Porto Business School
/ University of Porto

REMOBILISE

ClusterXchange

Co-funded by the COSME programme of the European Union

Part 1
Fundamentals of smart cities

Prof. Daniel G. Costa
Department of Electrical and Computer Enginnering
Faculty of Engineering (FEUP), University of Porto
danielgcosta@fe.up.pt

ACCREDITATIONS MEMBERSHIPS RANKINGS

Agenda

Objective: To discuss some of the most important concepts related to current and future **Smart Mobility** scenarios, giving a perspective centred on Smart Cities and Sustainability

Organisation:

- Part 1: General (and relevant) discussions about smart cities
- Part 2: Basic concepts around smart mobility
- Part 3: Development trends and what we can expect

Smart cities: Why?

Porto Business School
/ University of Porto

Smart cities: the technological revolution reaches the cities

IBERDROLA

BOSCH

Smart cities 2.0: what works today

Smart cities: How data and artificial intelligence could change London

BBC

HOW WILL WE LIVE, CONNECT, COMMUTE AND CREATE IN THE URBAN WORLD OF TOMORROW?

Continental

TICKET TO THE FUTURE Thousands of Brits will be shuttled around in driverless buses in plans for 'future city' – will you ride them?

THE Sun

The New York Times

A smarter transition to electric vehicles

Smart cities are…

Porto Business School / University of Porto

One of the best marketing campaigns of the last 20 years

Smart → Better

What are **people/companies** expecting?

Porto Business School
/ University of Porto

Qualify of Life

Profit

Efficiency

But do we **really** need smart city services?

Porto Business School / University of Porto

If the answer is YES, other questions come:

- **WHICH** services?
- **WHERE** to deploy?
- **WHEN** are they required?
- **WHO** is going to pay?

Yes! But to do what?

- Sanitation
- Housing and space occupation
- Healthcare
- Energy
- Public lighting
- Communications
- Transportation

Back then…

Yes! But to do what?

- Sustainability
  - Renewable energies
  - Garbage management
- Air pollution
- Public security
- Emergencies
- Spatial inequalities
- **Smart transportation**

Now and beyond

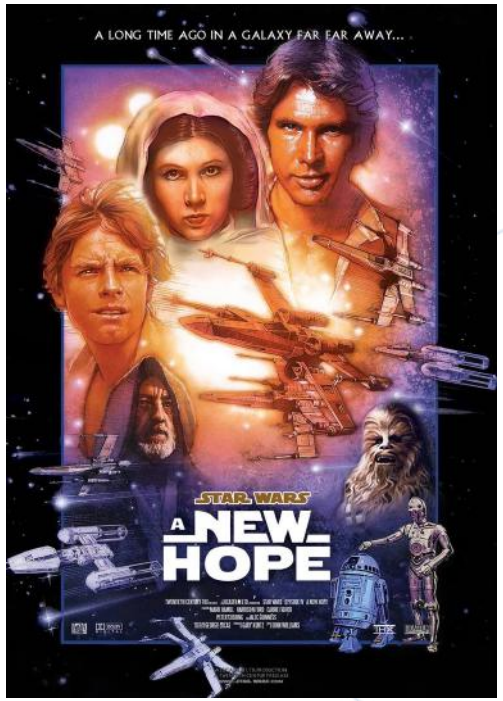
Co-funded by the COSME programme of the European Union

New player: climatic changes!

High levels of pollution

Extreme weather conditions

Smart cities: a new hope



Understand → Act!

It should involve multiple stakeholders:

- Public administrators
- Services providers
- Companies
- Citizens

How can smart cities be created?

Technology can be the enabler, but it should never be the goal

- **New technologies will emerge**, changing the solutions
- However, their goals should be preserved

The benefits of the collectivity **MUST** surpass the benefits of the individuals

- Once again: who will pay for the smart services?

Smart for who?

EXPECTATION: **citizens**

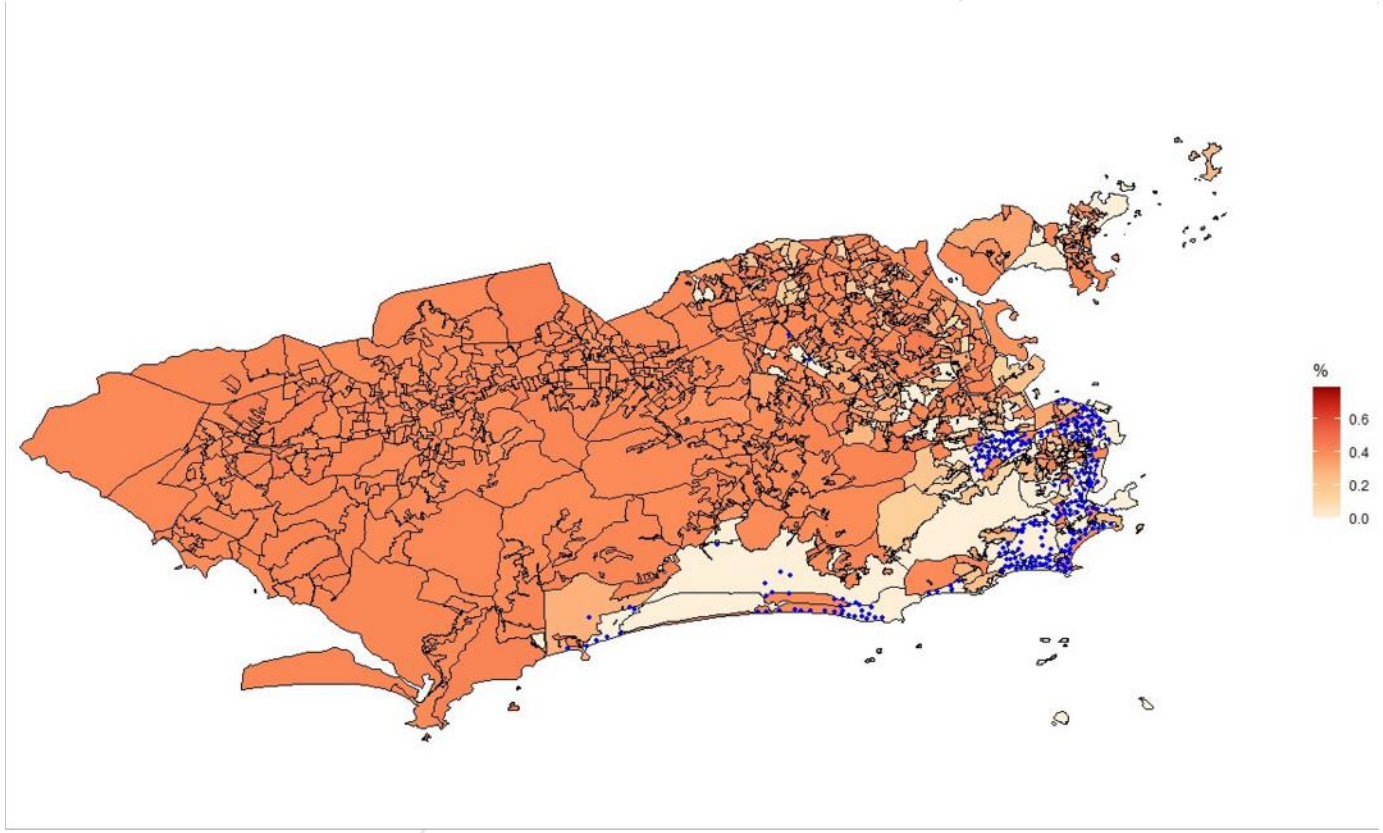
REALITY: **users**

If everybody is paying for a smart city, why the benefits are unequal?

Smart for who?

Porto Business School / University of Porto

Another example for Rio de Janeiro, considering a bike-sharing system



Smart cities for a better life

Porto Business School
/ University of Porto

- Environment monitoring
- Crisis control
- Healthcare
- Public security
- Sustainability
- Smart homes
- **Smart mobility**
  - Parking
  - Traffic control
  - Transportation
  - Smart vehicles

UN Agenda 2030

Porto Business School
/ University of Porto

How cities, society and smart transportation relate?

Porto Business School
/ University of Porto

A long history for the *Homo Sapiens*

Hunter-gatherer groups of ≅50 members

Agriculture comes as an agent of deep transformations

10.000 years ago, agriculture is invented

300.000 years of *Homo Sapiens* evolution forged by small nomadic groups

- For **97%** of our species history, we have lived without cities
- For the *Homo* genus (2 million years old), it is 99.5% of our history living with no city

Living in cities is not in our DNA

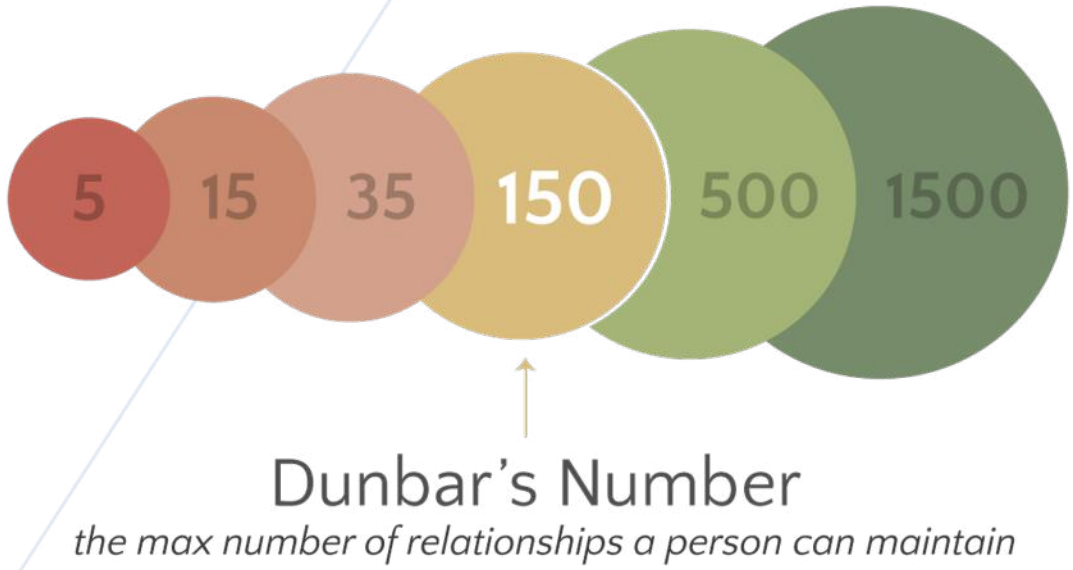
Living in cities

Are we suited to live in cities with millions of people?

- Our capacity for social interactions is limited

Dunbar's number

- We can only really maintain about **150** connections at once (keep track and regard part of a social network)
- A "limitation" found in different Apes, associated to our brain structure



However...

Porto Business School / University of Porto

Metcalfe's law

- The value of a network scales like the square of the total number of nodes
- Value depends on the number of possible links between agents

Cities become more appealing as they become bigger

The resulted scenario is...

- Humankind becomes **dependent of cities**

The urban "way of living"

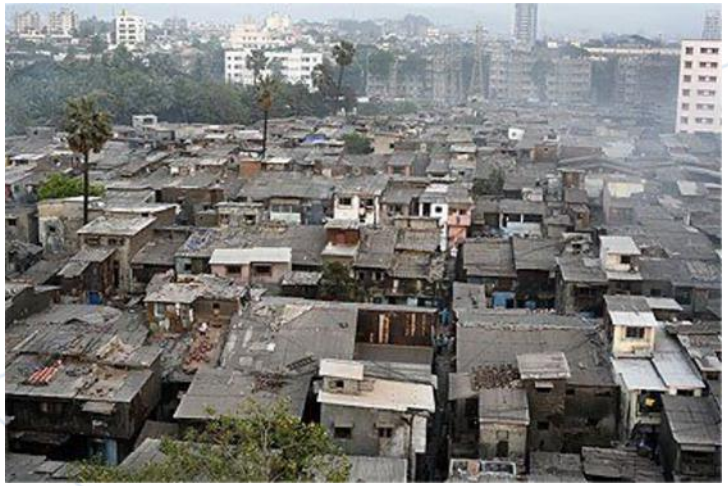
In 2007, more people were living in cities than in rural areas

68% of the world population projected to live in urban areas by 2050

- Major growth rates in Africa and Asia

Will we be prepared?

We need to study cities and urbanisation



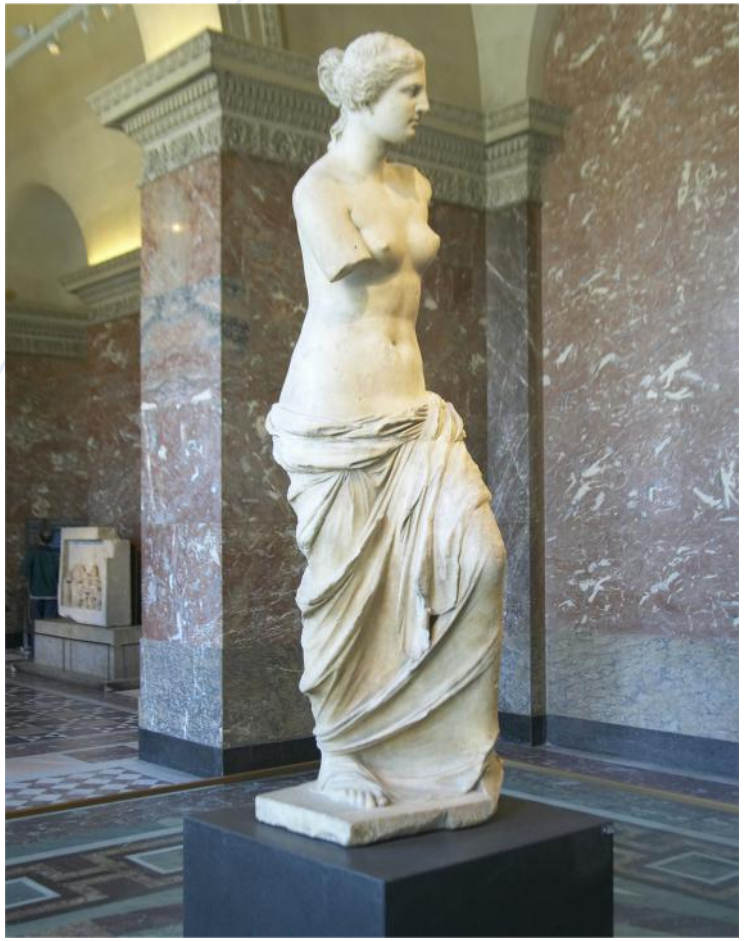
Identify the dominant forces that shape their formation and evolution

Project smart cities solutions

Some important remarks...

What we have today is a result of a continuous process

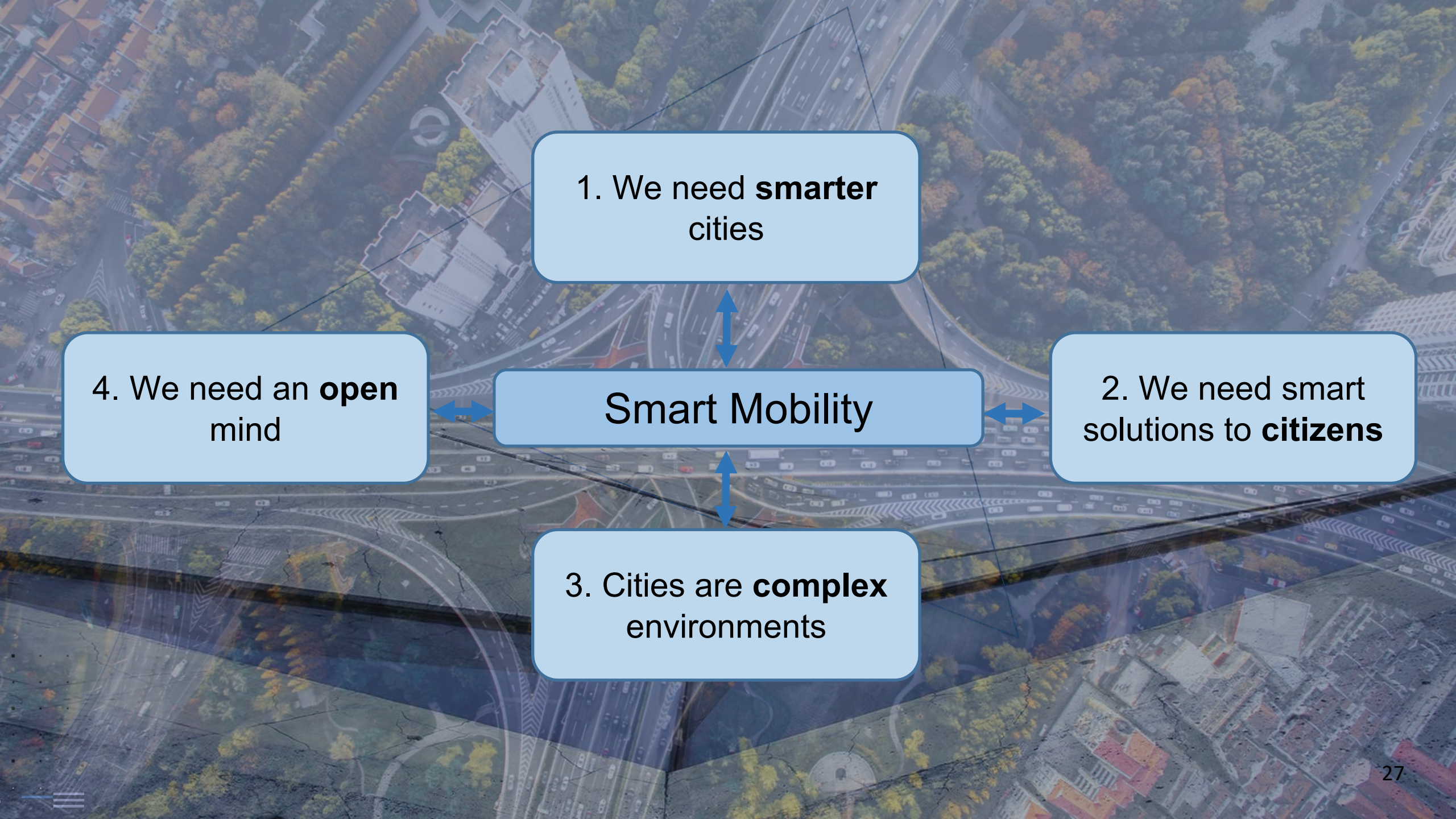
1. The case of the ancient Greek art
    - White (clean) art <u>was</u> a sign of superiority
    - Coloured art (houses and buildings) <u>is</u> inferior



Some important remarks...

2. The case of the European aristocracy and the lawn

- White houses with lawn → new riches


1. We need **smarter** cities
4. We need an **open** mind
Smart Mobility
2. We need smart solutions to **citizens**
3. Cities are **complex** environments