



WRI MÉXICO  
— ROSS CENTER

# INNOVACIONES Y TENDENCIAS EN SISTEMAS DE BICICLETAS COMPARTIDAS

Revisión preliminar de la investigación de casos de estudios globales

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A product of WRI Ross Center for Sustainable Cities

# MISSION

Move human society to live in ways that protect Earth's environment and its capacity to provide for the needs and aspirations of current and future generations.



# OUR APPROACH

We measure our success through real change on the ground.  
Our approach involves three essential steps:

**1.Count It** We conduct independent research and draw on the latest technology to develop new insights and recommendations.

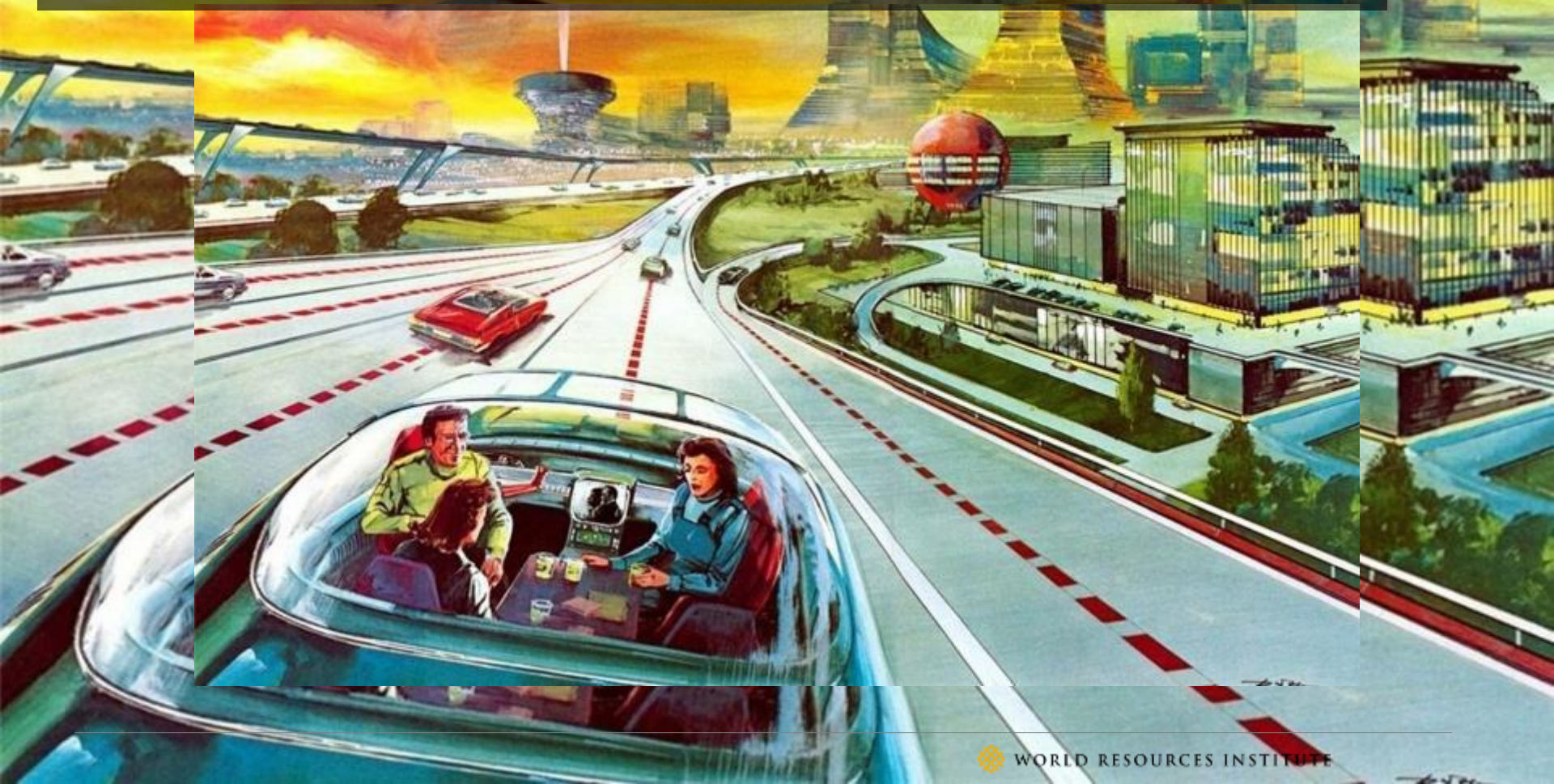
**2.Change It** We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base.

**3.Scale It** We work with partners to adopt and expand our efforts regionally and globally.

+700 WRI Experts

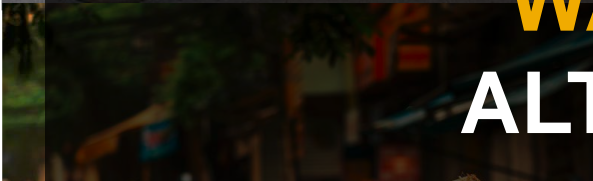
180 in Transport

# NEW MOBILITY???





# WALKING & CYCLING = ALTERNATIVE MOBILITY?



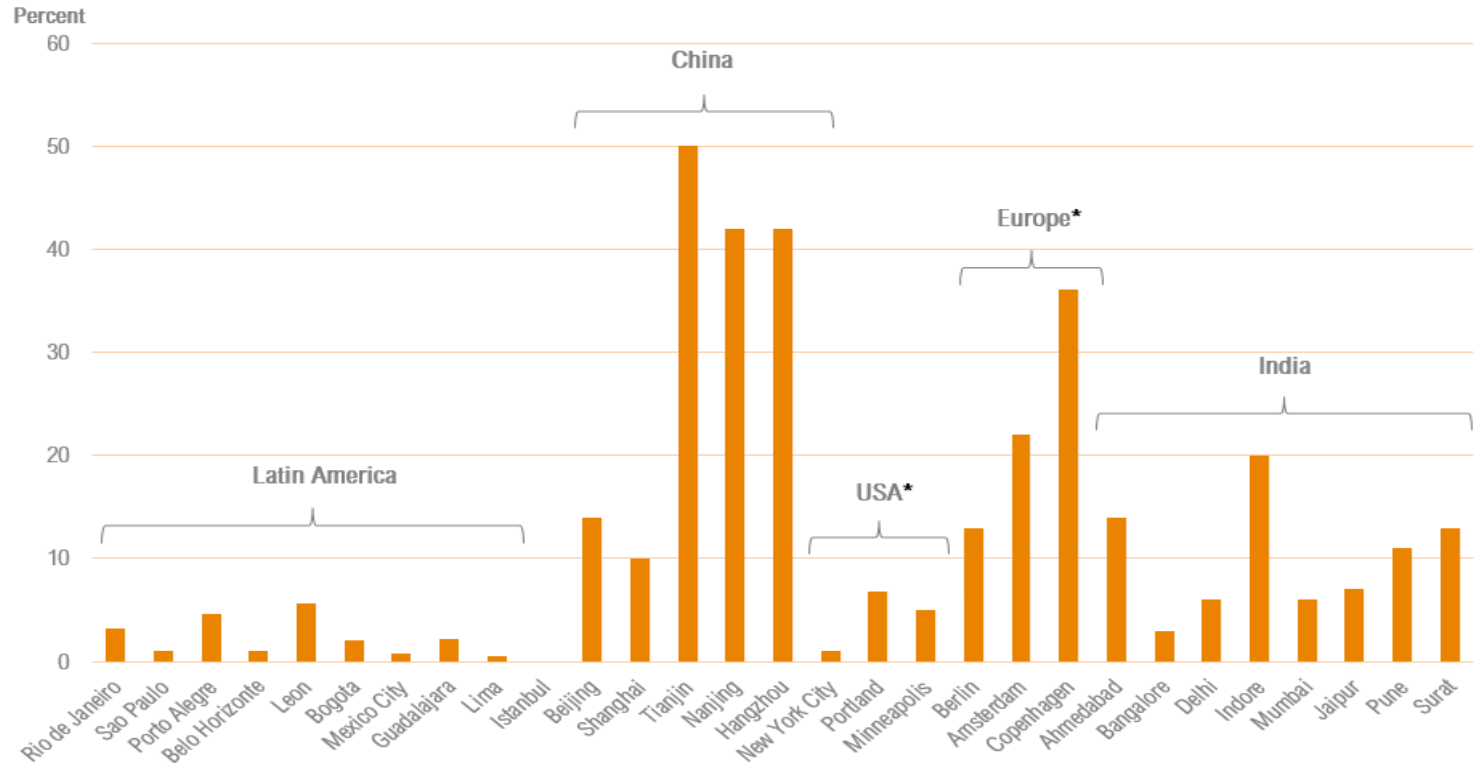
1. <http://www.unep.org/transport/sharetheroad/PDF/globalOutlookOnWalkingAndCycling.pdf>



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SUSTAINABLE  
CITIES

# BICYCLE MODE SHARE IN SELECTED CITIES

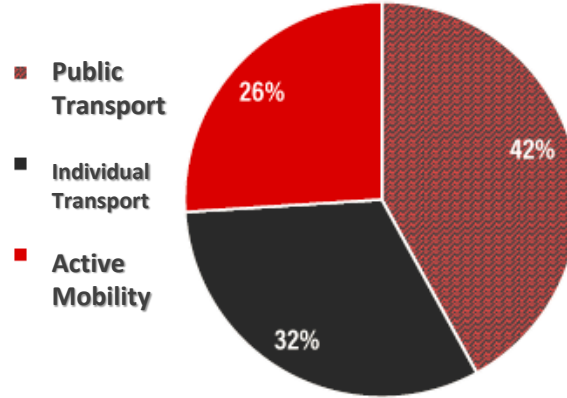
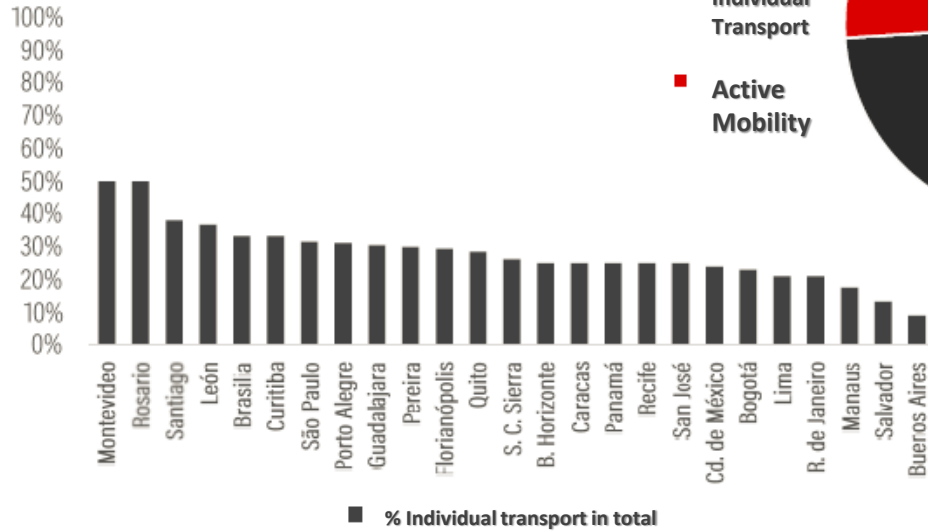


\* Reflects journey to work while other data reflects % of total trips

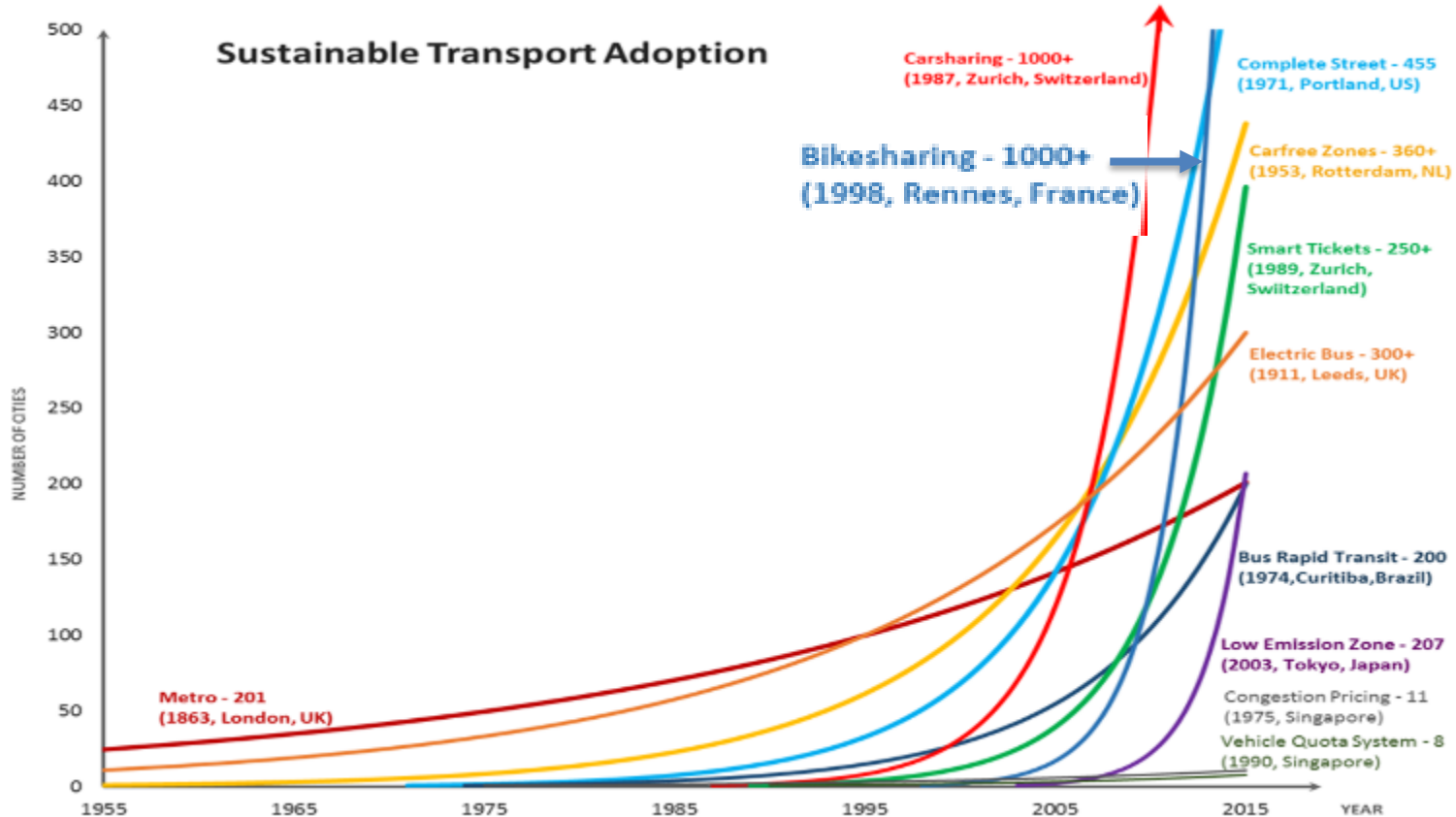
Source: Graph compiled based on most available data: Latin America, the Urban Mobility Observatory, CAF; China, Pucher et. Al 2007; India, EMBARQ India, Europe: EC Urban Audit, LTA Academy

# BICYCLE MODE SHARE IN SELECTED CITIES

## LATIN AMERICAN CITIES



# (NEW) MOBILITY IS GROWING FAST



# SAFETY & ACCESSIBILITY

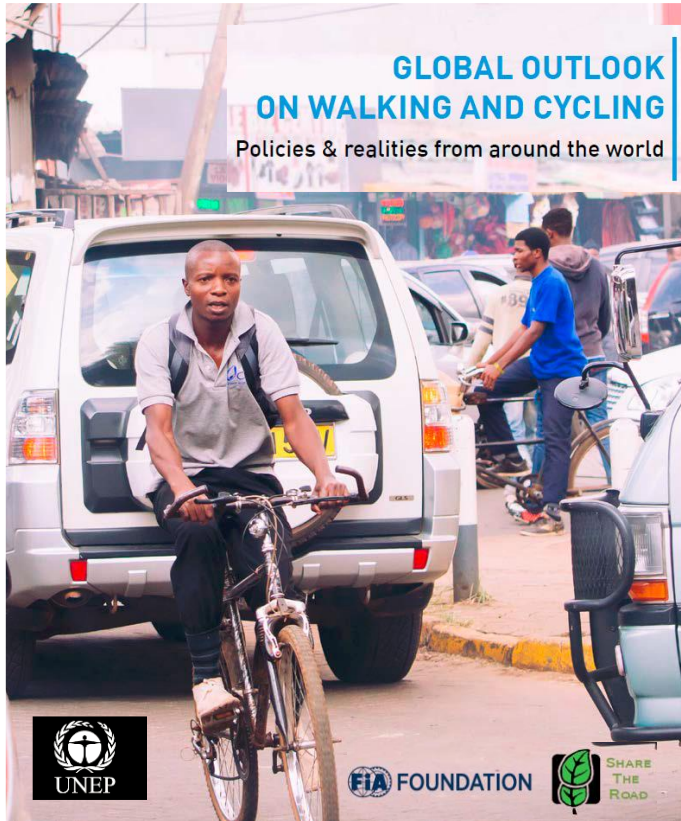




# SAFETY & ACCESSIBILITY



# GLOBAL OUTLOOK ON WALKING AND CYCLING



- **20–65%** of all the trips around the world rely only on walking or cycling.
- Many more **begins or end** walking and cycling.
- **Active transport** provides a huge range of benefits (environmental, economics, health).
- Many of this people risk their life's while traveling on active transport.
- More than **25%** of the people killed on the road are pedestrians.

# ACTIVE MOBILITY AROUND THE WORLD

- Safe Access to transport by **Active Mobility** is **fundamental** not only for sustainable mobility, mainly **for sustainable development**.



**Are bike-sharing systems part of sustainable urban solutions? Mobility, development...?**



# BIKE-SHARING AROUND THE WORLD

2015: 1,188 systems / 1.2 million bicycles

2018: 1,600 systems / 17 million bikes / 980 cities

# OPPORTUNITIES



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- Integration with public transport **network for last mile connectivity.**
- Can be the fastest and the more flexible mobility solution in cities.
- Increase accessibility and availability of bikes.
- **Can reduce the investment** for local governments in mobility.
- **Potential increase in bicycle trips** (depending on other conditions of the city e.g. Infrastructure, equipment, regulations)



# CHALLENGES



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- **Lack of technical process** for planning, design and implementation.
- **Not enough policy's** around bicycle mobility in general.
- **Need for improve and transparency on:** business models legal arrangements and regulations for operation.
- **Close coordination between** local governments, private sector and stakeholders is needed to develop long-lasting regulations to operate safely, sustainably and civilly



# WHAT DO WE NEED TO KNOW?



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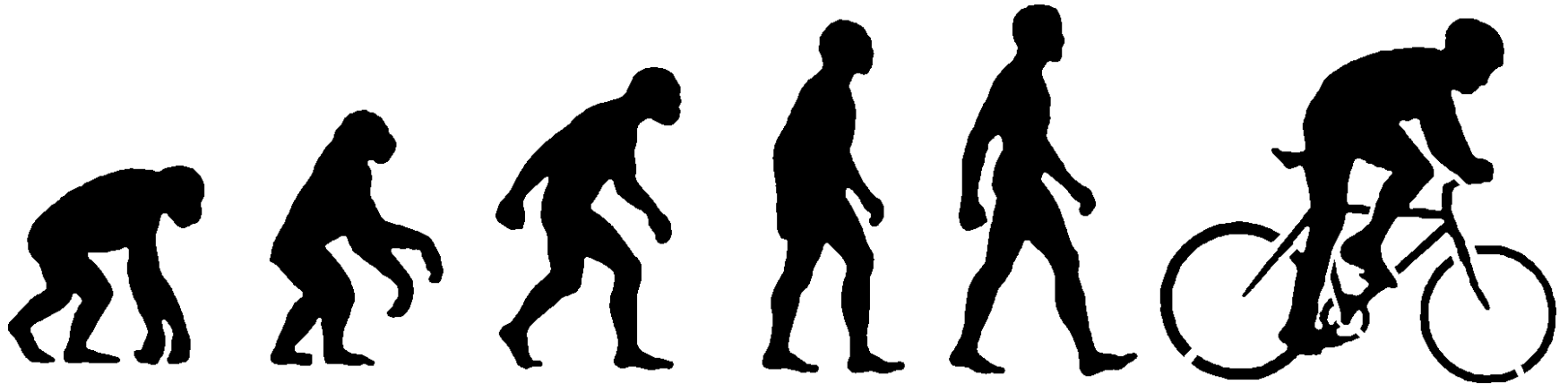
- There are **many different types of bike-sharing** systems.
- A bike-sharing system is **more than just a bicycle**. It requires additional elements, including **cycling infrastructure**.
- Many cities in the world have **already gone through this process**.



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# EVOLUTION OF BIKE-SHARING



# FIRST GENERATION WITTE FIETSEN – AMSTERDAM (1965)



## FEATURES

- Bicycles painted in one bright colour
- Unlocked
- Free of use in unregulated areas of the city

- Prone to bike theft
- Lack of security functions

## CHALLENGES

# SECOND GENERATION BYCYKLEN - COPENHAGEN (1995)

## FEATURES

- Coin-deposit system – introduction of docking stations
- Bikes designed and built with special components
- Free of use in unregulated areas of the city

## CHALLENGES

- Impossibility to track users
- Prone to bike theft and vandalism

## THIRD GENERATION BIKEABOUT – PORTSMOUTH (1996) & SMARTBIKE - RENNES (1998)

### FEATURES

- Incorporation of advanced technologies (e.g. automated credit card payments, embedded GPS, smart-cards, etc.)
- Possibility to track users and information

### CHALLENGES

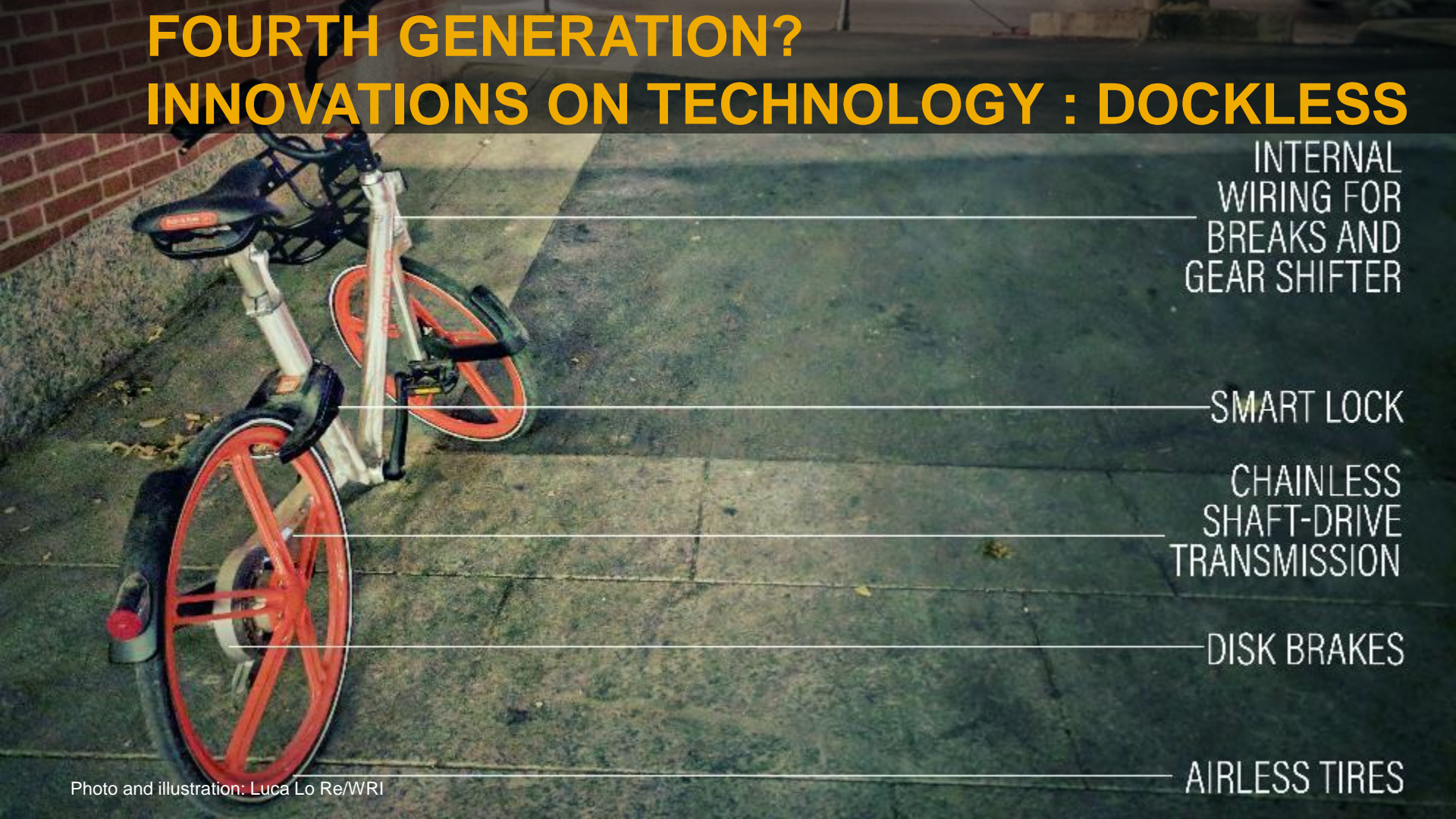
- Expensive (at the time)
- Still prone to bike theft and vandalism

# FOURTH GENERATION?

A silver and orange bicycle is leaning against a red brick wall. The bicycle has a silver frame, black handlebars, a black seat, and orange wheels. The background is a red brick wall.

- Still no consolidated consensus in literature
- Innovations on:
  - Technology (station-based vs dockless)
  - Ownership and operation models

# FOURTH GENERATION? INNOVATIONS ON TECHNOLOGY : DOCKLESS



INTERNAL  
WIRING FOR  
BREAKS AND  
GEAR SHIFTER

SMART LOCK

CHAINLESS  
SHAFT-DRIVE  
TRANSMISSION

DISK BRAKES

AIRLESS TIRES

# FOURTH GENERATION? INNOVATIONS ON TECHNOLOGY : STATION-BASED

## INFRASTRUCTURE INNOVATIONS

- Modular stations
- Off-grid renewable energy technology
- Seamless integration of smartcards with public transit

## ON-BIKE INNOVATIONS

- Pedelecs
- Tandem bikes
- Cargo-bikes
- Adaptive bikes
- Children's bikes
- Hydrogen-powered pedelecs

# FOURTH GENERATION? INNOVATIONS ON TECHNOLOGY : DOCKLESS

On-bike technological Innovation Dockless provider	Smart locks	Chainless shaft-drive transmission	Internal wiring for breaks and gear shifter	Disk brakes	Airless tires	Pedal-assisted
Mobike	Yes	Yes	Yes	Yes	Yes	No
ofo	Yes	No	Yes	No	Yes	No
SoBi	Yes	Yes	Yes	Yes	No	No
Jump	Yes	Yes	Yes	Yes	No	Yes
LimeBike	Yes	No	No	No	Yes	Yes
Spin	Yes	No	No	No	Yes	Yes



# FOURTH GENERATION? INNOVATIONS ON OWNERSHIP AND OPERATION MODELS

The background of the slide is a dense stack of orange bicycles, likely from a bike-sharing program. The bicycles are parked closely together, with their frames, wheels, and handlebars visible. The color is a bright, vibrant orange. The text is overlaid on this image.

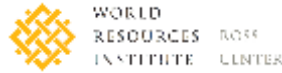
## HISTORICAL OWNERSHIP & OPERATION MODELS

- Publicly owned and operated
- Publicly owned and privately operated
- Privately owned and operated

## RECENT INNOVATIONS

- Dockless fully private providers
- Operations permit schemes and dockless-specific RfP

# FINANCING SUSTAINABLE CITIES INITIATIVE



□ Partnership:

□ Project: “*Financing Sustainable Cities Initiative*”

□ Main question: How can we develop business models that can accelerate and scale-up the implementation of sustainable urban solutions?



Bike-sharing systems



Bus rapid transit (BRT)



Low- and zero-emission buses



New efficient buildings



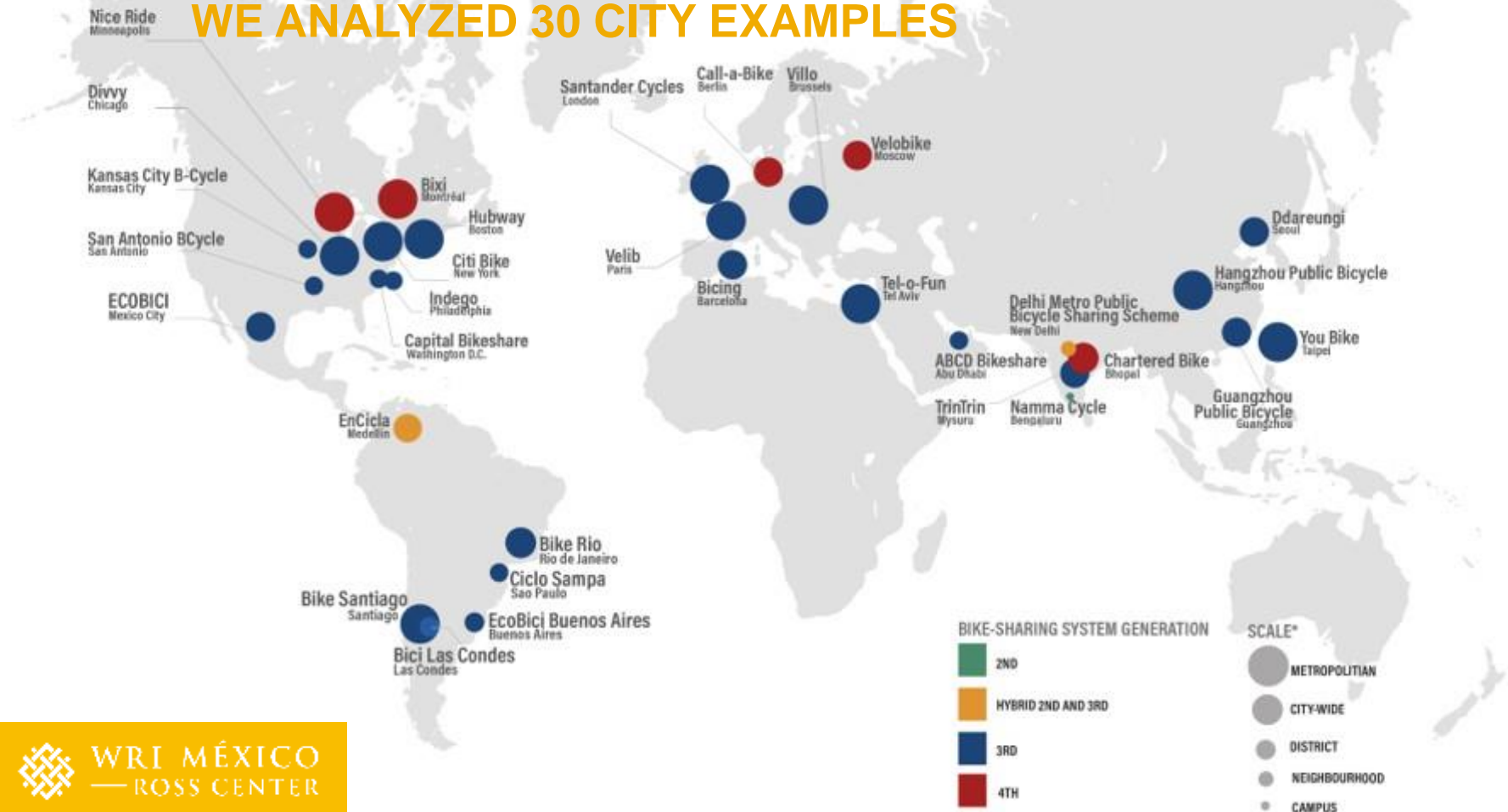
Municipal building retrofits



Transit-oriented development (TOD)

<http://www.financingsustainablecities.org/>

# WHAT BUSINESS MODELS ARE CITIES USING? WE ANALYZED 30 CITY EXAMPLES



# WHAT IS A BUSINESS MODEL?

## How to mobilize investment capital?

The financial products that can be used to mobilize third-party capital

## How to structure implementation?

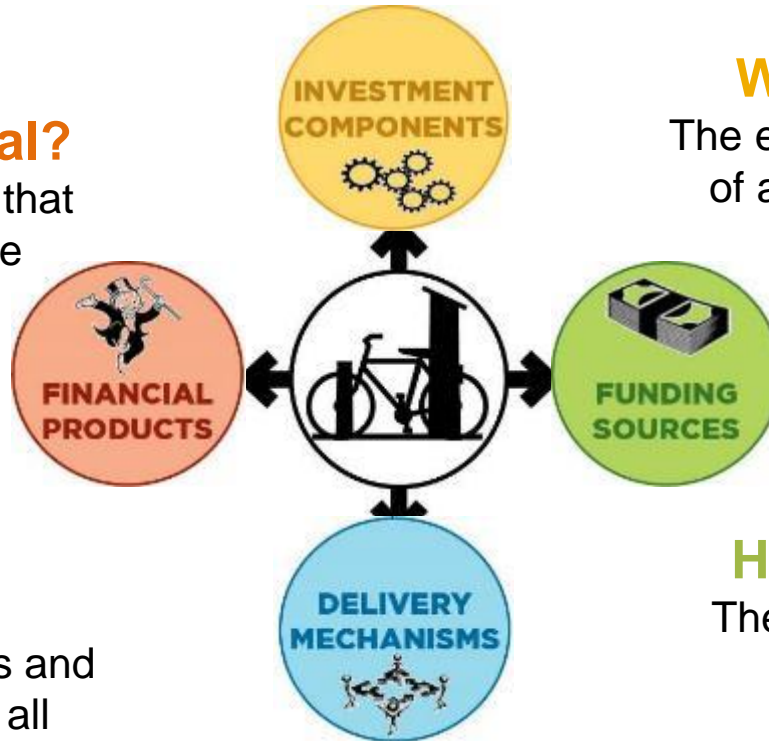
The distribution of risks and responsibilities among all stakeholders

## What to invest in?

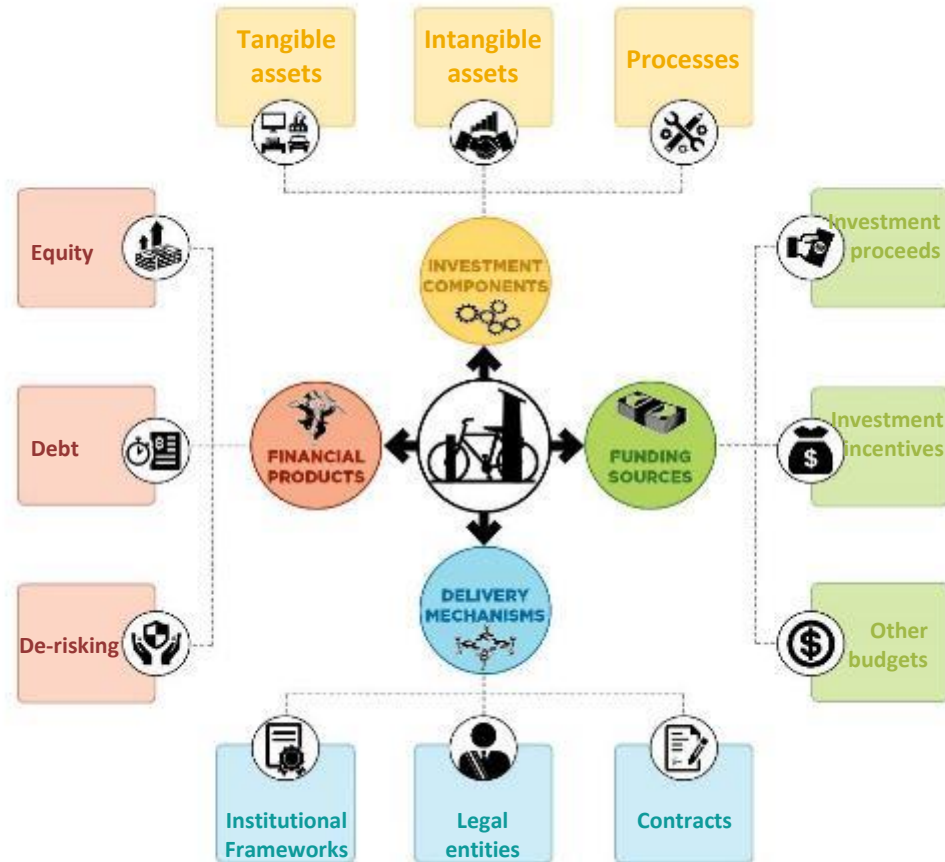
The elements that form part of an investment in a bike share system

## How to pay for it?

The funding sources that exist to pay the investment



# BUSINESS MODEL FRAMEWORK FOR BIKE SHARING SYSTEMS



# ELEMENTOS CLAVE DE LA INVESTIGACIÓN

## ARREGLOS LEGALES

### 1.- SEGURIDAD

- Calidad y Seguridad, estándares internacionales 43.150, 4210; ISO 4210:2014.
- Asistencia eléctrica
- Sistema de iluminación
- Sistema de frenos
- Protocolos y procesos de accidentes
- Seguro de usuario

### 2.- MANTENIMIENTO

- Centro de control en la ciudad
- Planes de mantenimiento y limpieza.
- Niveles de servicio

### 3.- OPERACIONES

- Balanceo y disponibilidad de bicicletas por Km<sup>2</sup>.
- Plan de operación y balanceo.
- Personal de operaciones acorde con número de bicicletas.
- Número mínimo y máximo de bicis.
- Área de operación
- GPS

### 4.- ESTACIONAMIENTO EN ESPACIO PÚBLICO

- Áreas de estacionamiento (geo-fencing)
- Integración con Transporte (Público y Privado)
- Áreas restringidas: aceras, parques espacios públicos esquinas rampas de accesibilidad)
- Mobiliario urbano (racks)

### 5.-TARIFAS

- Accesibilidad para grupos de bajo ingreso
- Regulación de incrementos
- Garantía para usuarios (depósitos)

### 6.- SERVICIO, COMUNICACIÓN Y EDUCACIÓN

- 24/7 servicio a cliente en tiempo real
- Biciescuelas, capacitación y guías de usuarios.
- Términos y condiciones de uso.

### 7.- DATOS (ABIERTOS/COMPARTIDOS)

- Datos compartidos en tiempo real
- Datos abiertos
- Protección de datos personales
- Registro de datos e información de operación, mantenimiento y accidentalidad
- Auditorias externas

### 8.-REQUISITOS

- Permisos de la ciudad y costos
- Uso del espacio Público
- Contraprestación
- Garantía Pública

# FOURTH GENERATION? INNOVATIONS ON OWNERSHIP AND OPERATION MODELS

- Too early to draw informed conclusions on the effects dockless bike sharing is having on urban mobility
- Great potential to become excellent first- and last-mile connectivity solutions for cities
- Close coordination between local governments and dockless companies needed to develop long-lasting regulations to operate safely, sustainably and civilly



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# MEXICO CITY



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**21,000**

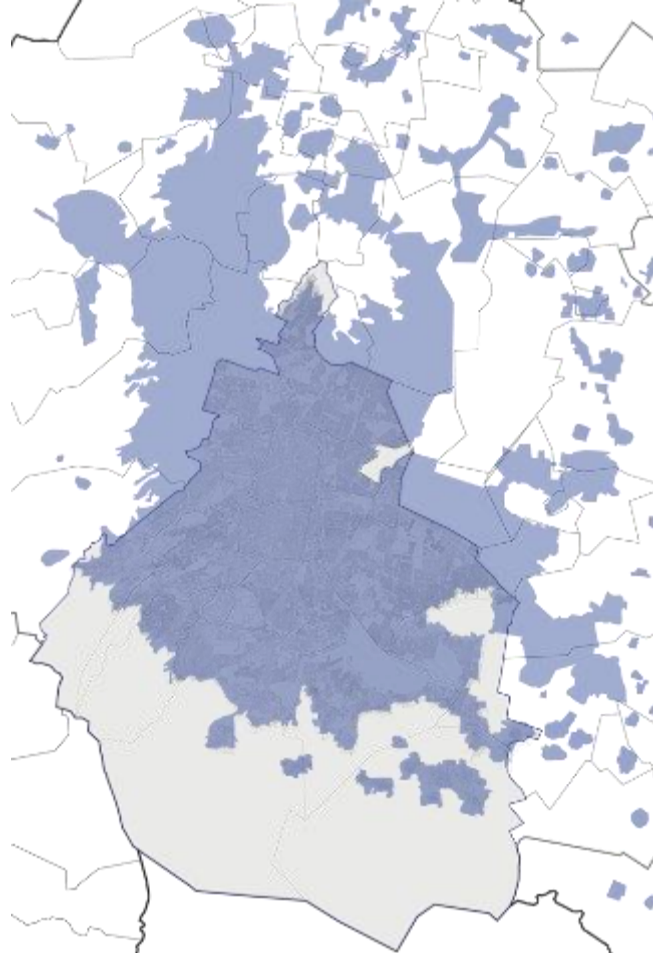
INHABITANTS

**GREATER  
MEXICO  
CITY**



**8.9**

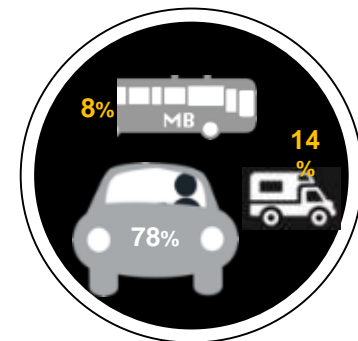
million



**Mexico City Context**

**35**

million  
**TRIPS  
PER  
DAY**



**7.4**

million

Tangible  
assets



Intangible  
assets



Processes



# Integrated Transportation System

Articulate the different modes  
of transport financially,  
technically and operationally.

## Culture of mobility

Change mobility patterns to **encourage  
non-motorized modes and / or public  
transportation**



## Streets for all

Space for all modes **pedestrian and  
cyclist priority**

## More mobility with less car

**Demand management** with non-  
motorized modes of transport





# BICYCLE - MOBILITY STRATEGY

1

**Infrastructure and  
equipment**

**Bike lanes and Bikehubs**

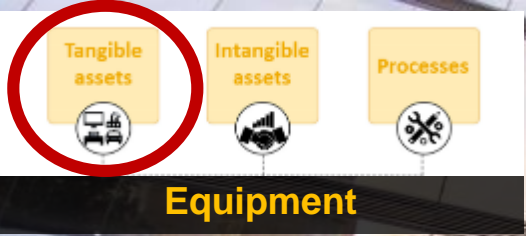
2

**Culture and Education**

**Open Street Programs & Bike schools**

3

**ECOBICI  
Bike-share system**



**6,800**  
bikes



**480**  
stations



**38 Km<sup>2</sup>**  
Area



**TRIPS**

**51 Mill**

**USERS**

**279,000**

**DAILY  
TRIPS**

**35,000**

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Photo: Enrique Abe <http://kiks49.wixsite.com/lightbandit>



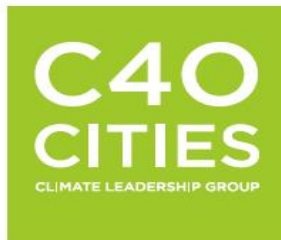
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# 500% BYCICLE TRIPS INCREASE 2008-2016



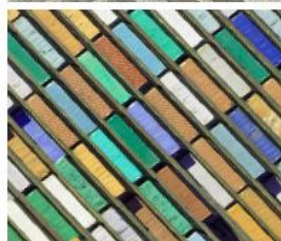
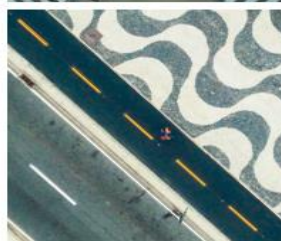
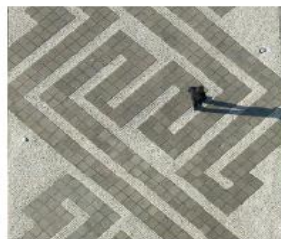
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# BENEFITS OF CLIMATE ACTION

Piloting A Global Approach To Measurement







Initial findings on **measuring the wider benefits** of climate action focus on **bikeability and walkability in Mexico City**; specifically:

- Introduction of bike lanes
- Bike-share (EcoBici)
- Pedestrian avenue (Madero Street).

**Cities need the evidence and tools to make a stronger case,** enabling the staggering increase in scale and pace of action required.



# Bikeability and walkability in **México City** has saved the city 109 million **US dollars** in the last 7 years



Huge range of benefits for the health and wellbeing of citizens, reducing the risk of obesity and associated Non-Communicable Diseases, such as cardiovascular disease and type 2 diabetes.

# MODAL SHIFT

**300% increase**

on the **number of people who switched** their mean of transport from car to bike-share



# SUSTAINABLE DEVELOPMENT BENEFITS

## CO2 REDUCTION

### ON THE FIRST 8 YEARS\*



**4,000** Tons

equivalent to

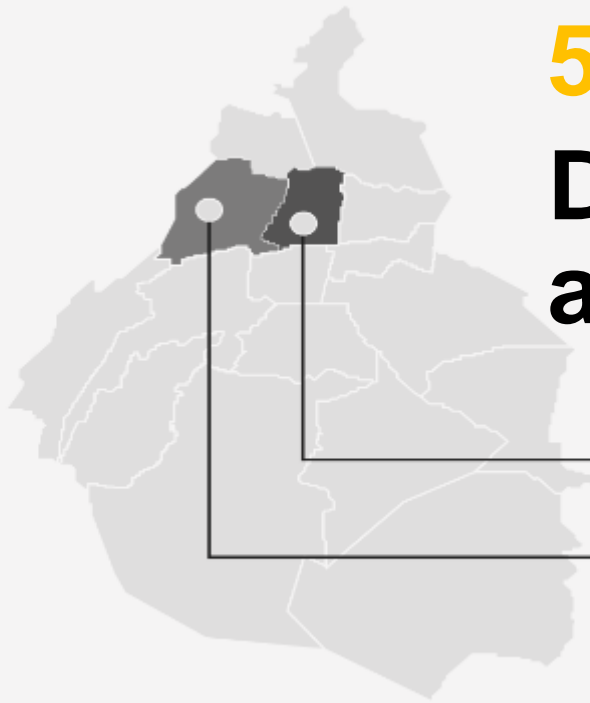
**12,000** trees

**\*First CO2 Calculator Reduction in LATAM. WRI México in 2012**

# USERS

**5 out of 10 users**

**Do not live in ECOBICI area**



# USERS

15%

live in the Metropolitan  
Area



# INTERMODODALITY

Tangible assets



Intangible assets



Processes



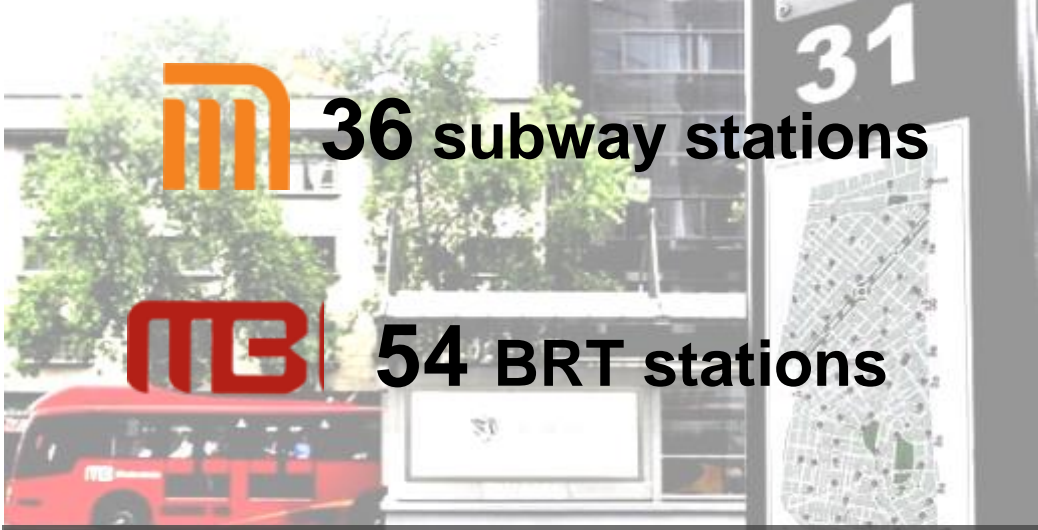
9 out of 10 trips in bike-share are combine with transit



36 subway stations



54 BRT stations



34% ECOBICI total trips

Source: [http://www.cms.sedema.cdmx.gob.mx/storage/app/media/libro\\_ciclista.pdf](http://www.cms.sedema.cdmx.gob.mx/storage/app/media/libro_ciclista.pdf)

# TIME SAVED & HEATH BENEFITS

**95.8 years**  
**saved** from all  
**bike share trips.**

Time spent using ECOBICI  
represents between **31-55%**  
**of the weekly recommended**  
**exercise**





# ACCESSIBILITY & GENDER



In 2010, **20% women**  
used cycles



Now **4 out of 10**  
users are **women**



# ACCESSIBILITY & GENDER



“In my office, we are mainly women. I think that a **key factor for using ECOBICI is safety**. On ECOBICI you avoid harassment, you do not experience any violence. I think that it is an important argument for women *riding a bike.*”

**Sara Hernández, 51 years old.**



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# OTHER CYCLING PROGRAMS WAITING TO BE MEASURED

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# THANK YOU FOR YOUR TIME!

THE *FINANCING SUSTAINABLE CITIES INITIATIVE (FSCI)* TEAM  
RESEARCHERS AND COLLABORATORS IN BIKE-SHARING  
SYSTEM INNOVATIONS:



Anne Maassen



Christopher Moon



Sebastian Castellanos



Luca Lo Re



Ivan de la Lanza



Sarika Panda Bhatt



Amit Bhatt



Azra Khan