URBAN AND TERRITORIAL PLANNING – URBAN ENGINEERING

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in cities lays the solutions
for our common future

MAIN DRIVERS OF CHANGE

(1) **GLOBAL AND LOCAL DEMOGRAPHY, based on migrations, population evolution and composition;**

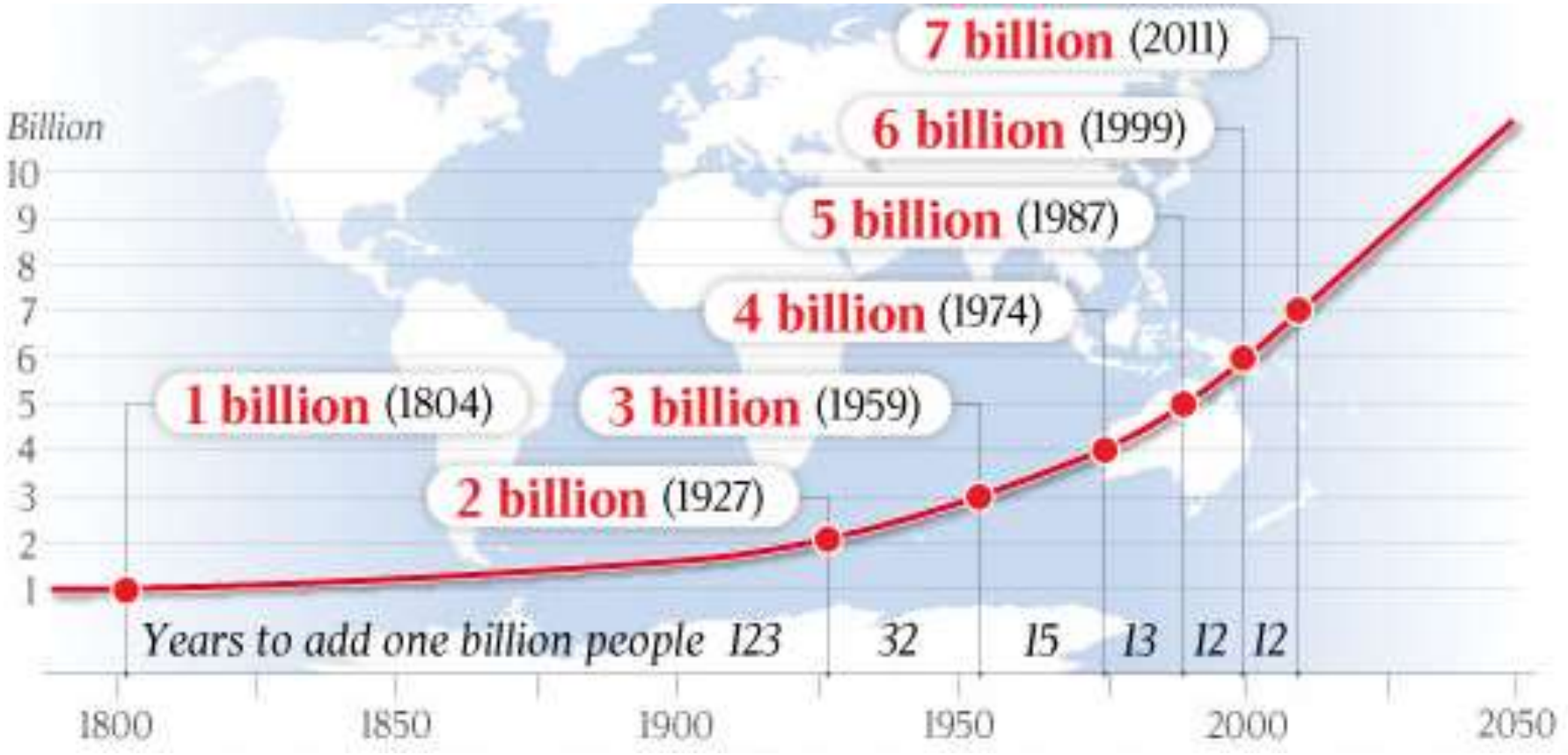
(2) **TECHNICAL INNOVATION, based on information technology, communications grids, big data, biological, biochemical, genetic and materials science technologies, robots, thinking machines;**

(3) **ECOLOGY THREAT, based on the relationship between humans and the Earth's ecological system, mainly atmosphere and climate balance, energy matrix, consumption, natural resources and biodiversity;**

(4) **SOCIAL EVOLUTION, based on changes of lifestyles, family structure and relations, working conditions, mobility, housing, leisure, culture and education patterns;**

(5) **ECONOMIC AND POLITICAL CHANGES based on new balances, interconnected holistic global/local economy, different relationship between capital, labour, markets and governments and new forms of democracy.**

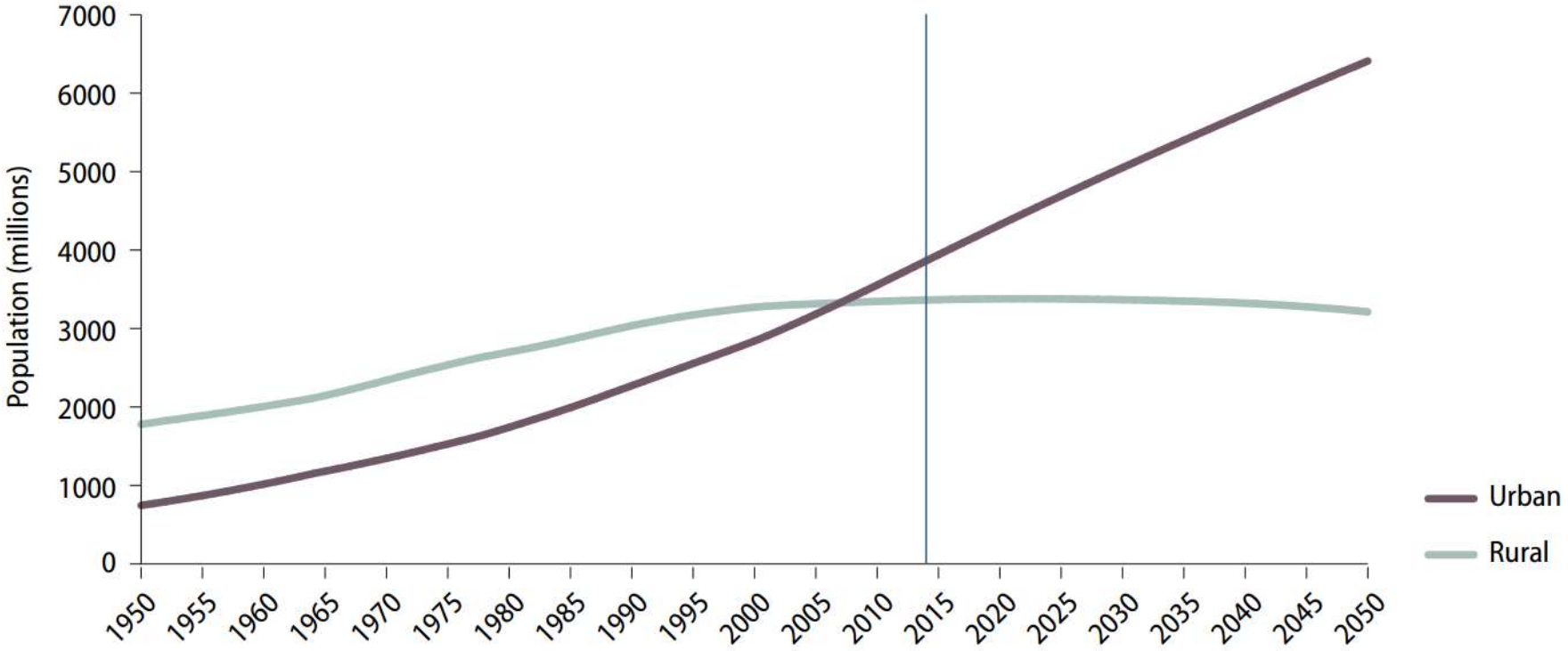
POPULATION EVOLUTION



World Population in increments of 1 bilion (source UN 2014)

It took 300 milion years to reach the first billion, 130 to add second billion, 30 years to add third billion, 15 years to add fourth billion, and now each billion come every 12 years period, including for future trend.

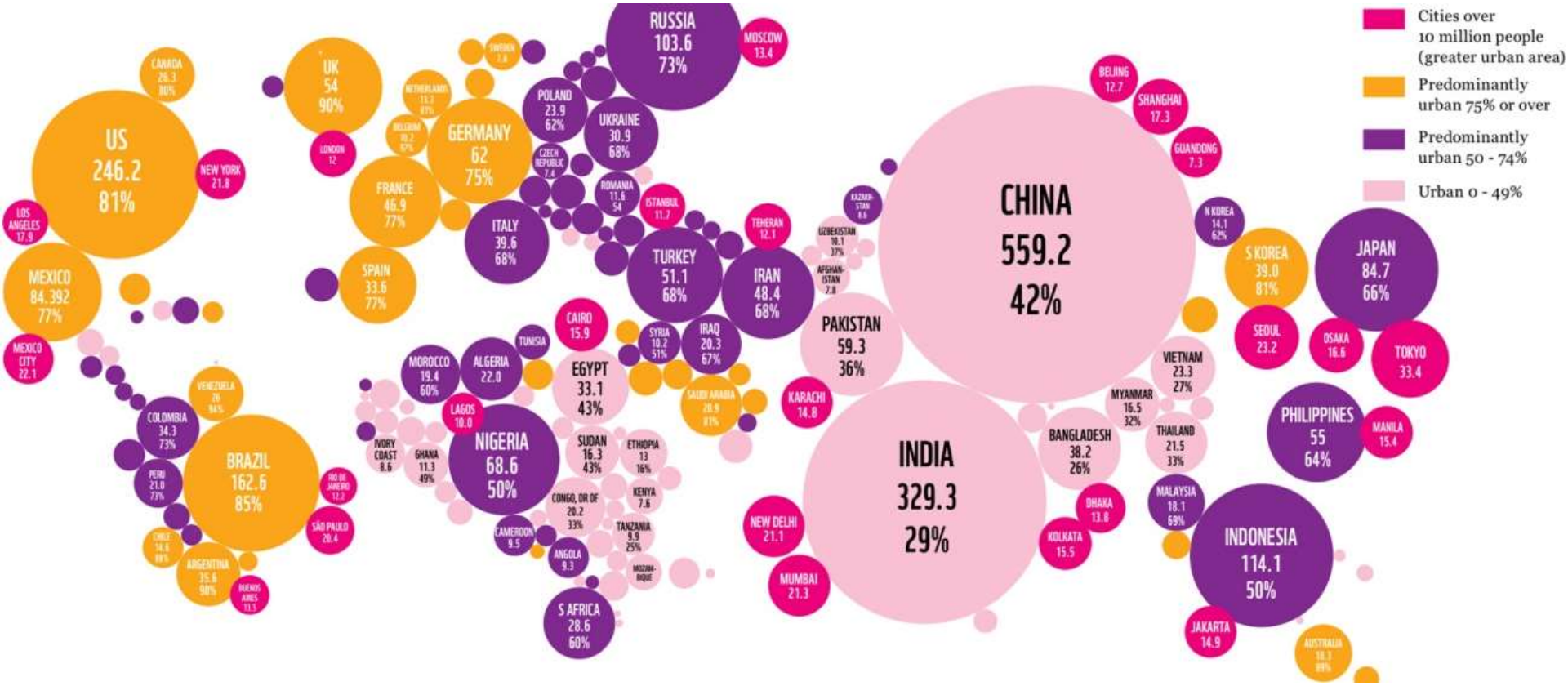
URBAN / RURAL POPULATION



Urban and Rural population (source UN 2014)

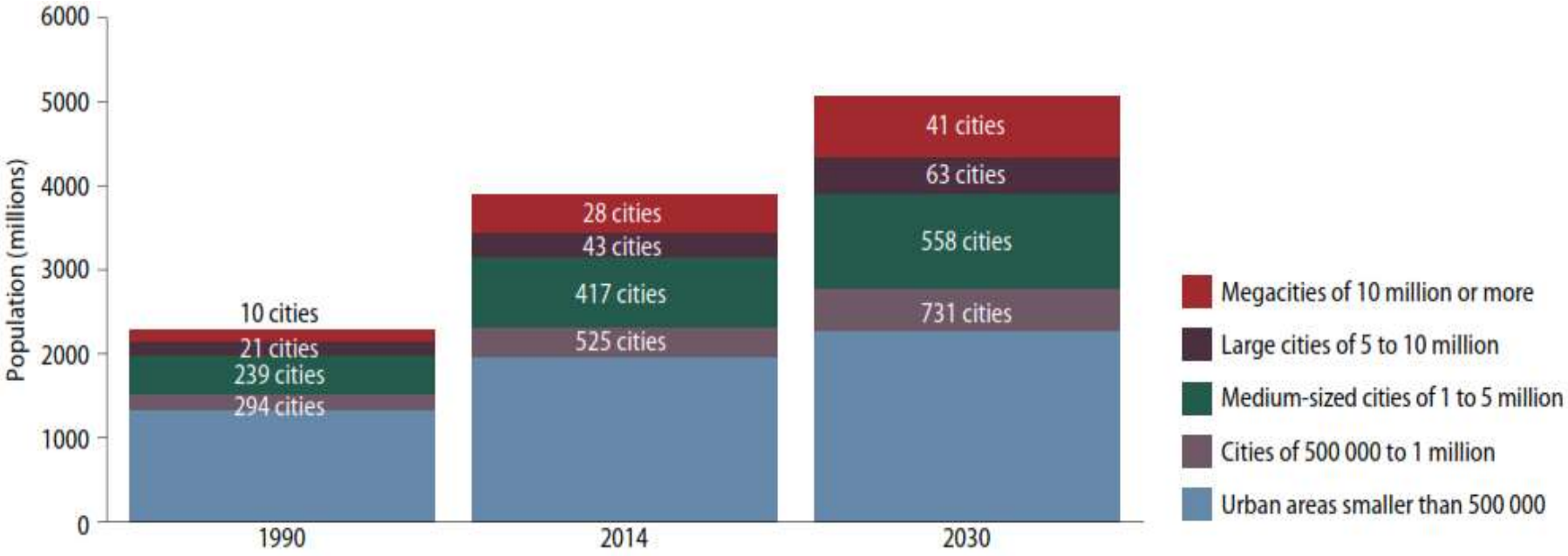
Today's reality of human settlements is urban. In 2007, 50% of the population lived in urban areas. In 2050, 66% is estimated.

CONCENTRATION OF POPULATION IN MEGA AND BIG CITIES



Global urban population growth in 2010 (source Business Insider)

CONCENTRATION OF POPULATION IN MEGA AND BIG CITIES



Small Cities Population Growth By 2050 (source UN)

SOCIAL CHANGES SHAPE CITIES

For example

- **Increasing life expectancy;**
- **family units shrunk because of birth rate decline;**
- **one-person households increased;**
- **working hours are diminishing and more flexible;**
- **number of hours devoted to culture, sports and leisure are increasing;**
- **mobility of work places obliges to a flexible housing market;**
- **number and size of travels are increasing;**
- **new lifestyle choices.**

TECHNOLOGY EVOLUTION TRANSFORME CITIES

For example

- **Increasing life expectancy;**
- **Steam engine,**
- **sewage collection systems,**
- **radio,**
- **rail road,**
- **metro underground,**
- **internal combustion engine,**
- **automobile,**
- **airplane,**
- **jet engine,**
- **steel,**
- **elevators and skyscrapers**
- **motorways,**
- **new glasses,**
- **television,**
- **real estate financing,**
- **solar cells,**
- **microchip,**
- **high-speed trains,**
- **space flight,**
- **personal computer,**
- **credit card,**
- **mobile personal phone,**
- **world wide web,**
- **containers ships,**
- **shopping centres,**
- **light mobility systems,**
- **recycling (RRR) systems,**
- **optic communication cable.**

CITIES MAIN ISSUES

1. CLIMATE CHANGE
2. ZERO CARBON
3. BIODIVERSITY
4. INTEGRATED GOVERNANCE

   (meta territorial and meta sectorial)
5. CIRCULAR ECONOMY
6. AFFORDABLE AND SUSTAINABLE HOUSING
7. MOBILITY AND TRANSPORTS
8. ECONOMIC, SOCIAL ANT TERRITORIAL COHESION
9. URBAN REGENERATION
10. PARTICIPATING DEMOCRACY
11. NEW EQUIPMENTS AND INFRAESTRUTURES

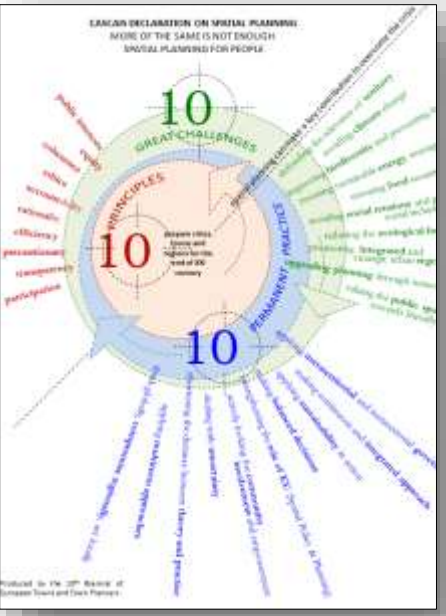
MAIN DOCUMENTS

THE CHARTER OF EUROPEAN PLANNING 2013

THE CASCAIS DECLARATION 2013

HABITAT III QUITO – NEW URBAN AGENDA 2016

URBAN AGENDA FOR EU – PACT OF AMSTERDAM 2016



NEW INFRASTRUCTURES FOR CITIES' FUTURE

For example

1. **Local small scale renewable energy technologies can substitute centralized energy systems;**
2. **smart grids and meters can benefit local communities;**
3. **clean public transport substituting existing ones;**
4. **buildings can be adapted instead of being demolished and reconstructed;**
5. **retrofitting of buildings to reduce energy demand;**
6. **turning buildings into power plants to collect energy on the facades and roofs;**
7. **avenues can be redesigned to pedestrians and bicycles, can have different uses during hours of the day;**
8. **dry sewage systems can save water;**
9. **fitting water capture and grey water recycling into homes to save 30% of water consumption;**
10. **local sewage treatment can substitute central ones;**
11. **water desalinization can save energy transporting fresh water from long way;**
12. **solid waste in anaerobic digesters to provide energy and compost.**

SOCIAL INNOVATION AND SOCIAL PATTERNS

The pattern of consumption can change:

- **from the property of the car to the mobility as a service,**
- **from the actual products consumption to sustainable ones,**
- **from owned used to share based using websites,**
- **application and networks platform's,**
- **from traditional democratic representative models to innovative forms of governance closer to direct democracy.**

examples

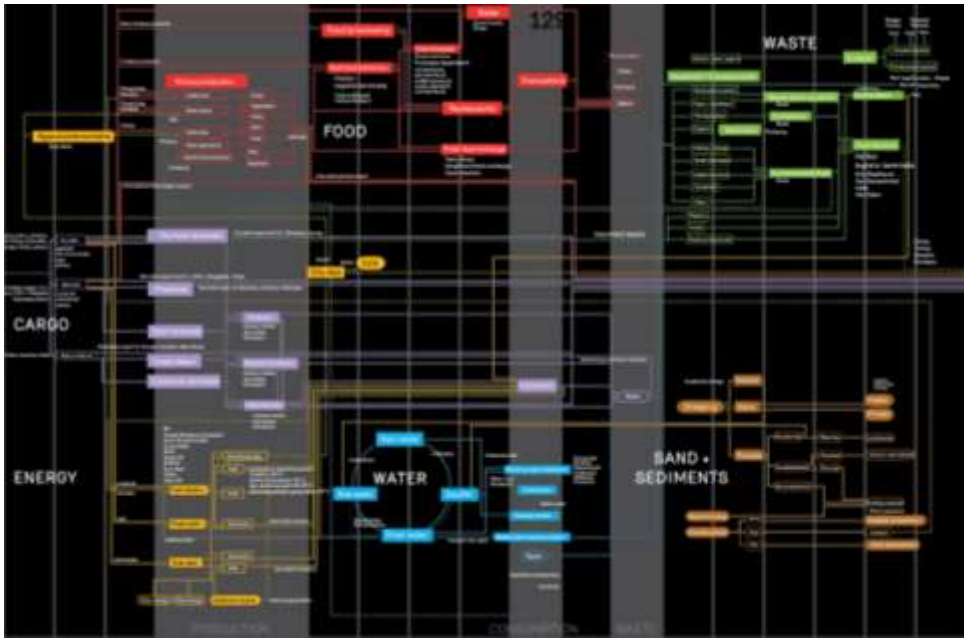
EXAMPLE – DATA ANALYSIS FOR URBAN MANAGEMENT

Spatial planning interventions (through infrastructures, equipment's and design models) that can save resources and minimize Green House Gases (GHGs) emissions.

EXAMPLE – URBAN FORM AND COMPACTIVITY

Urban form and compactivity can optimize urban resources consumption if used in a strategic way. It presents the ability of saving Land and energy;
It also prevents:

- **the production of construction material of building and infrastructures, as well as construction and demolition waste;**
- **costs of use and maintenance;**
- **costs of demolition, recycling and re-use.**



Compactivity is related to urban components closely fitted together.
In that sense, urban forms and commuter lines minimize walking and travel distances and times in public transport systems.

THE COMPACT CITY NEEDS THUS LESS RESOURCES FOR CONSTRUCTION, MAINTENANCE AND OPERATION OF INFRASTRUCTURES

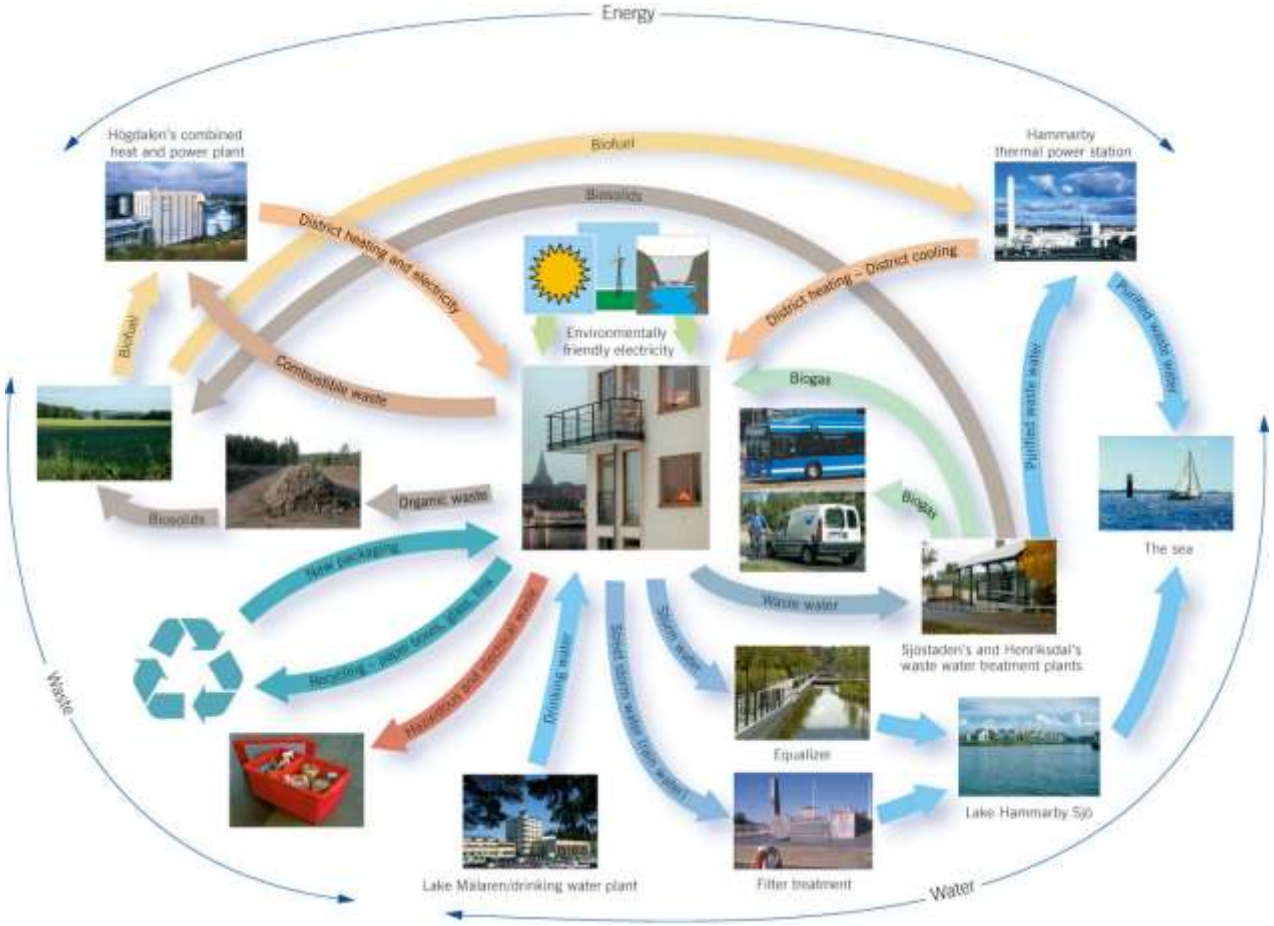
EXAMPLE – TOD-TRANSIT-ORIENTED DEVELOPMENT

Urban form and compactivity can be optimized with:

- **high densities, strategic nodes, and well-articulated networks, with mixed uses, and with a good balance between residents, jobs and equipments, and urban designs to promote walking and cycling;**
- **well-articulated networks such as:**
  - **soft mobility networks (such as walking and cycling routes);**
  - **mass transit systems in the strategic nodes (TOD-Transit-Oriented Development).**

EXAMPLE – ECO-NEIGHBORHOOD

- thermal power stations, district heating and industry networks;
- waste water treatment plants and biogas networks for cars and houses;
- waste water treatment plants and biosolids, to land to produce biofuel, to the heat and power plant;
- stormwater, watering gardens, street cleaning and toilet flushing networks;



EXAMPLE – GREEN AND BLUE NETWORKS

- Green and blue networks for a better climate balance, sustainable drainage system and protected drinking water supplies;
- Green and urban food production networks and biodiversity systems;
- Energy efficient buildings, quarters, neighborhoods and public space;

EXAMPLE – WATER TANK OF THE TOKYO METROPOLITAN AREA

- **Main water tank of the Tokyo Metropolitan Area Outer Underground Discharge Channel facility, 19 miles north of Tokyo, built to protect Tokyo megalopolis from flooding of heavy storms or typhoons. 177 meters long, 78 meters wide and 25 meters high. The water can be used to clean streets, water gardens and parks, and fire-fighting;**
- **The Sumo-wrestling arena in Sumida City uses the 8400 m^2 of roof tops to catch rainwater into a 1000m^3 underground storage. The water is used for toilet flushing and air conditioning. More than 1000 private and public building are using these systems;**

EXAMPLE – RAINWATER HARVESTING AT FRANKFURT AIRPORT

- The rainwater harvesting at Frankfurt Airport saves 1 million m^3 of water per year. The water is collected from 26800 m^2 of roofs and stored in six tanks, with a capacity of 100 m^3 each;
- The Singapore system of rainwater harvesting includes the utilization of: big roofs; high rise buildings; urban residential areas; and capturing urban runoff;
- Industrial Symbiosis is a model in which resources and energy are recycled and recovered instead of going linear. It turns the output (whether it's products, energy, water, food, waste or effluents) of one enterprise into inputs of another;

EXAMPLE – ECO-INNOVATION PARKS, PITTSBURGH

- **Eco-innovation parks promote various strategic objectives: waste management; energy efficiency; water management; flow of materials; renewable energy and industrial symbiosis;**
- **“Park and Ride” is an important component of TOD. Parking lots are located near cities rings and local transportation system (trams, buses) are, whenever possible, near big attraction parks, arenas, stadiums, etc;**
- **The parking lots shall have a big capacity and be almost free of charge during one to three days, so that people feel encouraged to use the public transport system;**

EXAMPLE – CATCH THE IRRIGATION WATERS, TAKE PHOSPHATES TO PRODUCE ALGAE

- **Carbon dioxide capture and utilization: process of capture and utilization of carbon dioxide to recycling purposes such as upcycling (turning waste into products of higher value such as bio-plastics, bio-alcohols, concrete and biofuel). It presents a true potential for mitigating fossil fuel emissions;**
- **Surpluses of phosphors and nitrogen nutrients of agriculture can be re-used in aquaculture and algae production in the health and cosmetic products industry;**
- **Dry sewage systems can save fresh water;**

EXAMPLE – FLEA MARKETS AND SECOND HAND MARKETS, BRATISLAVA

- **Flea markets and second hand markets provide the opportunity to buy household items, clothes, jewelry, bicycles, etc. These items can be sold by the owner or by a reseller, thus applying the principles of "reuse" and life cycle of products extension. It is important that Municipalities support these markets.**

- **Misfit markets deliver ugly but edible fruits and vegetables One fifth of production is trashed because it is not attractive to the eye, although presenting the same quality. Ugly fruits and vegetables are generally sold 30 to 50 percent cheaper than "normal" retail prices.**

EXAMPLE – FLEA MARKETS AND SECOND HAND MARKETS, BRATISLAVA

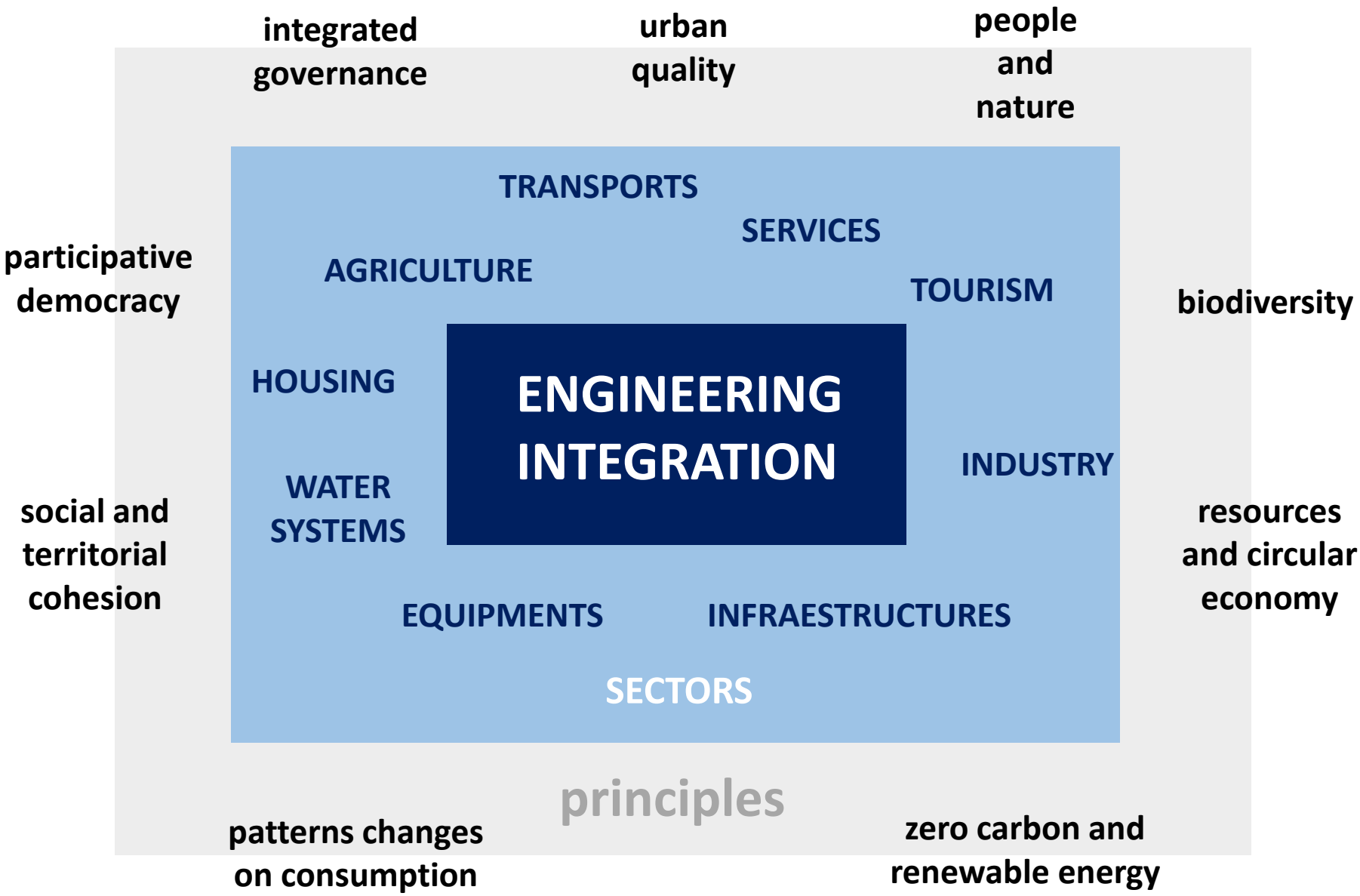
It is necessary to promote these misfit markets and delivery companies in order to reduce food waste.

It is necessary to overcome five operational challenges:

- **the systematic destructions;**
- **the efficient distribution;**
- **the liability;**
- **the profitability;**
- **the location.**

final argument

ROADMAP FOR SMART CITIES



https://sites.google.com/view/planning4all

THANK YOU

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