Build a Smart City Ecosystem

Petros Zisimopoulos
System Integration Division
pzis@space.gr

A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently.

Smart city

For the 2006 film, see Smart City (film).

A **smart city** is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently. This includes data collected from citizens, devices, and assets that is processed and analyzed to monitor and manage traffic and transportation systems, power plants, water supply networks, waste management, law enforcement, information systems, schools, libraries, hospitals, and other community services.[1][2][page needed] The smart city concept integrates information and communication technology (ICT), and various physical devices connected to the network (the Internet of things or IoT) to optimize the efficiency of city operations and services and connect to citizens.[3][4] Smart city technology allows city officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving.

ICT is used to enhance quality, performance and interactivity of urban services, to reduce costs and resource consumption and to increase contact between citizens and government.[5] Smart city applications are developed to manage urban flows and allow for real-time responses.[6] A smart city may therefore be more prepared to respond to challenges than one with a simple "transactional" relationship with its citizens.[7][8] Yet, the term itself remains unclear to its specifics and therefore, open to many interpretations.[9]

Other terms that have been used for similar concepts include *cyberville, digital city, electronic communities, flexicity, information city, intelligent city, knowledge-based city, MESH city, telecity, teletopia, Ubiquitous city, wired city.*

Major technological, economic and environmental changes have generated interest in smart cities, including climate change, economic restructuring, the move to online retail and entertainment, ageing populations, urban population growth and pressures on public finances.[10] The European Union (EU) has devoted constant efforts to devising a strategy for achieving 'smart' urban growth for its metropolitan city-regions.[11][12] The EU has developed a range of programmes under 'Europe's Digital Agenda".[13] In 2010, it highlighted its focus on strengthening innovation and investment in ICT services for the purpose of improving public services and quality of life.[12] Arup estimates that the global market for smart urban services will be $400 billion per annum by 2020.[14] Examples of Smart City technologies and programs have been implemented in Singapore,[15] Dubai,[16] Milton Keynes,[17] Southampton,[18] Amsterdam,[19] Barcelona,[20] Madrid,[21] Stockholm,[22] China[23] and New York.[24]

Why smart cities?

| Lighting	Parking	Environment	Urban Mobility	Safety and Security	Waste Management
Up to 38%	**30%**	**$1.7T**	**$300B**	**$3.2T**	**60%**
of overall municipal utility bill	of traffic congestion is caused by drivers circling to find a space	economic impact due to air pollution	Annual cost of congestion for US drivers. $1400 per driver	annual cost of crime in the US, including both direct and indirect costs	inefficiency in waste bin collection

Challenges in smart cities
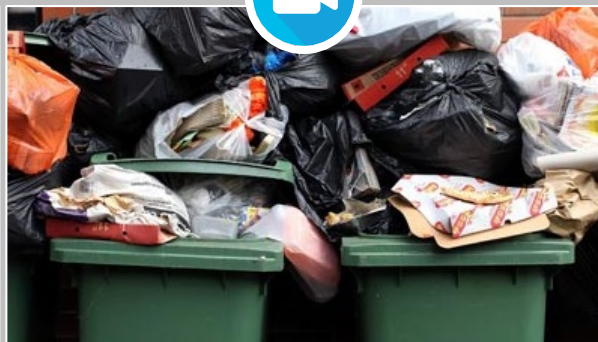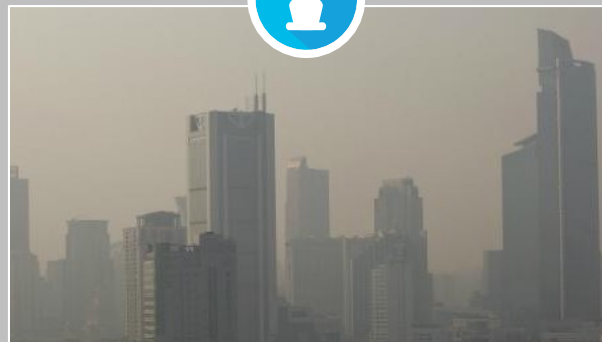
Vertically integrated sensors

No standardization across sensors

Lack of cross-domain data and information sharing
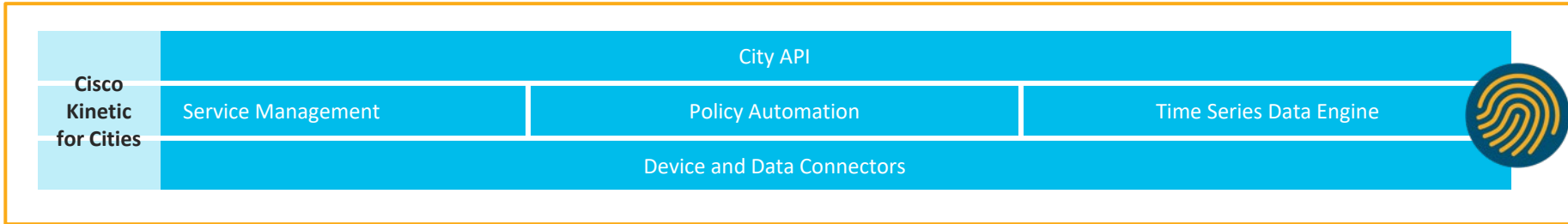
Fragmented application ecosystem

The Cisco approach

Cisco's Approach for Smart Cities

Cisco Kinetic for Cities – What does it do

Cisco Kinetic for Cities

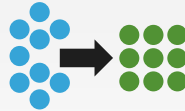| City API		
Service Management	Policy Automation	Time Series Data Engine
Device and Data Connectors		

Data from any device
- Aggregate and normalize data across multiple sensors
- Digital Model for the City
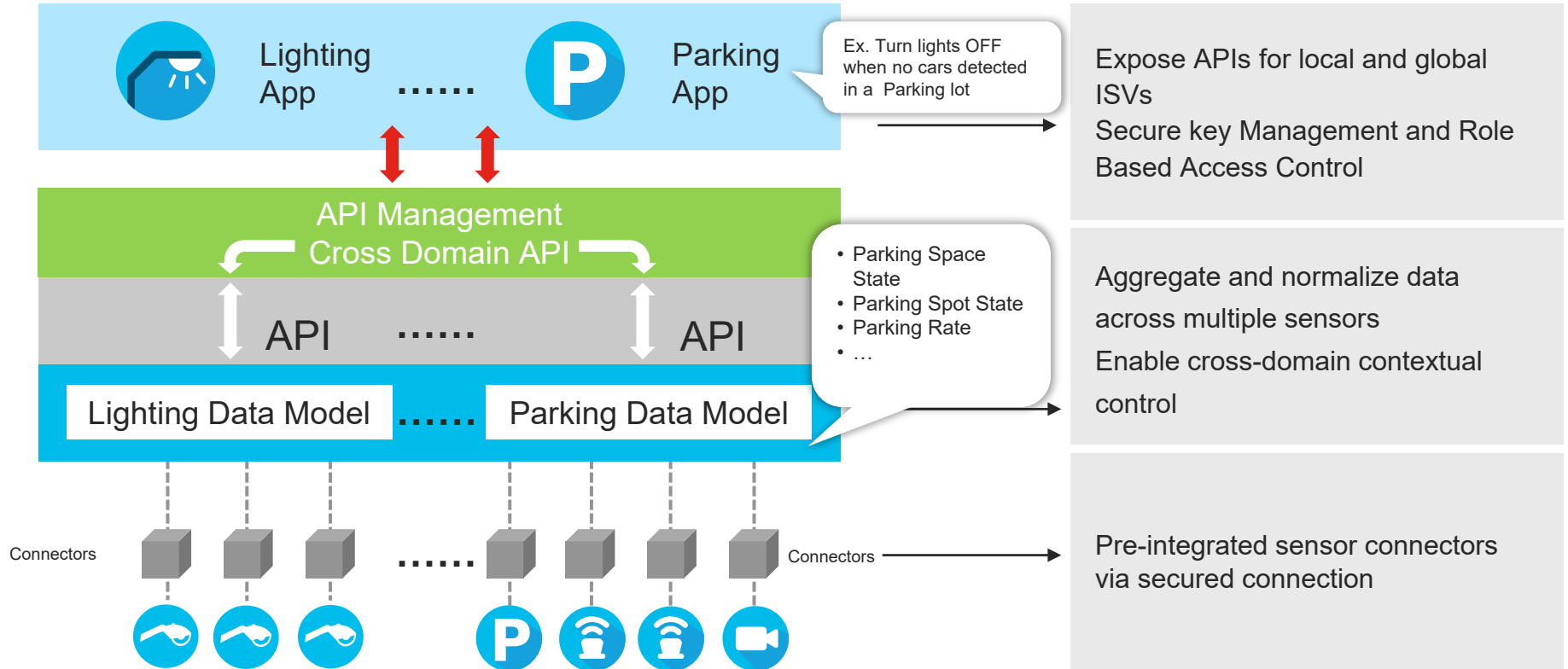
Cross-domain information
- Enable cross-domain contextual control (ie. With outdoor lighting & crime)
- Process automation through policies

Open ecosystem
- Expose APIs for local and global ISVs Applications
- Secure Key Management and Role based access control

Cisco Kinetics for Cities – Digitizing City Operations

Lighting App ...... Parking App

Ex. Turn lights OFF when no cars detected in a Parking lot

API Management
Cross Domain API

API ...... API

Lighting Data Model ...... Parking Data Model

- Parking Space State
- Parking Spot State
- Parking Rate
- ...

Connectors ...... Connectors

Expose APIs for local and global ISVs
Secure key Management and Role Based Access Control

Aggregate and normalize data across multiple sensors
Enable cross-domain contextual control

Pre-integrated sensor connectors via secured connection

Detailed architecture

Visualization

3rd Party Applications

City Manager - Operations Dashboard

Platform Components

API Management

Core Engine
- Standard Operating Procedure
- Location Mgmt
- Identity and Access Management(IAM)

Real Time Engine
- Policy Automation
- Data Aggregation and Normalization

Southbound Partner Extensions

Time Series Data Engine
- Raw Data Processing
- ETL Workflow

Reporting Engine for Operating Decisions

Video Services
- IAM
- Location Mgmt

Integration Engine

External Data Sources City Apps.

City Domains
- Parking
- Lighting
- Waste Management
- Environment
- Safety & Security
- Urban Mobility
- Video

*Arrows Represent Data Flow

CKC Lighting - Use Cases

FAN: 6lowpan, ZigBee
WAN: Cellular, Ethernet, Wi-Fi

Cisco Kinetic for Cities

Operator Dashboard

Light Control Node Connected to LED to control Light illumination

Customers

- City Lighting Department
- Urban Service Providers
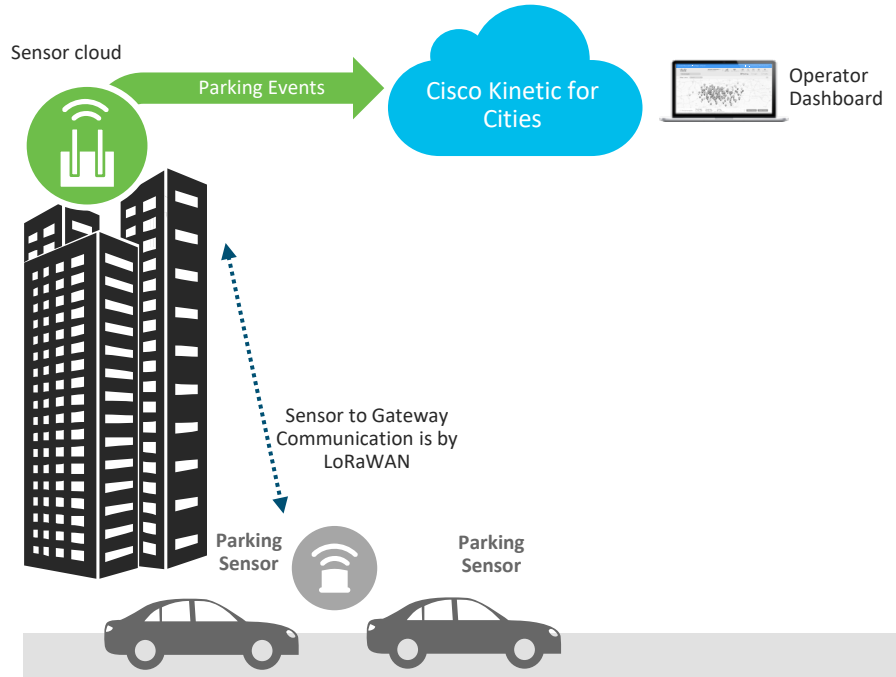- LED Manufacturers
- Utility/Power distribution companies

Customer Goals

- Reduce energy consumption (80%)and maintenance
- Improve citizen experience and safety through enhanced illumination
- Leverage existing network investment and infrastructure for future solutions

Use Cases

- Real Time Monitoring & Control
- Scheduling
- Cross-domain policies with environment, traffic, crowd, parking, safety and security

CKC Parking – Use Cases

Sensor cloud

Parking Events

Cisco Kinetic for Cities

Operator Dashboard

Sensor to Gateway Communication is by LoRaWAN

Parking Sensor

Parking Sensor

Customers

- City Parking Dept. / Parking Agencies
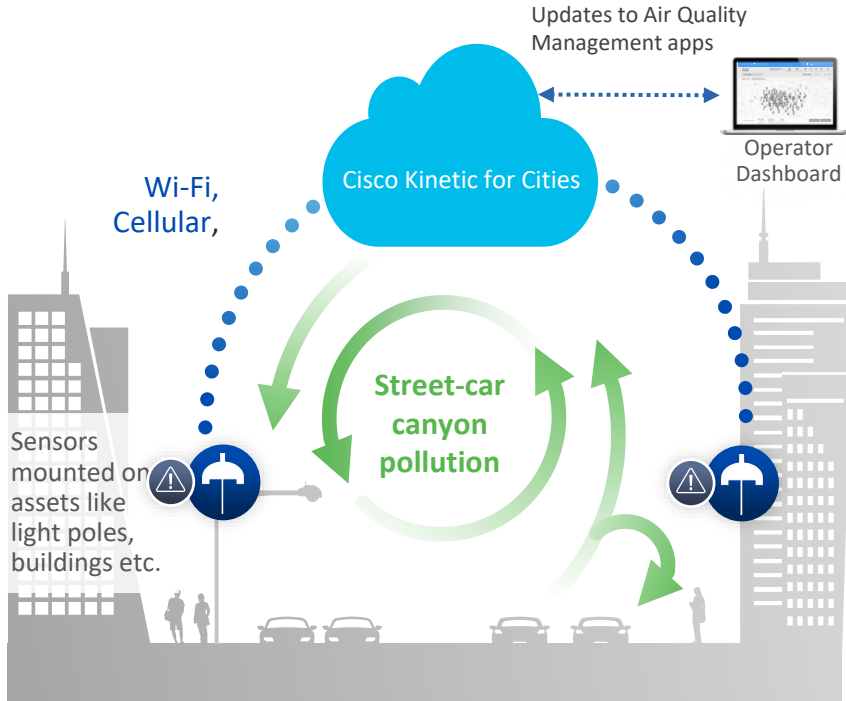- Parking based Urban Operators
- Parking garages/Malls

Customer Goals

- Maximize revenue from parking space and slots
- Generate additional revenue through demand-based parking pricing and more accurate ticketing of parking violations
- Enable citizens find parking more quickly -> reduce traffic congestion -> Environment

Use Cases

- Parking occupancy and availability
- Utilization reports and analytics
- Cross-domain linkage : Traffic, Crowd, Events, Weather

CKC Environment – Use Cases

Updates to Air Quality Management apps

Cisco Kinetic for Cities

Operator Dashboard

Wi-Fi, Cellular,

Street-car canyon pollution

Sensors mounted on assets like light poles, buildings etc.

Customers

- Local Air Quality Agency
- Dept. of Transportation
- Dept. of Sustainability

Customer Goals

- Identify problematic pollution areas that would benefit from air quality sensors
- Deploy sensors in different locations to collect Air Quality Index and create awareness
- Test Urban Planning actions to mitigate poor air quality.

Use Cases

- Sensor based Air Quality
- Software modeling of Air Quality

SPACE

City of Trikala, Greece

Implementing the Smart Open Mall

Business Objectives

- Stimulate local economy by attracting people to City Center businesses

- Lower connectivity costs for citizens and visitors

- Improve government efficiency; provide a foundation for smart city solution; City Digitization

Solutions

- **Cisco Digital Network Architecture for Cities, Cisco Kinetic for Cities, Smart Parking, Smart Lighting, Environmental Monitoring**

- Partners: **Space Hellas**, Kafkas S.A., Sieben, Parkguru

Business Outcomes

- Smart parking operations with a citizen mobile app

- city center-wide free Wi-Fi

- energy savings of 80% in lighting thanks to advanced dimming

- Environmental Monitoring

- Foundational network and Cisco Kinetic for Cities in place
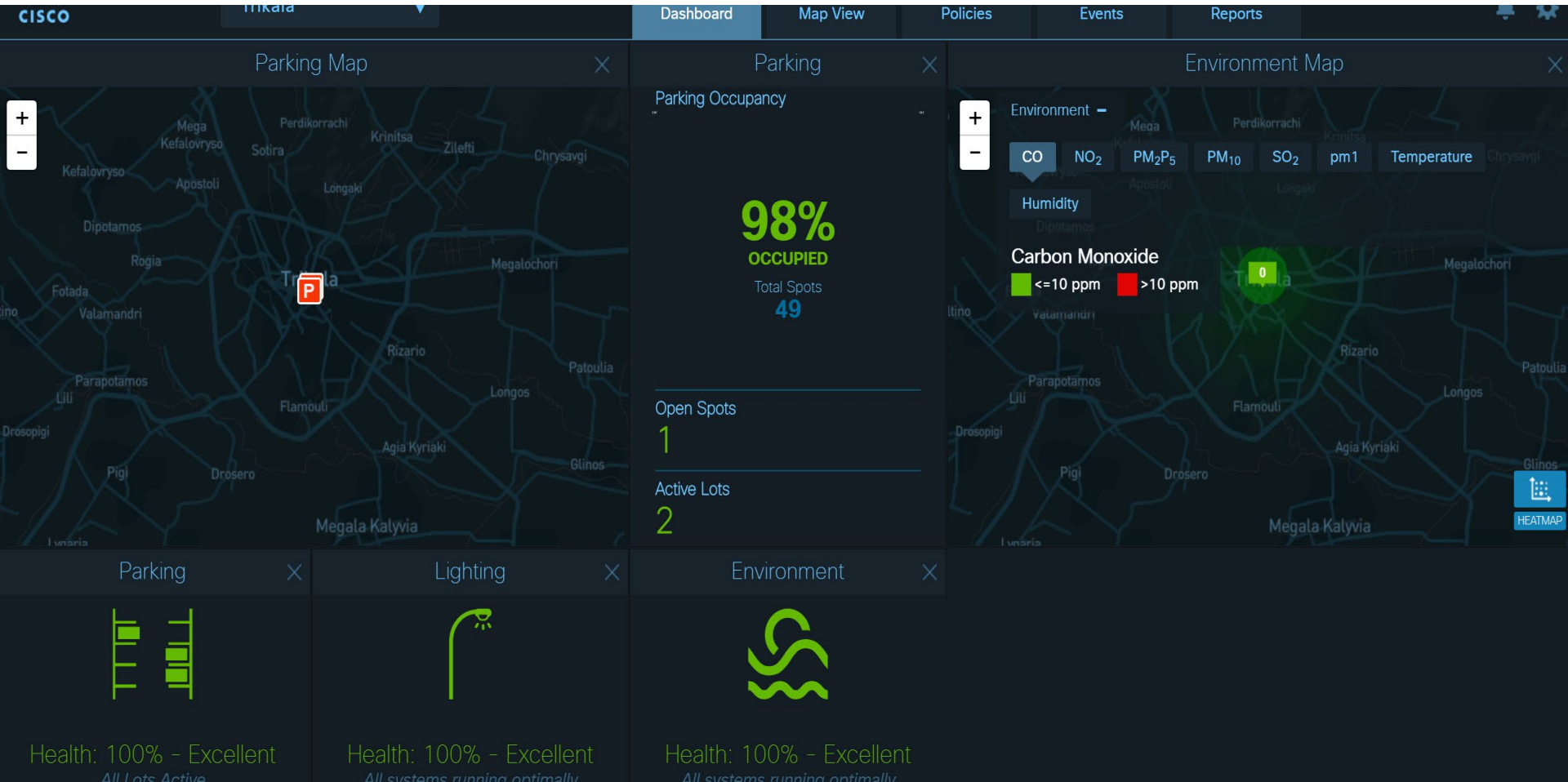
SMART OPEN MALL

Initial idea presented: **7th Mobile Connected World, May 2017**
Pilot started: **June 2017**

- **Smart Lighting**
- **Smart Parking**
- **Public Wi-Fi**
- **Environmental Monitoring**
- **Digital marketing, campaigns and loyalty**
- **Smart city platform**

Lessons learned:
- **City engagement**
- **Ecosystem**

Trikala Cisco Kinetic

Parking Map

Parking

Parking Occupancy

98%
OCCUPIED

Total Spots
49

Open Spots
1

Active Lots
2

Environment Map

Environment −

CO NO_2 PM_2P_5 PM_{10} SO_2 pm1   Temperature

Humidity

Carbon Monoxide
■ <=10 ppm   ■ >10 ppm

0

HEATMAP

Parking

Health: 100% – Excellent
All Lots Active

Lighting

Health: 100% – Excellent
All systems running optimally

Environment

Health: 100% – Excellent
All systems running optimally

Interconnected SAFE Cities

The Citizens are our sensors

WHO DOESN'T WANT SAFETY ?

- ❑ Using smart tech to serve and protect citizens
- ❑ Applying IoT and Social Media analytics to provide police and emergency services with new ways to fight crime and make cities safer
- ❑ Achieving a higher level of system collaboration and interconnection
- ❑ Integrating ICT infrastructures towards e-Government interoperability

Safe Cities, major goals

- City Authorities have to deal with:
  - Bullying, Rapes & Kidnaps
  - Immigration, Criminality & Terrorism
  - Physical Phenomena / Disasters

- Their duty includes protection of various forms of networks and social structures:
  - Energy Networks
  - Information Networks
  - Transportation Networks
  - Infrastructure Networks (Water Supply - Sewerage)
  - Public Infrastructure (Schools / Parks / Stadiums / etc.)

Safe Cities, key aspects

- Prevention & reduction of incidents
- Threat management
- Minimizing reaction time
- Better situation handling
- Information dissemination
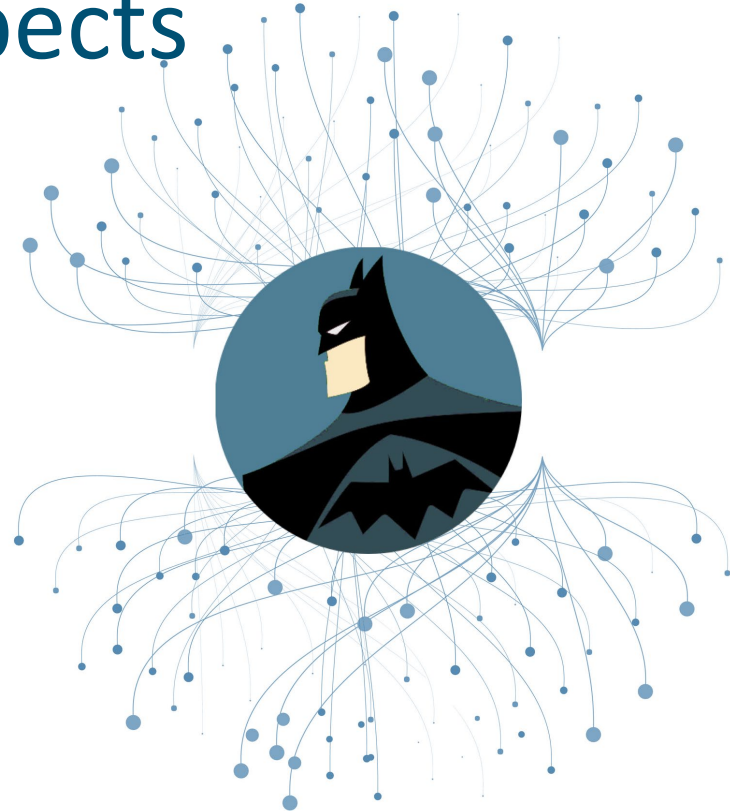
Interconnected SAFE Cities

- Everything can be connected
- Information is available everywhere
- Information is directly manageable
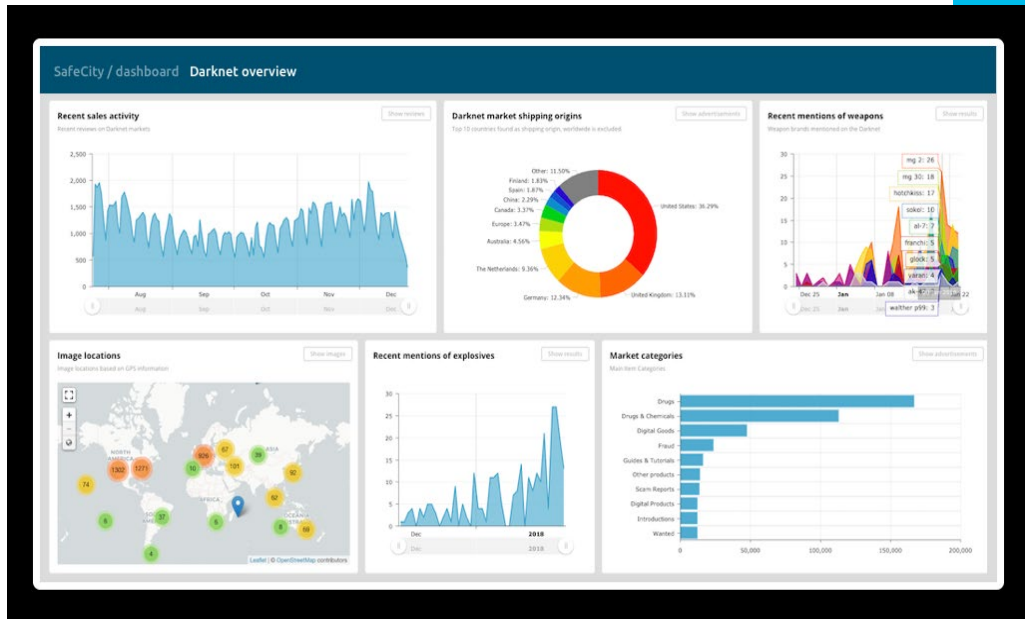- Crucial decisions can be taken directly

The Safe-City Intelligence Platform
By Web-IQ

Do you know what is happening online in your city? Who is undermining the safety and economic stability of your citizens?

Helping cities and municipalities to get a grip on the online landscape by providing data and expertise.

http://safe-city.io

Citizens in modern smart cities will be actively contributing to the fight against crime and the increase of security level in their daily activities

Creating shared value

CITY AGENCIES

Optimizes operations through real-time data intelligence and intra-agency collaboration; more citizen engagement.
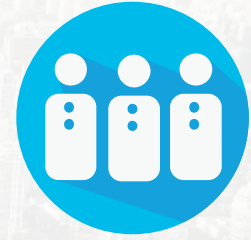
CITIZENS

Provides city services through visibility into real-time city data, including mobility, connectivity, safety and other key services for improving elements of daily life

BUSINESS

Drives new revenue streams and economic development by enhancing awareness of customer activity and behavior

DEVELOPERS AND VENDORS

Fuels application development of city data to help cities improve operational efficiencies, engage citizens and boost economic viability

Facts Sheet

SPACE

- ☐ System Integrator, Value-Added Solution and Service Provider

- ☐ Active in Telecommunications, IT and Security

- ☐ Over 30 Years of Operations and Sustainable Growth

- ☐ 350 Specialized Employees
  - ▪ Over 600 Certifications - Accreditations

- ☐ Turnover: € 66.1 million (2018)

- ☐ Listed on the Athens Stock Exchange since 2000

- ☐ Accreditation:
  - ▪ National . Cyprus . EU . NATO Secret

- ☐ Certified according to:
  - ▪ ISO9001:2015 . ISO/IEC27001:2013 ISO14001:2015 . OHSAS18001:2007

- ☐ National & International Presence
  - ▪ Space Hellas HQ located in Athens
  - ▪ Branches in Athens, Thessaloniki, Patra, Heraklion-Crete, Ioannina, Farsala and Nicosia-Cyprus
  - ▪ Subsidiaries in Cyprus, Romania, Serbia, Malta & Jordan
  - ▪ Activities in Europe and the Middle East

Thank you !