



# SMART IMPACT

**SUSTAINABLE AND INCLUSIVE CITIES IN A CONNECTED WORLD**

Paulo Calçada – Municipality of Porto / University of Porto

A satellite-style map of the world at night, showing the outlines of continents and the glowing patterns of city lights and urban areas. The background is a deep, dark blue, and the lights are a bright, warm yellow-gold color. The map is centered on the Atlantic Ocean, with North and South America on the left and Europe and Africa on the right.

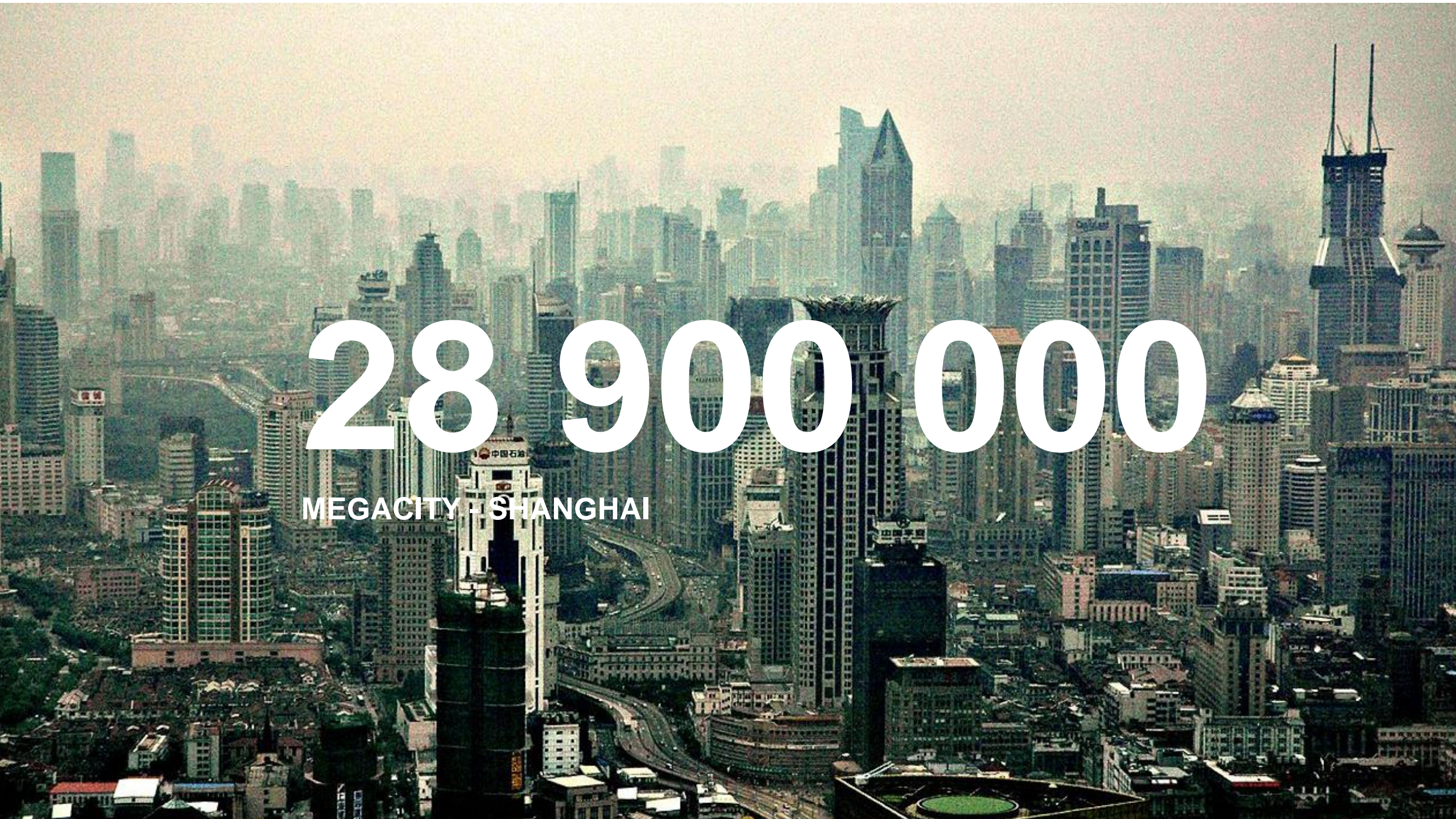
**7 721 500 000**

**WORLD POPULATION IN 2020**

An aerial night view of Tokyo, Japan, showing a dense urban landscape with numerous illuminated skyscrapers and buildings. The city lights are reflected in the water of a bay or river in the background. The overall scene is a vibrant display of urban illumination.

34 800 000

MEGACITY - TOKYO

An aerial photograph of a dense urban skyline, likely Shanghai, featuring numerous skyscrapers and a complex network of roads. The image is slightly hazy, giving it a historical or archival feel. The text is overlaid on the center of the image.

28 900 000

MEGACITY - SHANGHAI



21 500 000

MEGACITY – SÃO PAULO



**26 000 000 000**

**CONNECTED DEVICES IN 2020**



**DATA**

**ANALITICS**

**FUTURE  
CITY**

**SUSTAINABLE AND INCLUSIVE  
CITIES**

**COMPUTING  
POWER**

**ACTION**



**ELASTICITY**

**SECURITY**

**COMPUTING**

**HYBRID  
MODEL**

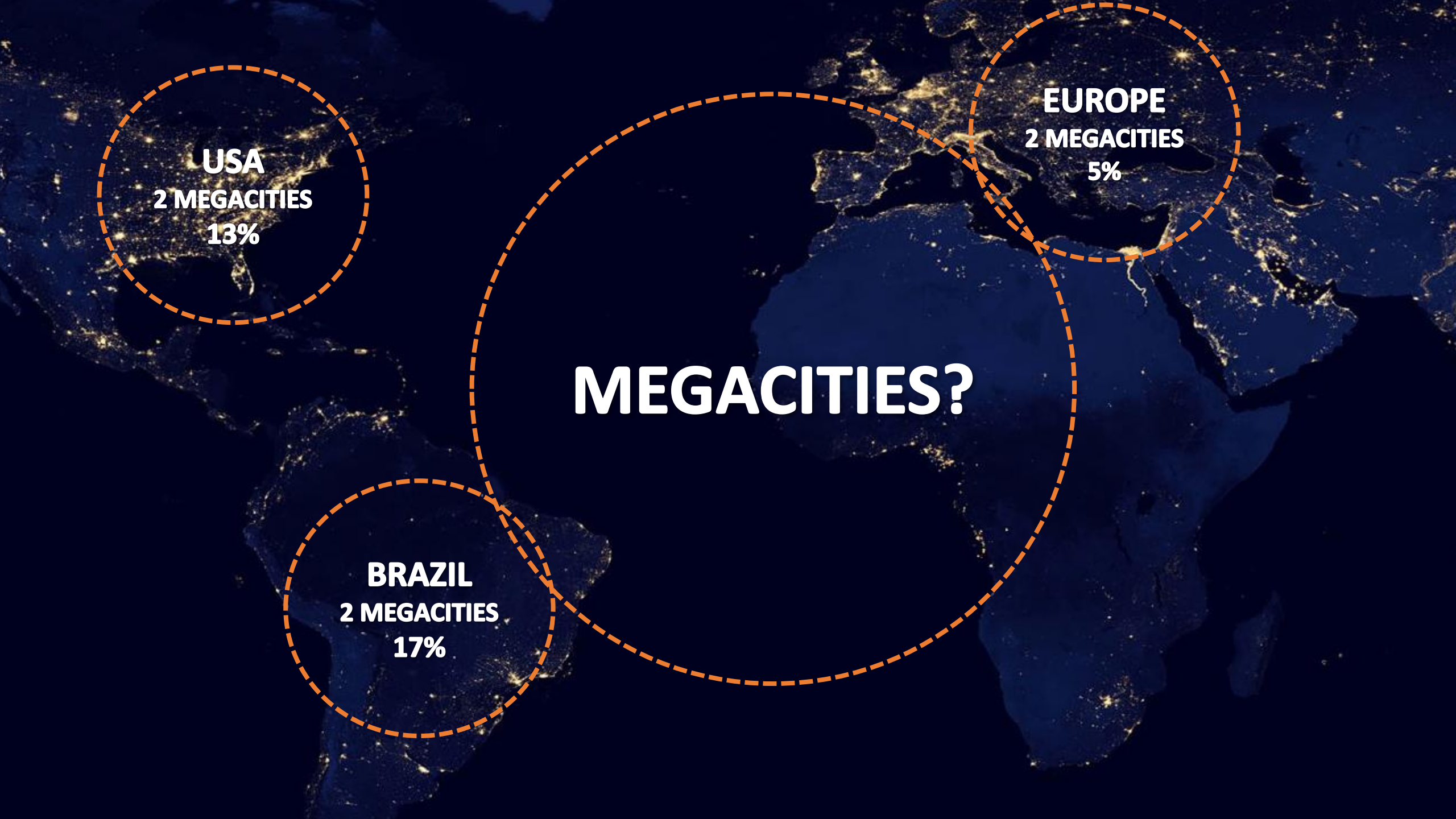
**MULTI  
TENANT**

**FAULT  
TOLERANT**



A satellite night view of Earth showing city lights and urban sprawl. The image is dark blue with numerous yellow and white lights representing cities and urban areas. The lights are concentrated in the Northern Hemisphere, particularly in North America, Europe, and Asia. The text is overlaid on the image in a large, white, sans-serif font.

# HOW TO FOSTER SMARTER CITIES?

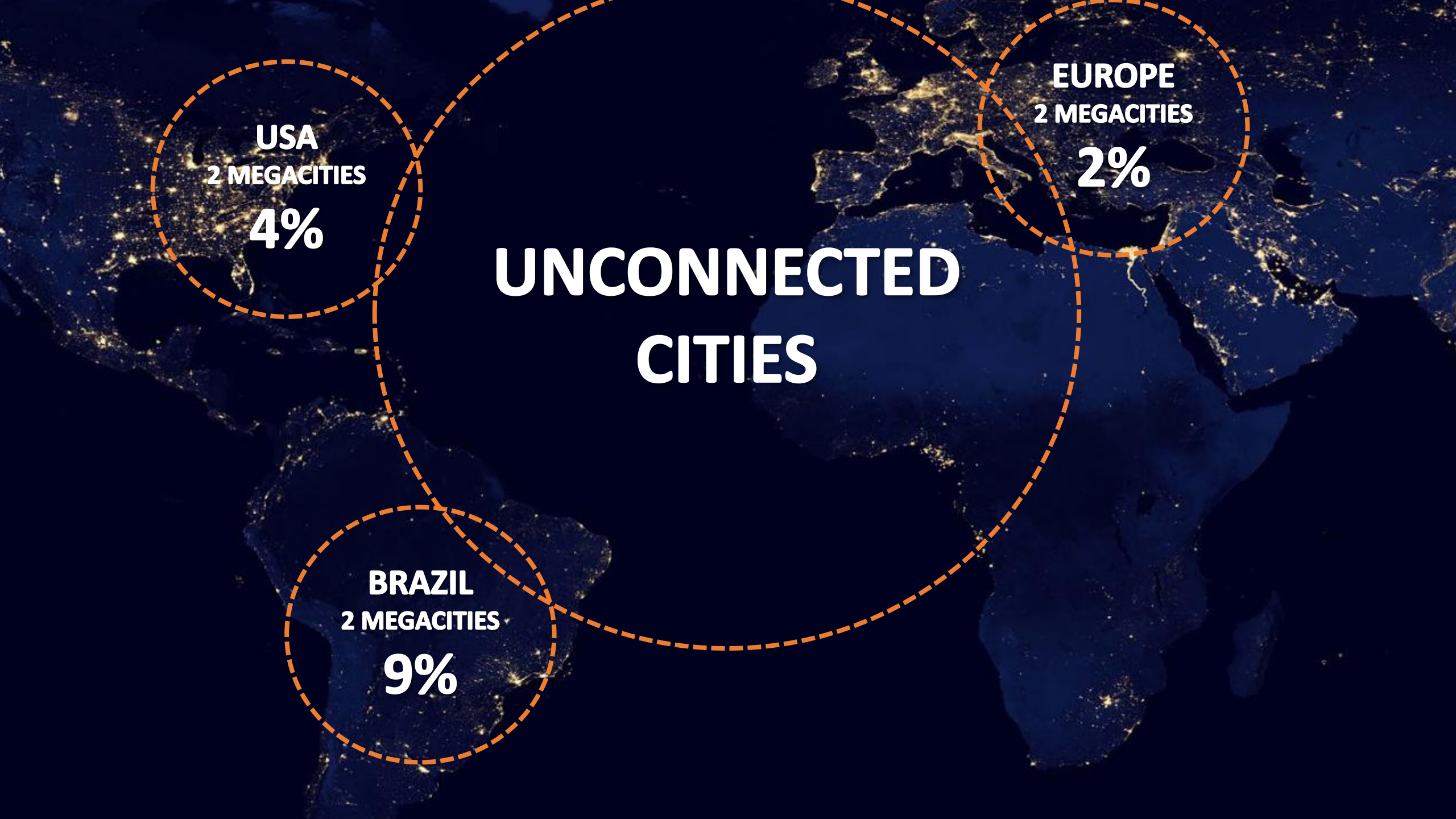


**USA**  
**2 MEGACITIES**  
**13%**

**EUROPE**  
**2 MEGACITIES**  
**5%**

**BRAZIL**  
**2 MEGACITIES**  
**17%**

# MEGACITIES?



**USA**  
**2 MEGACITIES**  
**4%**

**EUROPE**  
**2 MEGACITIES**  
**2%**

**BRAZIL**  
**2 MEGACITIES**  
**9%**

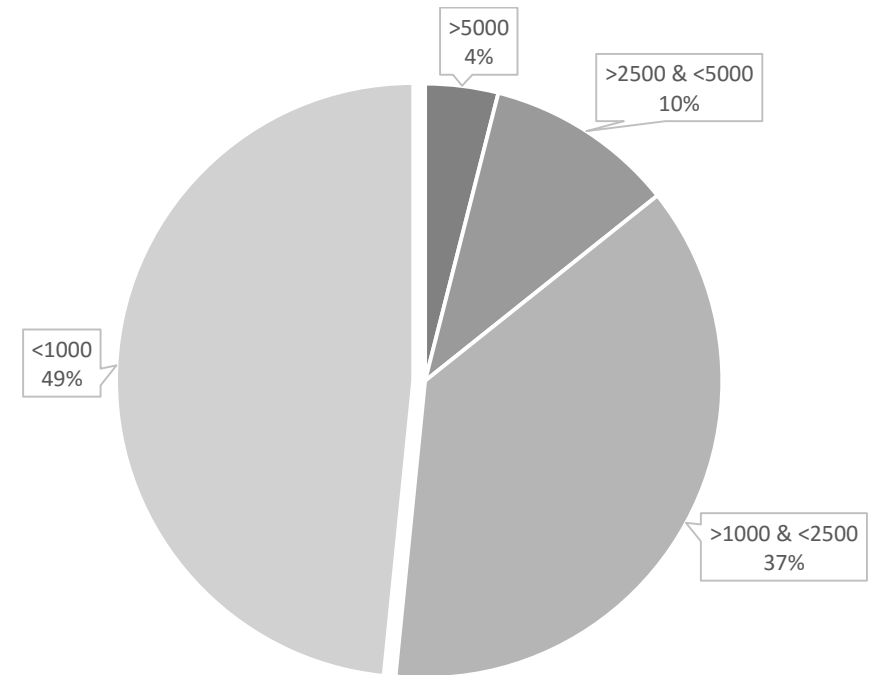
# UNCONNECTED CITIES

# POPULATIONS DISTRIBUTION IN THE EUROPE UNION

More than 40% of population lives in large urban areas, in which:

Almost 50% are small areas (<1 million)

Less than 4% are GLOBAL (>5 million)



■ >5000 ■ >2500 & <5000 ■ >1000 & <2500 ■ <1000

(thousands)

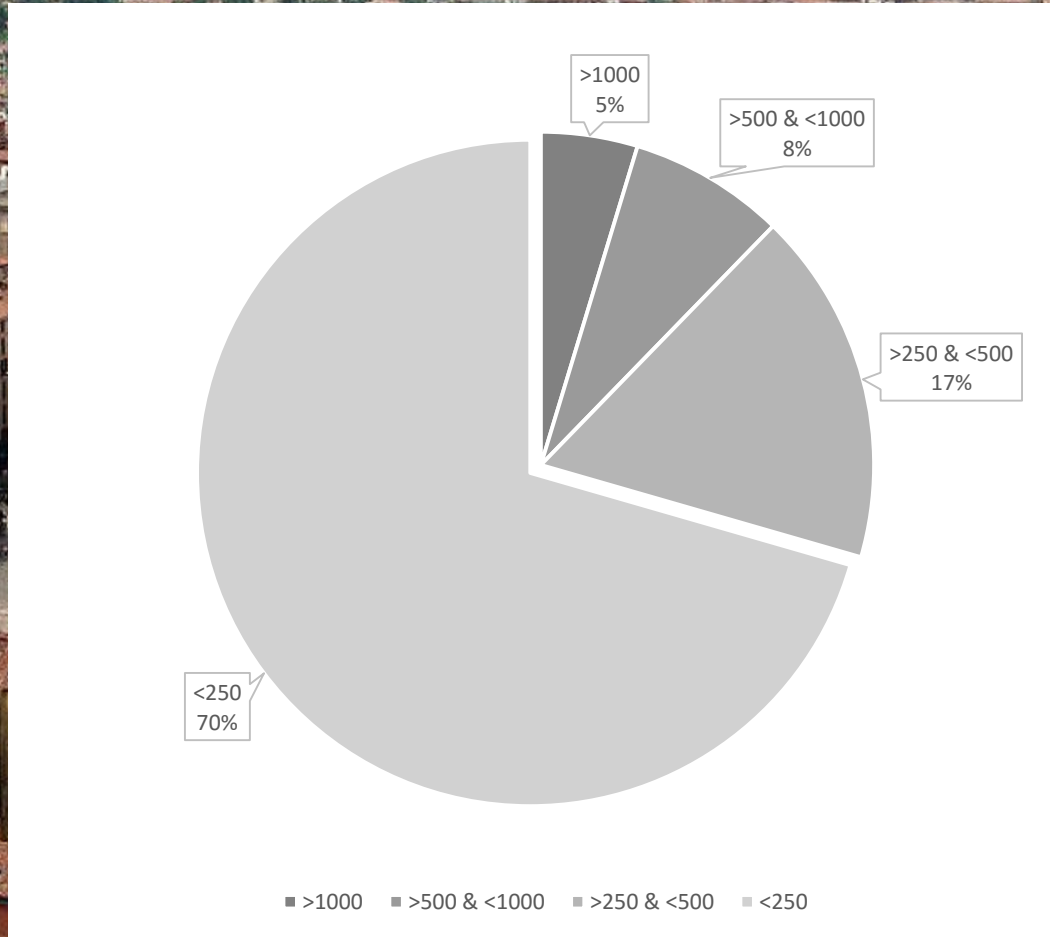
# CITY CENTRIC MANAGEMENT AND ADMINISTRATION



**23% living in cities with more than 100 thousand inhabitants, in which:**

**More than 70% are medium cities (< 250k)**

**Only 5% are extra large cities (> 1million)**



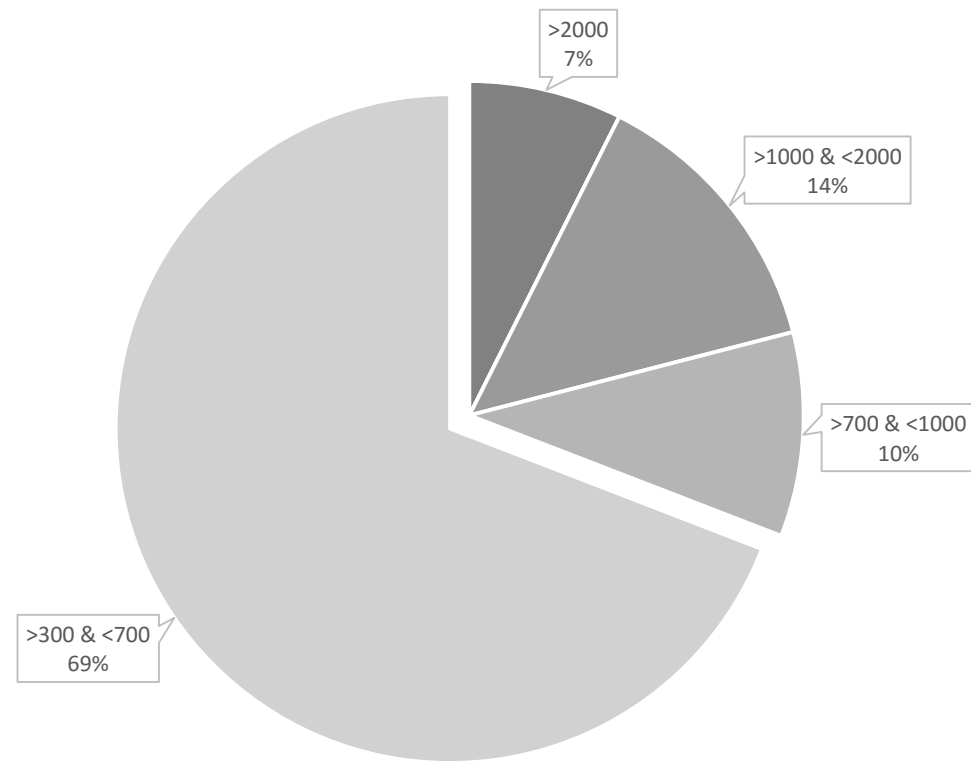
■ >1000 ■ >500 & <1000 ■ >250 & <500 ■ <250

# CITY CENTRIC MANAGEMENT - BRAZIL

More than 35% living in cities with more than 300 thousand inhabitants, in which:

Almost 70% have less than 700 thousands inhabitants

Only 7% are large cities (> 2million)



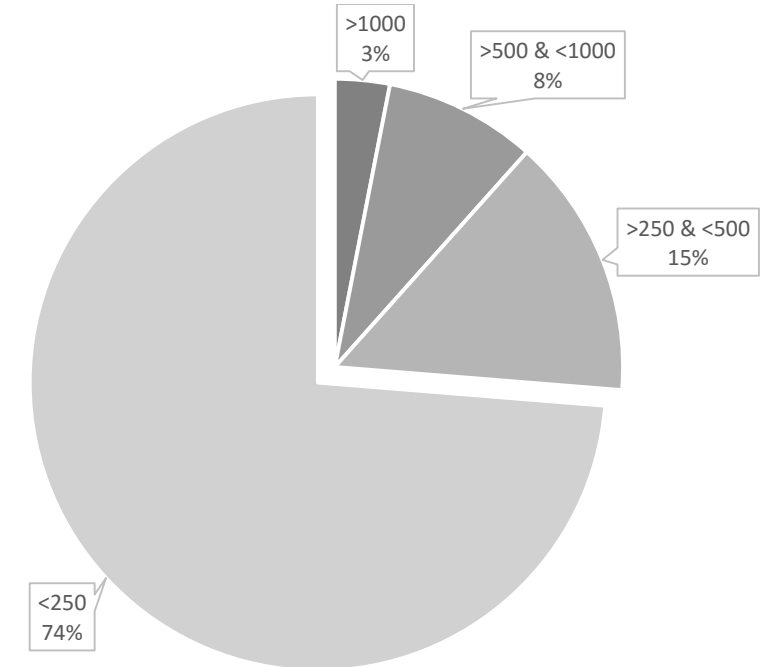
(thousands)

# CITY CENTRIC MANAGEMENT - USA

More than 27% living in cities with more than 100 thousand inhabitants, in which:

More 70% are medium cities (< 250k)

Only 9% are extra large cities (> 1million)



■ >1000 ■ >500 & <1000 ■ >250 & <500 ■ <250

(thousands)

A satellite view of Earth at night, showing city lights and a network of connections. The text "FUTURE CITIES CONNECTED" is overlaid in large, white, bold, sans-serif font.

**FUTURE  
CITIES  
CONNECTED**





# Smart IMPACT



Manchester

Eindhoven

Stockholm

Dublin

Smolyan

PORTO

# Challenges through market barriers...

**Integration of  
innovative technologies**

**Cash-flow models are  
not clear yet**

**Business models  
fail**

**Embedded within  
larger systems**

**Standards and  
interoperability of  
systems**

# Organizational challenges

**Eco-systems of  
businesses,  
technologies and  
services**

**Systems-integrator and  
systems operators.**

**Still think and act  
in silos.**

# Leadership challenges

**Political leadership is missing**

**Real partnership  
Companies and Cities**

**Holistic value  
models**

**Creating  
sustainable value**



# Smart IMPACT

Backup slides

# Porto - Ecosystem for sustainable future

A nighttime photograph of the Porto City Hall building, a grand neoclassical structure with a prominent clock tower. In the foreground, a fountain with water cascading down steps is visible, reflecting the lights of the building and the street. The sky is a deep blue, and the city lights create a warm, glowing atmosphere.

**MIDSIZED EUROPEAN CITY (> 250K INHABITANTS)**

**CENTER OF A LARGE URBAN AREA (> 1,8M INHABITANTS)**

**METROPOLITANIA AREA WITH 3 REFERENCE UNIVERSITIES (> 57 000 STUDENTS)**

**MULTI-MODAL TRANSPORTATION SYSTEM**

**INTEGRATED INFORMATION AND COMMUNICATION INFRASTRUCTURE**

**STRONG ECONOMIC AND ENTREPRENEURIAL ECOSYSTEM**

**LONG-TERM ENVIRONMENT STRATEGY**

**PORTO LIVING LAB - CENTER OF COMPETENCE FOR FUTURE CITIES**



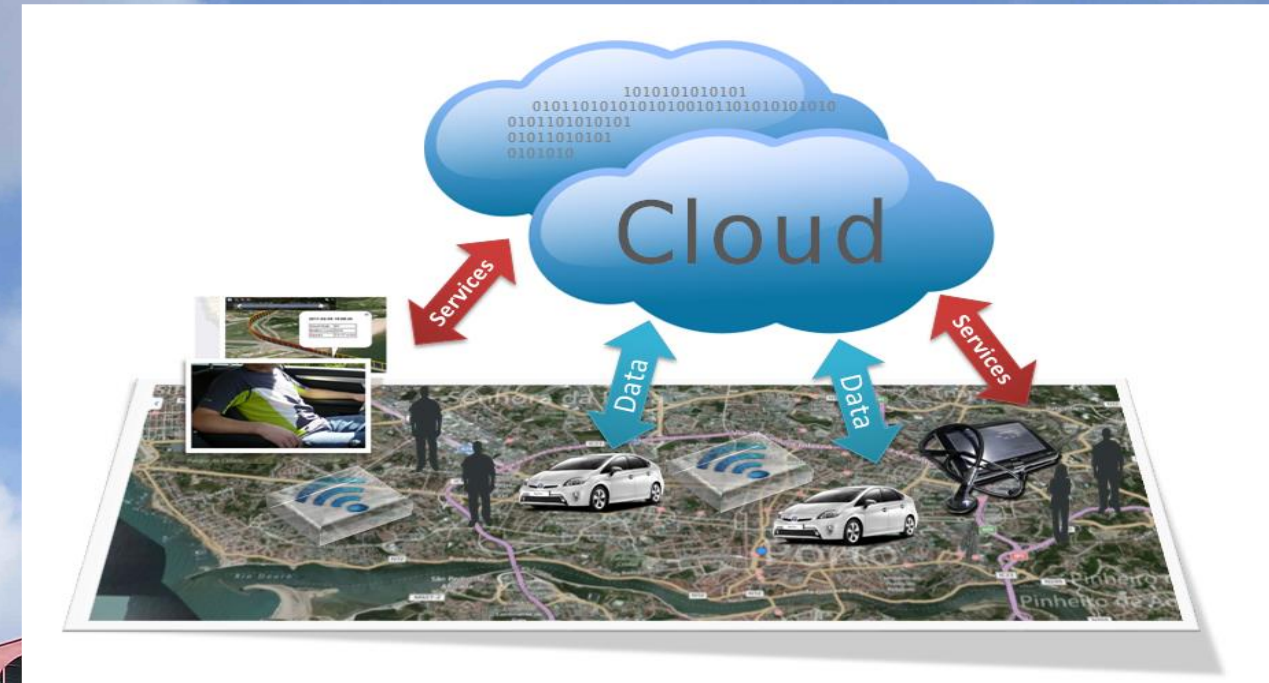
# PORTO LIVING LAB

LARGE SCALE SENSING PLATFORM

WIRELESS COMMUNICATIONS

CLOUD COMPUTING

SECURITY AND DATA PRIVACY

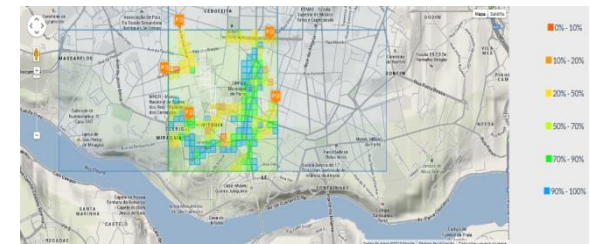


# VEHICULAR SOCIAL NETWORKING

NETWORK OF VEHICLES, WHICH USE DSRC, WI-FI OR 3G/GPRS TO CONNECT TO EACH OTHER AND TO THE INFRASTRUCTURE

CONNECTION TO THE LOCAL FIBER BACKBONE

600 NODES

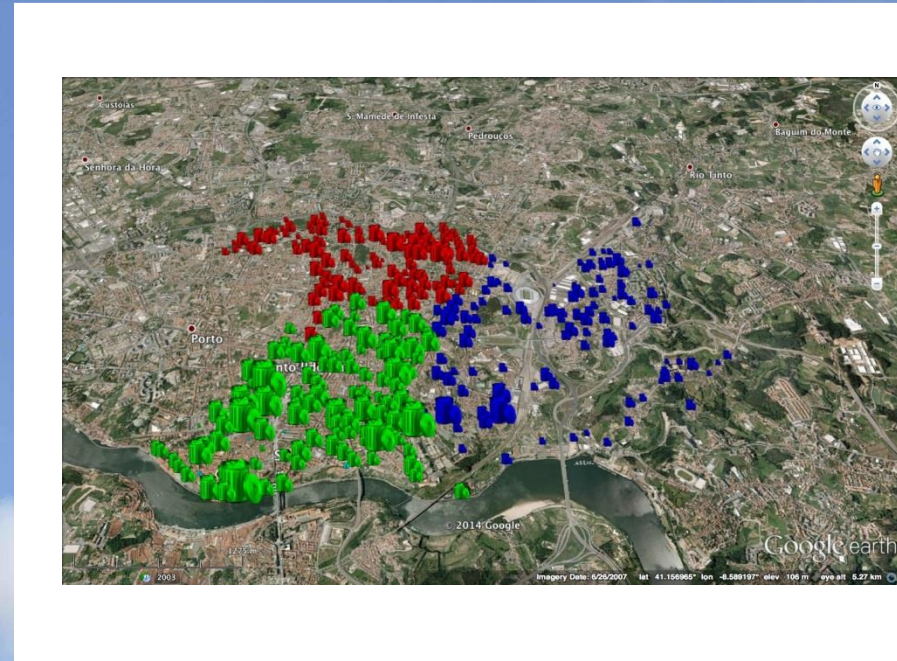


# USED CASE

# INTEGRATED WASTE MANAGEMENT

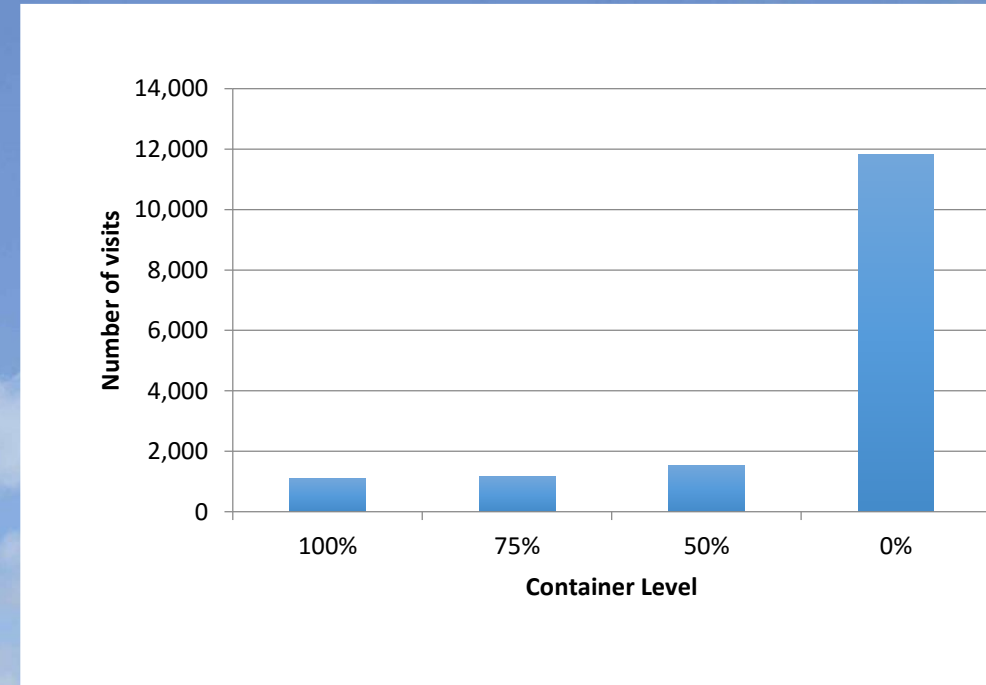
## EFFICIENCY OF TRASH COLLECTION IN 2013

- 96% FOR UNDIFFERENTIATED TRASH
  - 39% FOR SELECTIVE TRASH
  - 14% FOR GLASS
- (NUMBER OF TIMES CONTAINERS WERE ABOVE HALF CAPACITY)



# INTEGRATED WASTE MANAGEMENT - GLASS

- 16K COLLECTIONS IN 2013
- 85% OF THE TIMES THE CONTAINER WAS AT NO MORE THAN HALF CAPACITY
- 75% THE CONTAINER WAS PRACTICALLY EMPTY



# INTEGRATED WASTE MANAGEMENT - GLASS



## EXAMPLE ANALYSIS:

AVENIDA DE FERNÃO DE MAGALHÃES, VILA GALÉ  
64 VISITS IN 2013 - GARBAGE COLLECTED 26 TIMES

## PROPOSAL:

MINIMUM FREQUENCY TAKING INTO ACCOUNT PEAK PERIODS:

- **1 VISIT PER WEEK = 52 VISITS PER YEAR**

OPTIMAL FREQUENCY

- **25 VISITS PER YEAR (50% OPTIMIZATION)**