Smart Cities and the Internet of Things

Conquering Complexity in a New World


“ We live in a world of cities ”

Mumbai

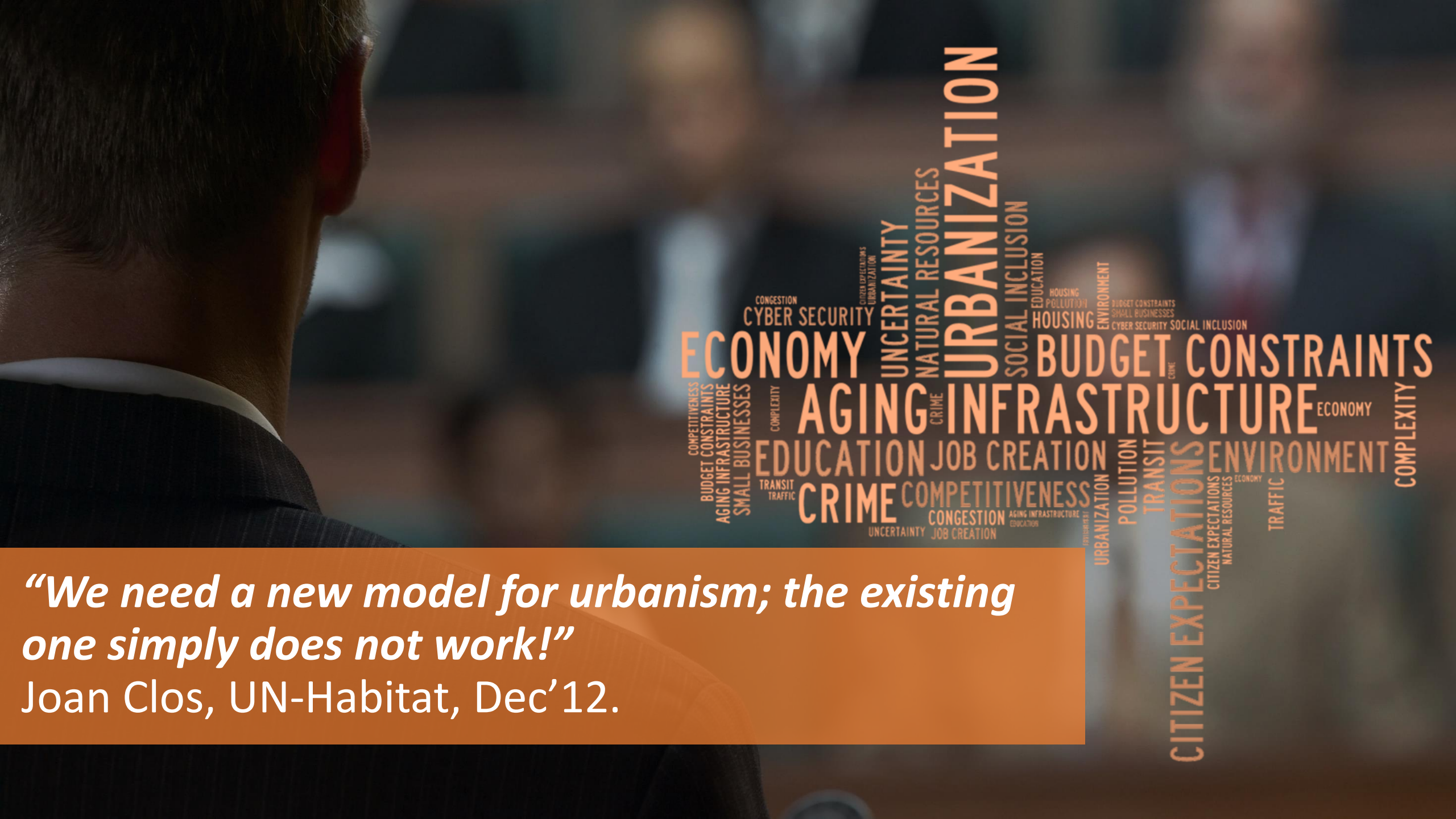
Tokio

San Francisco

Amsterdam

Barcelona


MAR MEDITERRANEO

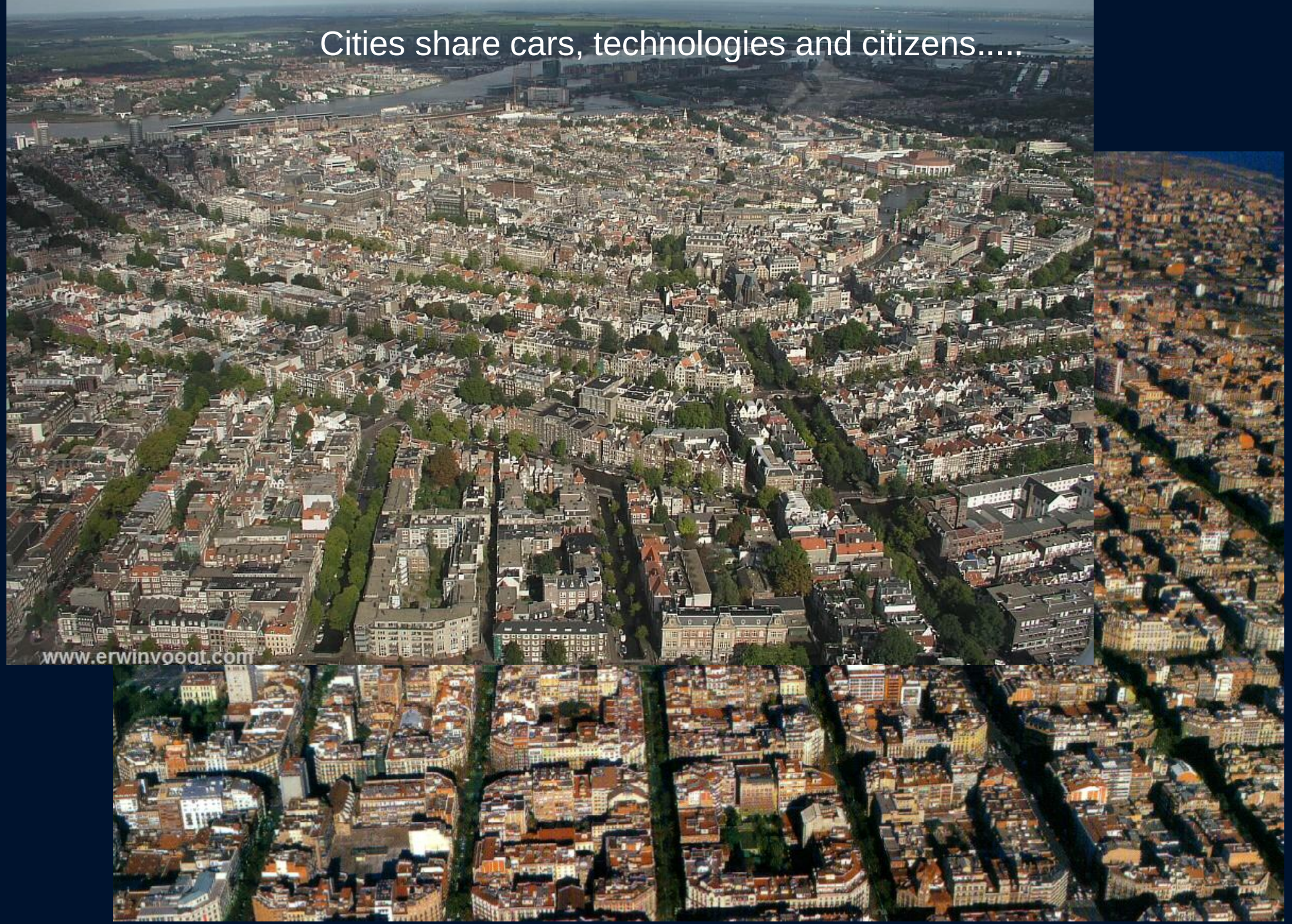


"We need a new model for urbanism; the existing one simply does not work!"

Joan Clos, UN-Habitat, Dec'12.

Cities share cars, technologies and citizens.....

Cities share cars, technologies and citizens.....



Cities share cars, technologies and citizens.....

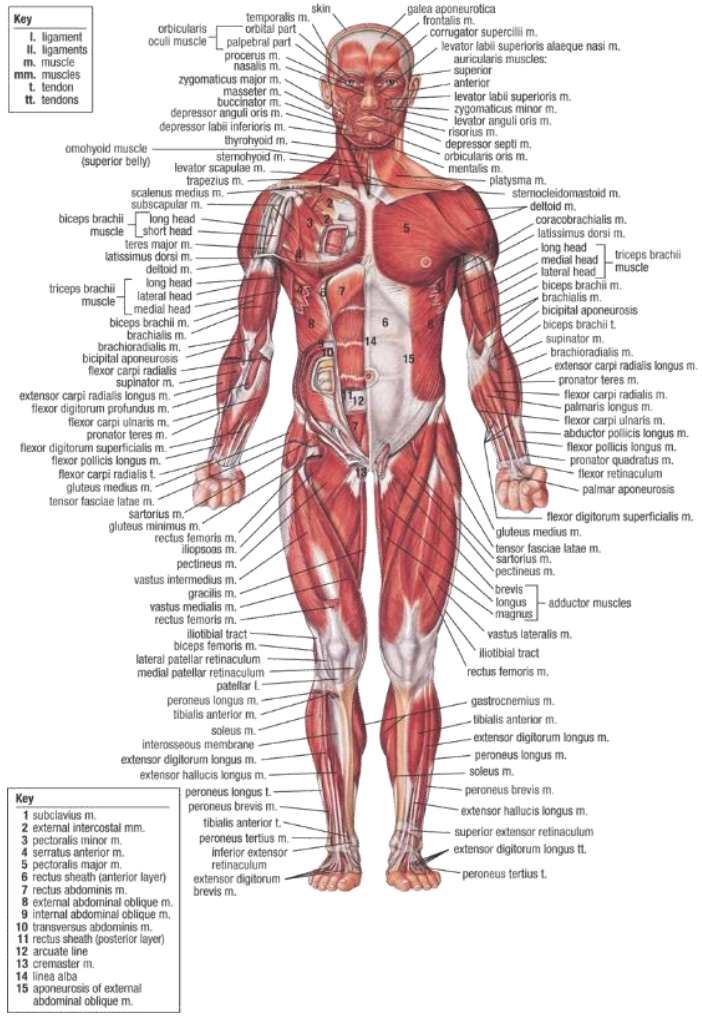
... And should share STANDARS

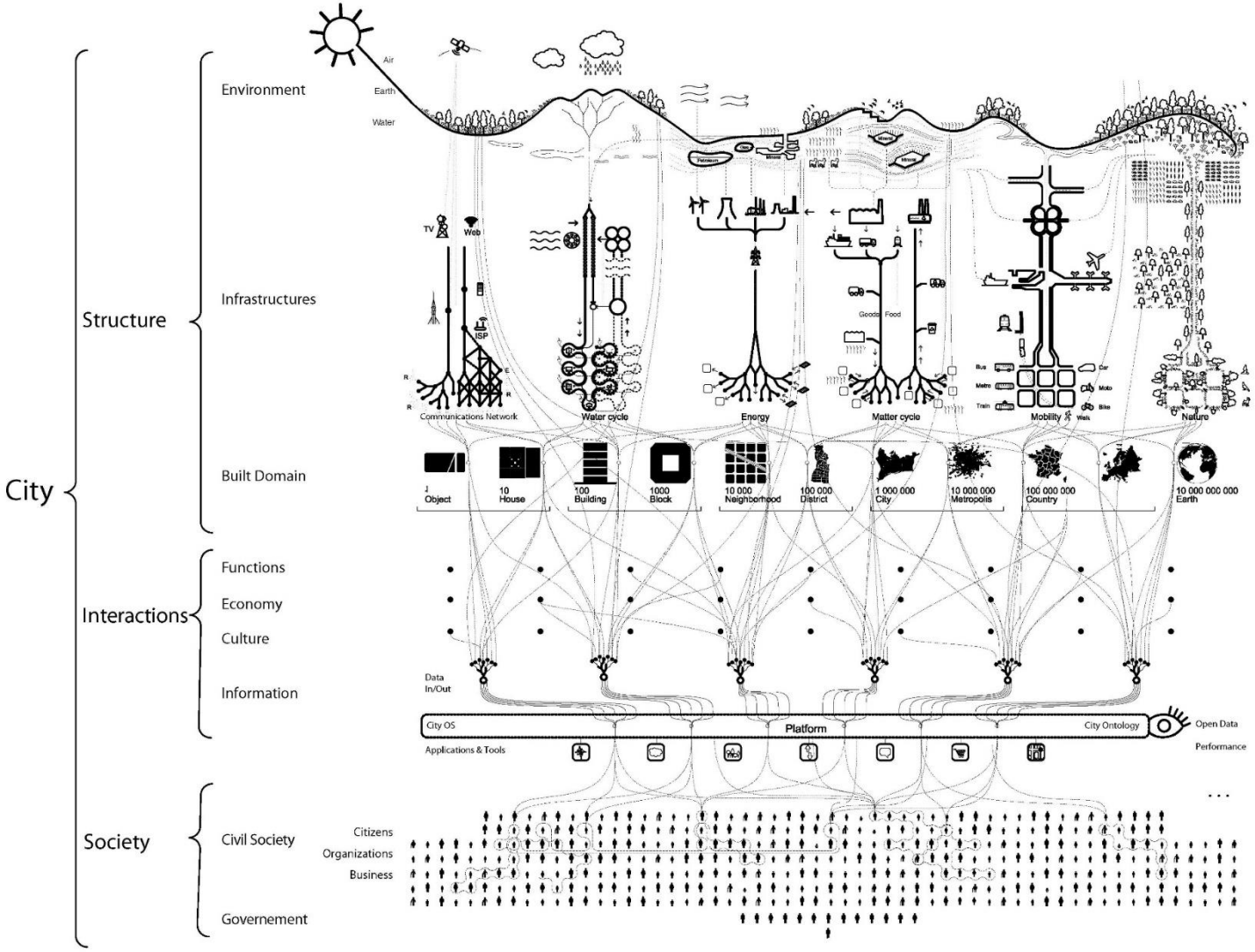
Smart Cities

The Internet of Things

City Anatomy – (physiology)

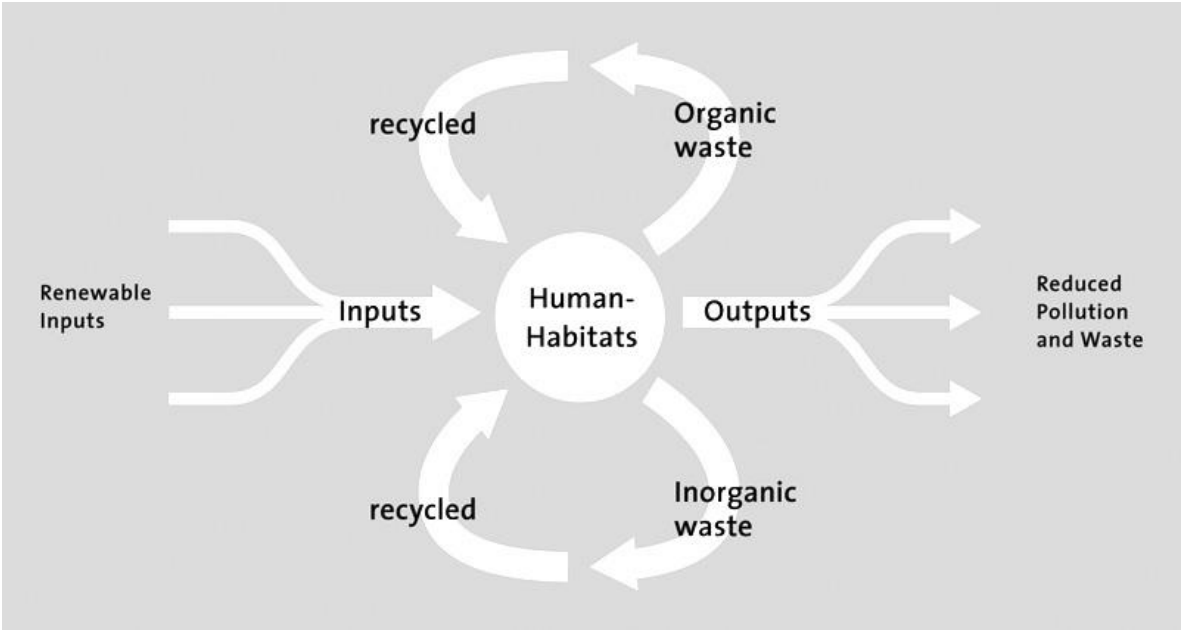
a common language for cities





City Physiology - The Urban Metabolism

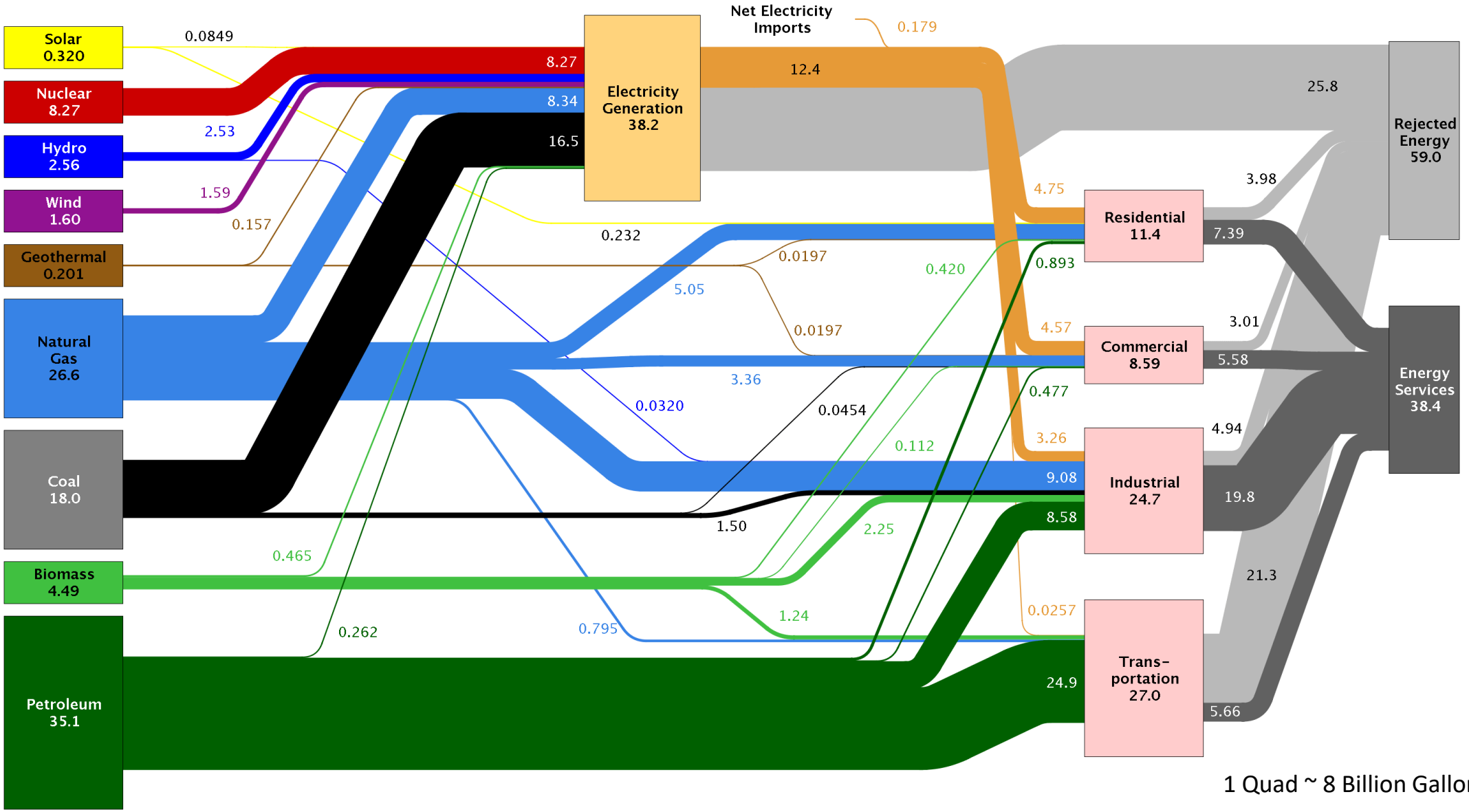
"*With the **growing concern of climate change** and atmospheric degradation, the use of the **urban metabolism model has become a key element in determining and maintaining levels of sustainability and health in cities** around the world.*"
from Wikipedia 'Urban Metabolism'



World Bank effort to measure the Urban Metabolism of the top 100 cities in the world.

Estimated U.S. Energy Use in 2013: ~97.4 Quads

Lawrence Livermore National Laboratory

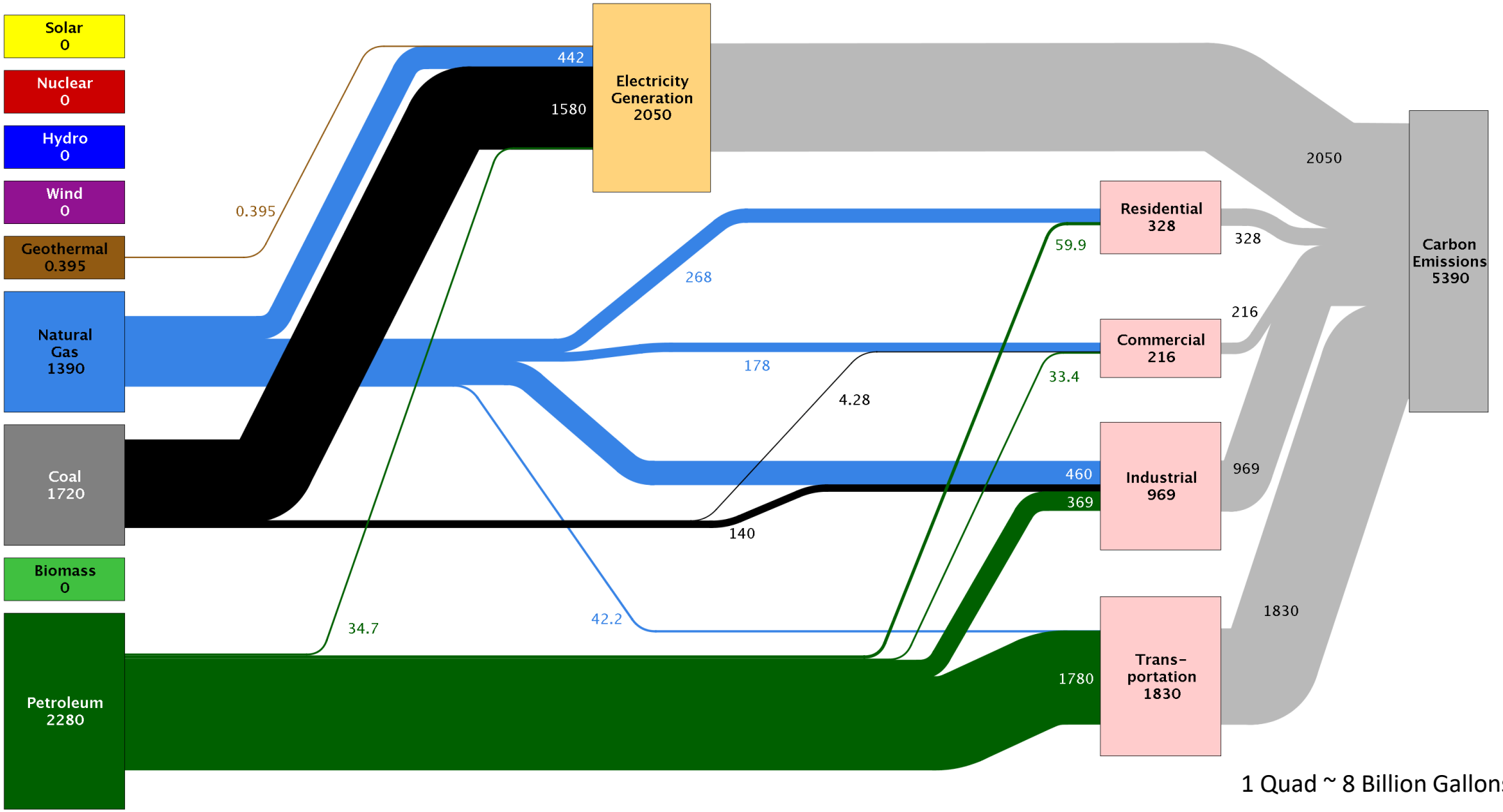


1 Quad ~ 8 Billion Gallons of gas

Source: LLNL 2014. Data is based on DOE/EIA-0035(2014-03), March, 2014. If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant "heat rate." The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential and commercial sectors 80% for the industrial sector, and 21% for the transportation sector. Totals may not equal sum of components due to independent rounding. LLNL-MI-410527

Estimated U.S. Carbon Emissions in 2013: ~5,390 Million Metric Tons

Lawrence Livermore National Laboratory



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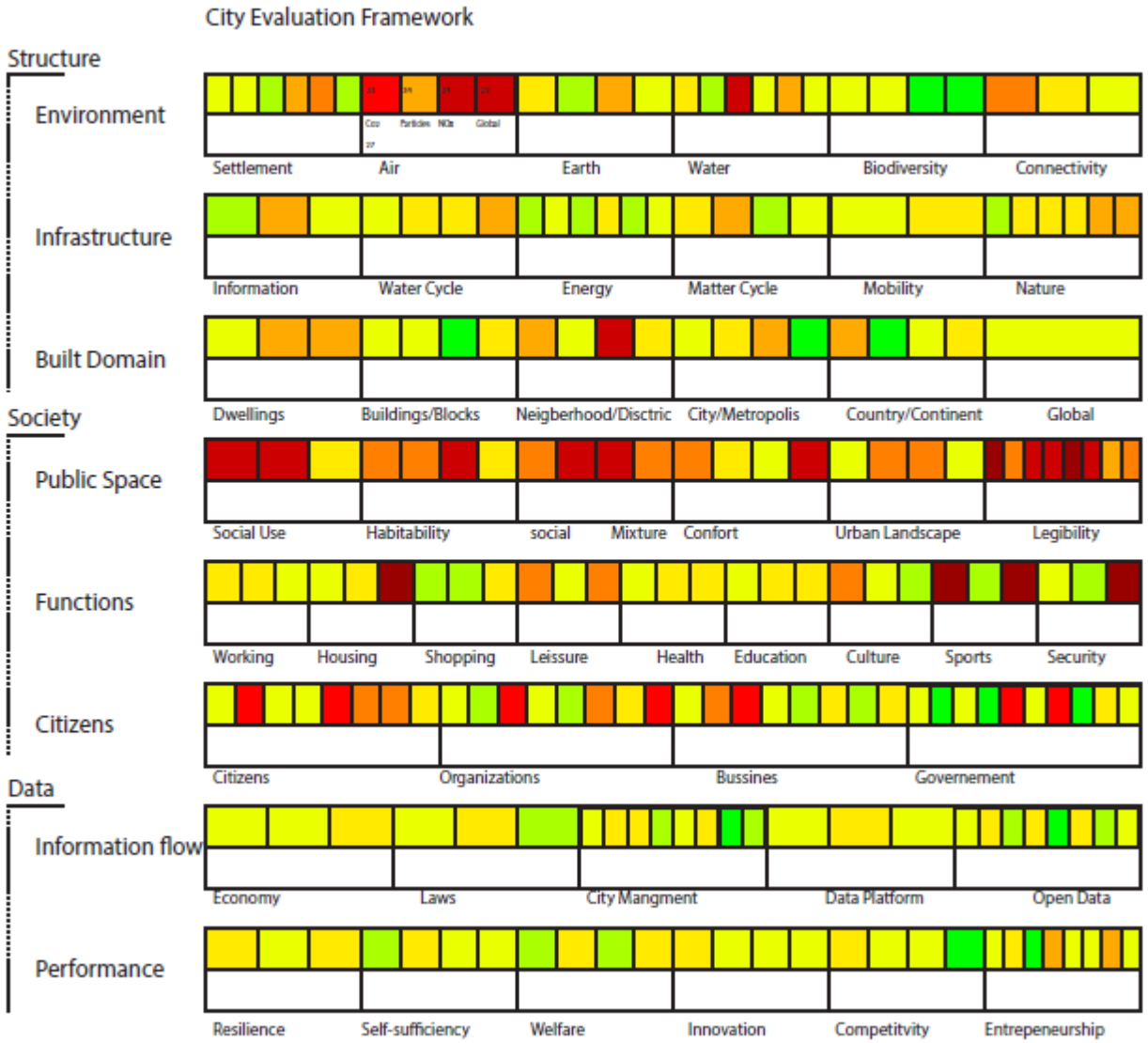
City Dashboard against the new City Anatomy



What is the Internet of Things?

> The network of physical objects that contain embedded technology to communicate and interact with their internal states or the external environment.

Source: Gartner

The 4th Revolutionary Wave of Technology

Internet has changed our life but it hasn't changed our cities, yet

MOBILE DEVICES

BIG DATA

CLOUD

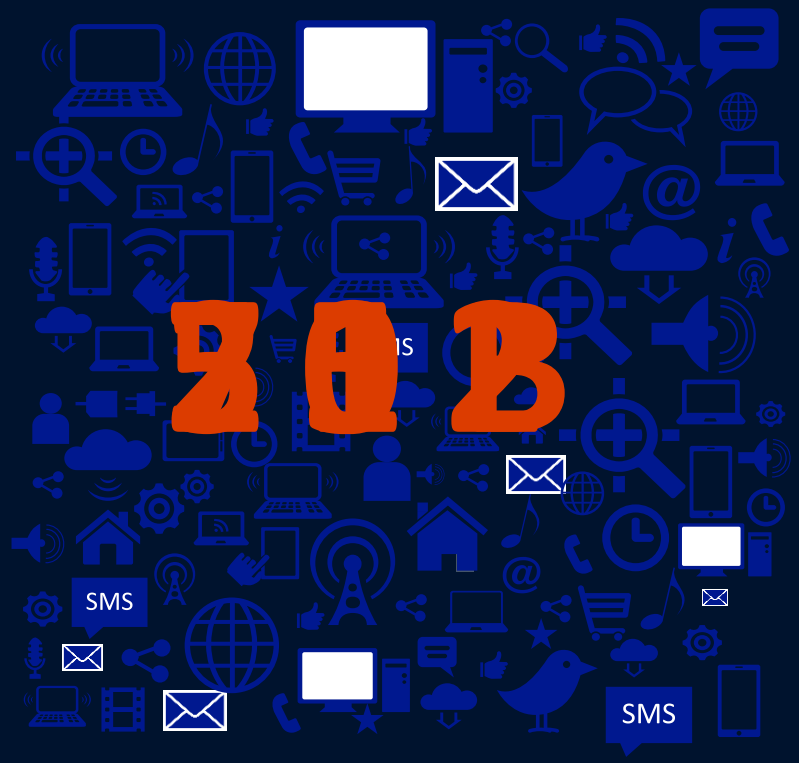
SOCIAL

NATURAL INTERFACE

The Internet of Things is complex

It's Big

So many devices and so much data…



It's Noisy

So many opinions…

Gartner

IDC
Analyze the Future

FORRESTER

intel

CISCO

ORACLE

IBM

Google

It's Confusing

So many possible decisions…

How (where) do we get started?

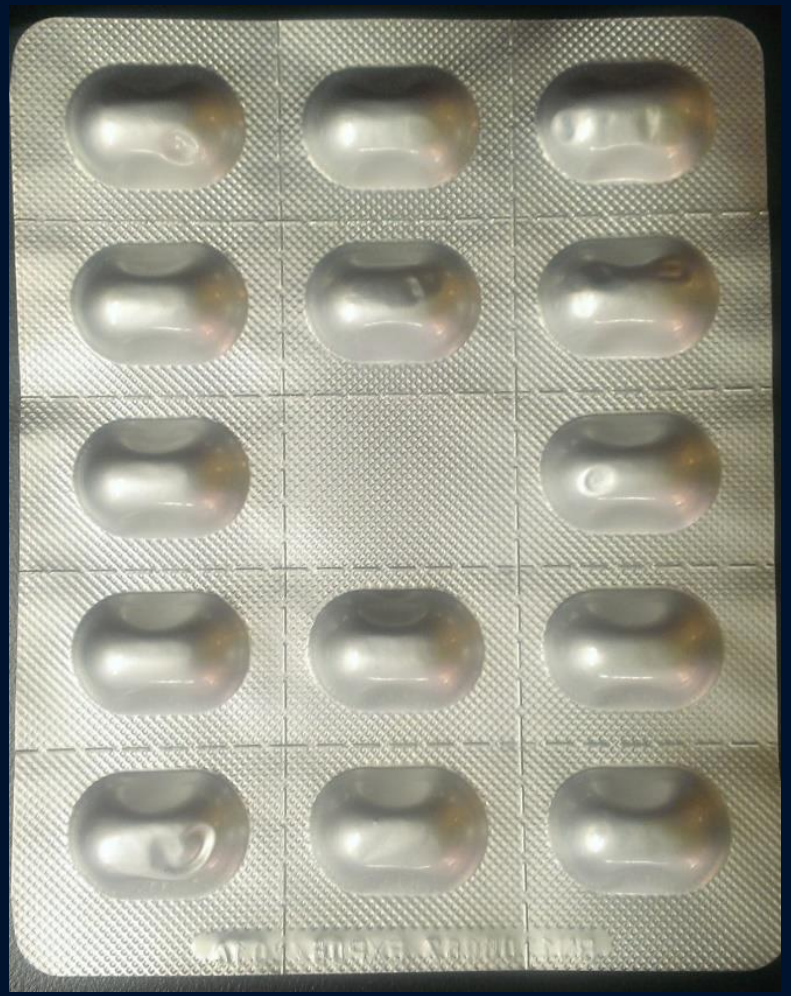
Who can really help us?

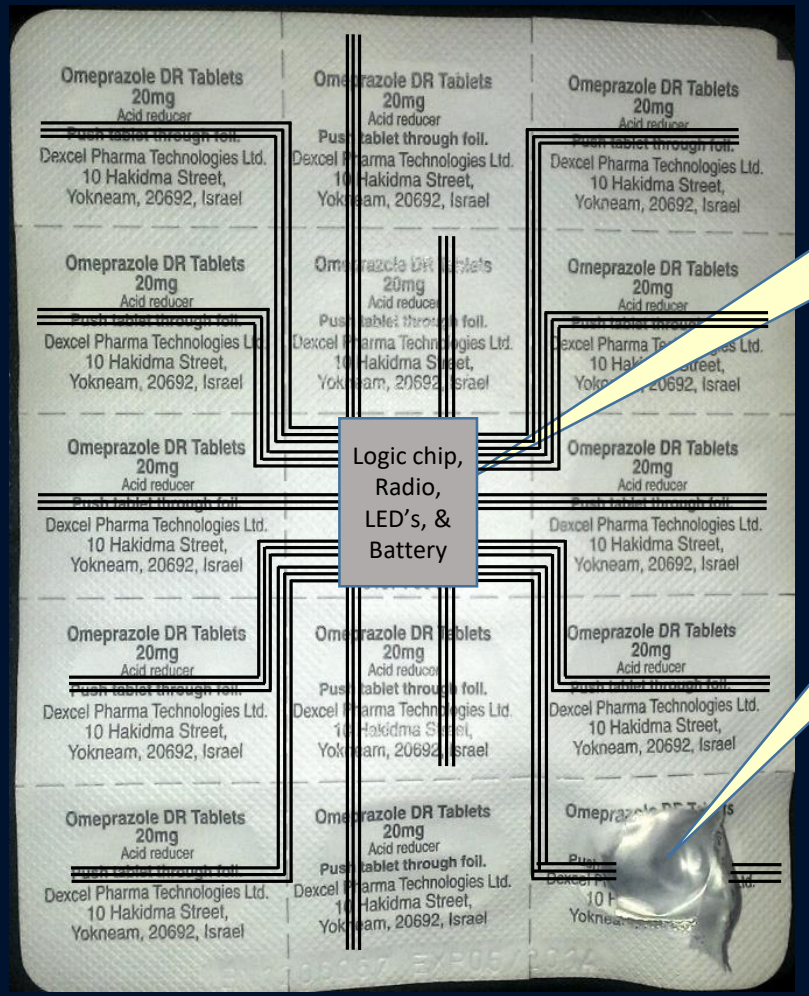
Do we need to start over?

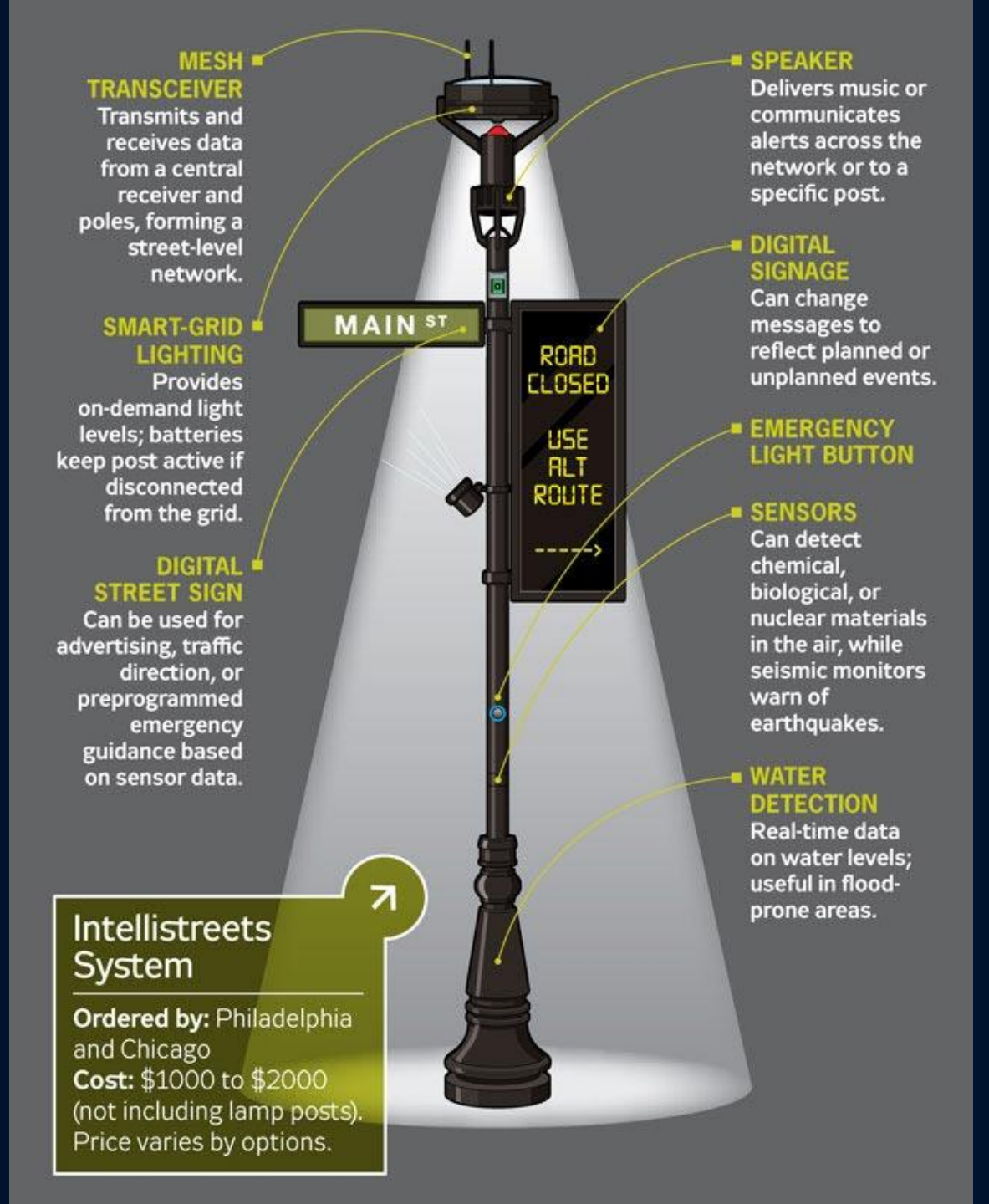
What technology do we need?

Should we wait?

New Opportunities







From http://www.popularmechanics.com/technology/engineering/infrastructure/smart-everything-even-lamp-posts-are-now-connected

Data


Protect
.0297 -0.1324 8.4854 963.8712
001010101101010101010101
1820 -0.1407 0.0297 -0.1324
Social Number
SSN
Security Information
Communication
People Network

Courtesy of ABC News

What is Open Data?

Making public data broadly accessible and usable by humans and machines, free of any technological, legal, or usability barriers. Based on the principles of:

Transparency

Enable greater accountability, efficiency, and economic opportunity by making government data more open.

Participation

Through direct involvement of citizens and developers to deliver better and more cost-effective government-based services.

Collaboration

Generate new ideas for problem solving by fostering cooperation across levels of government, agencies, and with the public.

Open Data typically does not contain personal or identifiable information about private citizens that is not otherwise available through existing government services.

Open Data around the World

"Release of public sector information creates opportunities for innovative use and reuse of data, and allows the commercial, research, and community sectors to add value."

Australian Government [2013]

"It enables data-driven decision making: parliamentarians, policy makers, civil society organizations and individuals can see progress and make accurate, informed decisions on issues that affect people's lives."

Kenya Open Data Initiative [2013]

"Openness will strengthen our democracy and promote efficiency and effectiveness in Government."

Barack Obama, President of the United States [January 2009]

"The next generation of innovation in… academic research or public services will be possible because we find new ways to harness and learn from data."

World Economic Forum [December 2013]

"It makes the government more accountable to citizens and strengthens our democracy. It brings us better public services and it feeds economic and social growth."

Data.gov.uk [2013]

"By opening up more data, and through innovative use of technology, we can crowd-source ideas and co-create applications with the wider community."

Tharman Shanmugaratnam, Singapore Deputy Prime Minister [April 2013]

"Not only are we making more effective decisions through improved use of data, but also involving communities, making them more informed and empowering them to deal with future challenges."

World Economic Forum [January 2013]

bigov Better City Indicators

City Council Scorecard

bism@rt
Power your business

Education

1,002.08
Total figure of students

Number of students in music schools
177.65
Var Yago: 100% Var target: -54.01%

Number of students in semiprivate schools at...
624.91
Var Yago: -6.17% Var target: -33.51%

Number of students in English language schools
309.22
Var Yago: -28.42% Var target: -17.94%

Number of students in state schools at infant...
1,047.95

166.66
Number of students in French language schools

Entrepreneurship

Startup businesses
649

New jobs created
3,298.22
Var Yago: 59% Var target: 15.7%

New entrepreneurships supported
663.81
Var Yago: 44% Var target: 19.0%

Public services

1,422.77
M3 water consumed in municipal facilities by term

M3 water consumed per citizen by month
3.45
Var Yago: -8.73% Var target: 8.70%

M3 water consumed by term
613.23

Numb
Var Yago:

Numb

Numb
license

bigov Better City Indicators

City Council Scorecard

bism@rt
Power your business

Economic activity

Business, industrial, services and mining

943.02

Var Yago: -89.70% Var target: -39.38%

% New business licenses in commercial sector

30.97%

Var Yago: -35.03% Var target: 12.0%

Professional activities

5,030.89

% New business licenses in books and magazines in...

26.52%

Artistic activities

571.91

% New business licenses in transport in commercial...

36.41%

Economic indicators

Development of economic activity in the city

19,712

Var Yago: 9.67% Var target: 2.12%

Development of vehicle census

2,673.82

Development of industrial census

3,572.97

Var Yago: 53% Var target: -58.81%

Development of TAX census

5,541.42

Educa

Total fi

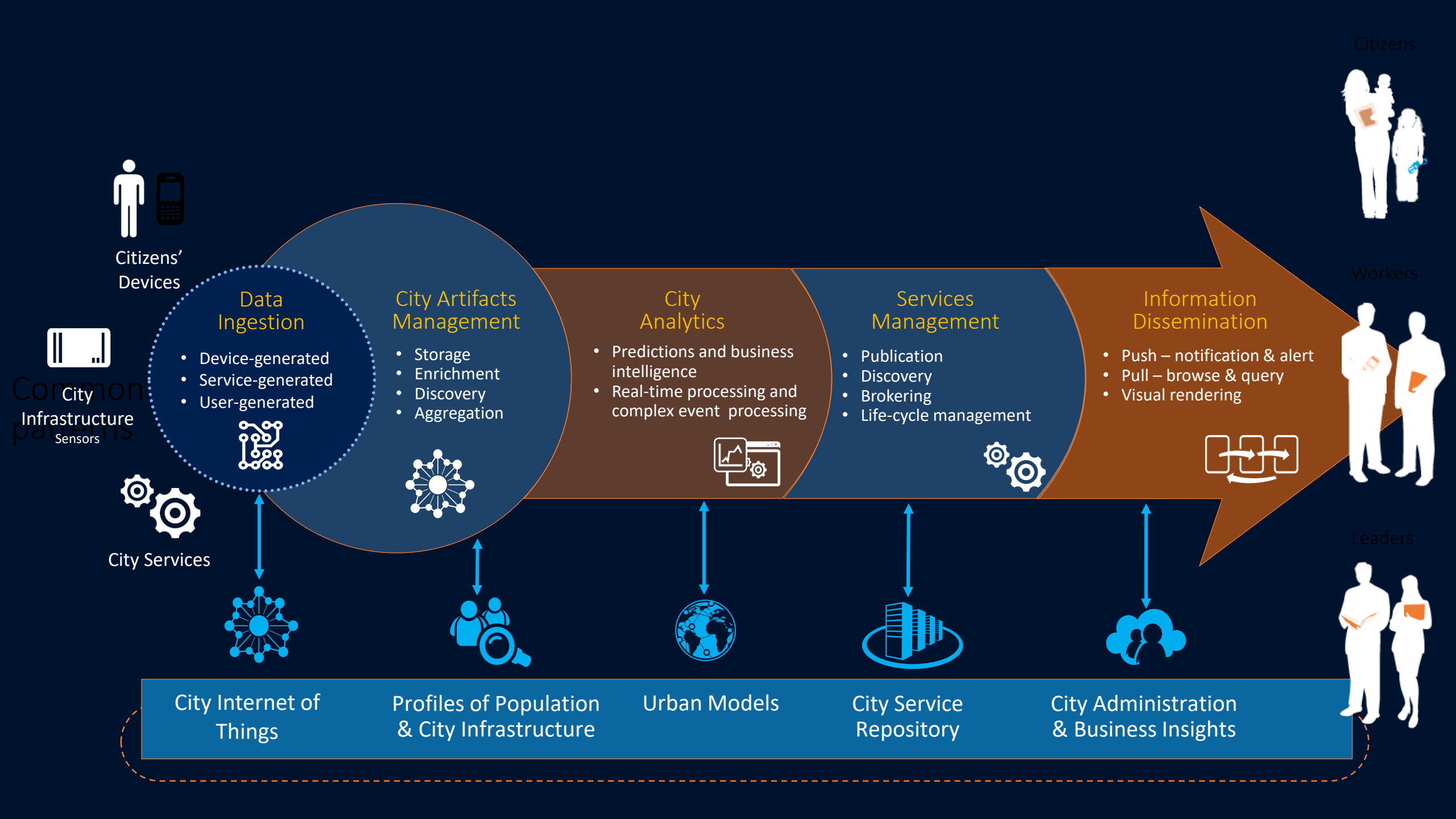
Var Yago:

Numbe semipr

6

Numbe state sc

1,


Citizens
Citizens' Devices
Data Ingestion
• Device-generated
• Service-generated
• User-generated
City Artifacts Management
• Storage
• Enrichment
• Discovery
• Aggregation
City Analytics
• Predictions and business intelligence
• Real-time processing and complex event processing
Services Management
• Publication
• Discovery
• Brokering
• Life-cycle management
Information Dissemination
• Push – notification & alert
• Pull – browse & query
• Visual rendering
Workers
Leaders
City Infrastructure
Sensors
City Services
City Internet of Things
Profiles of Population & City Infrastructure
Urban Models
City Service Repository
City Administration & Business Insights

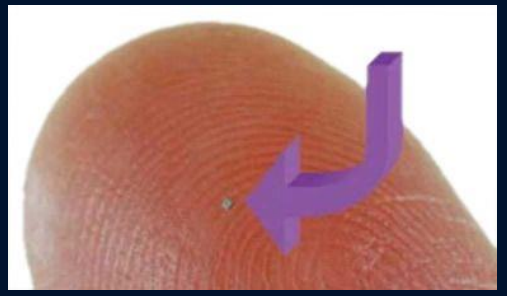
Monitor, Early Warning, Check Compliance

Source: Huggies

Source: Proteus

Source: Botanicalls

Source: Big Belly



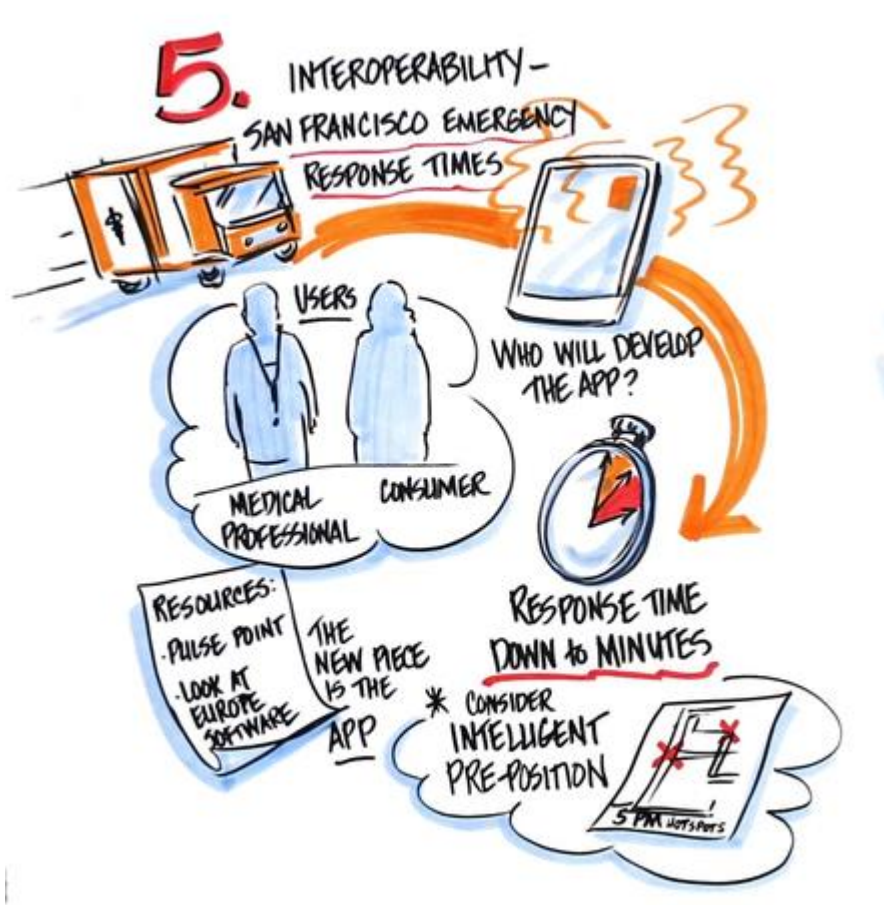
Smart Dust

Hitachi RFID

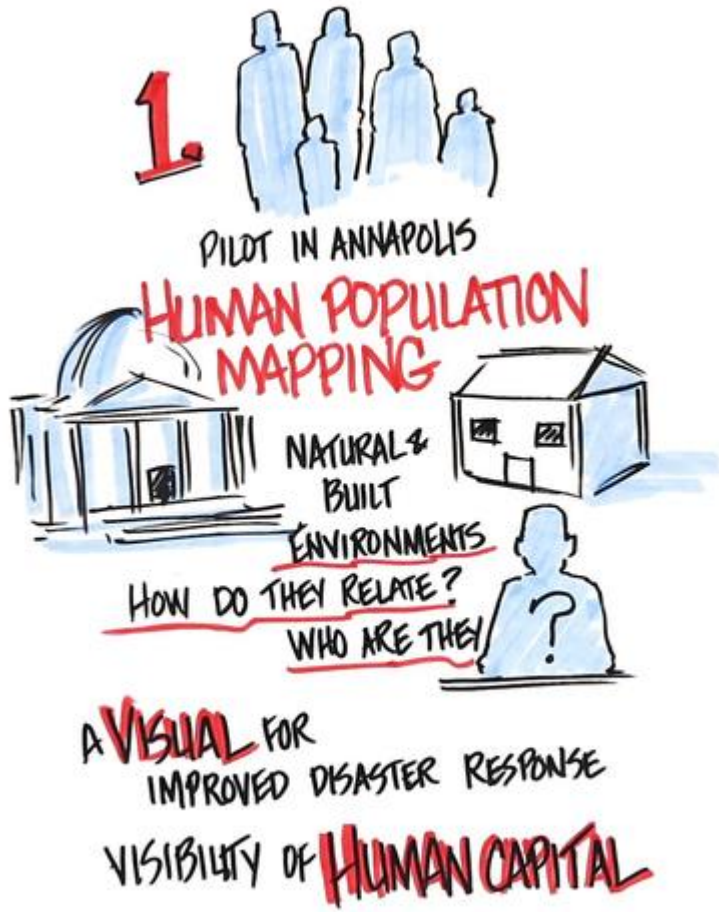
New Business Models

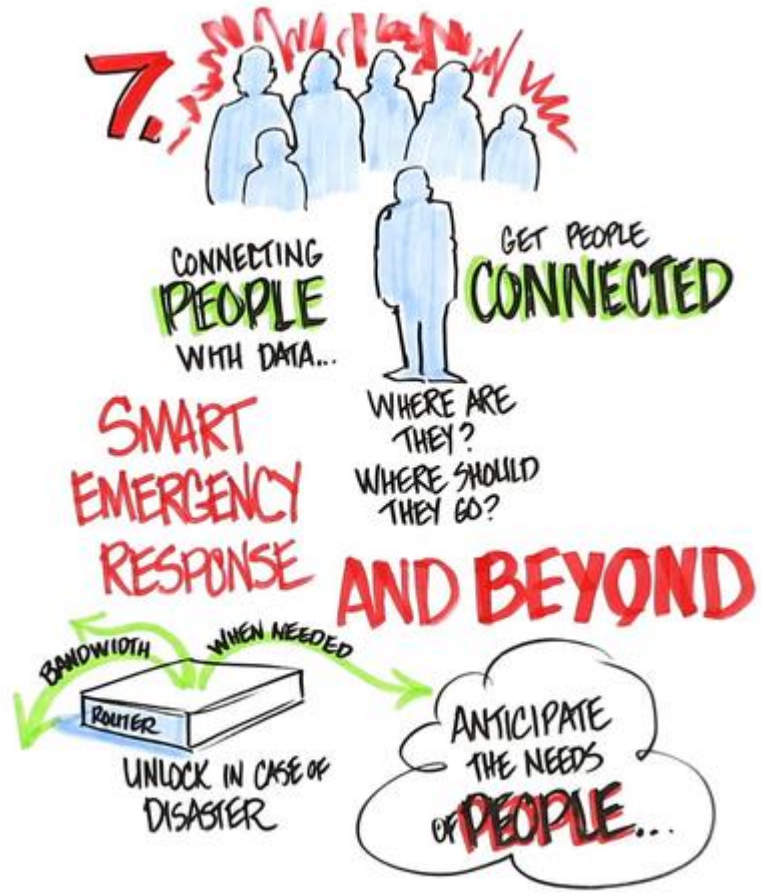
Creative Public Private Partnerships to meet big challenges & spark new opportunities

Global City Teams Challenge


5. INTEROPERABILITY -
SAN FRANCISCO EMERGENCY
RESPONSE TIMES
USERS
MEDICAL PROFESSIONAL
CONSUMER
WHO WILL DEVELOP THE APP?
RESOURCES:
· PULSE POINT
· LOOK AT EUROPE SOFTWARE
THE NEW PIECE IS THE APP
RESPONSE TIME DOWN to MINUTES
* CONSIDER INTELLIGENT PRE-POSITION
5 PM HOTSPOTS


13. NUDGING BEHAVIOR
WITH SMART DATA
HOW MUCH DO YOU KNOW?
IF YOU HAD ALL THE INFO, WOULD YOU DO THINGS DIFFERENTLY?
WATER BILL
USAGE DATA IN $
MY SAVINGS IN $
ONE POINT of ACCESS
TO THE NUMBERS..
"I PLAYED A GAME WITH MY HYBRID - GAVE UP SPEED FOR SAVINGS..."
REWARDS:
PERSONAL & COMMUNAL
EDUCATION:
HOW TO SAVE


1.
PILOT IN ANNAPOLIS
HUMAN POPULATION MAPPING
NATURAL & BUILT ENVIRONMENTS
HOW DO THEY RELATE?
WHO ARE THEY?
A VISUAL FOR IMPROVED DISASTER RESPONSE
VISIBILITY OF HUMAN CAPITAL


7.
CONNECTING PEOPLE WITH DATA...
GET PEOPLE CONNECTED
WHERE ARE THEY?
WHERE SHOULD THEY GO?
SMART EMERGENCY RESPONSE
AND BEYOND
BANDWIDTH
WHEN NEEDED
ROUTER
UNLOCK IN CASE OF DISASTER
ANTICIPATE THE NEEDS OF PEOPLE...

"Cities are power plants of human energy which creates jobs through innovation"

Jim Clifton
Chairman, Gallup

The laboratories of our future