul
Pedro Aguirre Cerda
San Joaquín
Cerrillos
Maipú
La Florida
La Granja
San José de Ma
Padre Hurtado
El Bosque
San Bernardo
La Pintana
Puente Alto
Peñaflor
Calera de Tango
Pirque

# Non-work trips majority

- Only 40% of households have cars (as many as five); signs that may have reached “peak” car
- Walking and cycling more important than averages indicate
- Gender differences highly apparent



# Roads as social spaces

# Automobility
## (Beckmann 2001, Urry 2004)


- An industry and a financial product
- A culture and a way of life
- A globalization based on cheap energy and unbridled consumption (by a tiny minority at the expense of the majority)
- A potent symbol inciting competition beyond ethical and moral limits,
- The result of 50 years of intense propaganda (like the cigarrette), ie there is nothing “natural” or “inevitable” about it.

# Inequality on roads and sid

**Inequality on roads and sidewalks**

| | |
|---|---|
| B | |
| Ar | |
| Sao | |
| New Yo | |
| Delhi | |
| Copenhagen | |
| London (UK) | |
| Toronto | 42 |
| Chicago | 12 |

26%

nte:
.cl/Indicadores_de_Movilidad/Indicadores/viajes_modo.html (27-III-2013)

# High price of building only for cars

- **45%** of car trips less than 5km
- **4,000** premature deaths every year due to air pollution (Cifuentes).
- After 30 years, only 40% of households have car, signs it is peaking

# Number 1 **killer** of **children and youth** (Comisión Nacional de Seguridad de Tránsito)

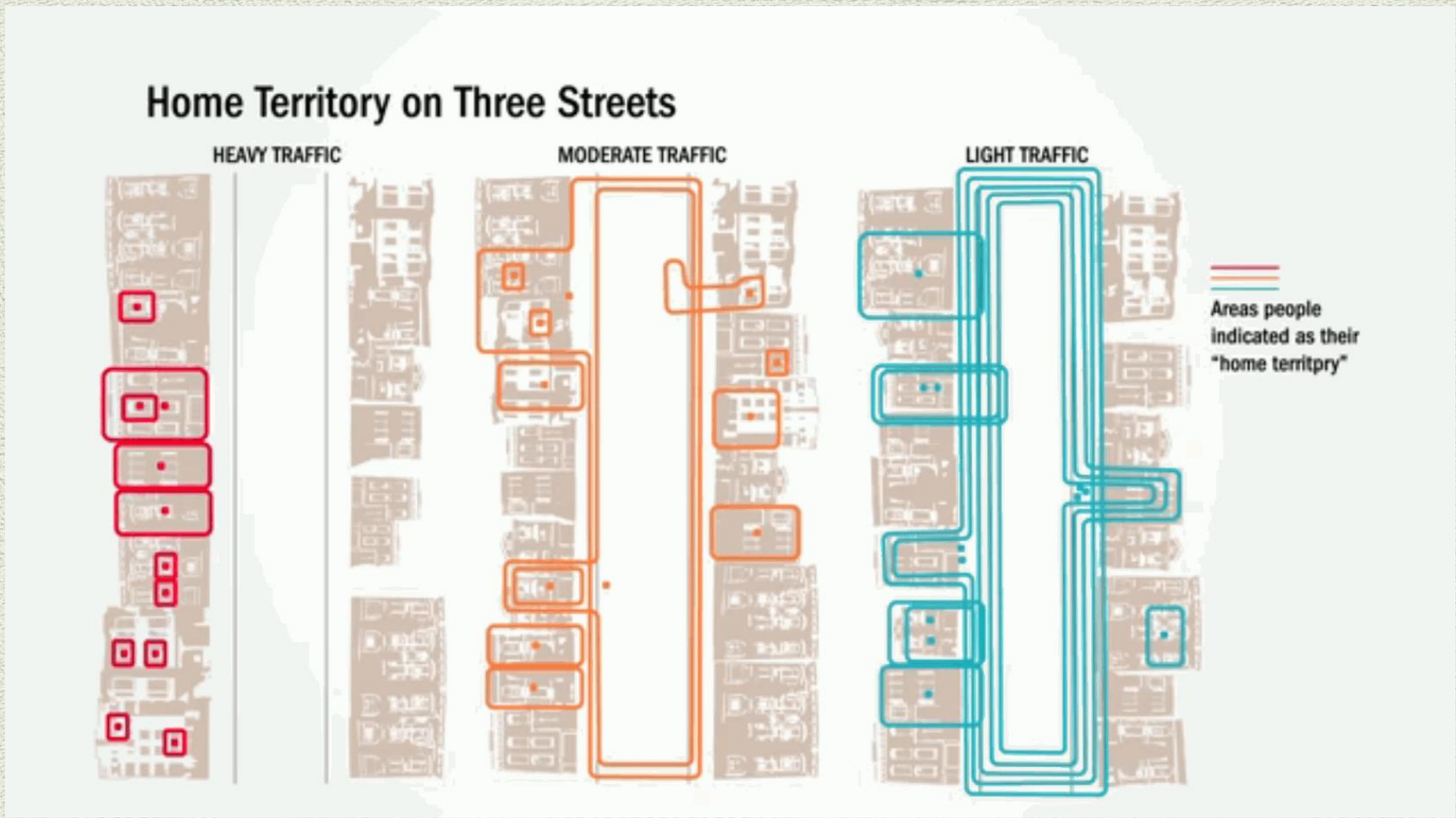
# Makes us more vulnerable to climate change and roller coaster fossil fuel prices

2nd storey highway, México DF

vs. Roads as **multi**-purpose, nourishing socially **essential, public and civic** places

# “Livable” Streets

## Appleyard, San Francisco, 1970,1981




**Mientras menos automóviles pasan por tu calle, más personas conocerás, más relaciones sociales tendrás, más lugares para jugar, interactuar, ser feliz...**

# the street as **public space**

## Green space

**Optimo:**
**40 m2/capita**

**Mínimo internacional (WHO):**
9m2/cap.

Berlín: 60.0 m2/cap.
Curitiba: 51.0 m2/cap.
Córdoba: 9.6 m2/cap.
Madrid:7.0 m2/cap.
**Santiago: 3.2 m2/cap.**
Sao Paulo: 2.7 m2/cap.

## Streets

**% of urban territory**

**“Developed”**

- New York, 22%
- London, 23%
- Tokyo, 24%
- Paris, 25%.

**“Developing”**

- Shanghai, 7.5%
- Bangkok, 11.4%
- Delhi, 21%
- Sao Paulo, 21%.

(Vasconcellos, 2001)

# **Social** spaces (Health, work, happiness)

Japanese fair and Metro station, Sao Paulo

# Street fairs that bring services within walking and cycling distance

Festivals and street fairs, in Buenos Aires, Santiago and Sao Paulo

# Livability (creativity, income, environmental **services**)

Art


Recycling


Service

# where we learn **citizenship**

Santiago, The community proposes improving Barrio Bellavista's main street, Santiago 2003. Inaugurated 2008.

# practice **human and civic rights**...

Four different

Delhi, March 2012

# Key “social” sustainability elements

| | Component/Key words |
|---|---|
| 1 | **Community cohesion**, community-based, take local cultures seriously, people in all their ***diversity*** as actors and agents |
| 2 | **Work, equity, quality of life:** social/environmental justice, from mobility to *access*, integration of poor and vulnerable, employment, income, housing/land use; informal sector impacts |
| 3 | **Participation, governance and rights:** institutions that guarantee social and political rights, nourish grassroots campaigning, individual and community participation, empowerment, justice. |
| 4 | **Health**: Human embodiment of most environmental issues. Active city, road safety, walkability and cycle-inclusion. |
| 5 | **Planning goals**: Air quality, water quality, noise-free; traffic safety; Transit metropolis (transit-land use nexus); overcome excessive dependency on cars); walkability; cycle-inclusion; transport mode choice as pleasure (more than derived demand). |
| 6 | **City & transport planning strategies**: Liveability (quality of life); Change to sustain; backcasting; City as eco-system: balance consumption, waste, renewal; Improve quality of life within carrying capacity; from multimodality to intermodality |
| 7 | **Transport planning tools**: (Re)Education; transit metropolis; smart growth; active city; walkability; cycle inclusion increased transport choice; complete streets; road diet; BRT/LRT/Metro; walk-bus (PT)-bike integration; roads as social: car-free days and zones |

*Source: Own elaboration based on literature discussed. “Civic values” reflects collective values to be reinforced or developed socially; “health” includes mental, physical and social elements; “efficiency” focuses primarily on making the transport system itself function better; “work”, employment, income and other dimensions; “ecology”, the balances sought between resources,*

# 2. Principles of “inter”modality and bike-bus focus

# “Intermodality”

- ***Multimodality***: The presence of different transport modes, usually with little or no coordination among them.
- ***Intermodality***: A focus on the seamless integration of diverse modes, considered socially, environmentally and economically sustainable.

- Not only work-related, but other kinds of trip purpose

- Not only “average” (male) user, but the outliers, girls and women, from 8-80 years

- Diverse modes, each with own “niche”, a combination of purpose, capacity, price, and **distance**

# Distance, density and trip purpose

central

Many people /m2

More people /m2

Few people /m2


outskirts/rural

0 km

5 km

10-15 km

Medium and high densities
+ short trips (0-10 km), walking and cycling (bicitaxis, bikeshare, tricycles)

+ Medium trips (5-15 km), BRT-Metro
Low density, long distances, Private car

KEY

- Walk
- Cycle
- Public transport
- Car

# Relocate daily services within walking and cycling distances

| KEY |
| --- |
| Walk |
| Cycle |
| Public transport |
| Car |

CARS-CARSHARE-AUTO-RICKSHAW: longer, lower density trips, (peri-urban, rural)

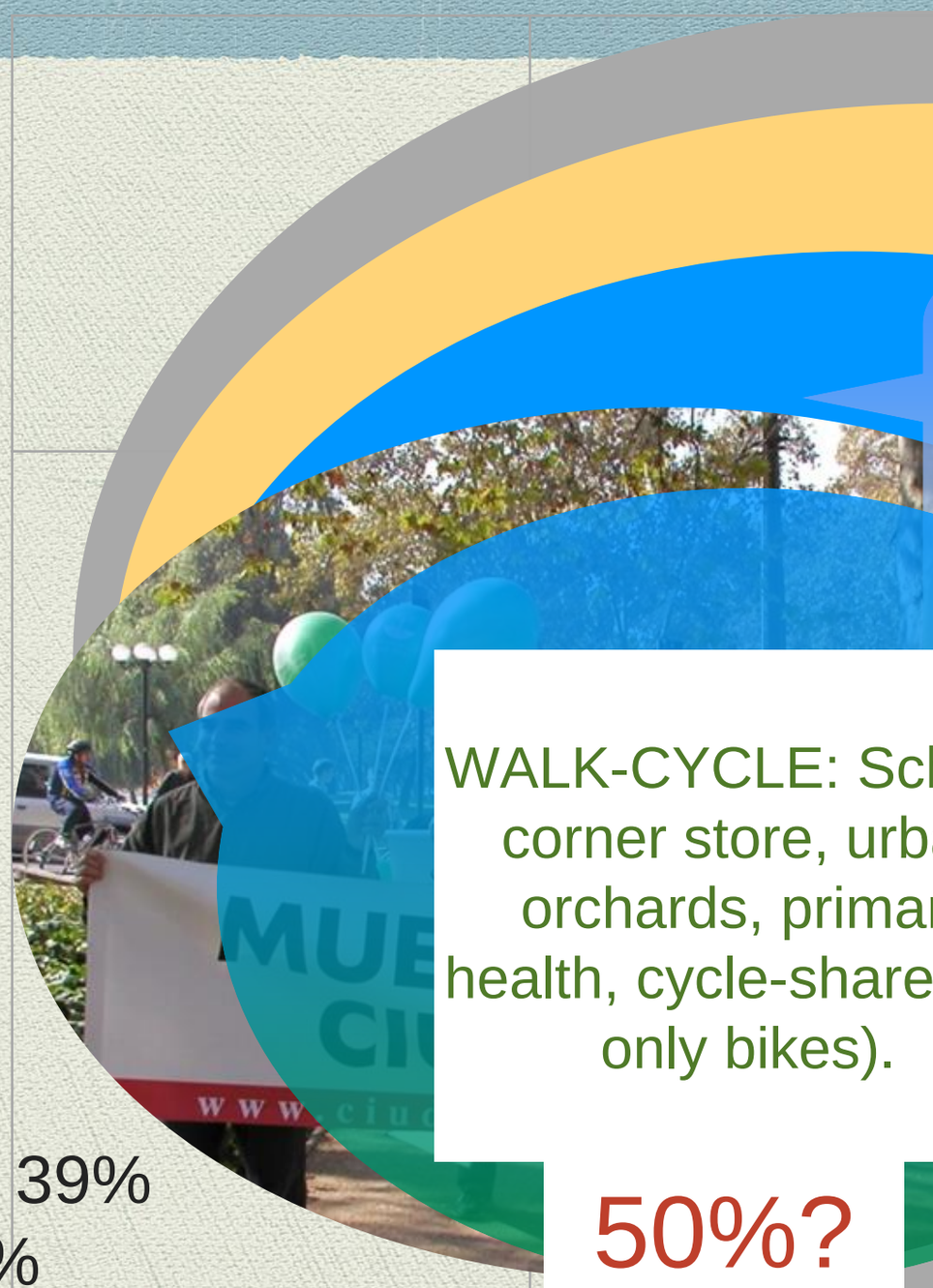
10%?

CYCLE-BUS-METRO: University, work, main needs, higher density

40%?

WALK-CYCLE: School, corner store, urban orchards, primary health, cycle-share (not only bikes).

50%?



ALREADY
Walk (35%); +
Cycles (4%) = 39%
Bus-Metro 26%
Car 26%

% Trips

90%

# Forms of intermodal bike-bus integration

| | Main Measures | Examples |
|---|---|---|
| **1** | Bike parking at train and bus stops | Bogotá, Munich, Amsterdam |
| **2** | Bike racks on buses | Mainly North American cities |
| **3** | Bikes on rail cars | Common in Europe, off-peak US |
| **4** | Bike rentals | The Netherlands, tourism |
| **5** | Public bike rentals | Netherlands, Germany, Copenhagen |
| **6** | Bikesharing, some fare-integration | Paris, Santiago, Barcelona, etc. |
| **7** | Bike routes connecting to public transport stations/stops | Netherlands, Germany, Denmark |
| **9** | Shared bus-bike-tram lanes | France, Belgium, Germany, UK |
| **10** | Cycle Taxis/Rickshaws | India |
| | *Source: Godefrooij et al., 2009; Pucher and Buehler 2012; observations in diverse cities; presentations Velo-City conferences (2012 Vancouver, 2015 Nantes).* | |

# Complementary measures

| Main Measures | Examples |
|---|---|
| Mapping, promotional and other information | Diverse agencies, and particularly citizens' organizations |
| Bike Stations | Run by city (Toronto) or by citizens' group (San Francisco), offering parking, repairs and other services, at key transport nodes. |
| Smart phone applications | India (rickshaws) |
| Inclusive business models | Social business, small business, cooperatives, etc. |

# Target: no motorized trips under 5 km

| Implications |
| --- |
| Spatial planning: 5 km blocks, connected with public transit grid |
| More space available for reforestation, vegetations, edibles: environmental services and resilience |
| Diverse cycles, including electro-assisted, tricycles, taxis, key |
| “Sustainable” speeds and pace: reduce deaths and disabilities, improve overall efficiency with more constant, lower speeds |

# Bike-bus for door-to-door

- Reduce empty or low-volume trips
- Improve service
- More efficient use of space, fuel, etc.
- Clean, safe, user-friendly

## 3. Examples of research on intermodality

## (a) a planning tool for modal share targets

## (b) participatory workshop to bring cyclists/bus drivers together

## (c) ongoing global collaboration to develop conceptual aspects: eg. Santiago

# A. Planning tool: analysis

Number of trips in particular modal categories that could be reasonably expected to shift given the normative distance-based hierarchy

# Distances and times

**TABLE 1.** Optimal distances and times for walking and cycling as standalone and public transport access modes.

| m | Walk (minutes) | | | Cycle (minutes) | | |
|---|---|---|---|---|---|---|
| | Easy (4.5 km/h) | Moderate (5 km/h) | Fast (5.5 km/h) | Easy (15 km/h) | Moderate (19 km/h) | Fast (24 km/hr) |
| 400 | 5.3 | 4.8 | 4.4 | 1.6 | 1.3 | 1.0 |
| 800 | 11 | 9.6 | 8.7 | 3.2 | 2.5 | 2.0 |
| 1200 | 16 | 14 | 13 | 4.8 | 3.8 | 3.0 |
| 2000 | 27 | 24 | 22 | 8.0 | 6.3 | 5.0 |
| 3000 | 40 | 36 | 33 | 12 | 9.5 | 7.5 |
| 4000 | 53 | 48 | 44 | 16 | 13 | 10 |
| 5000 | 67 | 60 | 55 | 20 | 16 | 13 |
| 8000 | 107 | 96 | 87 | 32 | 25 | 20 |
| 10000 | 133 | 120 | 109 | 40 | 32 | 25 |

Note: green = reasonable time for travel to access public transport; yellow = standalone single-mode travel or cycle service trip (bike taxi, bike share, etc.); orange = best served by combination with motorized modes.

Sources: Moderate walking speed taken as the average in TCRP (2003, p. 3-9) and range from Knoblauch, Pietrucha, and Nitzburg (1996). Cycling speeds from Gould and Karner (2009).

# Thresholds: criteria for establishing desirable modal shift targets

- Shift motorized trips under 8 km: most people can cover in less than 30 minutes on a bicycle/tricycle/cycle-taxi.
- Trips 0 to 2 km: shift to walking
- Trips 2 to 8 km: shift to cycle, cycle taxi, bike share, bike-bus combination.

# Comparison in two contrasting contexts: Bay Area and Metropolitan Santiago

**TABLE 2.** Comparison of demographic and travel characteristics in the two study areas.

| | San Francisco Bay Area[a] | Santiago, Chile[b] |
|---|---|---|
| Population | 7,140,325 | 6,651,735 |
| Households | 2,577,694 | 2,051,309 |
| Persons per household | 2.77 | 3.24 |
| Workers | 3,222,589 | 2,982,559 |
| Median Household income (2010 USD) | $75,000 – $99,999 | $9,800 |
| Mean vehicles per household | 1.91 | 0.566 |
| Mean bicycles per household | 1.75 | 2.35 |
| Total trips | 30,372,468 | 18,461,113 |
| Trips per household | 11.78 | 9.00 |

[a]Source: California Department of Transportation (2013).
[b]Source: SECTRA and Universidad Alberto Hurtado (2014).

# Mode share (%) and mean distance (km) per trip

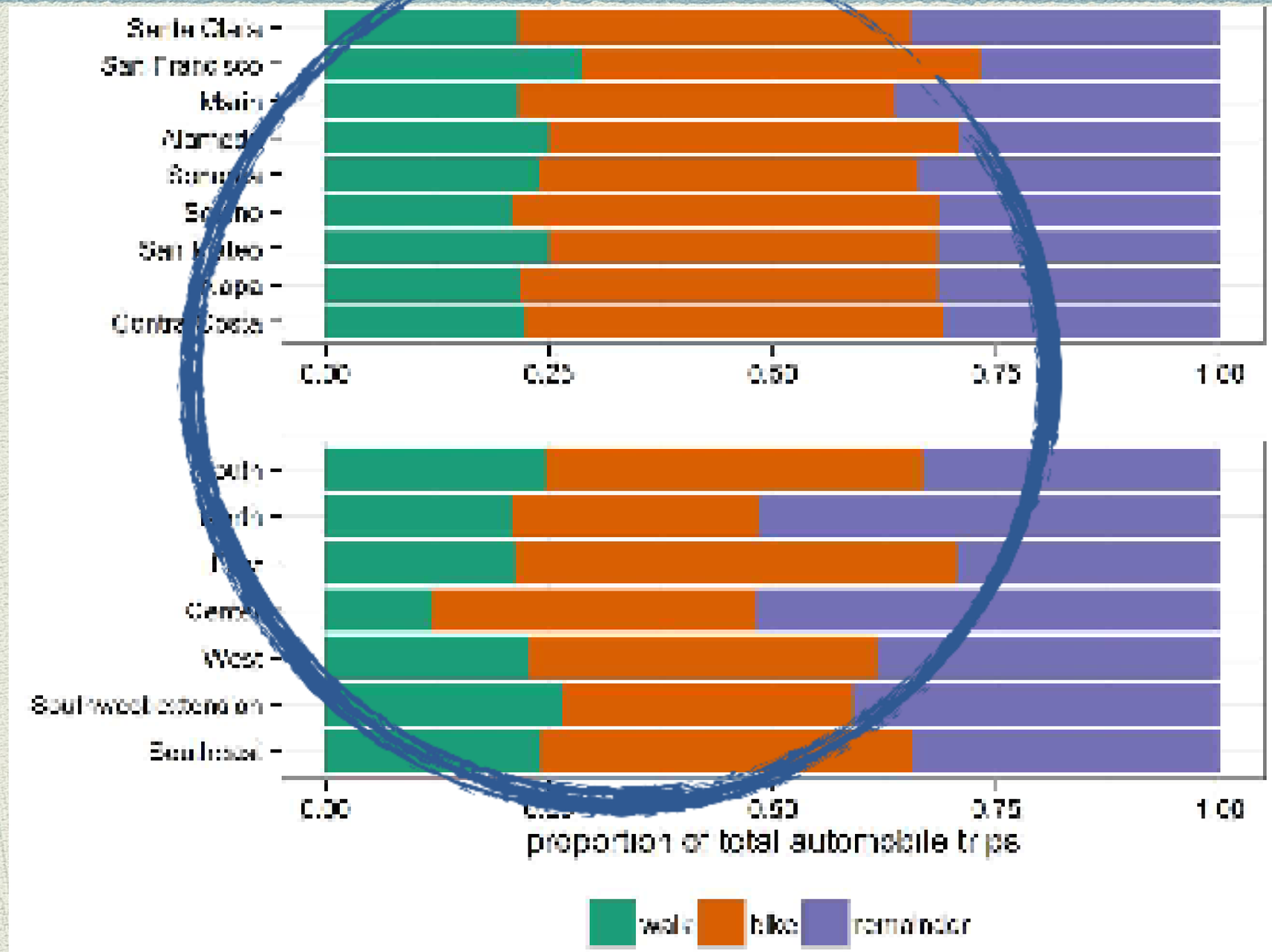
*San Francisco Bay Area*

| county | Auto | | Walk | | Bike | | Public | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| Solano | 92.7% | 15.2 | 4.6% | 0.868 | 0.6% | 4.03 | 0.7% | 21.88 | 1.3% | 27.81 |
| Sonoma | [illegible] | [illegible] | 8.8% | 0.784 | 1.7% | 3.18 | 0.9% | 13.45 | 0.6% | 18.40 |
| Napa | 83.7% | 10.1 | 10.7% | 0.817 | 1.4% | 3.12 | 3.5% | 19.78 | 0.8% | 12.23 |
| Santa Clara | 82.5% | 12.4 | 14.7% | 0.656 | 0.5% | 2.75 | 0.6% | 9.42 | 1.8% | 24.82 |
| Contra Costa | 82.2% | 11.3 | 12.3% | 0.614 | 1.8% | 3.43 | 3.0% | 13.77 | 0.7% | 12.49 |
| Marin | 80.7% | 10.1 | 11.9% | 0.684 | 3.1% | 3.04 | 3.4% | 17.58 | 1.0% | 19.34 |
| San Mateo | 79.3% | 9.8 | 13.7% | 0.749 | 1.8% | 3.11 | 4.2% | 17.34 | 1.0% | 16.05 |
| Alameda | 68.5% | 9.4 | 21.5% | 0.648 | 2.1% | 2.86 | 7.0% | 15.49 | 0.8% | 9.78 |
| San Francisco | [illegible] | 10.3 | [illegible] | 0.490 | [illegible] | 2.53 | [illegible] | 9.90 | 1.8% | 8.81 |
| Region | 71.5% | 10.[illegible] | 19.3% | 0.6[illegible] | 2.1% | 2.[illegible] | 6.0% | 13.72 | [illegible]1% | 14.13 |

*Santiago Metropolitan R[illegible]*

| sector | Auto | | Walk | | Bike | | Public | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| East | 43.7% | 7.32 | 22.1% | 0.562 | 4.4% | 2.69 | 24.4% | 11.74 | 5.3% | 6.77 |
| South-East | [illegible] | [illegible] | 32.6% | 0.432 | 3.1% | 1.94 | 31.9% | 10.22 | 6.8% | 5.12 |
| West | 20.4% | 8.30 | 39.9% | 0.390 | 3.6% | 1.93 | 29.0% | 9.95 | 7.1% | 5.15 |
| South | 19.8% | 7.47 | 43.9% | 0.386 | 3.8% | 1.92 | 25.1% | 10.22 | 7.4% | 5.52 |
| North | 19.3% | 11.07 | 38.4% | 0.407 | [illegible] | 2.29 | 30.0% | 11.15 | 7.0% | 6.26 |
| South-West Extension | 17.9% | 13.10 | 34.0% | 0.50[illegible] | 8.5% | 2.07 | 30.5% | 15.65 | 9.1% | 11.70 |
| Central | [illegible] | 10.27 | [illegible] | 0.632 | [illegible] | [illegible] | [illegible] | [illegible]47 | 4.4% | 7.82 |
| Region | 25.6% | 8.6[illegible] | 34.4% | 0.4[illegible] | 4.0% | 2.[illegible] | 29.4% | 11.08 | [illegible]5% | 6.78 |

# Potential modal shift targets: % of trips




Well over half and up to 75% of car trips in the Bay area (above) and Metro Santiago (below) more suited to walking and cycling

# Potential for modal shift targets

**TABLE 4.** Mode shift targets in the San Francisco Bay Area and Santiago de Chile.

| | Current mode share (%) | Share of trips (%) | | | Target modal share (2020) |
|---|---|---|---|---|---|
| | | < 2 km | 2 – 8 km | > 8 km | |
| *San Francisco Bay Area* | | | | | |
| Automobile | 71.5 | 23.4 | 44.8 | 31.7 | 12.9 |
| Walking | 19.3 | 96.3 | 3.7 | 0.03 | 37.7 |
| Bike | 2.1 | 47.7 | 46.8 | 5.5 | 36.7 |
| Public transit | 6.0 | 16.0 | 39.8 | 44.2 | 12.9 |
| *Santiago Metropolitan Region* | | | | | |
| Automobile | 25.6 | 21.6 | 42.0 | 36.2 | 13.3 |
| Walking | 34.4 | 95.8 | 3.8 | 0.39 | 46.6 |
| Bike | 4.0 | 62.8 | 32.4 | 4.8 | 26.7 |
| Public transit | 29.4 | 8.9 | 39.3 | 51.7 | 13.3 |

Source: Data from California Department of Transportation (2013) and SECTRA and Universidad Alberto Hurtado (2014). Estimates of potential for modal shift described in text.

# Additional planning possibilities

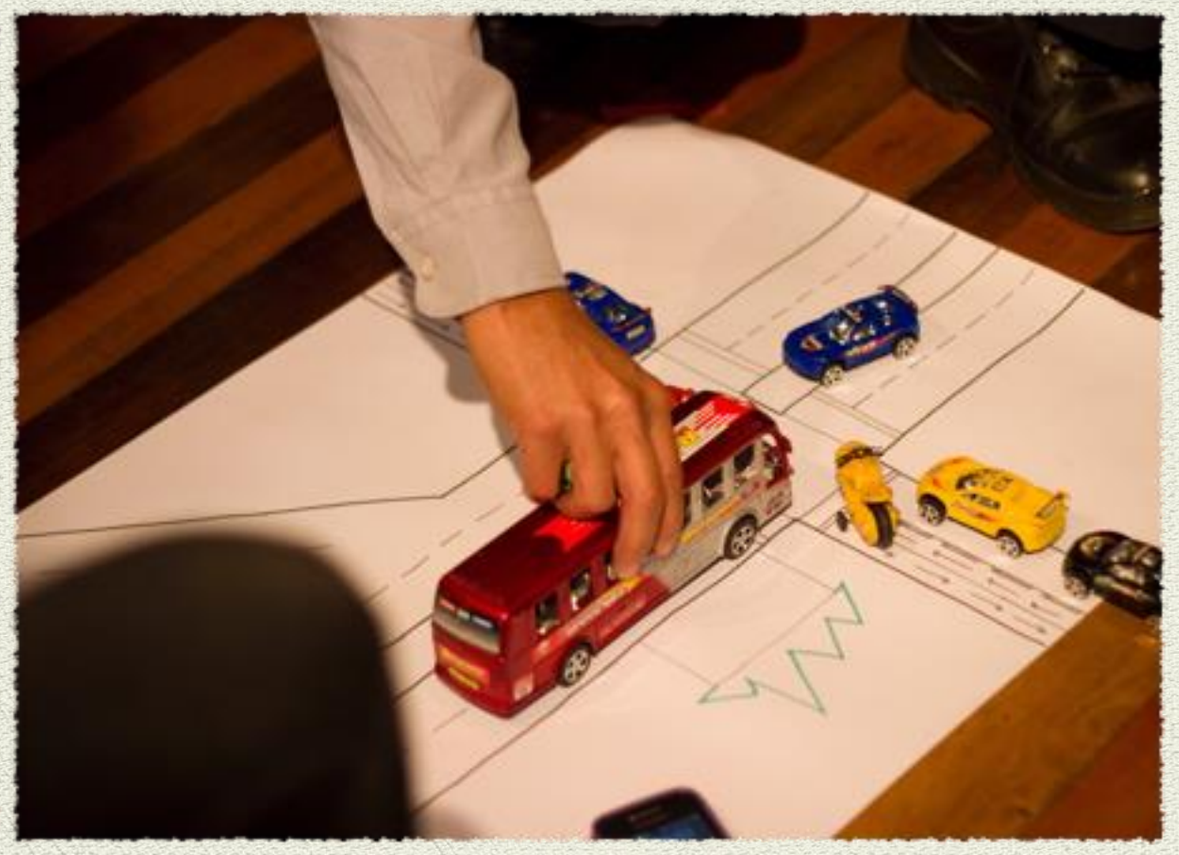
| Table 6 Modal shift targets for Santiago, Chile | | | *Think about* | |
|---|---|---|---|---|
| **Component/Recommendation** | **Current mode share %** | **Target mode share %** | **% of road space** | **Space saved for other sustainability uses, e.g.** |
| Walking | 34.4 | 46.6 | | Shade/reforestation |
| Public transport | 29.4 | 13.3 | | Water absorption, storage |
| Private vehicle | 25.6 | 13.3 | | Urban food cultivation |
| Cycling | 4 | 26.7 | | Local composting of organic waste |

*Source: Table 4, Karner and Sagaris 2016.*

# B. Participation for Action

Bring bus drivers and diverse cyclists together to create guidelines for sharing the road


FLXP 13



# Guidelines (25,000), basis for training module, potential for health program

HACIA UNA CIUDAD
MÁS AMABLE Y
MÁS HUMANA

Laboratorio de Cambio Social
Cambiarnos.cl

## Guía convivencia Bici-Bus

Desde el Laboratorio de Cambio Social, creado por el departamento de Ingeniería de Transporte PUC, Ciudad Viva, CEDEUS y el Centro de Excelencia Bus Rapid Transit (PUC), con el apoyo de ACTUS (Asociación de Concesionarios de Transporte Urbano de Superficie) y un panel de ciclistas y conductores del Transantiago, nos propusimos mejorar la convivencia Bici-Bus en el espacio vial.

Desde esa mirada entendemos que tanto ciclistas como usuarios de buses somos ciudadanos sustentables que contribuimos a crear una sociedad más activa, que no contaminamos con ruido ni emisiones y que descongestionamos las calles, lo que se traduce en beneficios acumulativos para todos los habitantes de la ciudad.

**¿Cómo lograr que estos beneficios se realicen, y pasen a ser una realidad para todos?**

*Ponerse en el sillín del otro fue el gran desafío con Ciclistas y Conductores del Transantiago donde intercambiaron roles para identificar las áreas de poca visibilidad que tiene el conductor de bus y permitir que los ciclistas tomen precauciones al respecto.*



## Guía convivencia Bici-Bus

### Recomendaciones:

**1. La seguridad del ciclista depende de ser VISIBLE Y PREDECIBLE.** Busca contacto visual con el conductor, directamente o por el espejo -que ellos revisan cada cinco segundos- y señala siempre con tus brazos antes de realizar cualquier cambio de dirección.

**2.** Los buses, especialmente los articulados, poseen varios puntos ciegos al frente, atrás y a ambos costados del vehículo. Por eso, antes de realizar cualquier cambio de dirección cerca de un bus, lo mejor es asumir que el conductor del bus no te ha visto. (Ver figura n°1)

**3.** El punto de mayor peligro: Evita adelantar a un bus por su **lado derecho** (según el sentido de tránsito) ya que el punto ciego de ese lado es inevitable para el conductor. Además, podrías atropellar a peatones que suben o bajan en el paradero. (Ver figura n°2)

**4.** Cuando el bus señala viaje a la derecha, **no te pegues a su cola para adelantar por la izquierda,** ya que su "cola" se abrirá hacia la izquierda y te puede golpear. Quédate detrás del bus hasta que éste termine de doblar. (Ver figura n°3).

**5.** En las luces rojas, sitúate varios metros delante del bus, evitando quedar dentro de su zona ciega, y si el bus está primero, prefiere quedarte detrás ya que el acelerará más rápido al momento de la luz verde. (Ver imagen n°1)

**6.** Si un bus se acerca por tu lado, resiste la tendencia de acercarte a la vereda ya que ello te hace aún menos visible (ver cómo la zona ciega "se abre" del costado del bus).

FIGURA N°1
ÁREAS CIEGAS DE UN BUS. Fuente: SFMTA Municipal Transportation Agency (http://www.sfmta.com/node/98621)

*Figura n°2*
*Modo correcto e incorrecto para adelantar a un bus. Flecha celeste: Área ciega de mayor magnitud y peligro para un ciclista, debe evitar. Flecha verde: modo correcto en que un ciclista debe adelantar a un bus. Flecha roja: conducta de riesgo. Fuente imagen: SFMTA (Municipal Transportation Agency*

*Figura n°3*
*Accidente común. En rojo: Ciclista quiere adelantar a un bus por la derecha estando justamente en el área ciega de ese bus que está virando. Flecha verde: distancia prudente para adelantar a un bus cuando vira, considerando la "cola" del bus que se abre. Fuente: SFMTA Municipal Transportation Agency*

*Imagen n°1:*
*Área ciega frente al bus señalada por un triángulo rojo.*
*El ciclista o peatón solo será visto de cuerpo completo si pasa varios metros frente al bus. Mientras más se acerque al paradero, es menos visible a los ojos del conductor, pudiendo desaparecer completamente de su vista.*



### Consejos para ciclistas:

- Siempre dejar una **distancia "prudente"** entre tú y un bus.
- Busca una **forma amistosa de comunicarte** con los conductores, recomendamos ocupar la seña de paz ("V") como base, haciendo un gesto hacia adelante para adelantar, hacia la izquierda para virar, hacia abajo si te vas a detener, etc.
- **No ingreses a los corredores de buses** (vías separadas) con tu bicicleta. En general los corredores del Transantiago son muy angostos y los buses andan a altas velocidades (60KM). Que una bicicleta ingrese a estas pistas exclusivas de buses es peligroso tanto para bicicleta como para el bus (José Navarro, Conductor y Capacitador Subus Chile).
- **Aprende a andar seguro, señalizando**, mirando atrás antes de cambiar de dirección, comunicándote visualmente con los otros usuarios de la calle.
- **Usa luces de noche y sé cortés a toda hora.** En la convivencia vial, la cortesía salva vidas.

### Consejos para conductores de buses

- Siempre dejar una distancia prudente entre tú y un ciclista: de 1,5 a 2 metros mínimo, ya que las bicicletas con ciclista y carga son más anchas de lo que se cree. Ten siempre en mente la fragilidad de la bicicleta ya que su única carrocería es su propio cuerpo. (José Navarro, Conductor y Capacitador Subus Chile)
- Busca la forma de comunicarse con ciclistas, con los ojos y las manos.
- Acercándote a una intersección, revisa alrededor de los mascos de los parabrisas.
- Realiza virajes lentamente, estando preparado para frenar si es necesario.
- Si vas a tomar pasajeros, evita encerrar al ciclista entre el bus y la vereda, esperando unos segundos para que pase adelante.

**LO MÁS IMPORTANTE:**

La seguridad pasa por que todos seamos más cuidadosos y respetuosos de los otros usuarios de las vías.

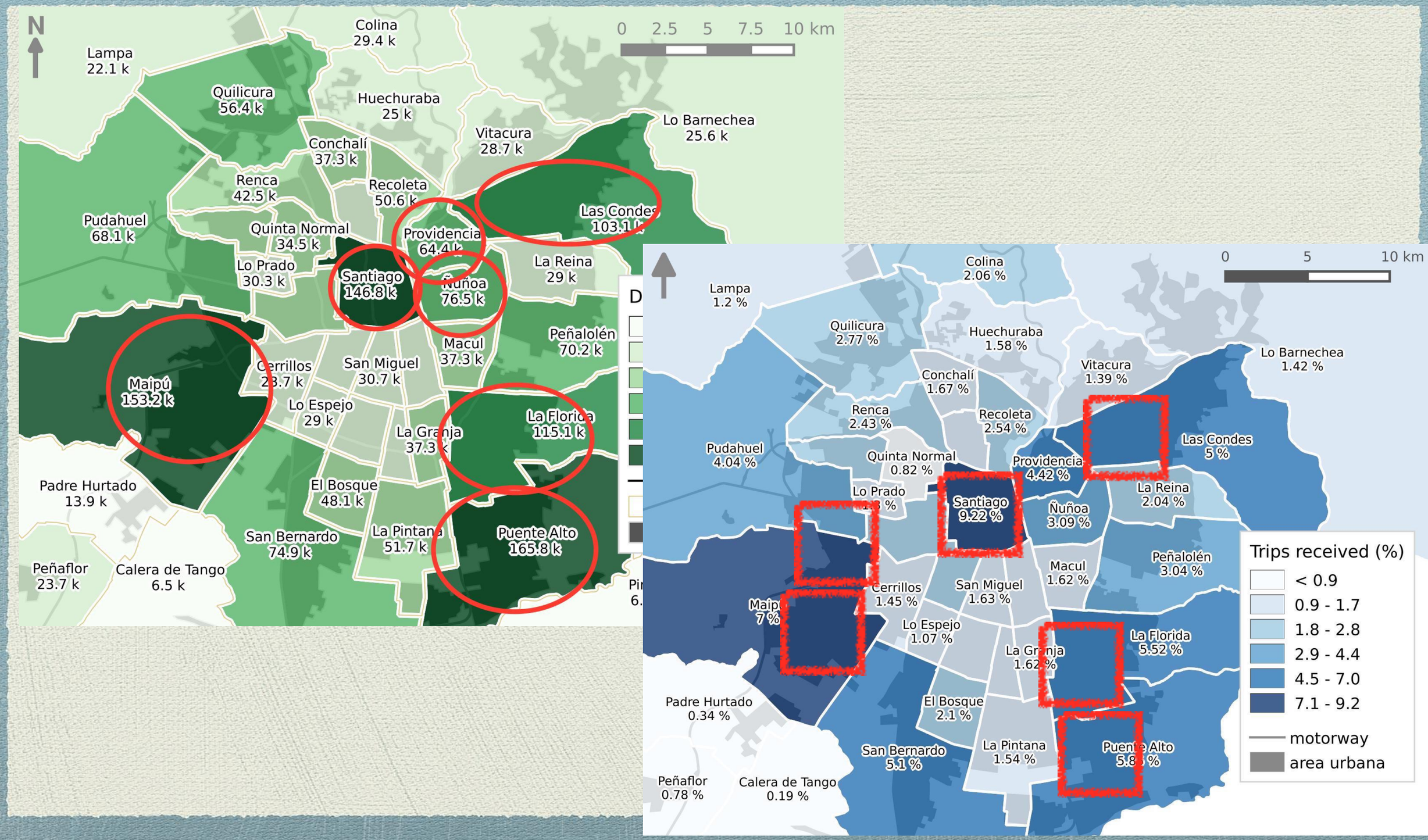
La idea es alcanzar una mejor calidad de vida y más sustentable.

# BikeRacks on Buses (experiment)

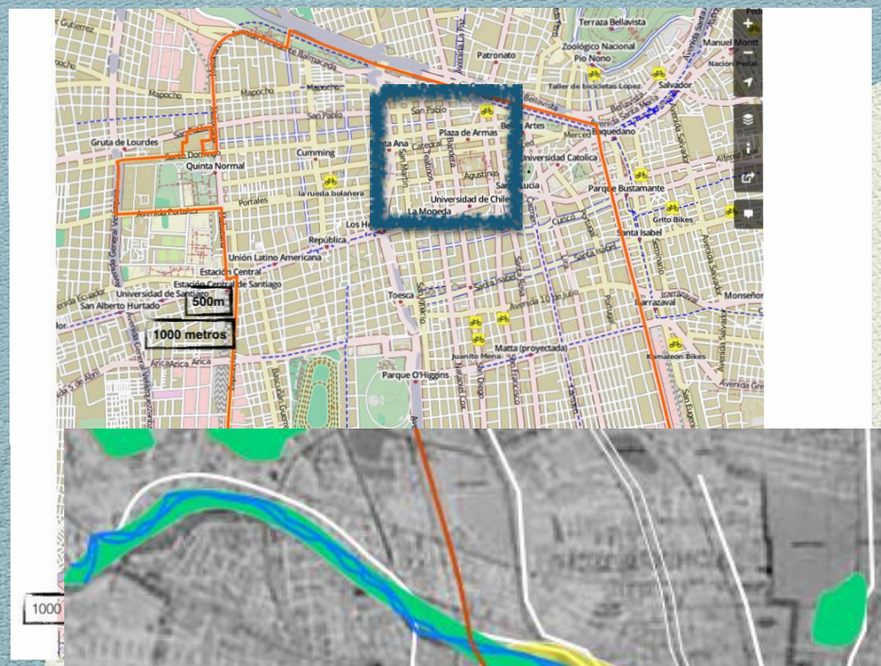
# C. Rethinking the city

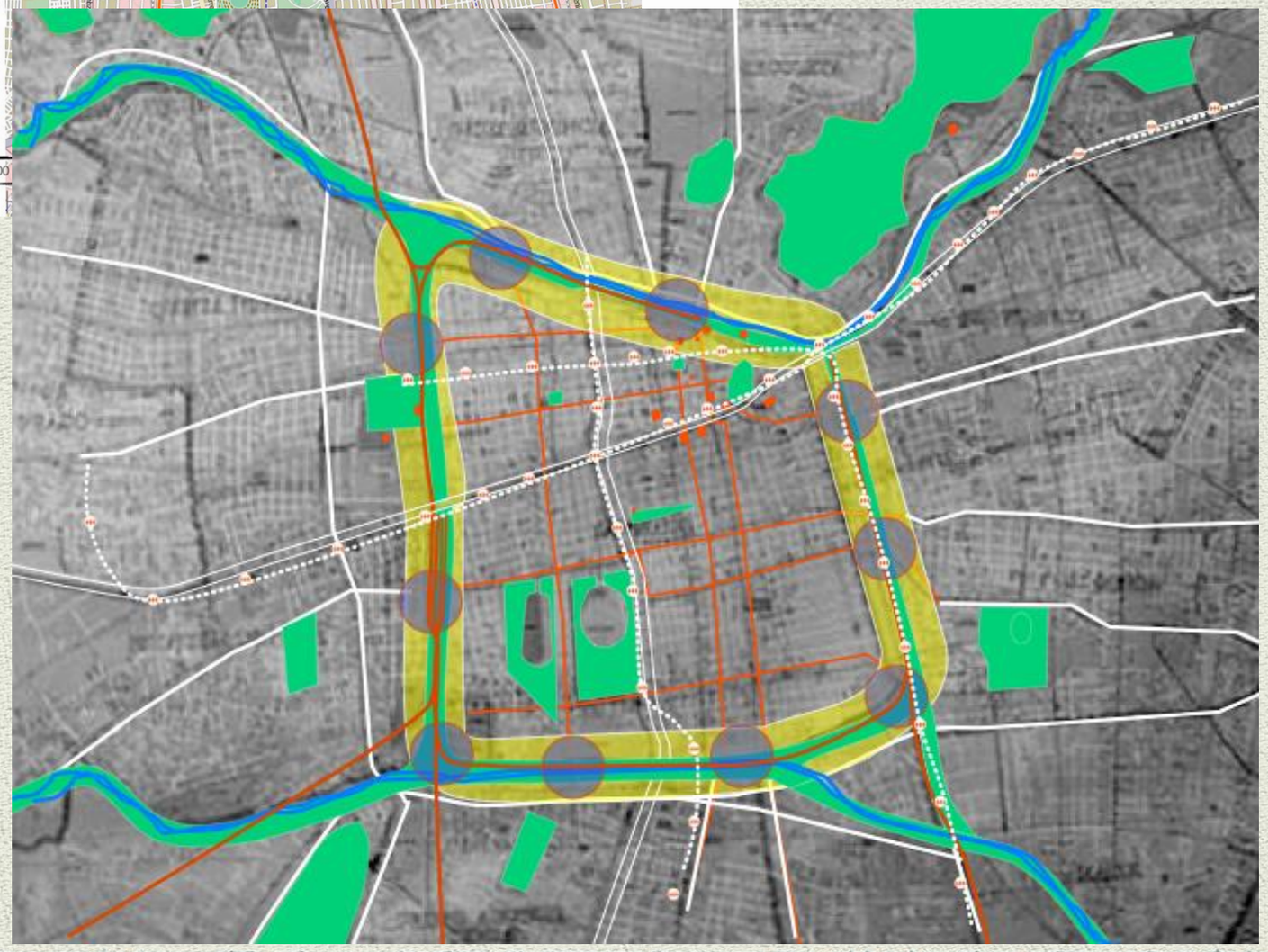
What if we started to plan car-free “patches”, stitched together with first-rate public transport?

# Santiago in general



# Santiago's Inner Ring



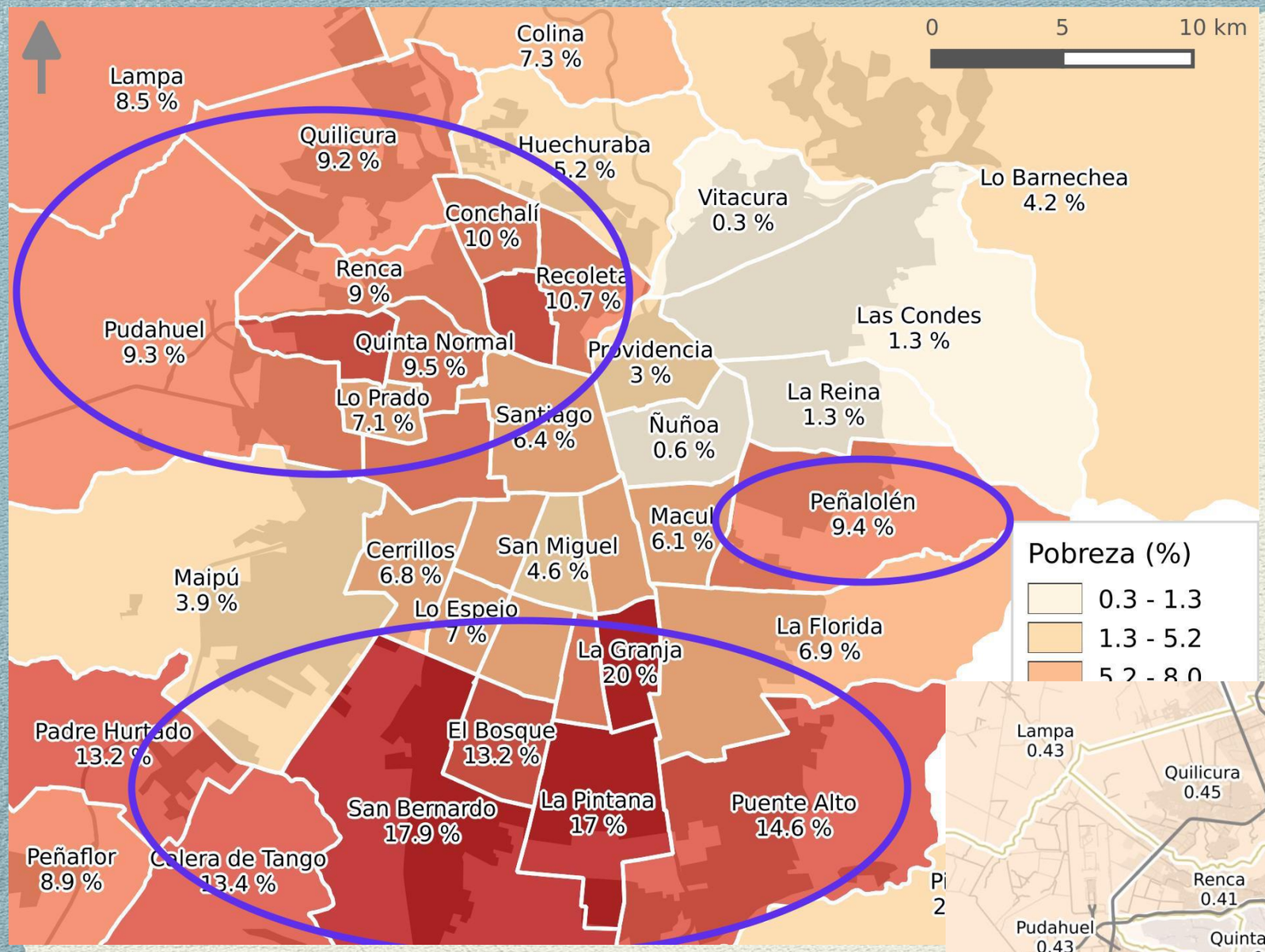



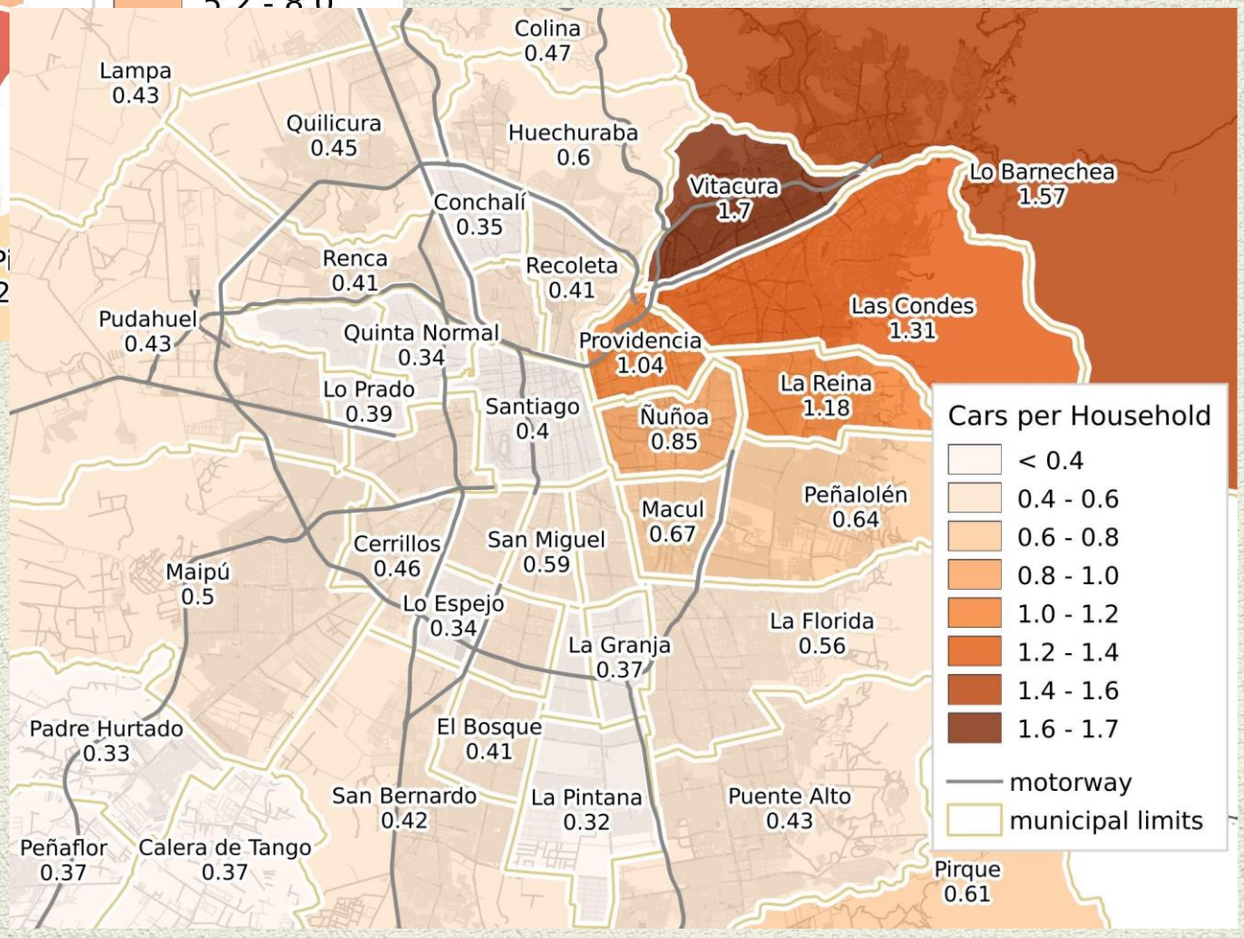
- 5 x 5 km aprox. Traditional heritage (original city)
- Government and other services (16 comunas)
- Bike share, cycle taxis, public taxi, within ring.

# Responds to challenges of social (including political) sustainability

| | Component/Key words | Status |
|---|---|---|
| 1 | **Community** cohesion, people in all their ***diversity*** as actors and agents | Yes |
| 2 | **Work, equity, quality of life:** social/environmental justice, from mobility to *access* | Yes |
| 3 | **Participation, governance and rights:** institutions that guarantee social and political rights, nourish grassroots campaigning, individual and community participation | Requires work |
| 4 | **Health**: Active city, road safety, walkability and cycle-inclusion. | Yes |
| 5 | **Planning goals**: Air quality, water quality, noise-free; traffic safety; Transit metropolis (transit-land use nexus); overcome excessive dependency on cars); walkability; cycle-inclusion; transport mode choice as pleasure (more than derived demand). | Contributes to current planning, requires more |
| 6 | **City & transport planning strategies**: Liveability (quality of life); Change to sustain; backcasting; City as eco-system: from multimodality to intermodality | |
| 7 | **Transport planning tools**: (Re)Education; transit metropolis; smart growth; active city; walkability; cycle inclusion increased transport choice; complete streets | |

# 4. Final reflections




# Inequality: segregation reflects **discrimination**

# Gender *strategic* to understand and challenge social/spatial injustice

Discrimination hard to examine, given enormous variety of socio-cultural realities /specifics in each place.

Focusing on women suggests a suitable proxy: exist everywhere and belong to all sectors. Have an enormous impact on values, Banister's "moral capital".

If we can get transport systems right for women and girls, we have probably achieved a lot for the elderly, the poor, persons with disabilities, the marginalized and youth.

# Ongoing research agenda

- ***Implications for*** bus/public transport ***operations***, eg. spacing of stops

- ***Opportunities*** for smartphone applications and small business development

- Implications for ***costs of retrofitting cities*** for sustainability (mostly reassigns existing infrastructure)

- ***Paths to sustainability***: feasible steps to help shift from today's behaviour to tomorrow's

# Across Latitudes and Cultures
# Bus Rapid Transit Centre of Excellence

- Headquarters: Dept of Transport Engineering and Logistics, ***Pontificia Universidad Católica de Chile***
- Instituto Superior Técnico, ***Lisbon Technical University***
- Institute of Transport and Logistics Studies, ***University of Sydney***
- ***Massachusetts Institute of Technology***
- ***EMBARQ Network,*** World Resources Institute Centre for Sustainable Transport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# Research-participation-action

Cambiarnos.cl
Laboratorio de Cambio Social

## Laboratory for Social Change

A space for research in the community, *with the community,* led by Transport Engineering (PUC) and Living City, which brings together leaders and partners working in the Living Laboratory of real cities. With support from the Center for Sustainable Urban Development (Cedeus) and the Across Latittudes and Cultures, Center for BRT Excellence

**www.cambiarnos.cl**

# Gracias

BUS RAPID TRANSIT
ACROSS LATITUDES AND CULTURES

Ciudad Viva
Participar es crecer juntos

Pontificia Universidad Católica de Chile

CEDEUS
Centro de Desarrollo Urbano Sustentable

CONICYT
Ministerio de Educación
Gobierno de Chile

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