INTRODUCTION TO
INTERNET OF THINGS (IOT) & SMART CITY

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June 21, 2016

KEVIN ASHTON – "FATHER OF THE IOT"

Kevin Ashton coined "Internet of Things" during his job at MIT Auto-ID Center

"So you get stuff like the smart wine bottle, the smart bikini, and the smart water bottle. This stuff is not the Internet of Things – this stuff is all rubbish."

He believed **IoT could "turn the world into data" that could be used to make macro decisions on resource utilization.**

"**Information is a great way to reduce waste and increase efficiency, and that's really what the Internet of Things provides**"

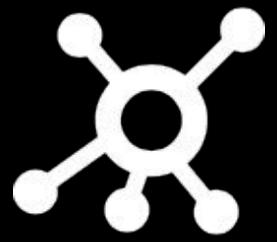
[Source: The Reimagination Thought Leaders Summit ,Sydney, 17 November 2015]

TECHNOLOGIES THAT ENABLE IOT

Big data
(unstructured
data)

IPv6

Cheap sensors
(50% cheaper)

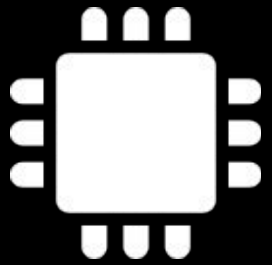


Cheap bandwidth
(40x cheaper)

For the Past 10 Years

Ubiquitous wireless
coverage
(free wifi)

Smartphones
(personal gateway)



Cheap
processing &
smarter
(60x cheaper)

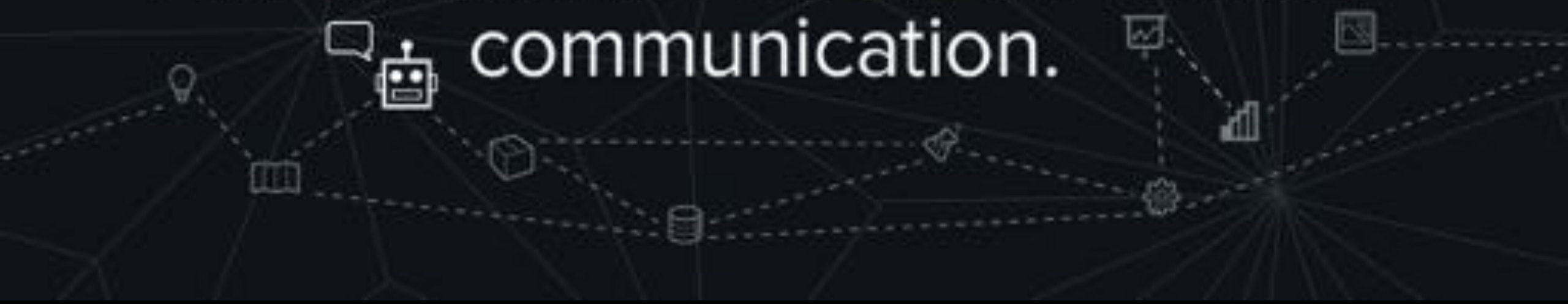
The Internet is currently a human-to-human affair,

but that is **CHANGING.**

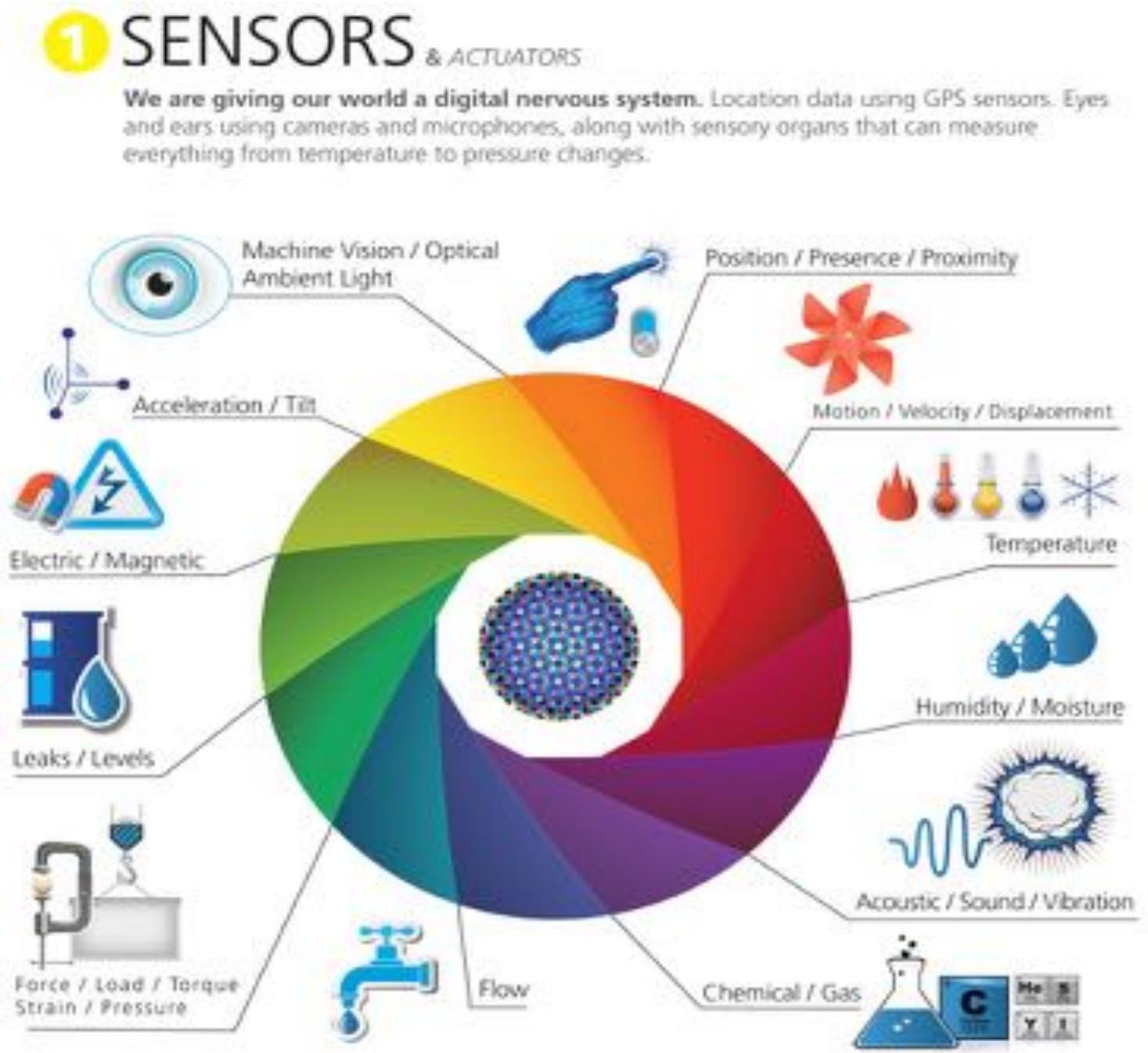
The Internet of Things is

EVERYTHING to **EVERYTHING**

communication.



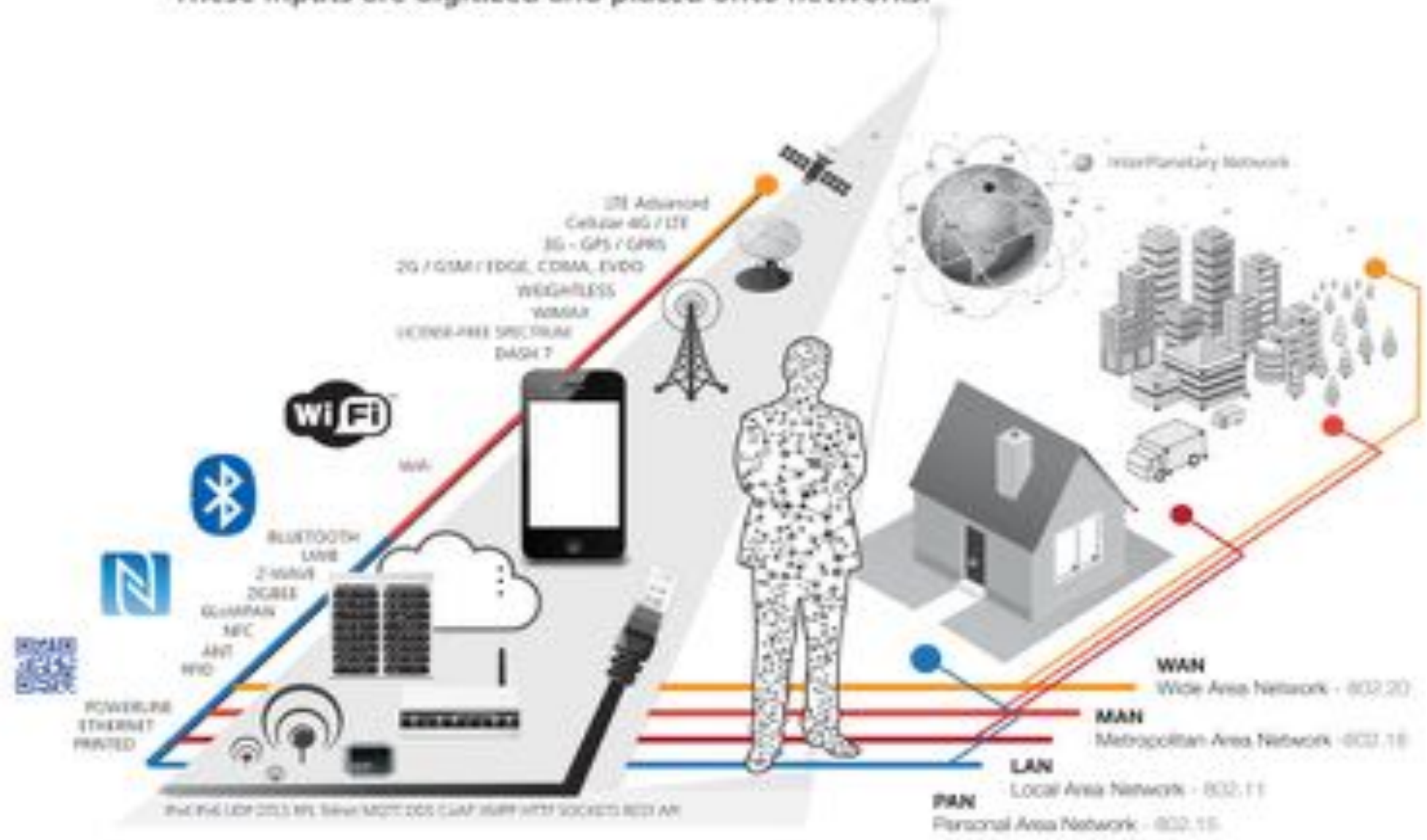
VIDEO - FACEBOOK OF THINGS



[Source: http://postscapes.com/what-exactly-is-the-internet-of-things-infographic]

2 CONNECTIVITY

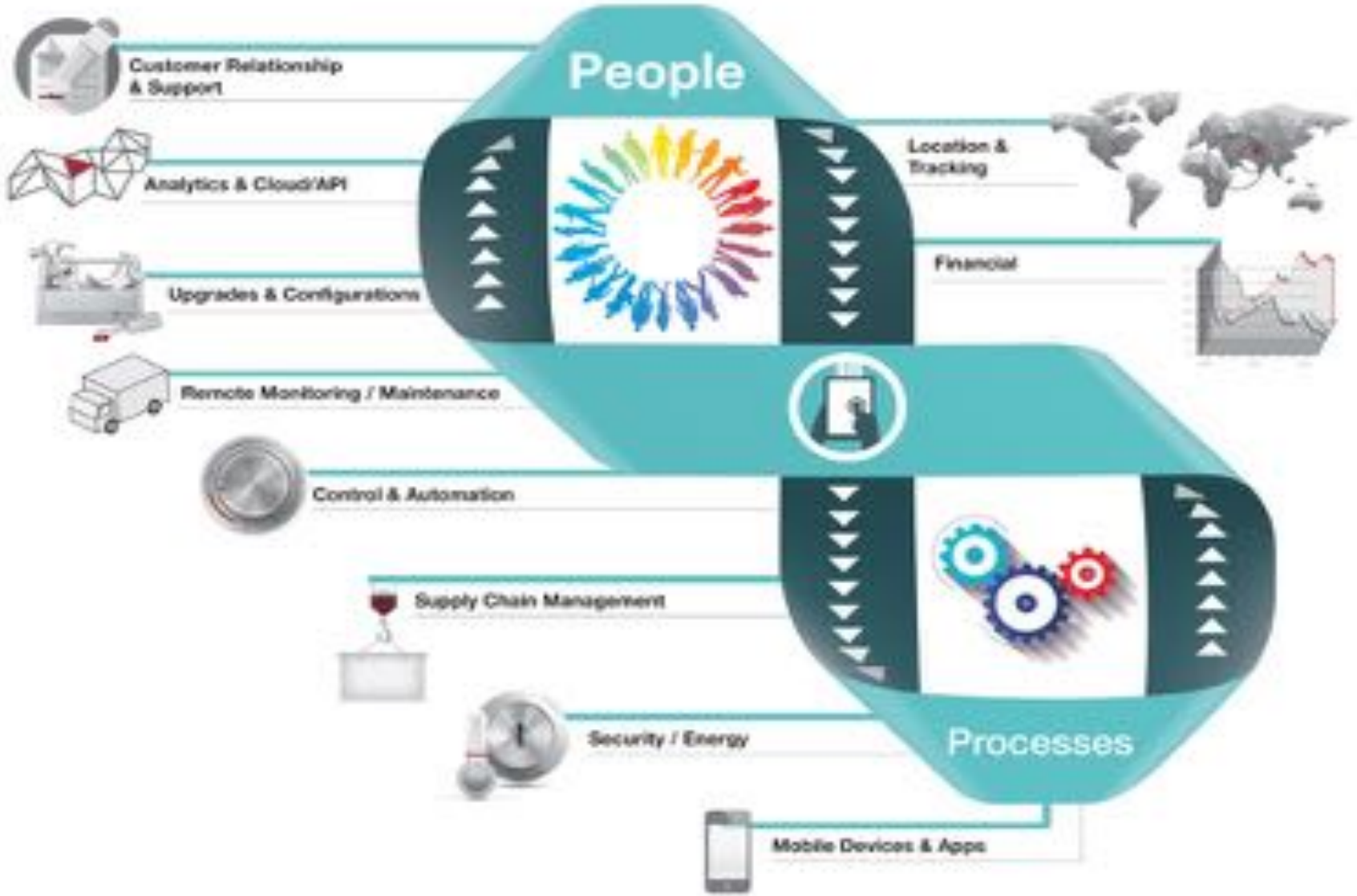
These inputs are digitized and placed onto networks.



[Source: http://postscapes.com/what-exactly-is-the-internet-of-things-infographic]

3 PEOPLE & *PROCESSES*

These networked inputs can then be combined into bi-directional systems that integrate data, people, processes and systems for better decision making.



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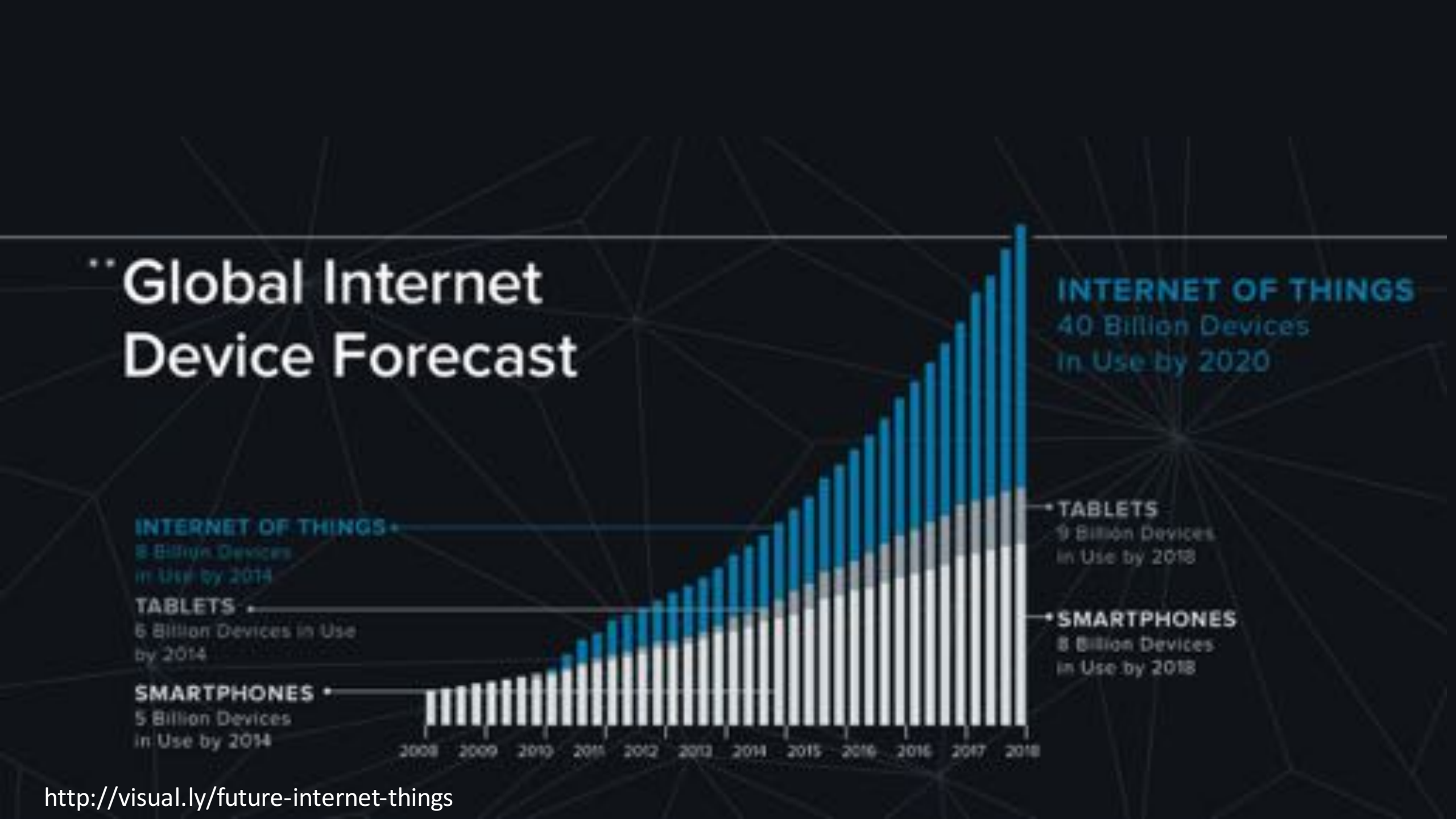


http://visual.ly/future-internet-things

There will be as many as

40 TO 80 BILLION

connected objects by 2020.

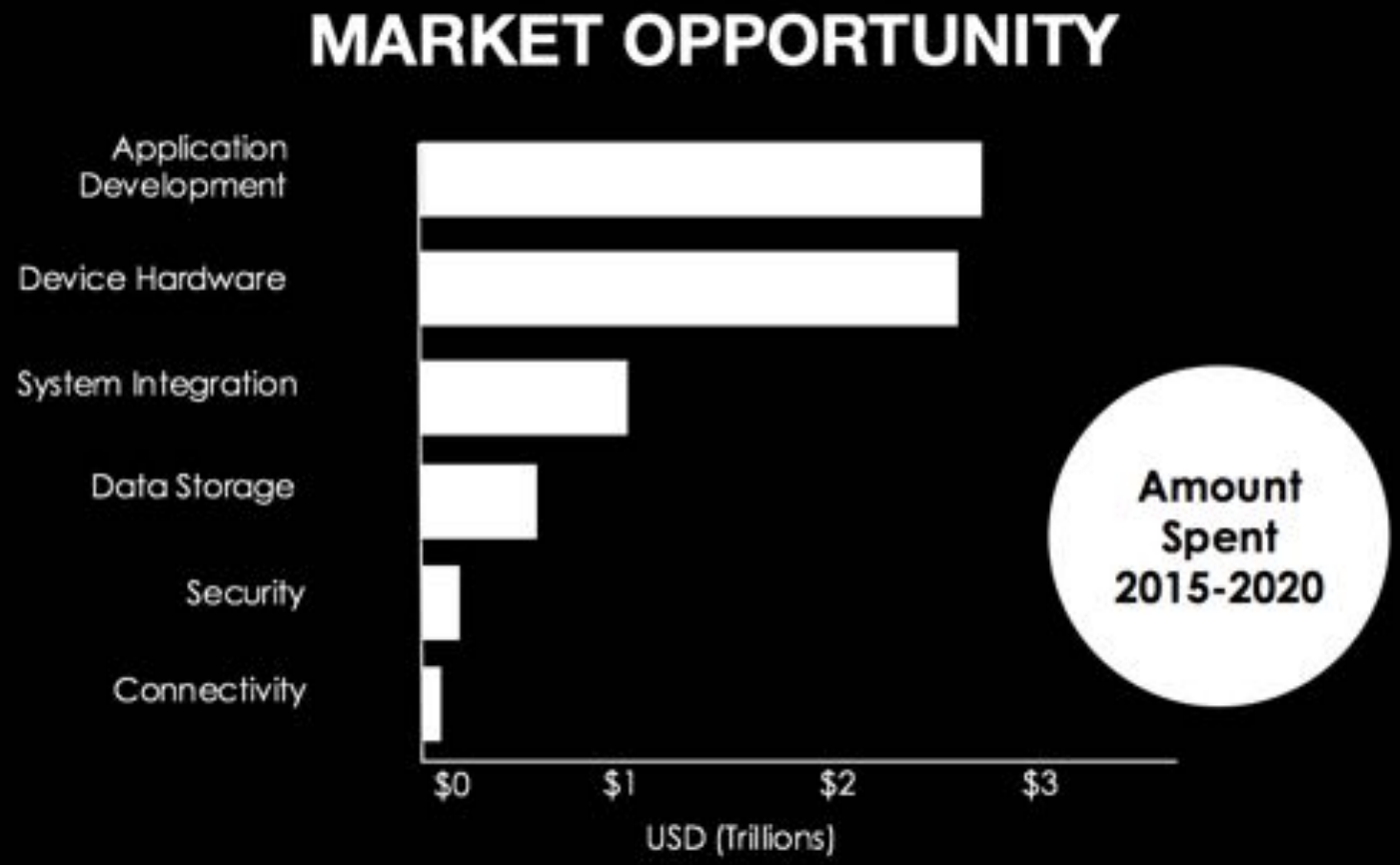
There will be **10** connected objects for every man, woman, and child on the **PLANET.**

Through the power of smart devices, people will not only consume data, but contribute observed data to the IoT through their phones and tablets as

human sensors

http://visual.ly/future-internet-things

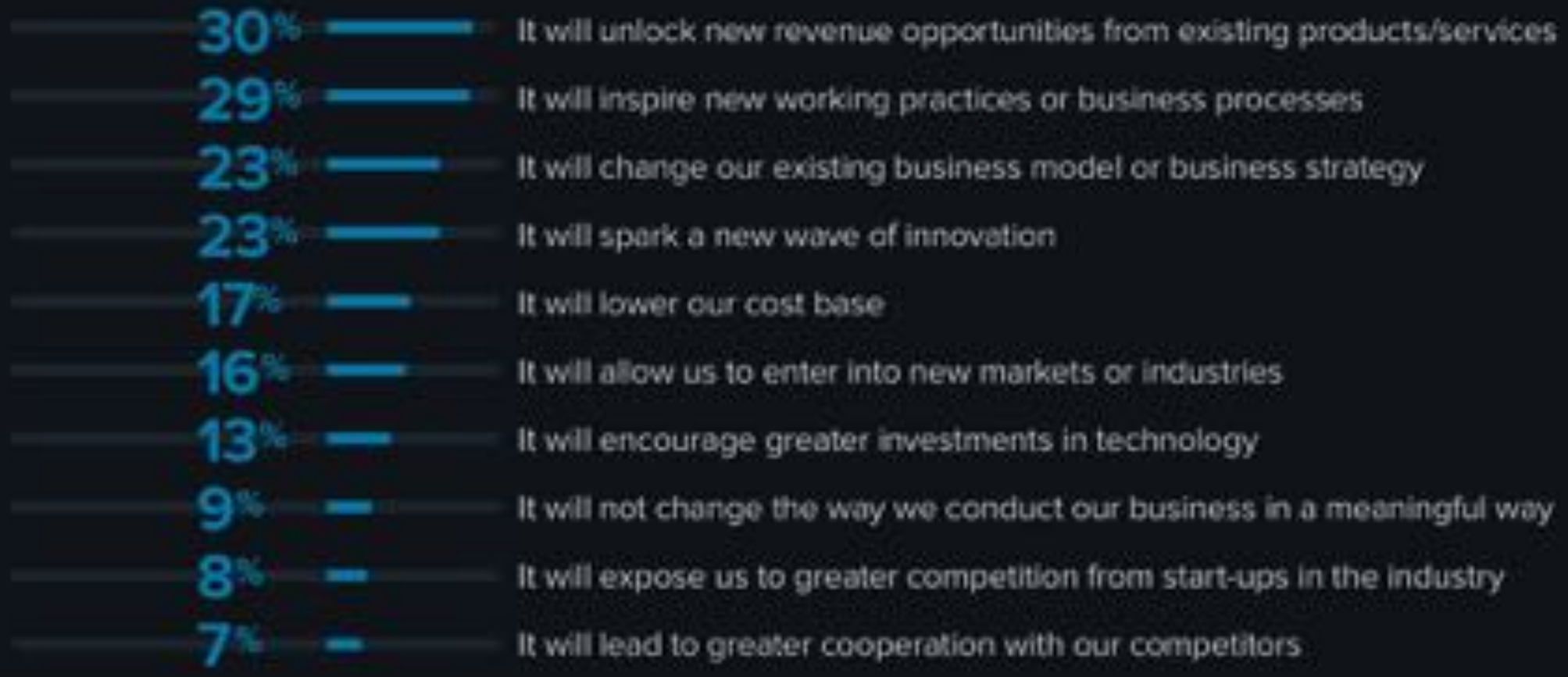
HOW BIG IS THE IOT MARKET?



63 devices connected every second

By 2016 Gartner predicts **6.4 billion** devices will be connected to the internet – and **5.5 million** new 'things' will join them each day.

How will the IoT change the way your company operates?



http://visual.ly/future-internet-things

IOT BENEFITS

Consumers

- 5B Devices Installed By 2020
- $900M Spent (2015-2020)
- $400 ROI (2015-2025)

Government

- 7.7B Devices Installed By 2020
- $2.1B Spent (2015-2020)
- $4.7B ROI (2015-2025)

Businesses

- 11.2B Devices Installed By 2020
- $3B Spent (2015-2020)
- $7.6B ROI (2015-2025)

Reduce Costs

Improve Efficiency

Create Innovative Products

New Revenue Streams

ENVIRONMENTS

Manufacturing
35% of manufacturers already use smart sensors. 10% plan to implement them within a year, and 8% plan to implement them within 3 years, according to PwC

Oil, gas, and mining
In five years, it is predicted that 5.4 million IoT devices will be used on oil extraction sites. BI Intelligence said that these devices will primarily be internet-connected sensors used to provide environmental metrics about extraction sites.

Transportation
Connected cars are a top IoT device. We estimate there will be over 220M connected cars on the road by 2020.

Insurance
A survey has found that 74% of insurance executives believe the IoT will disrupt insurance within the next five years. 74% also plan to invest in developing and implementing IoT strategies by 2016, according to an SMA Research survey.

[Source: http://www.cbronline.com/news/internet-of-things/m2m/smart-connected-always-on-10-huge-iot-impacts-on-10-huge-sectors-4709736v]

ENVIRONMENTS

Defense
We estimate spending on drones will reach $8.7B in 2020. In addition, 126K military robots will be shipped in 2020, according to Frost & Sullivan.

Connected Home
smart meters are already a reality, and from the 313 million installed in homes worldwide in 2013, Navigate Research predicts that number to jump to 1.1 billion by 2022

Agriculture
We estimate 75M IoT devices will be shipped for agricultural uses in 2020, at a 20% CAGR. These devices are primary sensors placed in soil to track acidity levels, temperature, and variables that help farmers increase crop yields.

Food Services
With the world population on the rise, IoT will help to keep food production levels at good pace. BI Intelligence estimates 75 million IoT device installations for agricultural uses by 2020, at a 20% CAGR.

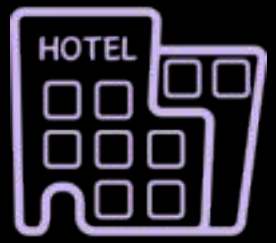
[Source: http://www.cbronline.com/news/internet-of-things/m2m/smart-connected-always-on-10-huge-iot-impacts-on-10-huge-sectors-4709736v]

ENVIRONMENTS

Infrastructure
We estimate municipalities worldwide will increase their spending on IoT systems at a 30% CAGR, from $36B in 2014 to $133B in 2019. This investment will generate $421B in economic value for cities worldwide in 2019.

Utilities
Energy companies throughout the world are trying to meet the rising demand in energy. To do this, they will be installing nearly 1 B smart meters by 2020.

Retail
Beacons, paired with mobile apps, are being used in stores to monitor customer behavior and push advertisements to customers. In the US, we estimate $44.4B will be generated from beacon triggered messages.



Hospitality
31% of hotels use next-generation door locks, 33% have room control devices, 16% have connected TVs, and 15% use beacons throughout the hotel, according to Hospitality Technology's 2015 Lodging Technology survey.

[Source: http://www.cbronline.com/news/internet-of-things/m2m/smart-connected-always-on-10-huge-iot-impacts-on-10-huge-sectors-4709736v]

ENVIRONMENTS

Logistics
Tracking sensors placed on parcels and shipping containers will help reduce costs associated to lost or damaged goods. In addition, robots such as Amazon Kiva robot, help reduce labor costs in warehouses.

Healthcare
We estimate 646M IoT devices will be used for healthcare by 2020. Connected healthcare devices can collect data, automate processes, and more. But these devices can also be hacked, thereby posing a threat to the patients who rely on them.

Banks
There are nearly 3M ATMs installed globally in 2015, according the World Bank. Some teller-assist ATMs provide live-stream video of a teller for added customer support.

Smart Buildings
43% of building managers in the US believe the IoT will affect how they run their building within the next 2 to 3 years, according to a survey from Daintree Networks.

[Source: http://www.cbronline.com/news/internet-of-things/m2m/smart-connected-always-on-10-huge-iot-impacts-on-10-huge-sectors-4709736v]

THE 4 STAGES OF IOT MATURITY

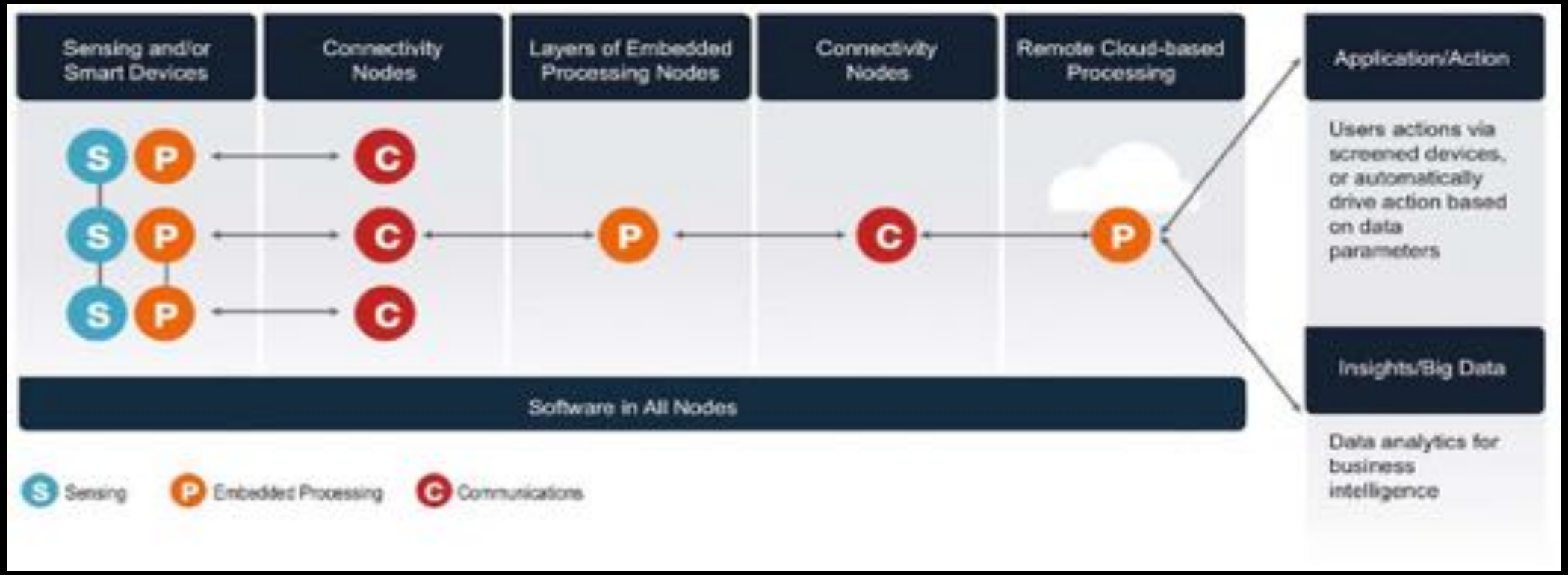
Monitoring

Control

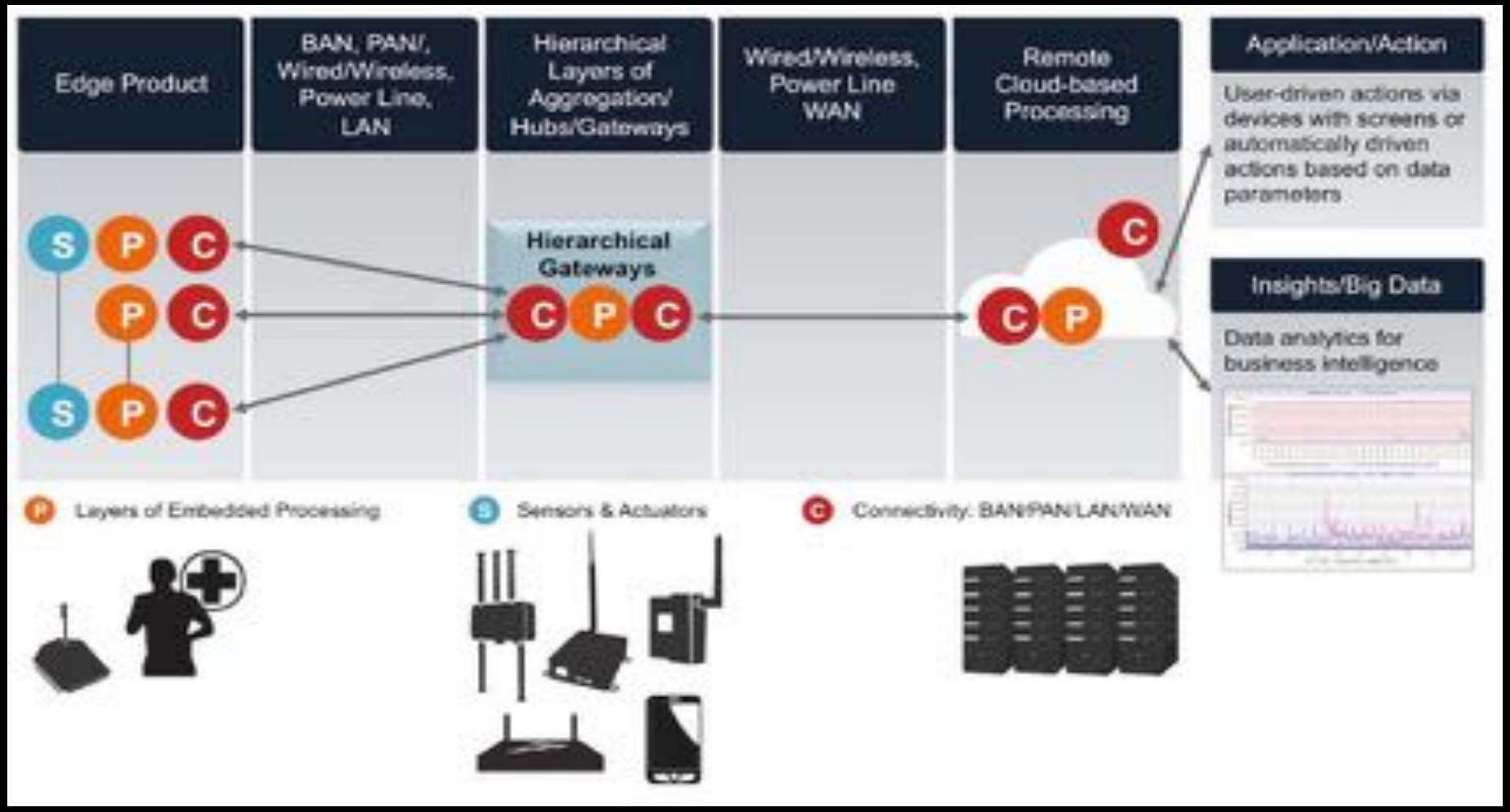
Optimization

Autonomous

FUNCTIONAL VIEW OF IOT TECHNOLOGIES



“BOX-LEVEL” VIEW OF IOT BUILDING BLOCKS



THE GOLD RUSH

MAKING SENSE OF DATA … BUT WHAT DATA?

What's Generating Data?

Big data is generated in a number of ways, including:

Moving around with your smartphone

Sensors in gambling casino chips

Sensors in pallets of products

Internet browsing

Sensors in soil

Sensors in pet collars

Sensors in oceans

44x

as much Data and Content Over Coming Decade

2020
35 zettabytes

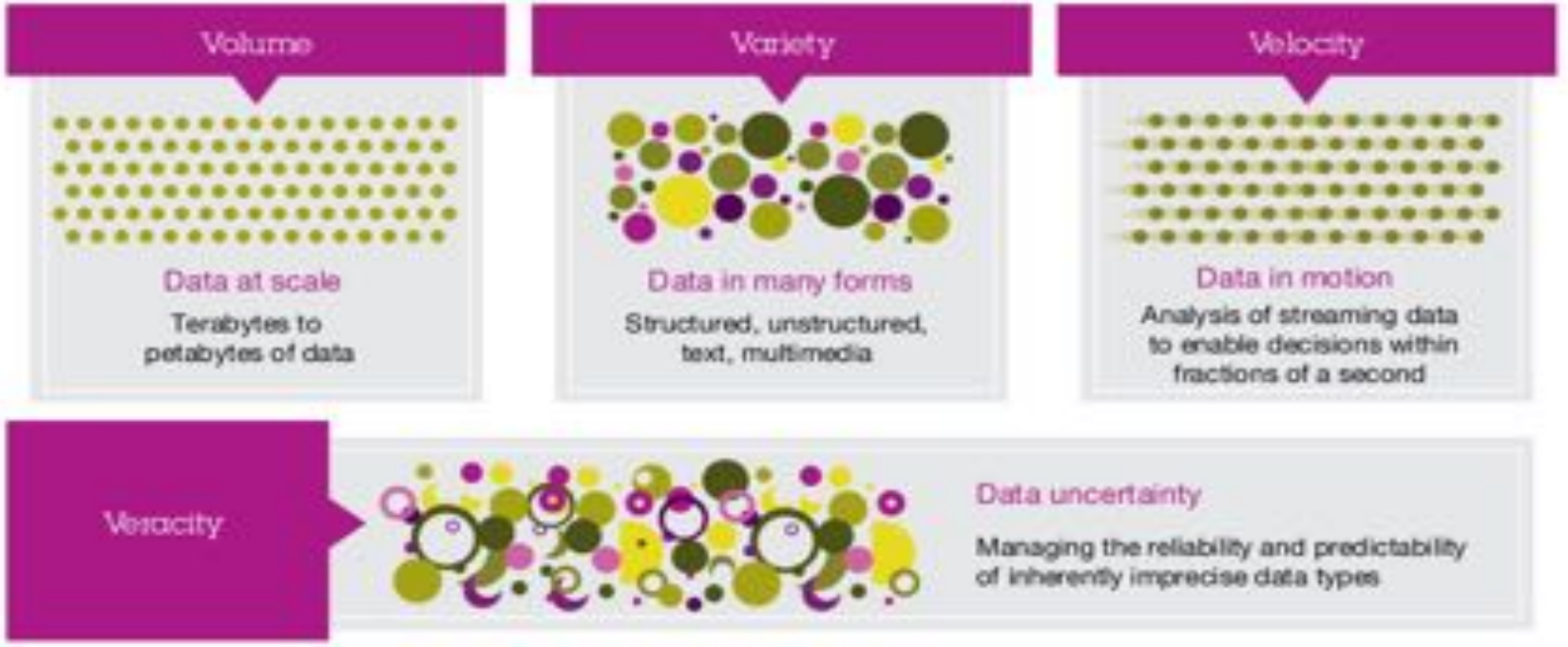
Velocity

Variety

Volume

2009
800,000 petabytes

80% Of world's data is unstructured



DATA OWNERSHIPS

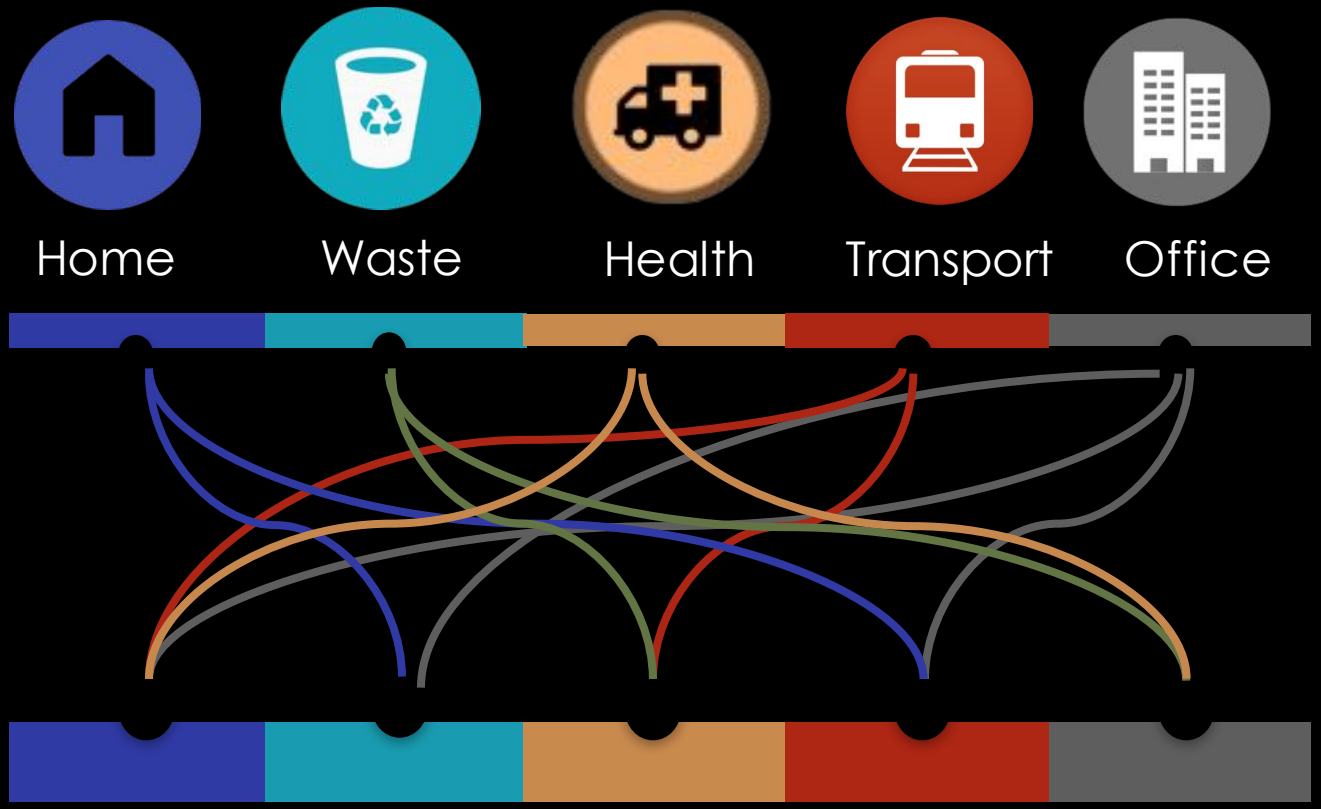
Personal / Household

Private

Public

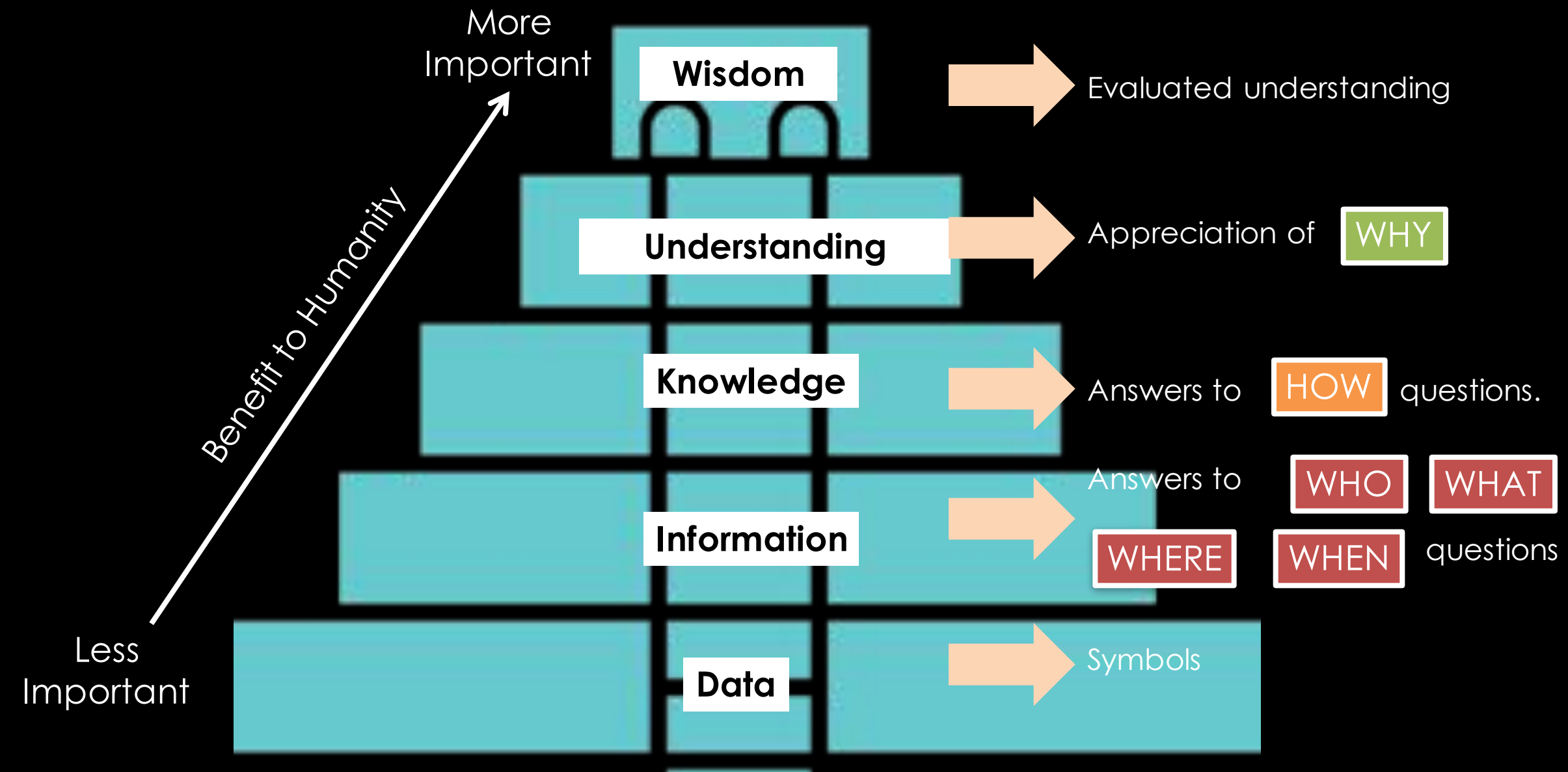
Commercial Sensor Data Provider

IOT MAKE SENSE WHEN YOU BLEND THE DATA

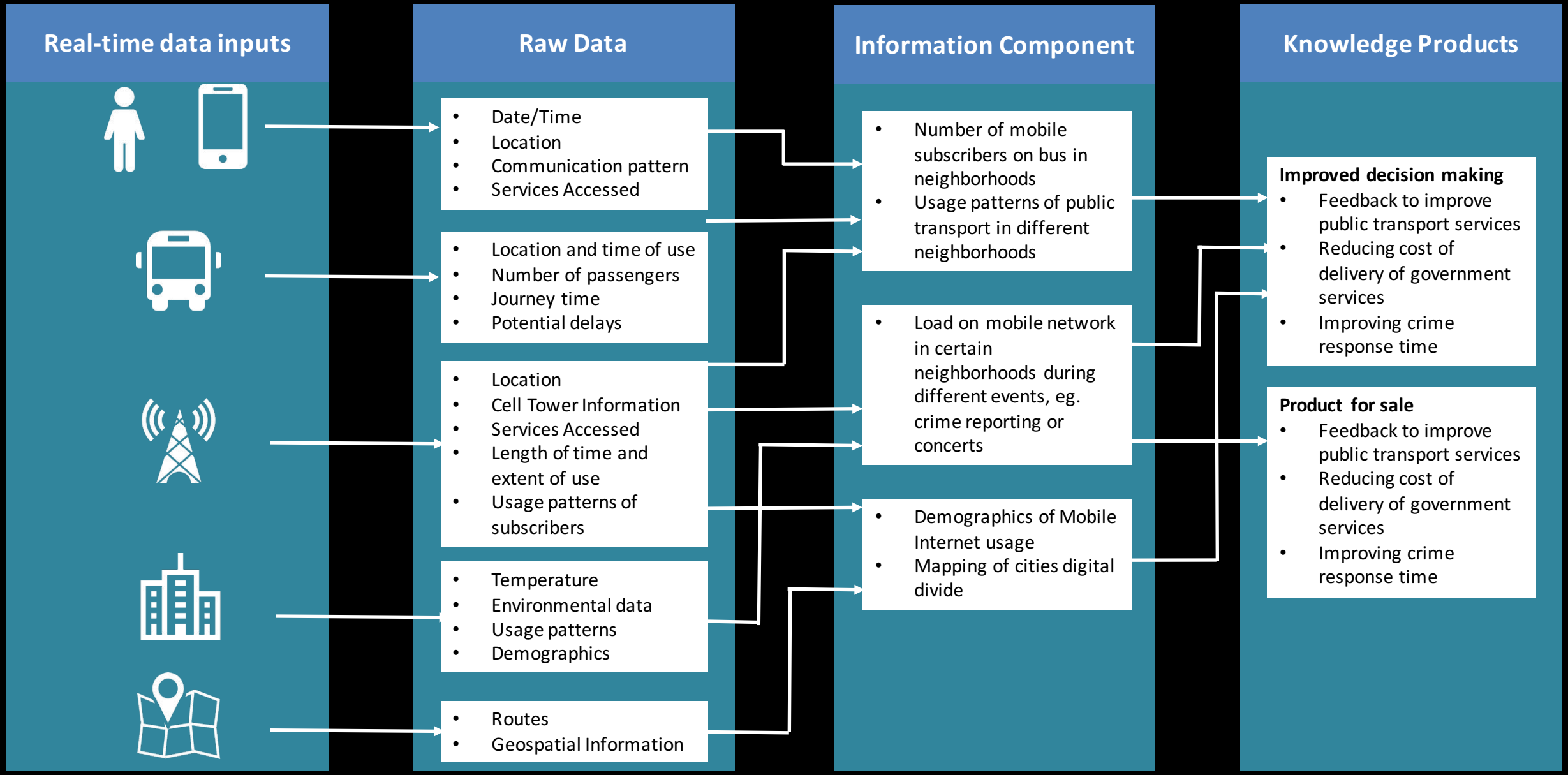


Creating New Compound Applications

VALUE IS CREATED BY MAKING SENSE OF DATA



COMPLEXITY OF SMART CITIES



WHAT IS

SMART CITY

FIVE BIG REASONS WE FOCUS ON CITIES

More than half the world lives in cities.

By 2050, 70% of the world's population will live in cities

More than 60% of cities have yet to be built.

Cities have been the center of civilization, life, and knowledge for centuries.

Cities are at the forefront of global innovation.

BUILDING 3 TYPES OF CITIES

ROI-driven

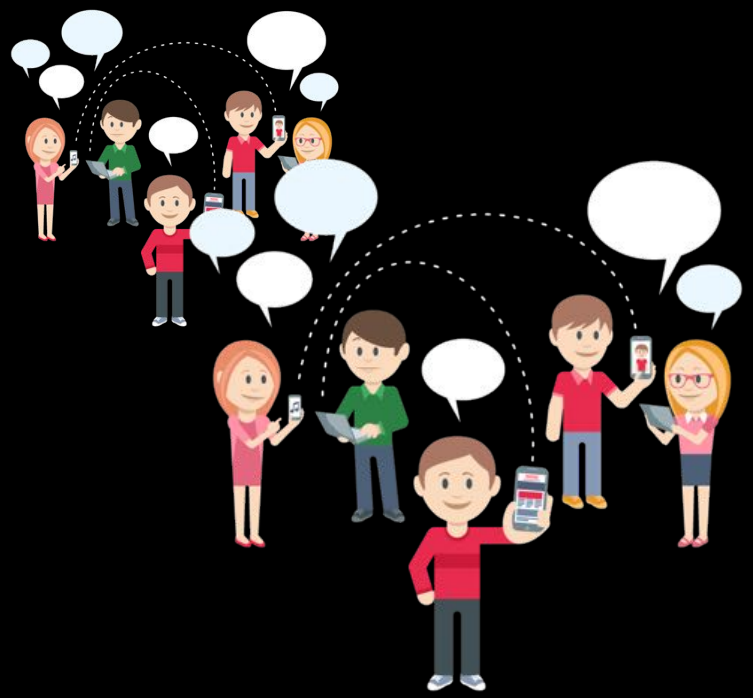
Carbon-driven

Vanity-driven

CITIZEN-FOCUSED · BUILDING TRUST

Citizen-Centric

Smart Tools



Data-Driven Decision

Collaborative

Responsive

Cost Effective

Accountable

Transparent


SMART
CITY
BETTER CITY • BETTER WORLD
Build cities through the eyes
of the CITIZENS
#bettercitybetterworld

VISION OF THE CITY OF THE FUTURE

Technology may help mitigate the “black hole” problem.

Make visible the invisible

Sensing the city

Provide tools for the citizens to interpret and change the workings of the city

Open source and open data

CROWDSENSING VIA

CITIZEN ENGAGEMENT

REDtone IOT APPROACH

BUILDING THE NEXT SMART CITY SOLUTIONS

We Build Cities Based on Citizen-Centric Approach

01 CROWDSENSING

Get citizens input via their smartphones

02 IDENTIFY & SOLVE

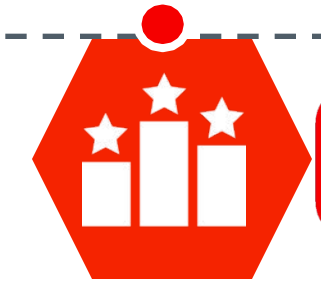
Identify locations of issues and City Authorities respond accordingly

03 LIVEABLE CITIES

Citizens have a better quality of life

04 CITY INDICATOR

Citizens will see how their cities perform



05 RANK & DECIDE

Authorities decide and justify their next plan of action

06 BUILD NEXT SMART CITY SOLUTION

Leverage innovative IOT solutions to solve the pain points of cities inhabitants


CROWDSOURCING
CitiAct
Available on the App Store
ANDROID APP ON Google play
HELP TO IDENTIFY
CRIME AREAS
POLICE


POTHOLES
PREVENT BEFORE BECOMING UNBEARABLE


Smart Cities are responsive to the problems of the citizens.
SMART
CITY
#bettercitybetterworld
CitiAct
Available on the App Store
ANDROID APP ON Google play


FLASH FLOOD
THE DANGERS OF UNKNOWN


CROWDSOURCING
HELP TO IDENTIFY FLOOD AREAS
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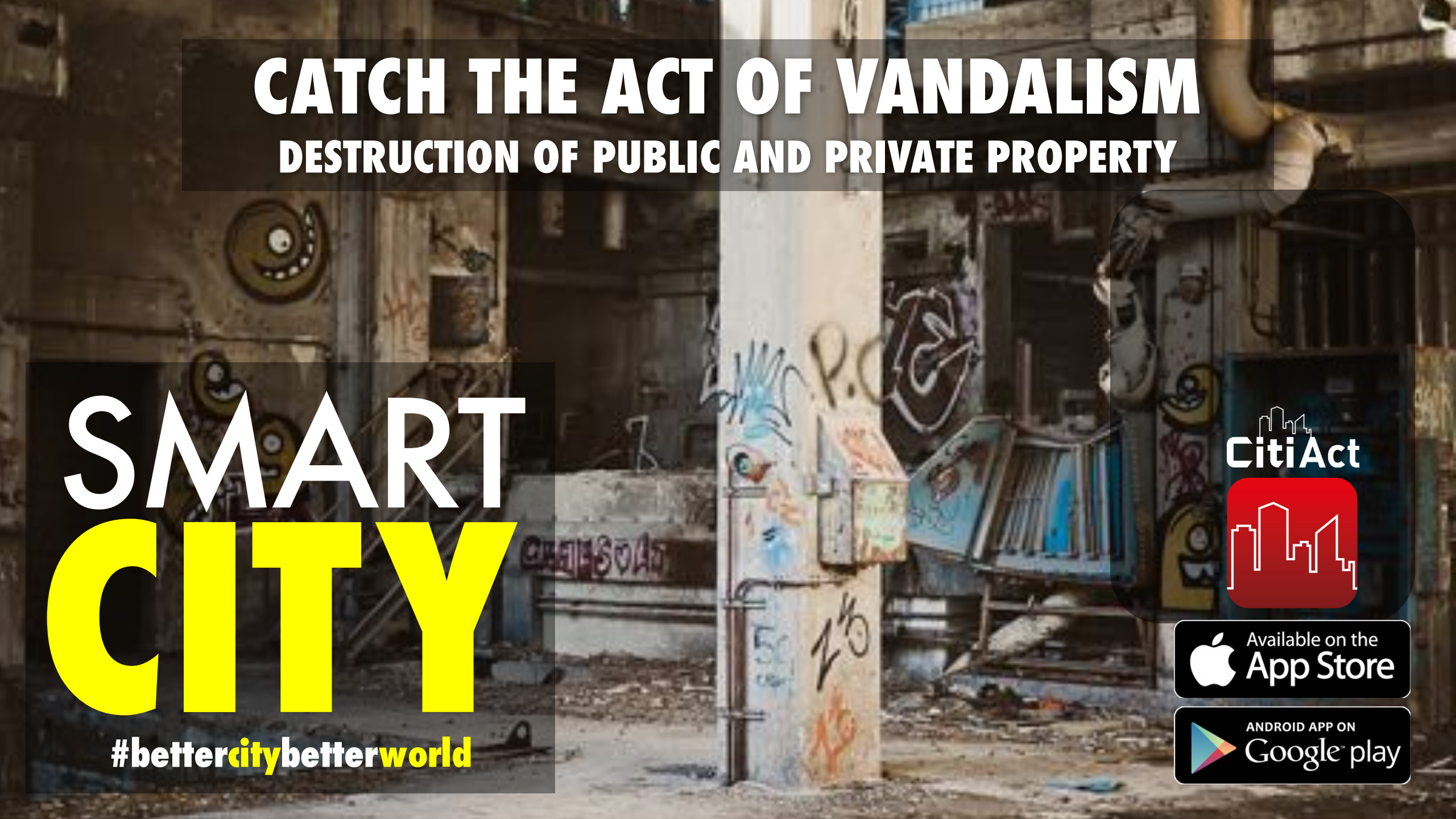
SMART CITY
#bettercitybetterworld


CATCH THE ACT OF VANDALISM
DESTRUCTION OF PUBLIC AND PRIVATE PROPERTY
SMART
CITY
#bettercitybetterworld
CitiAct
Available on the App Store
ANDROID APP ON Google play

SMS

Whatsapp

Facebook

Twitter

Radio

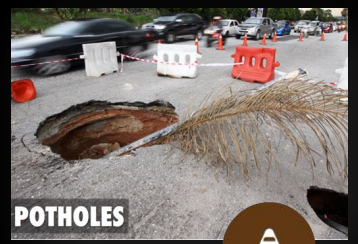
TV

Ad Hoc
Chaotic
Unmanaged

BE THE EYES OF THE CITY

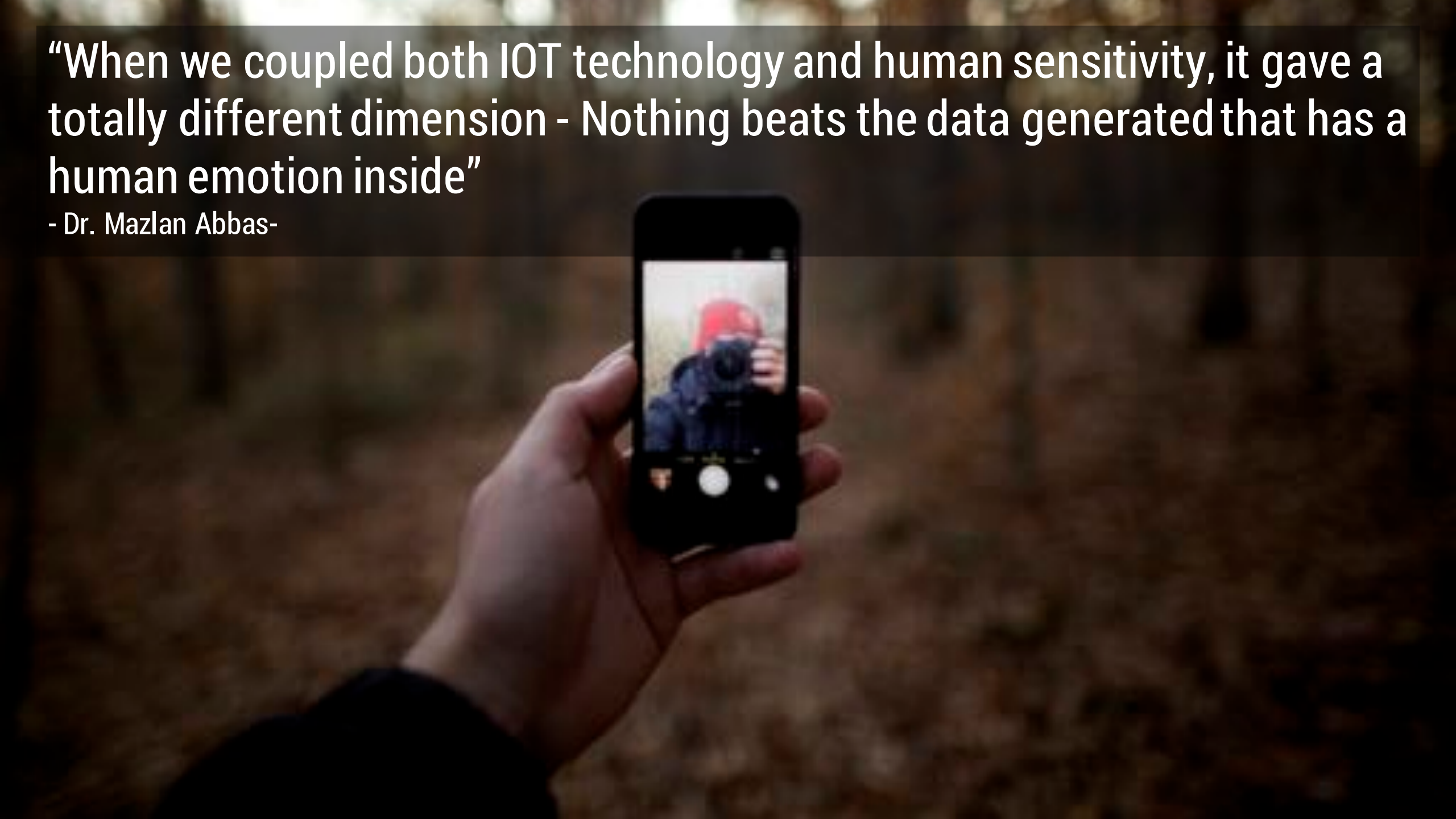
REPORT TO THE CITY COUNCILS

LET ALL CITIZENS BE THE CITY'S "EYES"




SAVES TIME TO REPORT
A PICTURE IS WORTH A 1000 WORDS


REPORT AN ISSUE
BUT NOT FEEL LIKE A COMPLAINT
BUT NOT FEEL LIKE A COMPLAINT

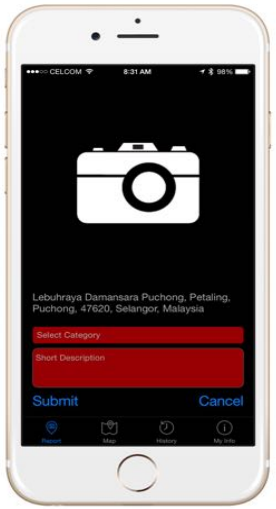

“When we coupled both IOT technology and human sensitivity, it gave a totally different dimension - Nothing beats the data generated that has a human emotion inside”
- Dr. Mazlan Abbas-

CITIACT

APP FOR ACTION, NOT TALKING

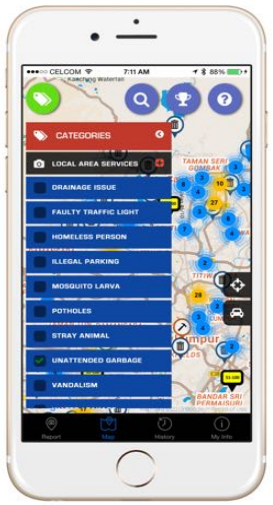
ANDROID APP ON Google play

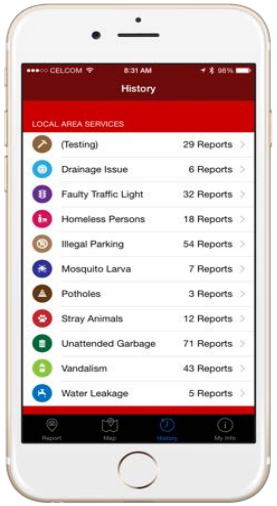
Available on the App Store

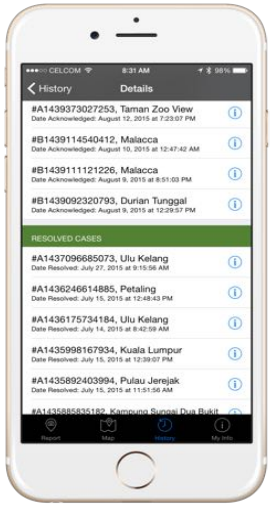


CitiAct

MOBILE APPLICATION







ANDROID APP ON Google play

Available on the App Store

CRIME AREAS

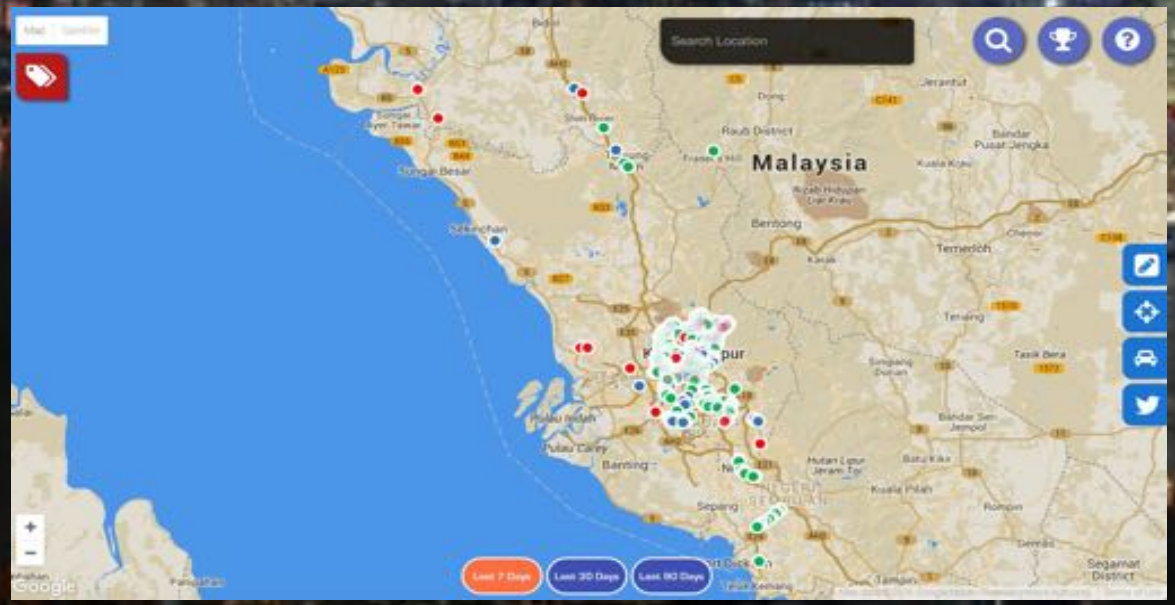
FLASH FLOODS

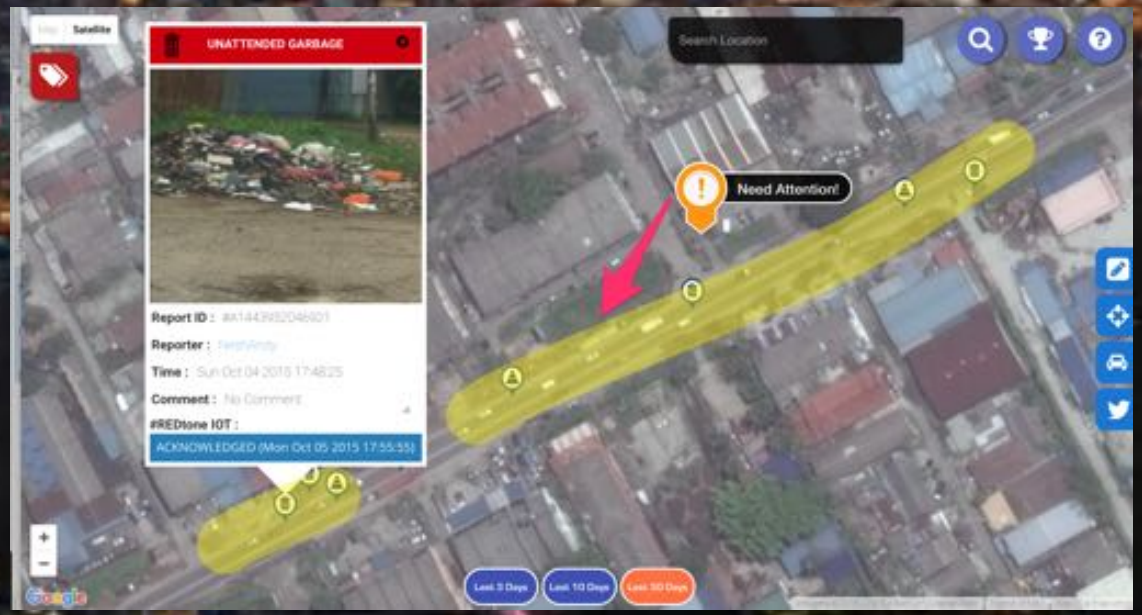
NOISE LEVEL

ROAD QUALITY

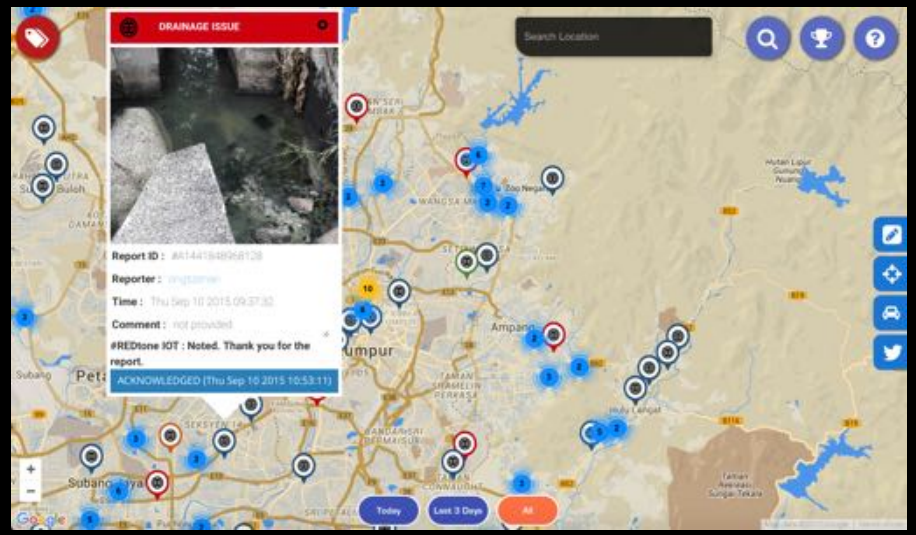
PROFILING OUR CITIES

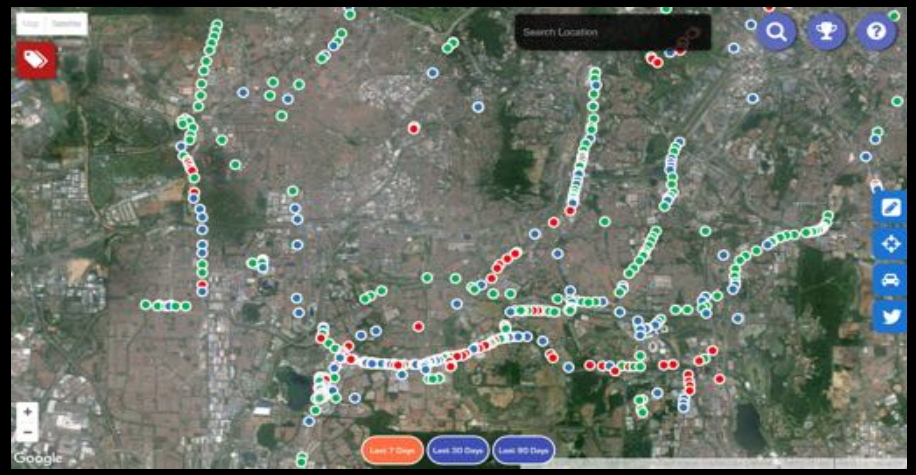
GAINING INSIGHTS • OPTIMISING RESOURCES

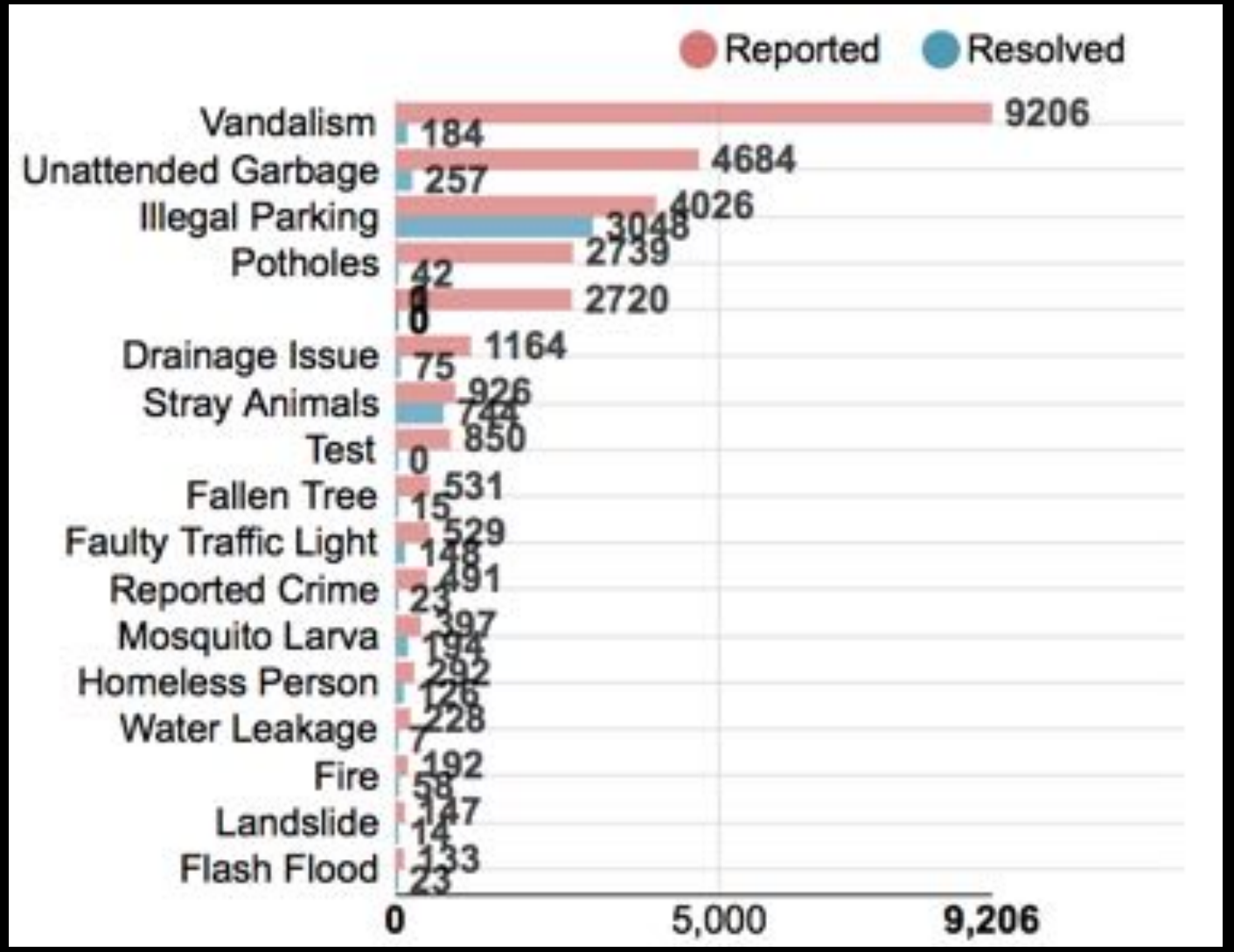




TOP CITIZENS' PAIN POINTS







HOW-TO

BUILD YOUR NEXT SMART CITY SOLUTIONS?

SMART VANDALISM MANAGEMENT SYSTEM

Illegal Posters with Telephone Numbers

Phone Numbers Blocked

Illegal Posters Will be useless

Local Councils

SMART WASTE MANAGEMENT

"I'M FULL"

ALERT

UNATTENDED GARBAGE

RIGHT ROUTES

TIMELY SCHEDULE

SMART PARKING

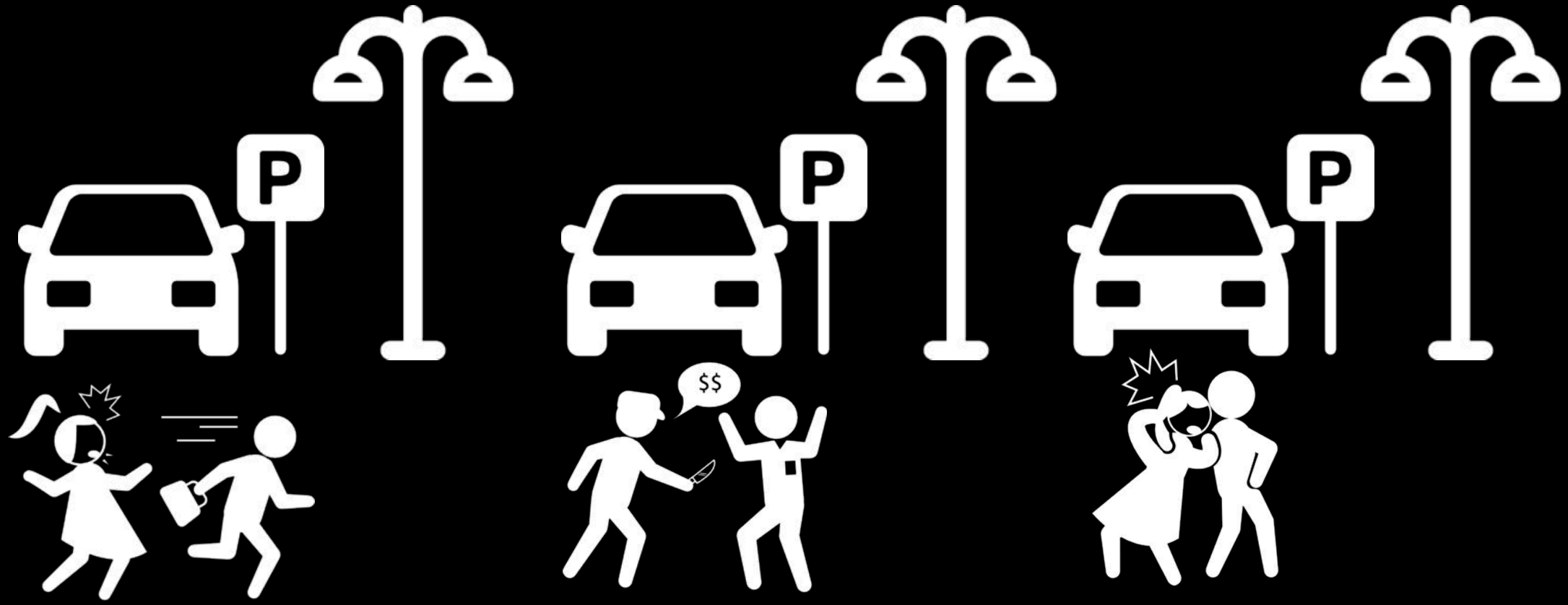
Smart Parking With Sensors

Location of Parking Availability

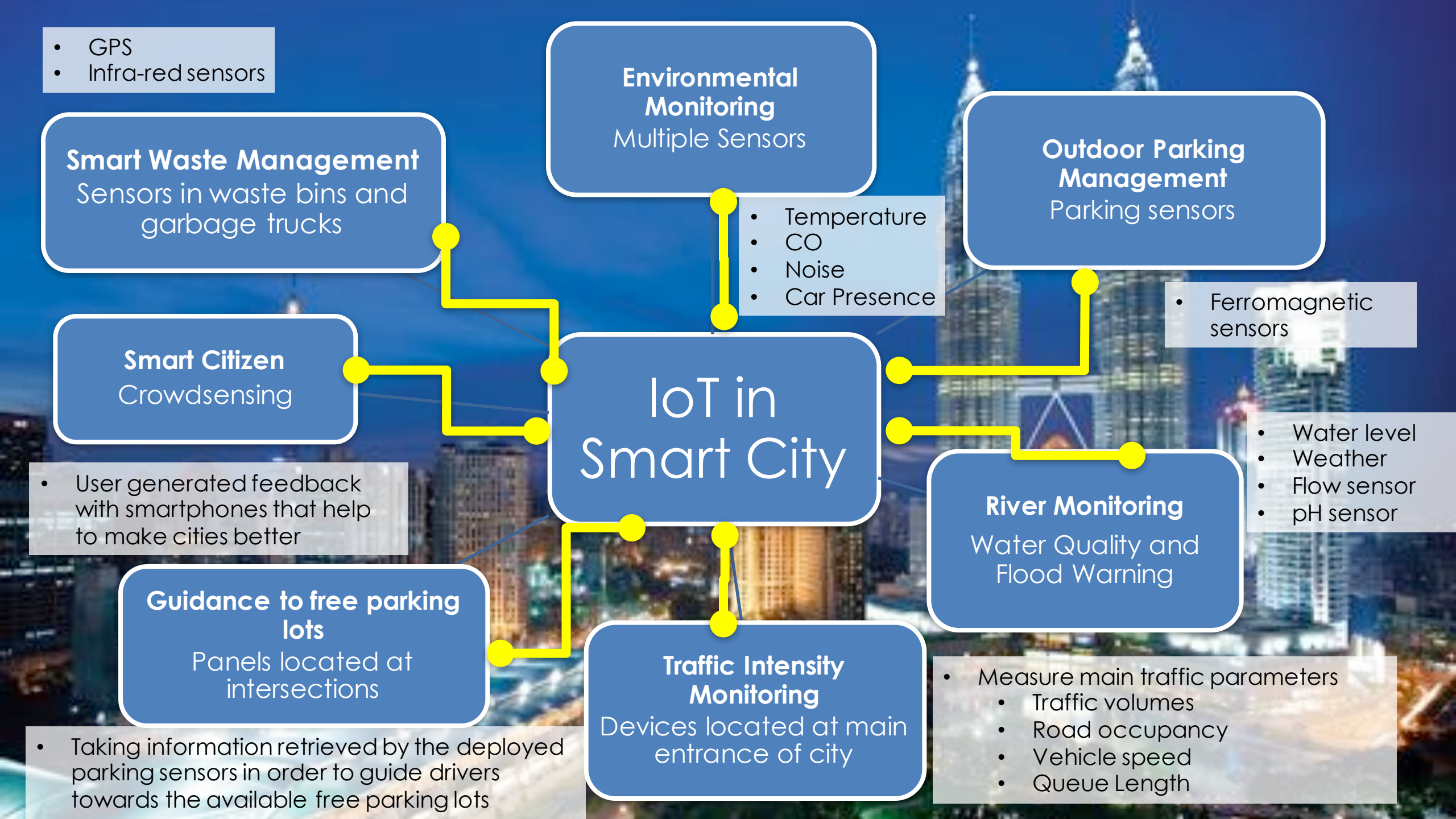
Parking Utilization

Tiered Pricing Parking

SMART STREET LIGHTING

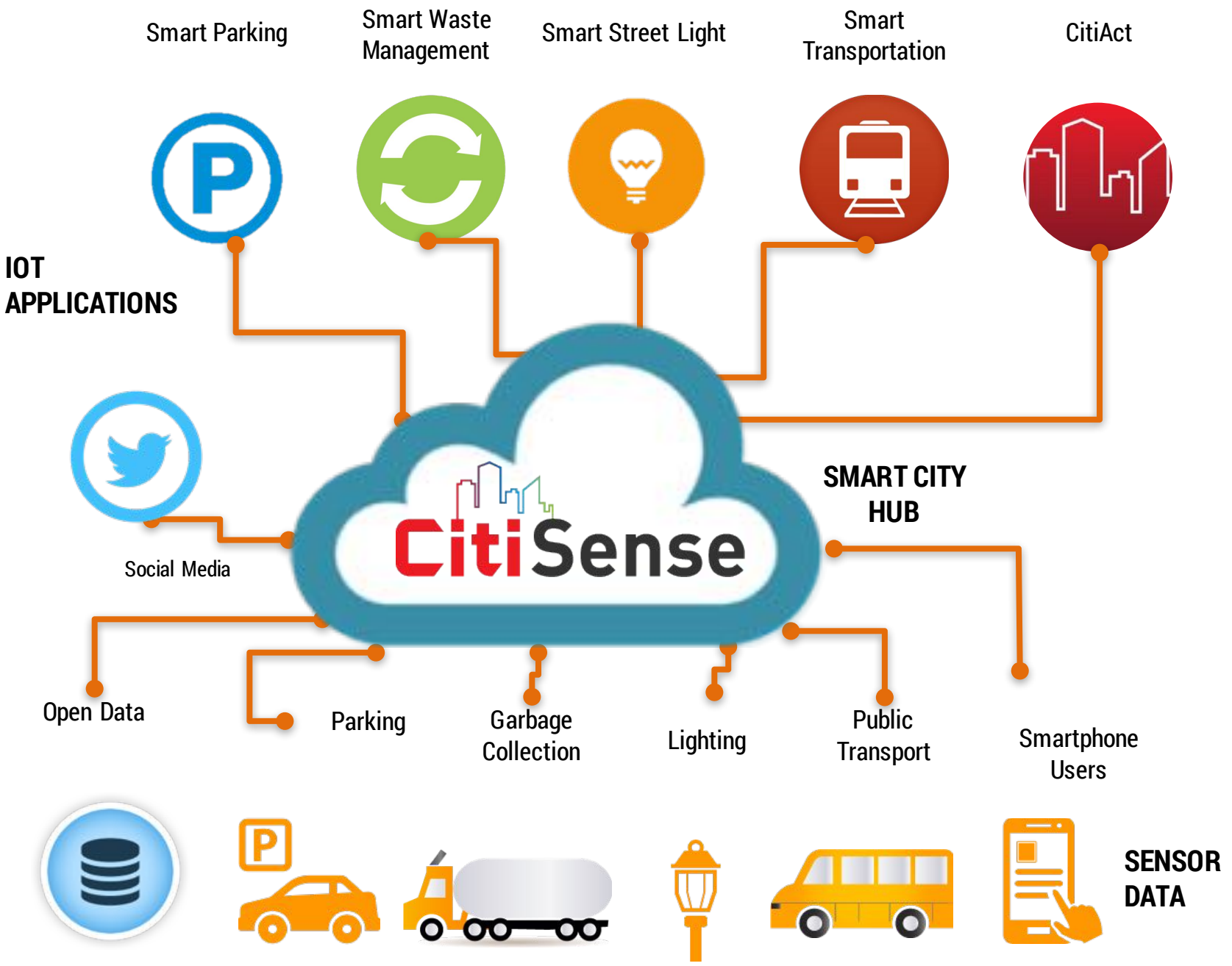


Prevent Crime with Proper Lighting


• GPS
• Infra-red sensors
Smart Waste Management
Sensors in waste bins and garbage trucks
Environmental Monitoring
Multiple Sensors
• Temperature
• CO
• Noise
• Car Presence
Outdoor Parking Management
Parking sensors
• Ferromagnetic sensors
Smart Citizen
Crowdsensing
• User generated feedback with smartphones that help to make cities better
IoT in Smart City
River Monitoring
Water Quality and Flood Warning
• Water level
• Weather
• Flow sensor
• pH sensor
Guidance to free parking lots
Panels located at intersections
• Taking information retrieved by the deployed parking sensors in order to guide drivers towards the available free parking lots
Traffic Intensity Monitoring
Devices located at main entrance of city
• Measure main traffic parameters
• Traffic volumes
• Road occupancy
• Vehicle speed
• Queue Length

GETTING CONNECTED

CitiSense is REDtone IOT's Middleware that connects and aggregates sensor data from multiple sources. It also provide interface for developers to access the data and create innovative applications and derive meaningful insights for business decision making.



HOW TO ACHIEVE SMART NATION TRAITS

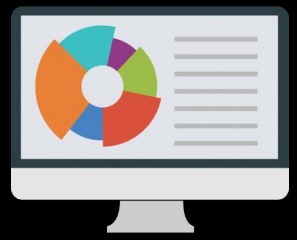
CitiAct
MOBILE APPLICATION

COLLABORATIVE

DASHBOARD

ACCOUNTABLE

CASE MANAGEMENT SYSTEM

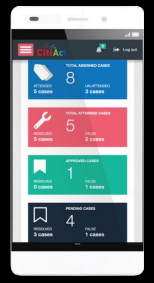


COST EFFECTIVE

CitiSense
PORTAL
CITISENSE.COM

TRANSPARENT

CONTRACTOR APP



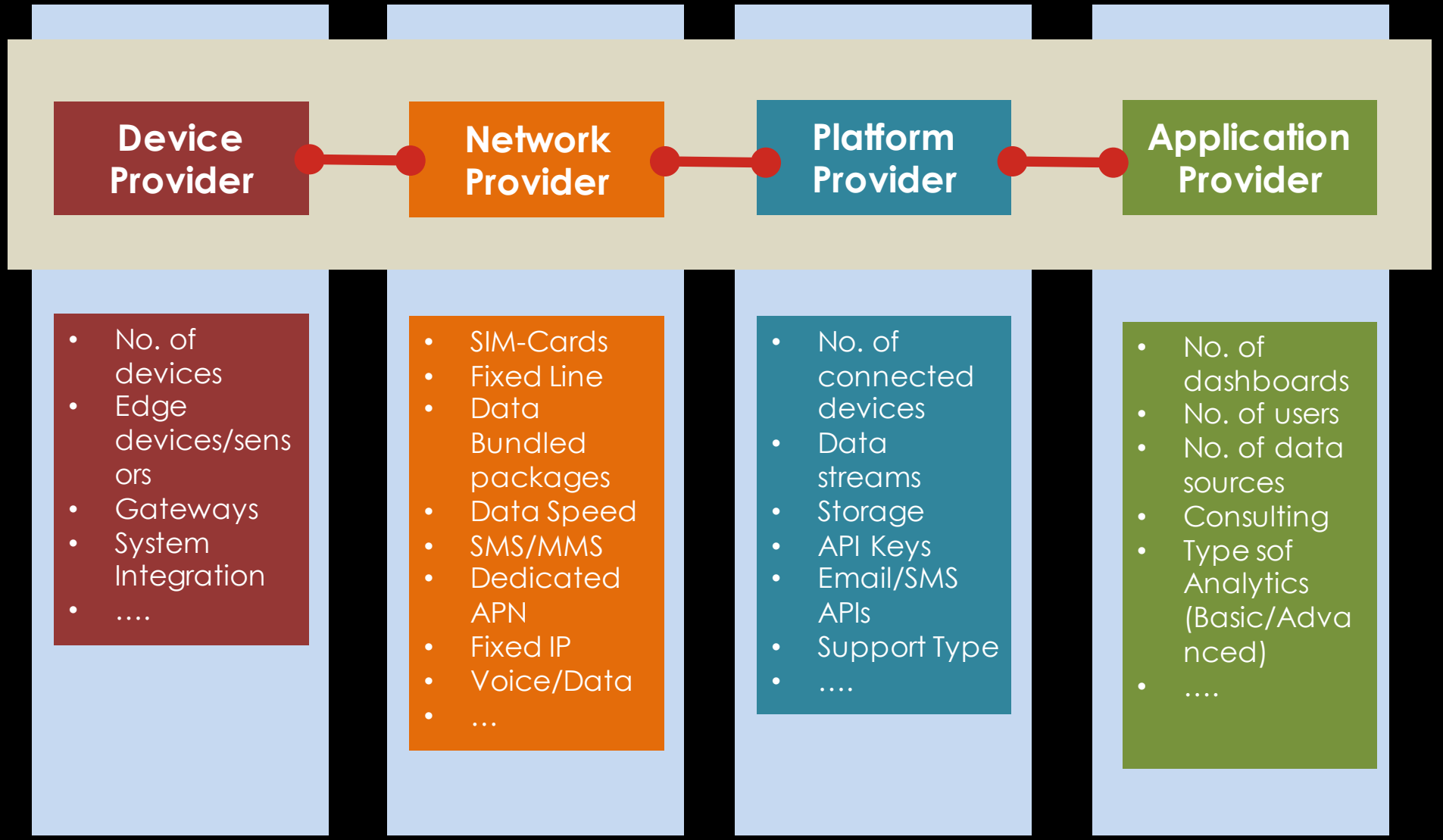
RESPONSIVE

IOT VALUE CHAIN

Components	Smart Objects	Network Operator	Service Enabler	System Integrator	Service Provider	Distributor / Reseller	Customer
• Embedded Chips • Modules • Wireless Modems • Sensors and cameras • Routers and gateways • Antennas and Cables	• Smart Bins • Smart Solar • Temp Monitoring • Fire Extinguishers • Meters • ATM/POS • Camera/Security	• Spectrum Allocation • Network Infrastructure • Backhaul Infrastructure • Connectivity • Availability & Quality • Billing • Customer Care	• Software • Infrastructure • Consulting • Technology Selection • Solution Design • Wireless Network Design	• Interfaces • Enterprise System Integration • Application Development • Security • Data Management • Hardware • Installation	• Analysis • App Management • Access Control • Data Management • Quality of Service • Packaging / Bundling • Service Provisioning	• Distributes Products • Resells services • Supply Chain and Fulfillment	• Buys Service • Users service
5-10%		**15-20%**	**30-40%**	**15-20%**	**15-20%**	**? %**	**? %**

Total Value

IOT VALUE CHAIN – WHERE IS THE MONEY?



ISSUES AND CHALLENGES

WHY TELCOS HAVE DIFFICULTY TO EMBRACE IOT

LEGACY BUSINESS IS STILL CONNECTIVITY

- Sim-Card based
- Less complex
- Old habits die hard
- Low ARPU
- M2M high volume

LACK OF DOMAIN EXPERTISE

Think beyond connectivity

Need go-to-market partner

Solutions, selling and managed services

MINDSET BLOCK

Full of skeptics

Slow business cycle

Low single digit growth contribution

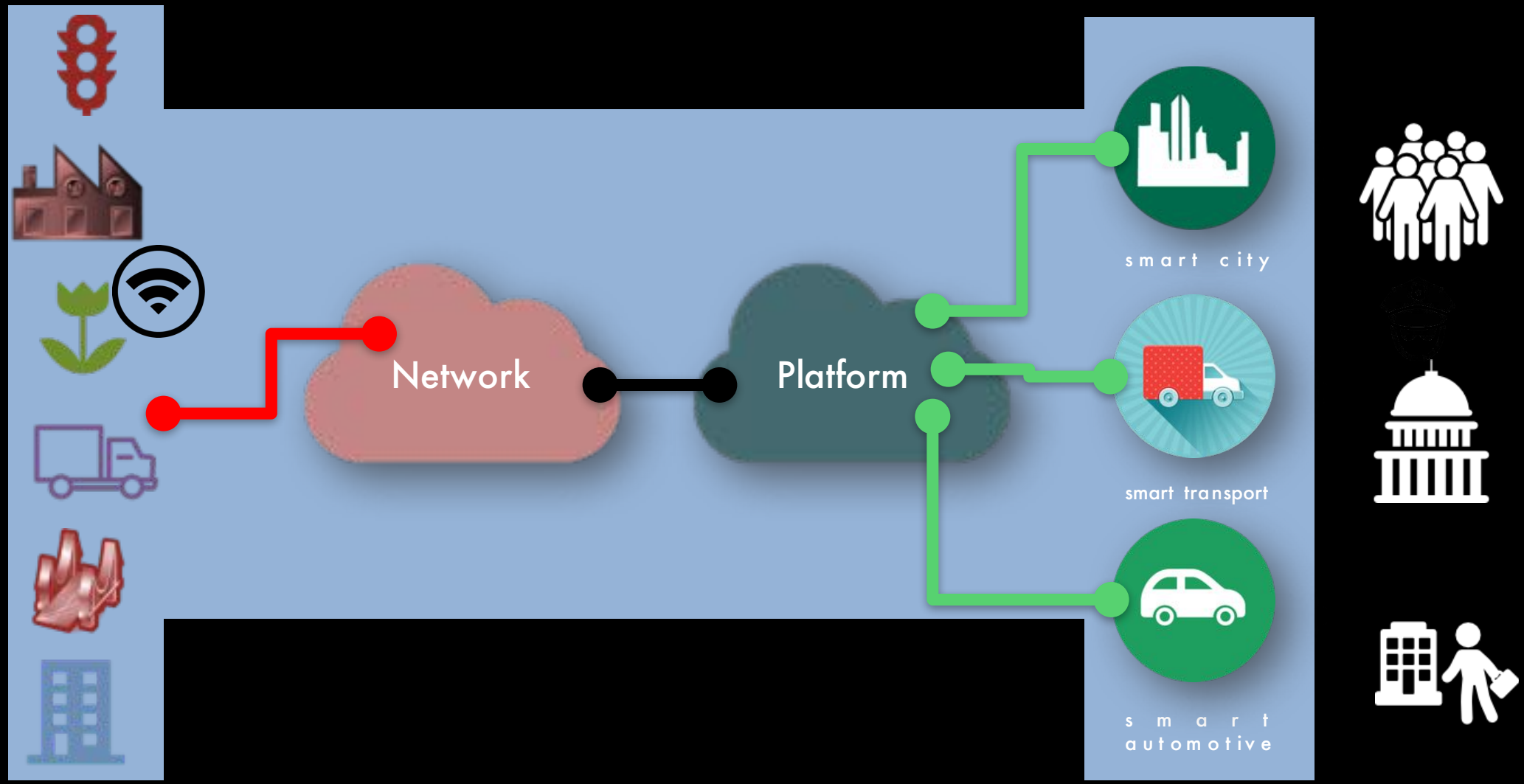
STABLE BUSINESS VS. RISKY VENTURES

- Telco business culture
- Stakeholders expectations
- IoT business is fluid
- Need to work like startup

THE END GAME

END-TO-END IOT SERVICE PROVIDER

END-TO-END IOT SERVICE PROVIDER



Device Provider

Network Provider

Platform Provider

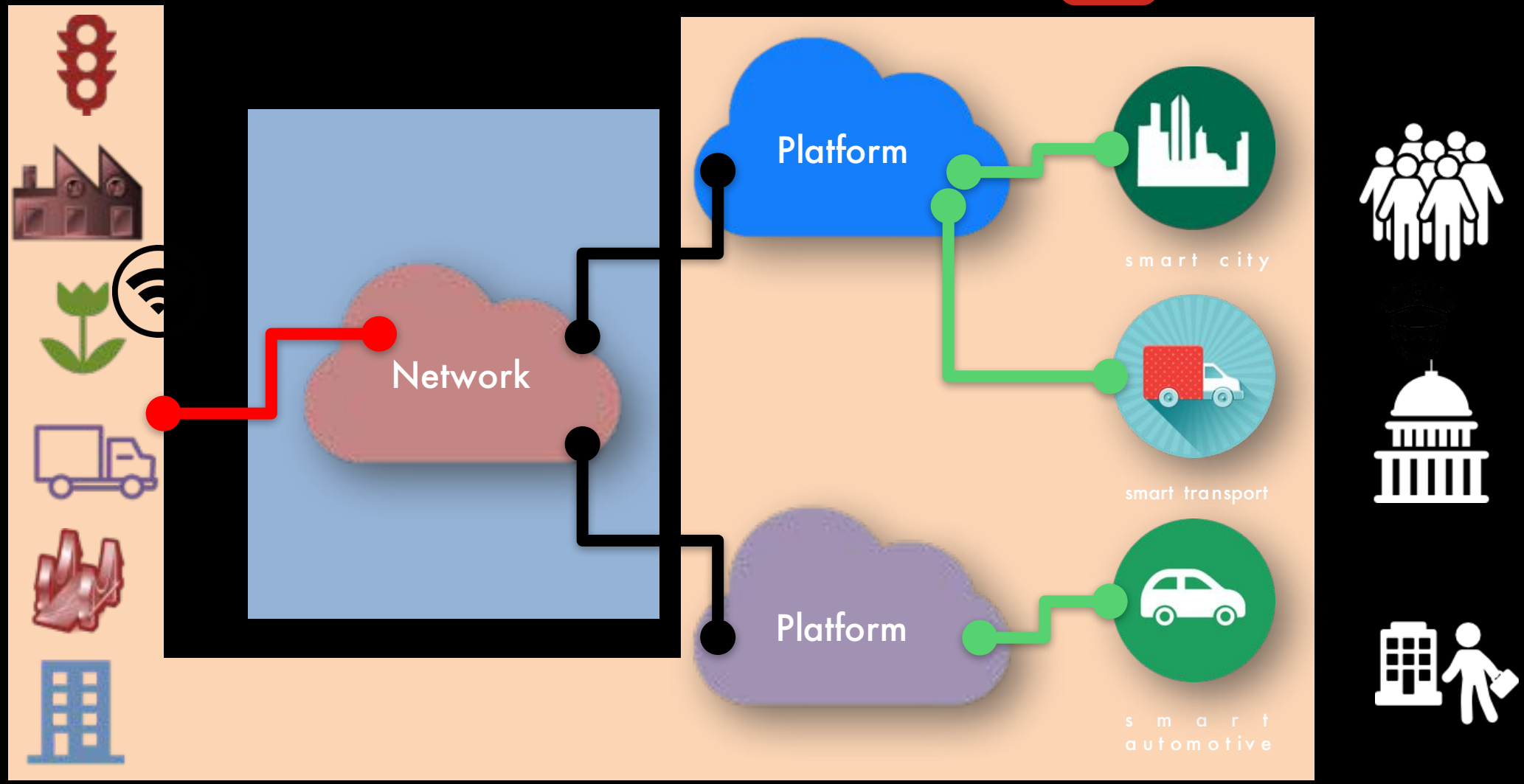
Application Provider

Customer

PHASE-1

CONNECTIVITY PLAYER

BUSINESS MODE 1



Device Provider

Network Provider

Platform Provider

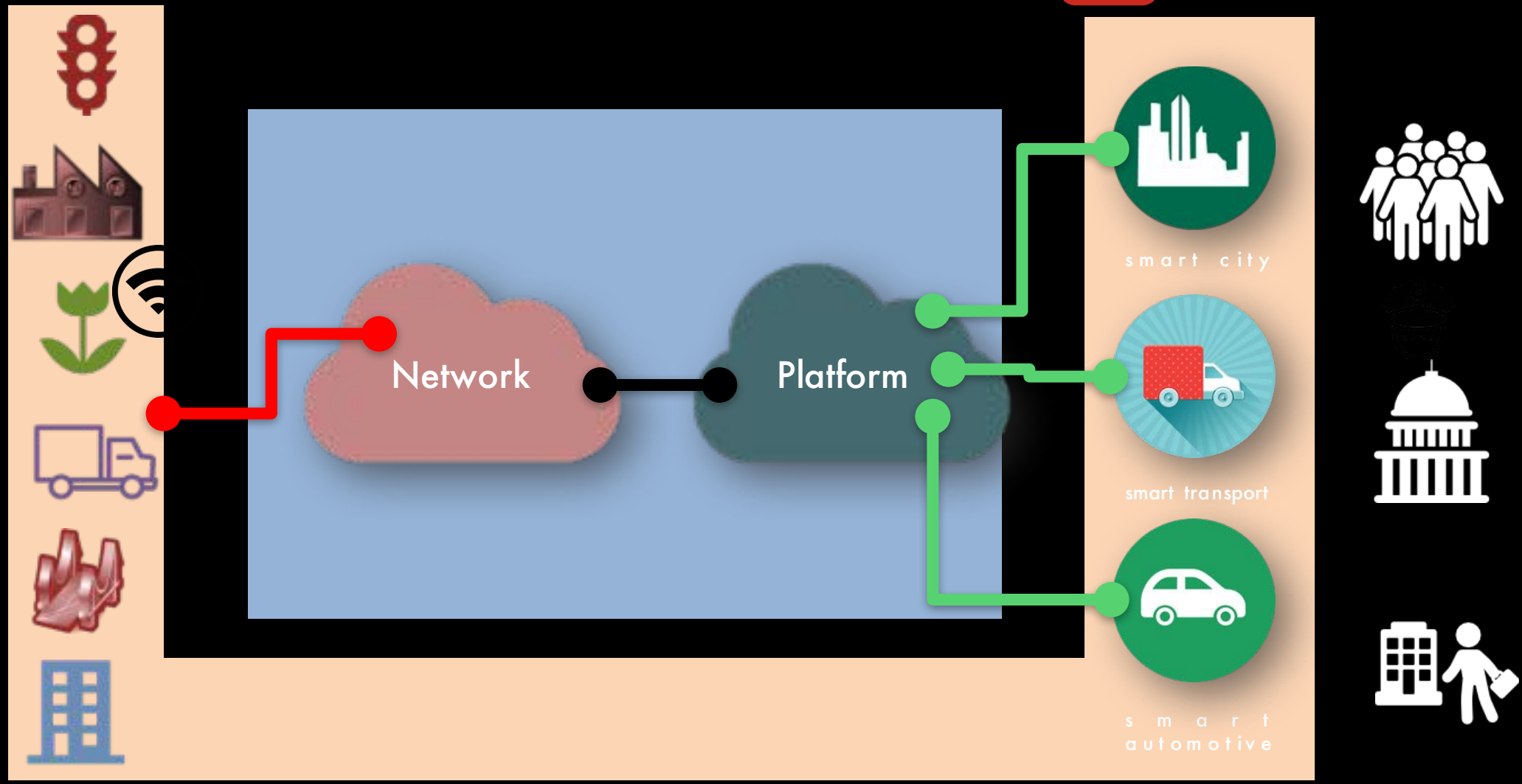
Application Provider

Customer

PHASE-2

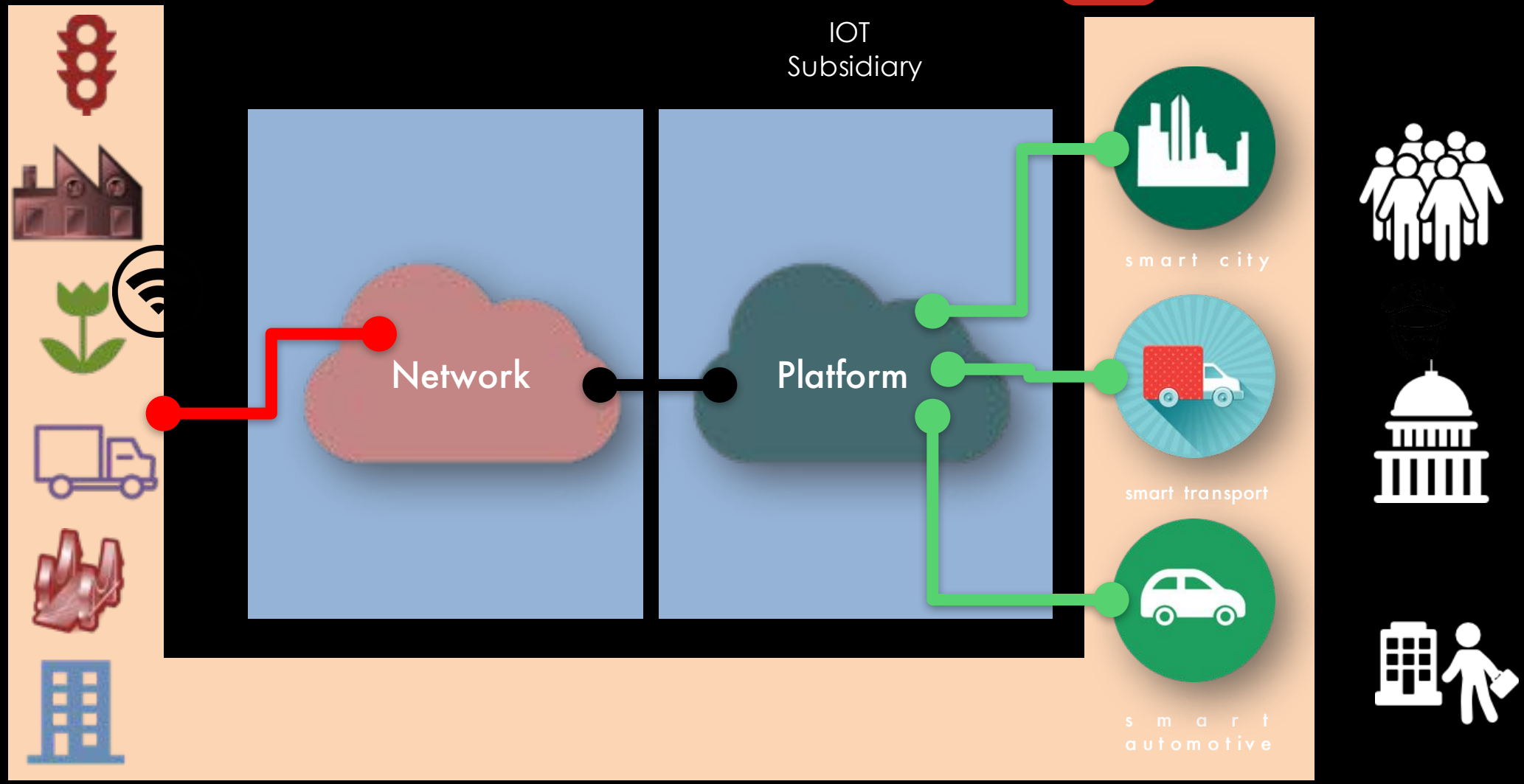
IOT ENABLER PLAYER

BUSINESS MODE 2



Device Provider | Network Provider | Platform Provider | Application Provider | Customer

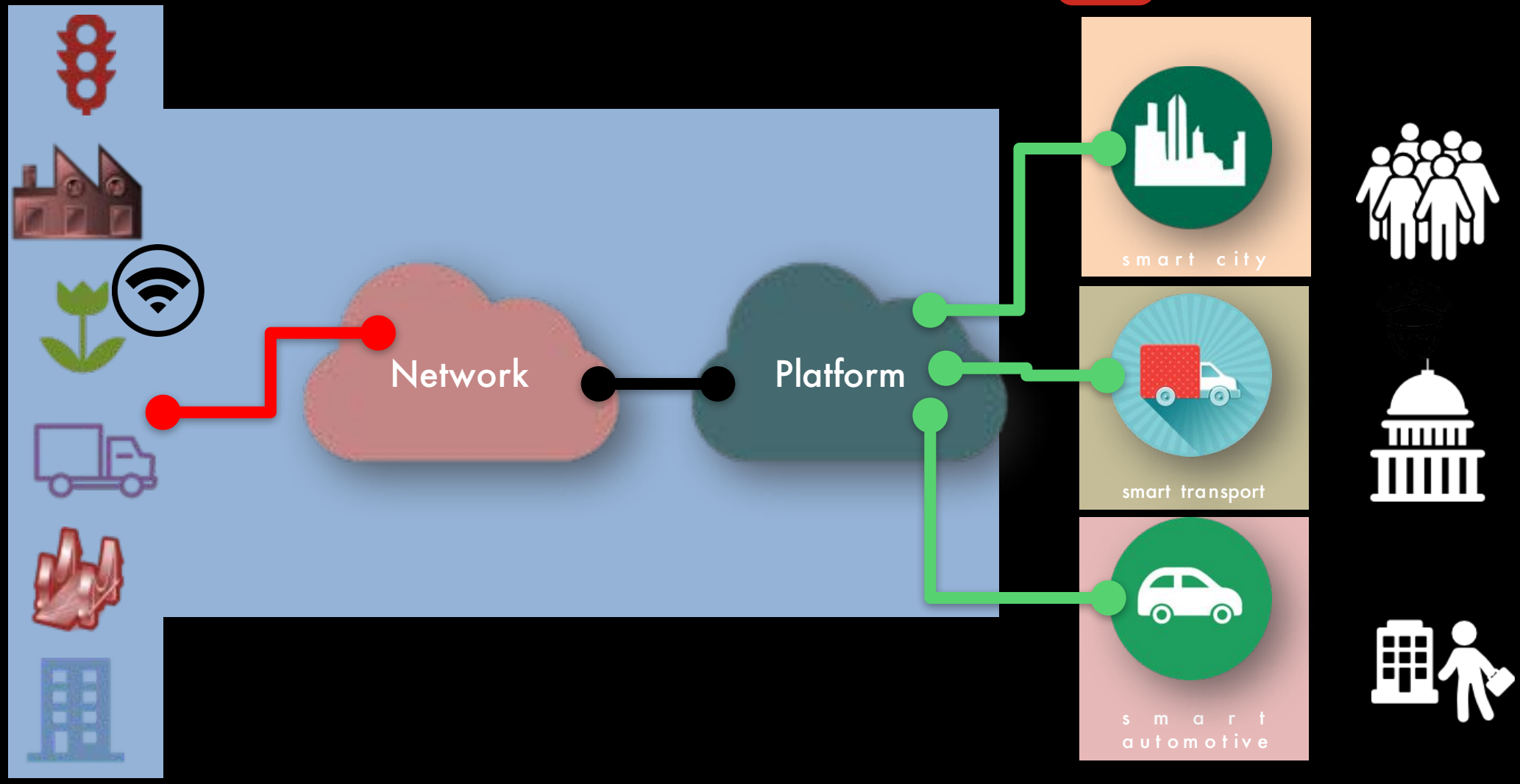
BUSINESS MODE 3



PHASE-3

IOT SOLUTIONS PLAYER

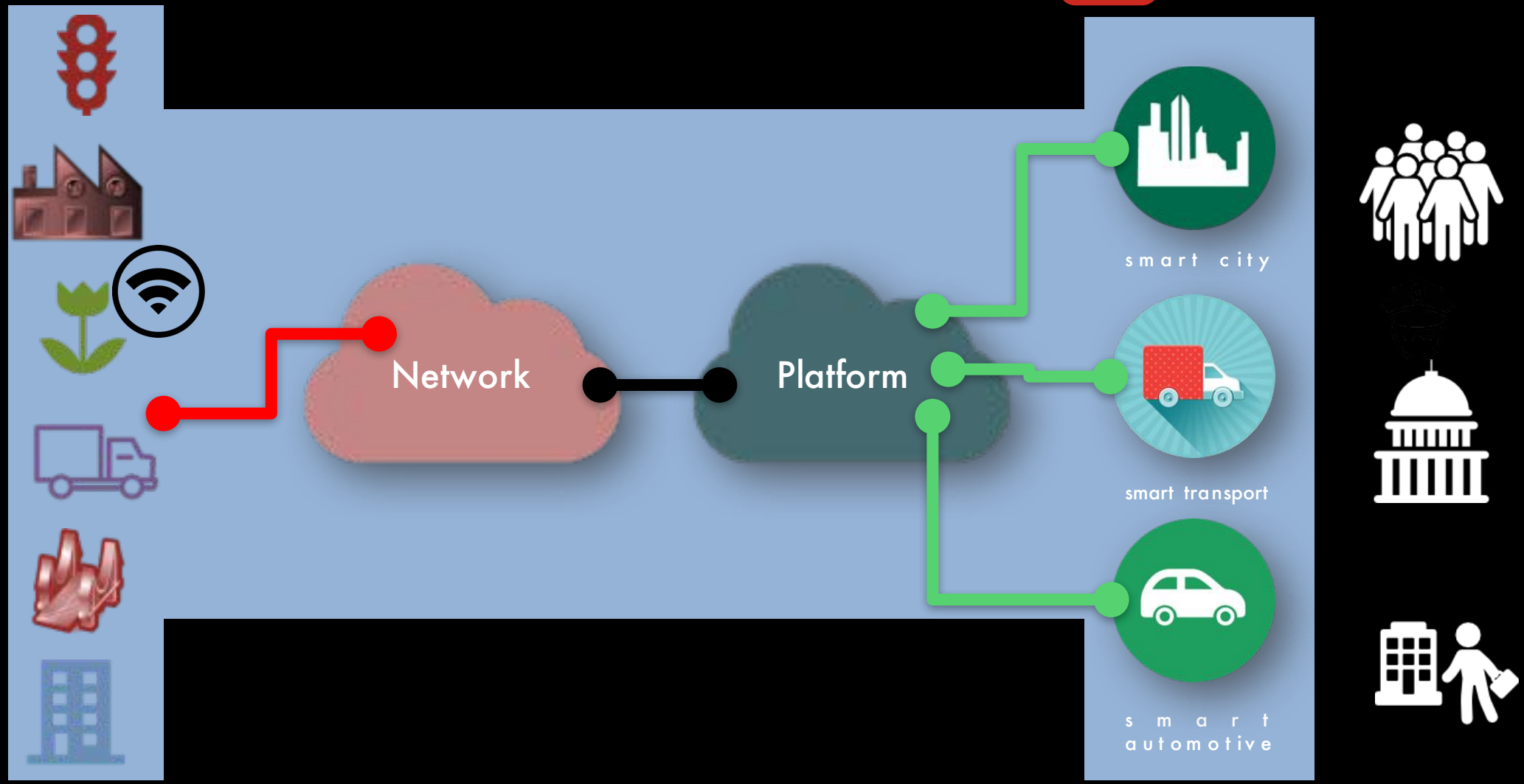
BUSINESS MODE 4



PHASE-4

IOT SERVICE PROVIDER

BUSINESS MODE 5



Device Provider

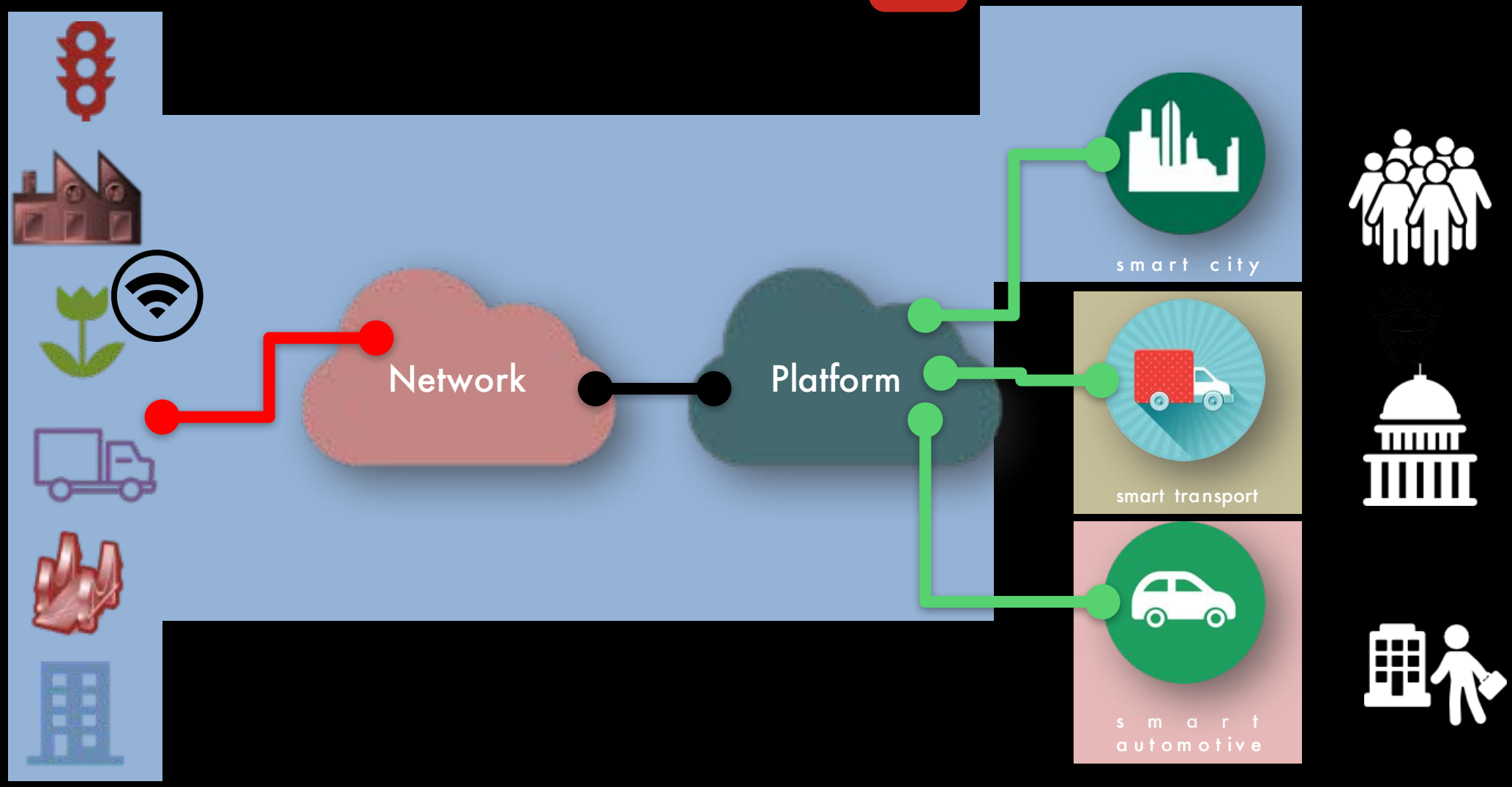
Network Provider

Platform Provider

Application Provider

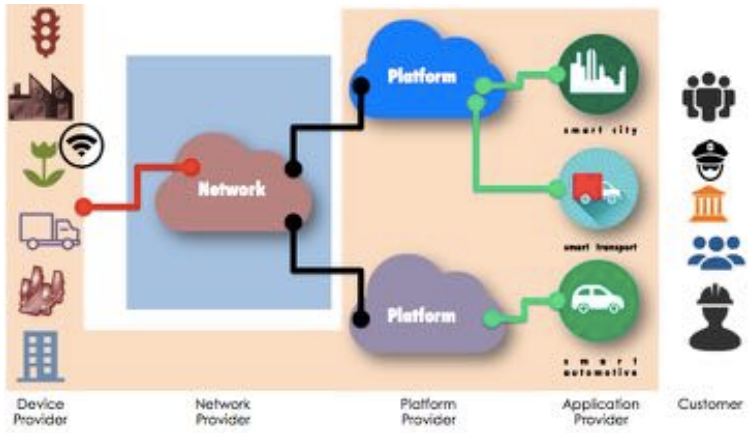
Customer

BUSINESS MODEL 6 -HYBRID



How to Evolve to a End-to-End IOT Service Provider

1



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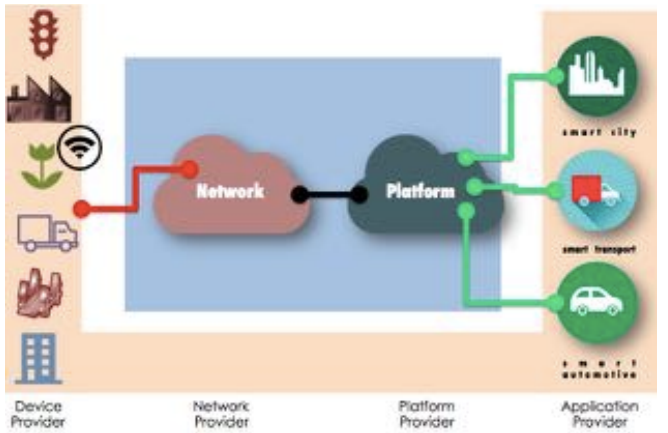

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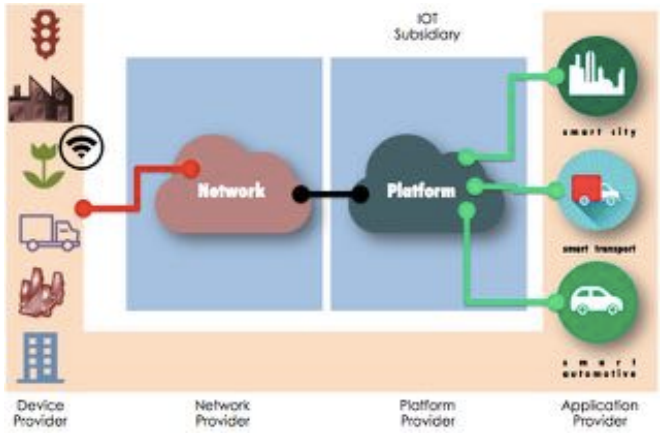

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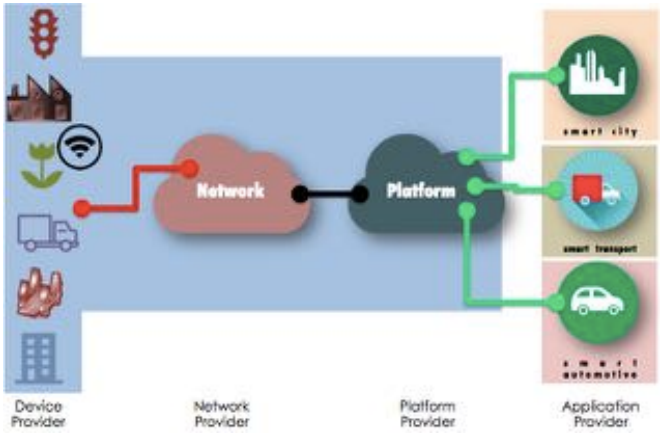

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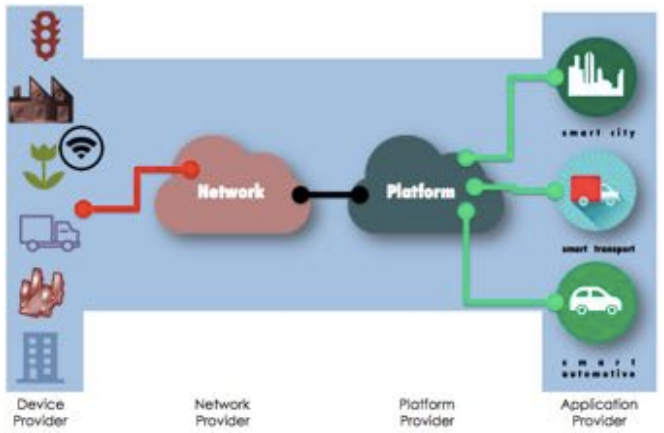

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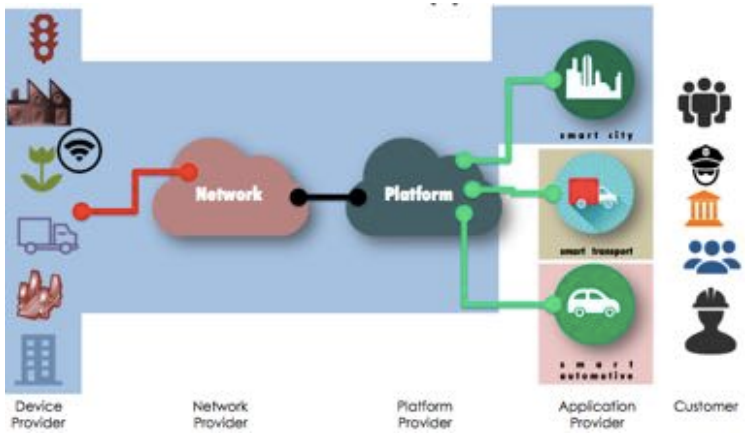

10 MOST IMPORTANT IOT TRENDS IN 2016

1. Potentially Record-Breaking Number of Acquisitions
2. IoT Playing Field Grows More Crowded
3. IoT Is So Complex That Partnerships Are a Must
4. Established Companies Double Down on IoT to Offset Declining Revenue
5. Security Still a Massive Concern
6. IoT Shines for Industrial Applications amidst Patchy Success in the Smart Home Market
7. Keen Interest in IoT Outside of the United States
8. Smart Cities and Self-Driving Cars Gain Traction
9. IoT Is Now More about Data Than It Is Things
10. Beyond the Hype and into Reality

THANK YOU

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