



5G potential in the urban space: the case of Smart Trikala

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Head of the Greek Smart City Standardization Group

Why would 5G give potential? (IoT in cities)



Smart monitors: Seoul



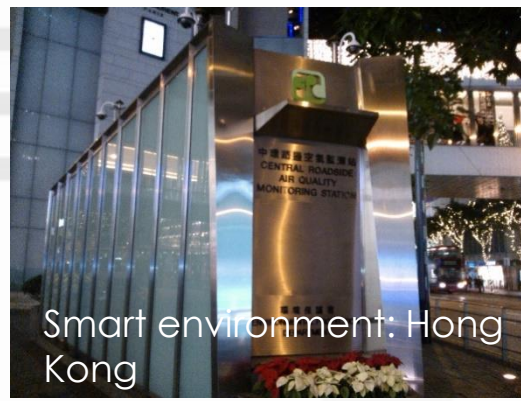
Smart buildings: Songdo



Smart signs: Geneva



Smart bins: London



Smart environment: Hong Kong

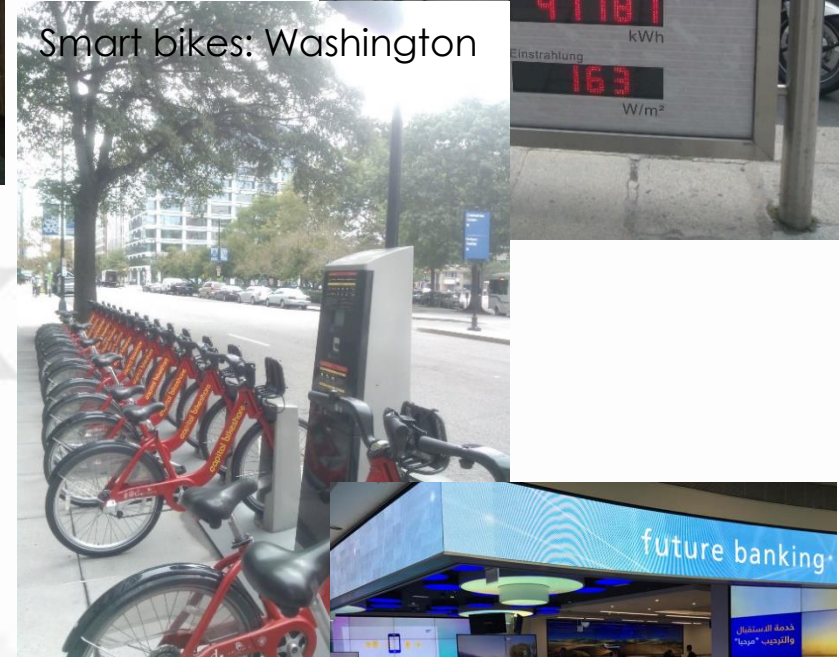


QR codes: Hong Kong



Energy monitoring: Vienna

Smart bikes: Washington



Future banking: Dubai

An aerial photograph of a town, likely Trikala, Greece. The town is built on a hillside with a river flowing through it. A prominent feature is a large, circular stone structure, possibly a castle or a stadium, situated on a green hillside. The town is densely packed with buildings, many with red-tiled roofs. The background shows a mix of urban and natural landscapes.

5.000

**Years of history.
Birthplace of Asklepios
(Aesculapius), the first
doctor of the universe!**

81.355

**Inhabitants.
The Municipality consists of
the city of Trikala surrounded
by 34 villages
Area: 608 km²**



6.000

**famous Greek songs were
composed
and performed by:
Tsitsanis, Virvos
Kaldaras, Samoladas,
Mitropanos, Kolokotronis**

No.1

**Prefecture in bottling Tsipouro
(famous Greek drink)
and feta cheese
Also famous the Trikalian
sausage!**



Strengths

- Agriculture
- Strong higher education system
- A long “smart” story
- Branding (Elves Mill)
- Coherent community

Weaknesses

- Low local GDP
- High levels of unemployment
- Only 2 university departments
- National «Brain drain»



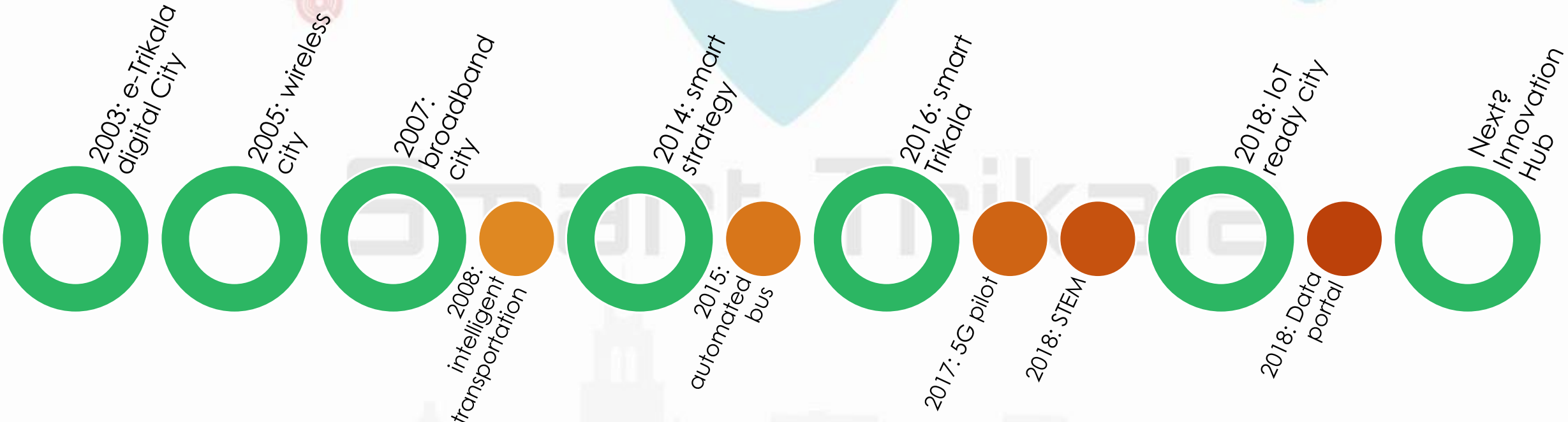
Opportunities

- Brand new transportation networks
- Regional Mobility
- Regional Innovation Strategy (RIS3)
- International recognition
- Emerging technologies (STEM, precise architecture etc.)

Threats

- Political and economic uncertainties
- Changes in tertiary education
- Climate change effects to local GDP
- Immigration and community changes

Trikala: a brief smart story



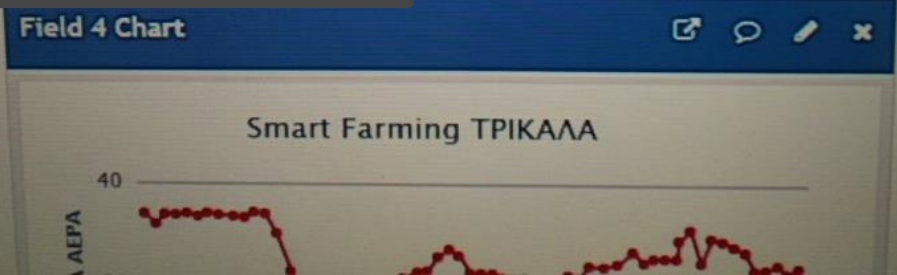
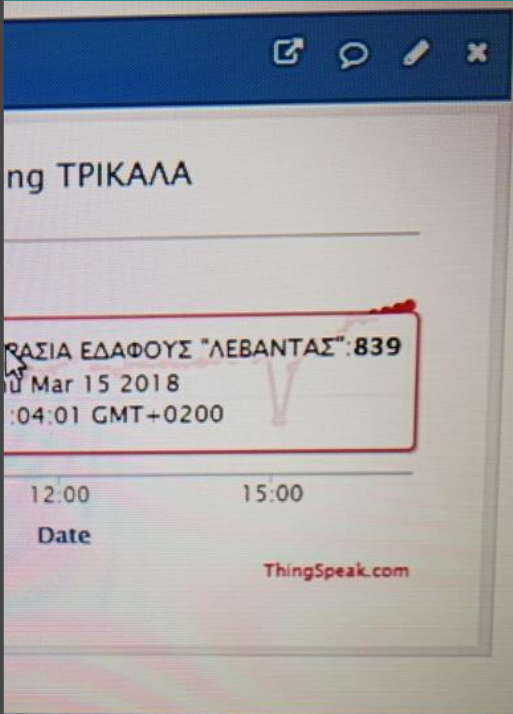
Trikala with ISO37100, ISO37122

Sustainable development in communities - Indicators for Smart Cities

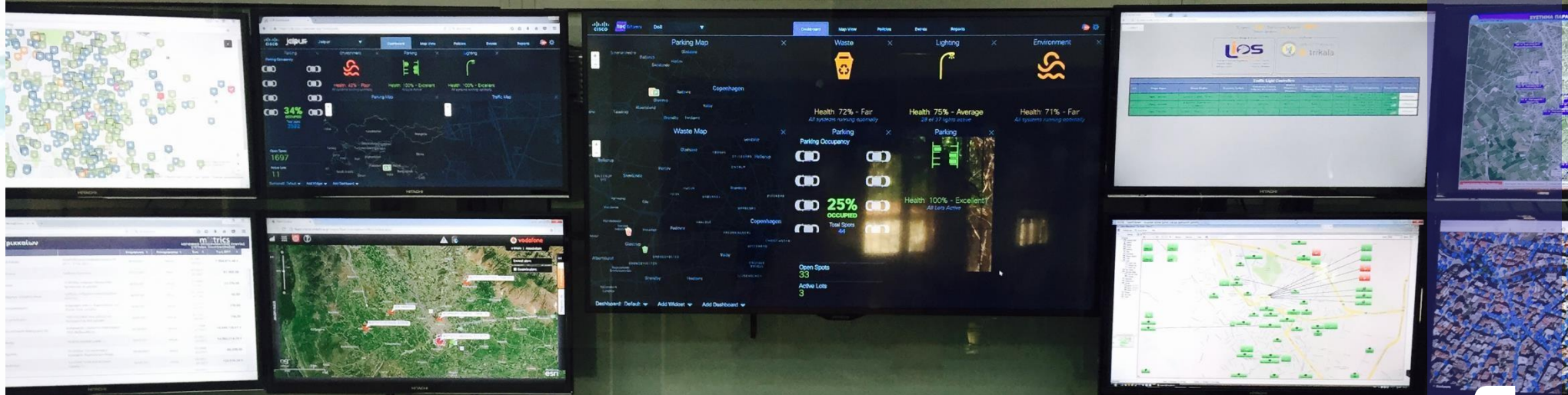
- The city setup the Smart City department to coordinate activities, standardize and measure
- Representative Values (ISO37122)

Culture	Number of library book titles per 100 000 population	78050	Education	Number of online databases available through public libraries per 100 000 population	1
	Number of library e-book titles per 100 000 population	0		Percentage of city population with professional proficiency in one or more foreign languages	15%
	Active library users as a percentage of total population	27,6		Number of computers, laptops, tablets, or other digital learning devices available per 1000 primary school students	10
Economy	Percentage of local businesses contracted to provide city services which have data communication openly available	0		Number of computers, laptops, tablets, or other digital learning devices available per 1 000 secondary school students	74
	Annual number of new start-ups per 100 000 population	270		Number of Science, Technology, Engineering, and Mathematics (STEM) higher education degrees per 100 000 population	0,50%
	Percentage of labour force employed in the Information and Communications Technology (ICT) sector	(20 companies of 112 people) 4%			
	Percentage of the labour force employed in the Education and Research & Development sectors	(2 university departments, 50 scientists) 0.4%			

The first Greek 5G pilot! Why? What for?



Wi-Fi

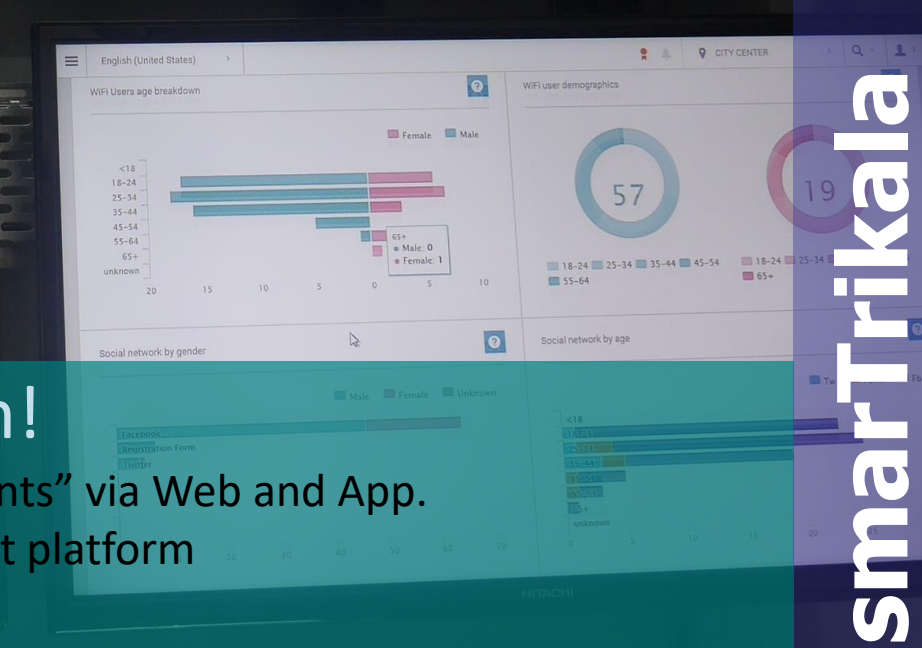
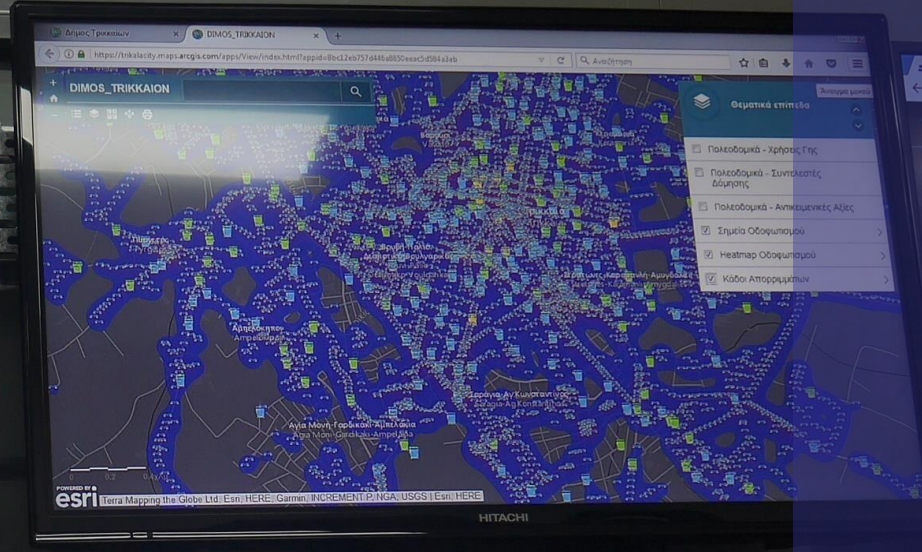
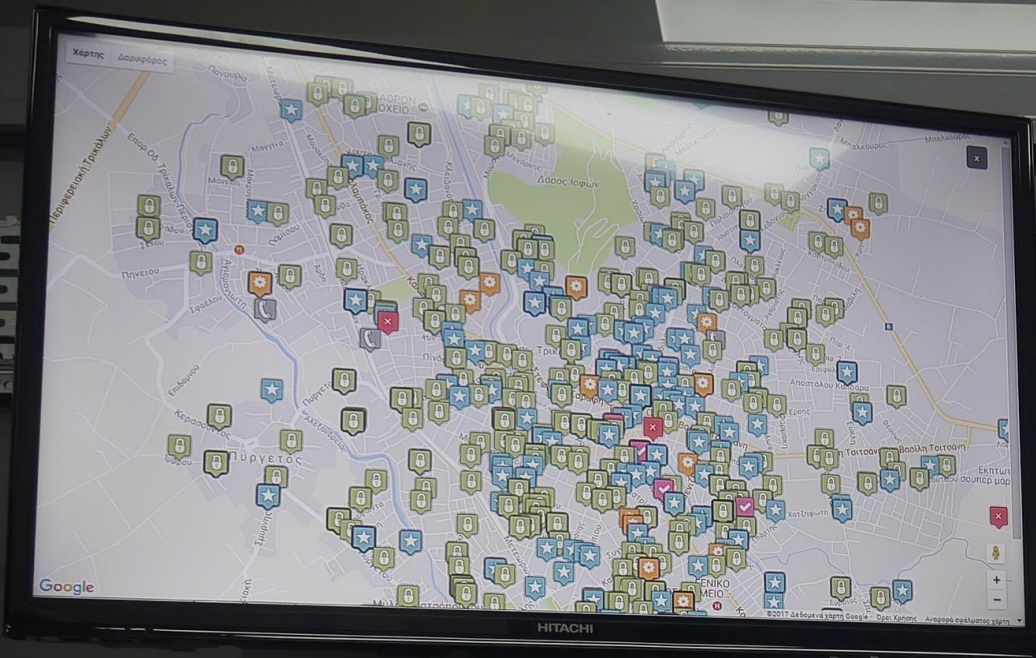


Municipal control room

Although the long “smart” story, the citizens were listening to “smart solutions” but the didn’t receive “smart” result! That’s why we installed the Municipal control room at the entrance of the City Hall.

So that they can realize that technology can truly improve their life!

smarTrikala



A brief tour in the control room!

Municipal call center- Citizen claims and “complaints” via Web and App.
 Fleet management; GIS; Metro-WiFi management platform

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4.854

requests
2017

4.590

requests
2016



71%

were solved
(2016-2017)

57%

had to do with
city lights

60%

solved in less than 10 days



COSMOTE 10:23 πμ 88%

SPEEDTEST™

PING
12ms

DOWNLOAD

UPLOAD



50.12
Megabits



Hosted by: Vodafone Greece

Walk in the city!
Free WiFi (Cisco APP)
Open Mall application

smarTrikala



2004

started

50 Mbps

upload/download

35

Gb per day

570

Users per day



65

Access
points



btm intelligent traffic light management

Developed by **LIOS electronics**
Software Programming, Hardware Design, Software Analysis, Ανάλυση Γεωγραφικών Πληροφοριών, Ανάλυση Γεωγραφικών Πληροφοριών

Δήμος Τρικκαίων Control Room #1#

Current User : trik User ID : 00004

Επίπεδο Πρόσβασης : USER Level [-X]

Α.Α.	Όνομα Φάση	Όνομα Κιβότυπ	Σημαντικός Αριθμός	Κατεύθυνση Είσοδο	Προβλεπόμενη Ρύθμιση	Ελεγχος Πίνακας Ελεγχής	Κατεύθυνση Διατάξεις	Τάση/Αριθμός	Επισκευάσεις	Παρατηρήσεις
1	Κιβότυπ	Κατεύθυνση & Κιβότυπ	0110D 25.02.17 00.00.00	Κατεύθυνση	Κατεύθυνση	Κιβότυπ	Κατεύθυνση	2017-06-29 18:04:26 000 Ηλεκτρ. 00.04.48	ΣΟΛΜΟΠ1 03176	Λειτουργικός
2	Κιβότυπ	Αποκλίση & Κιβότυπ	0110D 25.02.17 00.00.00	Κατεύθυνση	Κατεύθυνση	Κιβότυπ	Κατεύθυνση	2017-06-29 18:04:21 000 Ηλεκτρ. 00.04:53	ΣΟΛΜΟΠ1 03176	Λειτουργικός
3	Κιβότυπ	Γραβιάς & Οδών	0110D 25.02.17 00.00.00	Κατεύθυνση	Κατεύθυνση	Κιβότυπ	Κατεύθυνση	2017-06-29 18:09:06 000 Ηλεκτρ. 00.00.06	ΣΟΛΜΟΠ1 03176	Λειτουργικός
4	Κιβότυπ	Κατεύθυνση & Σημείο	0110D 25.02.17 00.00.00	Κατεύθυνση	Κατεύθυνση	Κιβότυπ	Κατεύθυνση	2017-06-29 18:06:01 000 Ηλεκτρ. 00:23:11	ΣΟΛΜΟΠ1 03176	Λειτουργικός

ΣΥΣΤΗΜΑ ΠΑΡΑΚΟΛΟΥΘΗΣΗΣ ΣΤΑΘΜΩΝ ΔΙΚΤΥΟΥ ΤΡΙΚΑΛΩΝ

ΣΤΑΘΜΟΣ ΕΣΩΤΕΡΙΚΟΥ ΔΙΚΤΥΟΥ ΣΤΣ 11 (ΠΡΟΣ ΠΥΡΕΤΟ) ΤΥΠΟΥ Γ

ΕΙΣΟΔΟΣ	ΕΞΟΔΟΣ
ΕΙΣΟΔΟΣ ΟΔΟΥ	ΕΞΟΔΟΣ ΟΔΟΥ
ΟΔΟΣ ΠΥΡΕΤΟ 13657 m ²	0 m ²
ΟΔΟΣ ΤΡΙΚΑΛΑ 83191 m ²	80729 m ²

ΓΡΑΦΗΜΑΤΑ ΣΤΣ 11

ΕΠΙΜΟΡΦΩΣΗ ΣΤΑΘΜΩΝ

- 1. ΕΠΙΜΟΡΦΩΣΗ
- 2. ΧΡΗΣΗ ΜΑΞΙ Δ.Ε.Μ.
- 3. Β.Ρ.Σ.
- 4. ΦΩΤΙΣΜΟΣ ΠΕΛΑΤΕΣ
- 5. ΣΥΡΤΑ ΚΑΙΣΗΤΗ
- 6. ΣΕΡΟ ΣΤΟ ΔΑΜΑΣΟ

BY USAGE

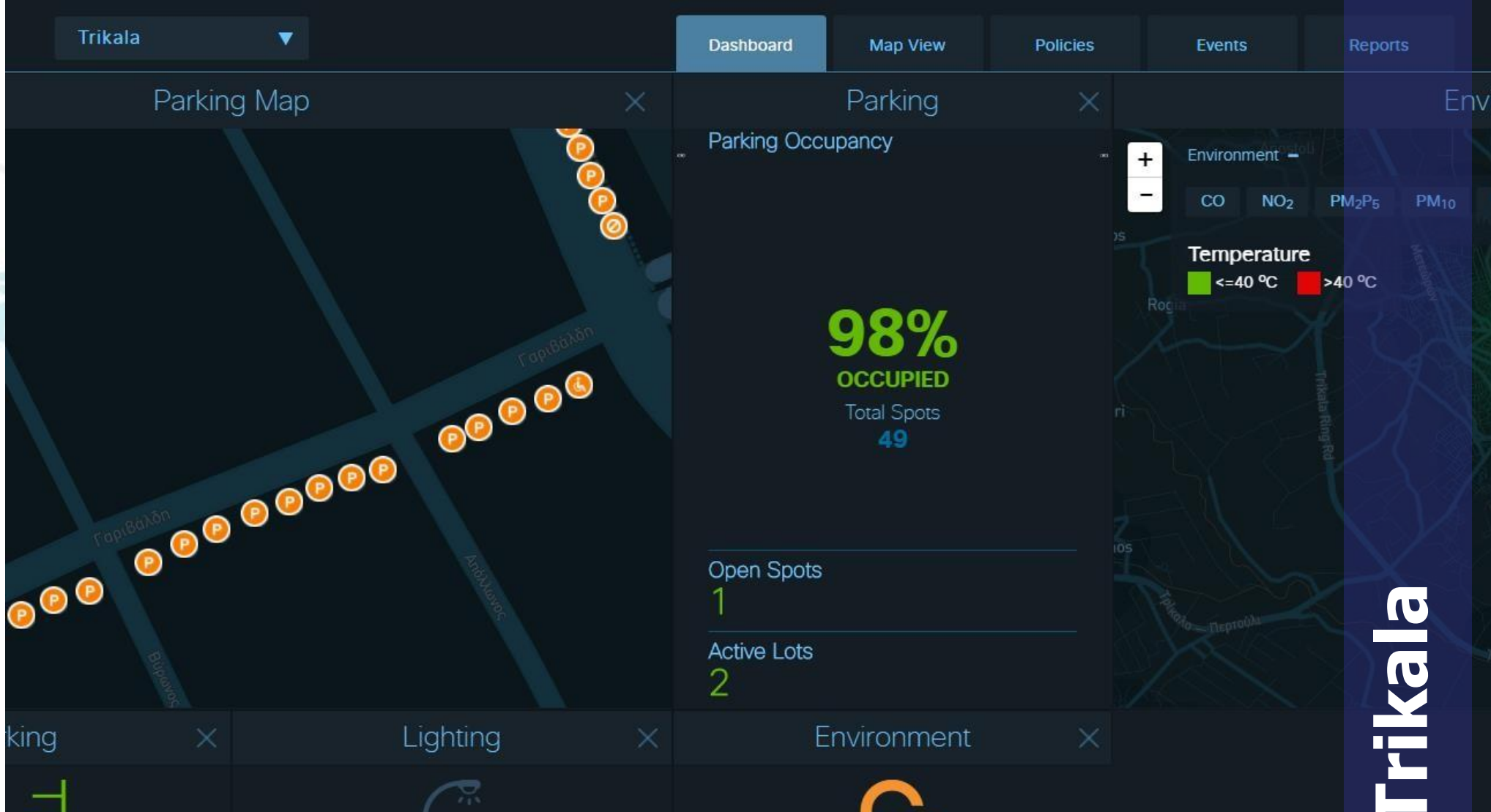
Name	Clients
1 Android	3
2 Android-LG	1
3 Android-HTC	1

PARKGIRI

Εισαγάγετε μια τοποθεσία

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A brief tour in the control room!
 Traffic lights' control system; Smart parking
 Municipal budget progress on our open data section
 Water pipe network's remote control system
 Street light remote control system, through Cisco API's (Kinetic)



A brief tour in the control room!

The “heart” is Cisco Kinetic, where most of the above systems are integrated and data is collected and analyzed (lighting, parking, environmental monitoring)

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1Y projection

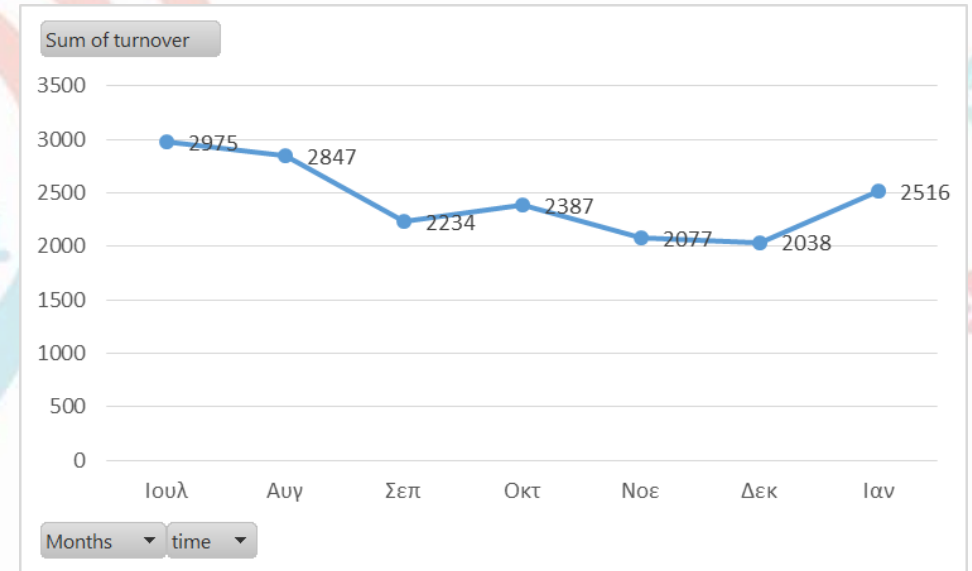
Parking

- occupancy (aprx 90% 8:00am-8:00pm)
- $365 - 52 * 2 - 31 = 230$
- 1 euro : $230 * 11 = 2,530$ euros
- 0.5 euro : $1,265$ euros

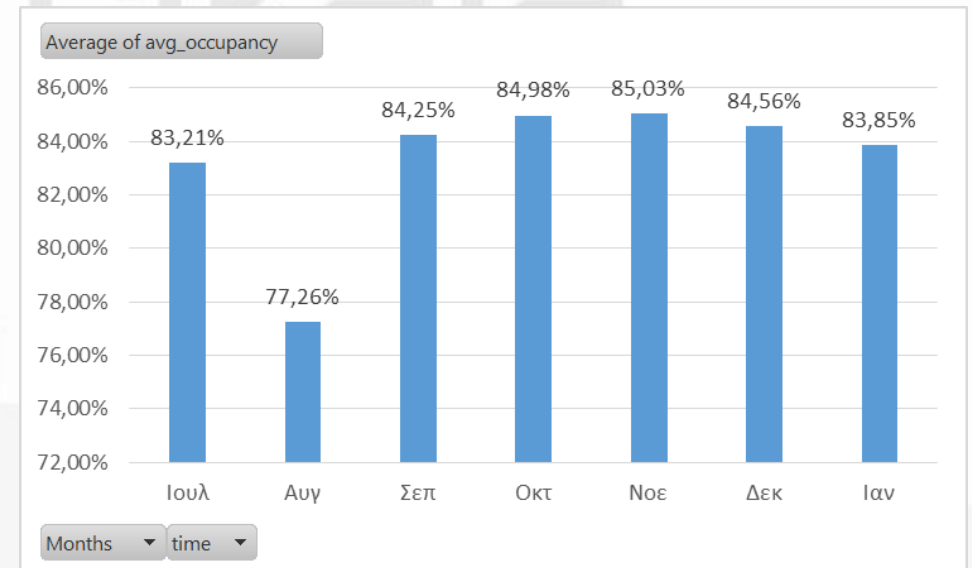
Violations

- 120-150 per month / per lot
- $11 * 135 * 20$ euros = $29,700$ euros

Parking Sessions per month



Occupancy per month



New Trip Forms Data

Category	Measurement	Device ID	Type	Date
Waste Management	99.00	a8-61-0a-30-39-2e-6c-05	Sensor	24/06/2018 11:20:25
Waste Management	99.00	a8-61-0a-30-39-33-71-05	Sensor	24/06/2018 11:18:47
Waste Management	37.00	a8-61-0a-30-39-1e-6f-05	Sensor	24/06/2018 11:17:48
Waste Management	73.00	A8-61-0A-30-39-39-71-05	Sensor	24/06/2018 11:17:40
Waste Management	87.00	a8-61-0a-30-37-3b-8b-01	Sensor	24/06/2018 11:17:34
Water Meter	0.91	01-20-36-63	Meter	24/06/2018 11:14:52
Water Meter	0.85	01-20-36-59	Meter	24/06/2018 11:11:57
Waste Management	86.00	a8-61-0a-30-39-29-60-0b	Sensor	24/06/2018 11:08:10



10

Meters



10

Sensors



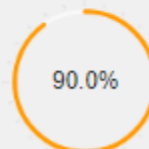
1

Gateways



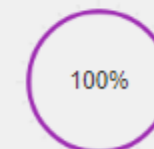
100%

Meters live



90.0%

Sensors live



100%

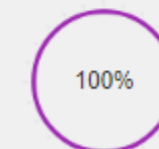
Gateways live

17.22

Total Consumption

0.95

Daily consumption



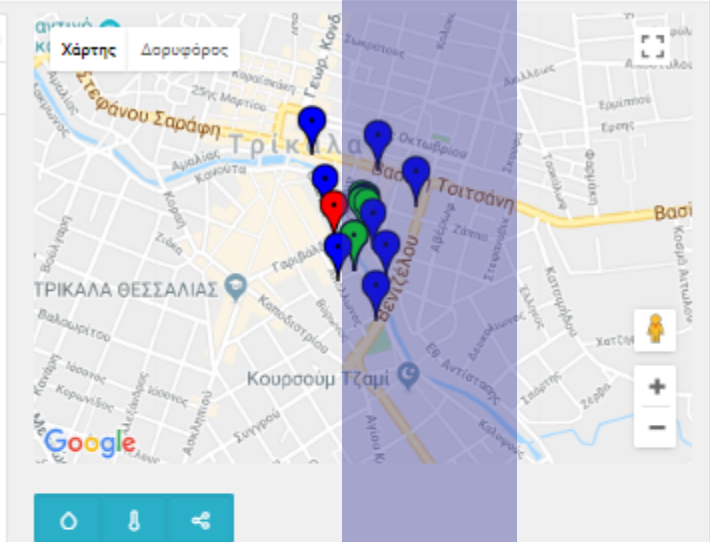
100%

Gateways live

More with IoT!

A set of Smart Bins and Smart meters have been installed in the city to measure and control garbage and consumption and improve accordingly

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GOVERNANCE



FINANCE



CITY PLANNING



TRANSPORTATION



ENVIRONMENT



SOCIAL CARE



EDUCATION



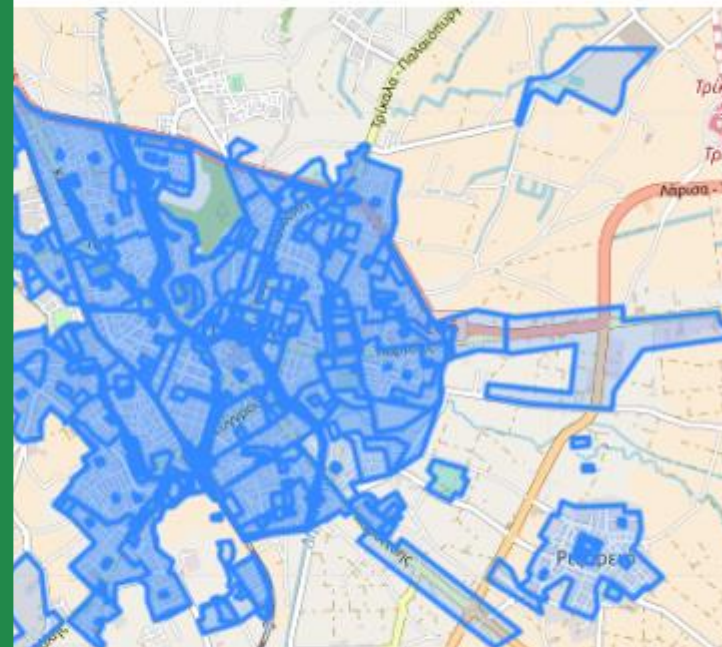
CULTURE



ATHLETICS



ENTERTAINMENT



Πολεοδομία (5)

Παιδεία (4)

Αθλητισμός (3)

Πρόνοια (3)

Ψυχαγωγία (1)

Ετικέτες

Τύποι Αρχείων

Άδεια Χρήσης



Συλλογικά Όργανα

Διακυβέρνηση Οικονομία

Παρουσιάζονται τα συλλογικά όργανα, οι συνεδριάσεις τους και οι αποφάσεις τους

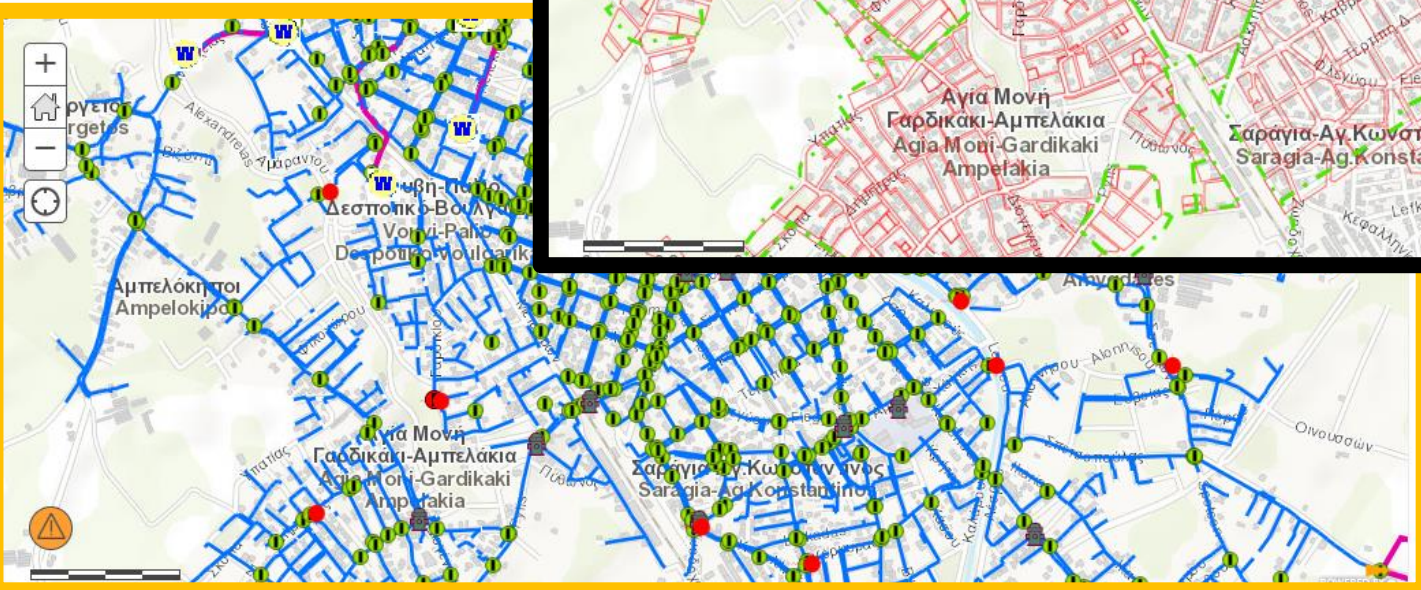
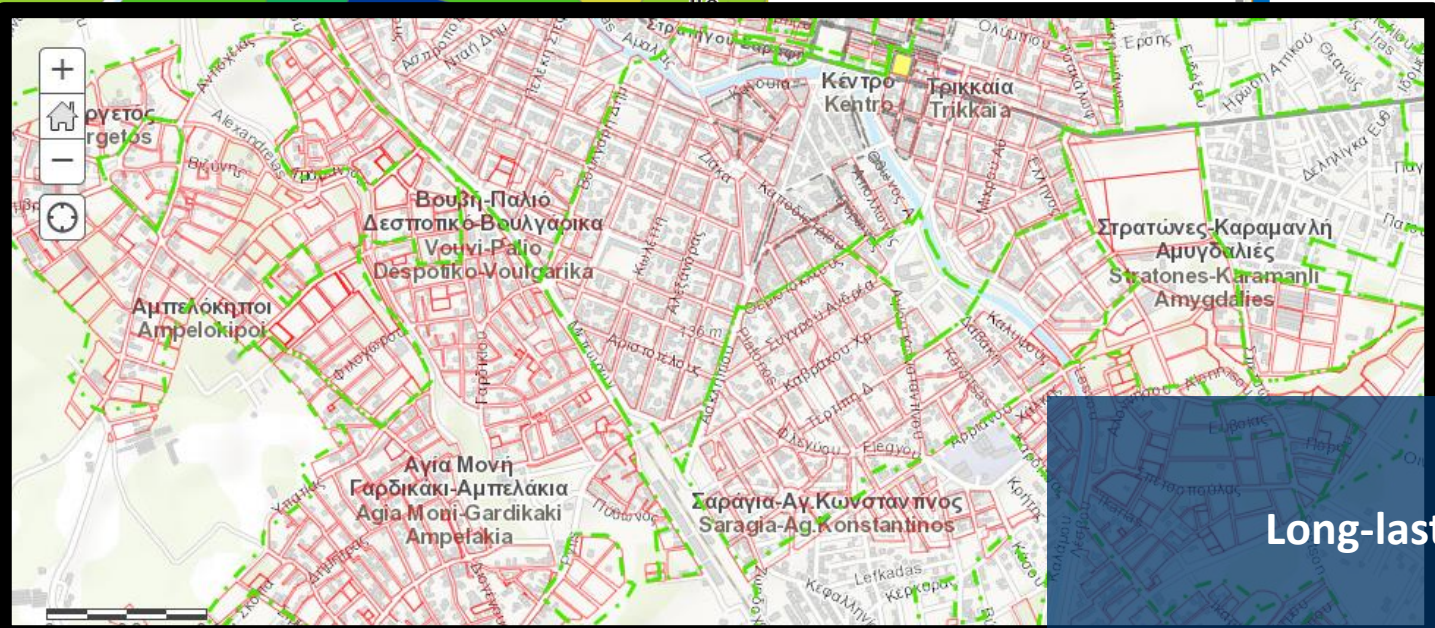
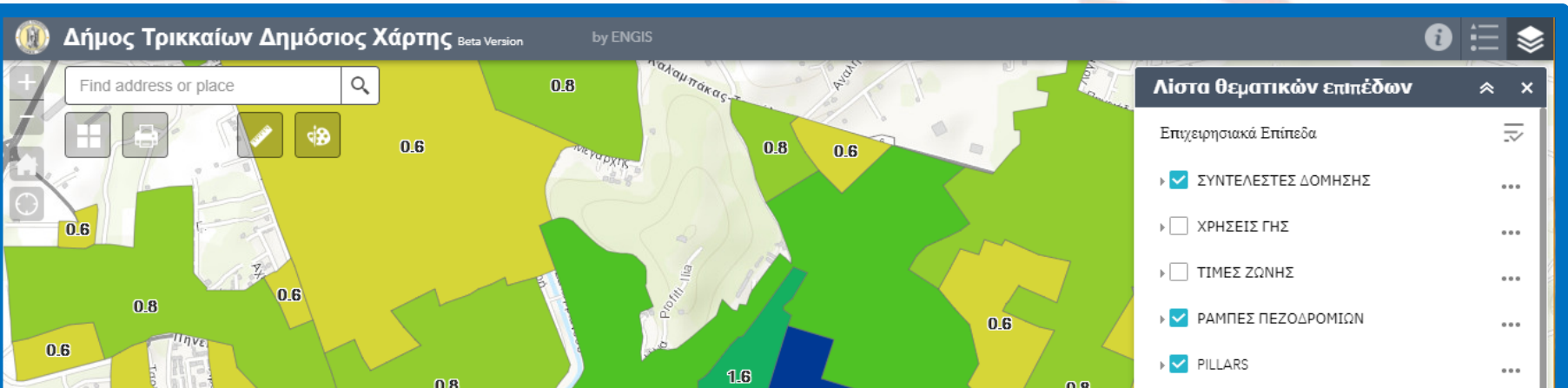
6x json

Open Data
<https://data.trikalacity.gr>

Sept. 2018: 67 datasets

several formats (json, geoJson, xml etc.)

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GIS
Long-lasting project

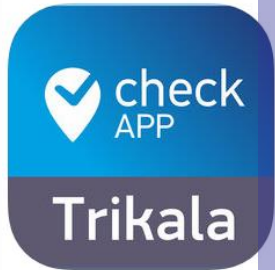
Sept. 2018:
more than 15 layers for
internal use
10 open layers for end users



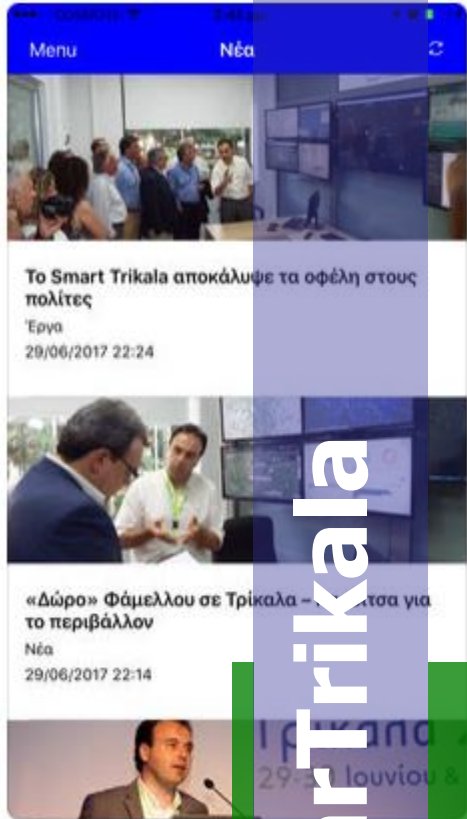
Fleet management
 30 vehicles
 real-time monitoring
 annual route analysis
 Servo

More than 30% fuel savings

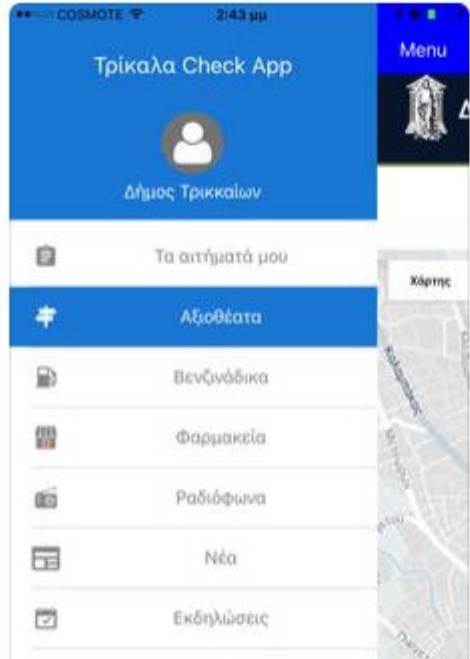




Trikala Check App ⁴⁺
MUNICIPALITY OF TRIKALA
Free

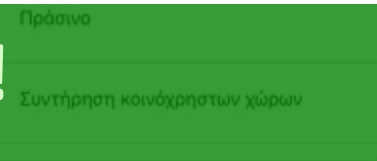


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The city ... at the citizens' hands!

- Complaints registration
- News/Events/Points of Interest etc.
- Online payments
- Consultation





Plision ¹²⁺
ENVIRELECTRIC
Free



PARKGENE - Free Parking App

PARKGURU Ltd Χάρτες και πλοήγηση

★★★★★ 125

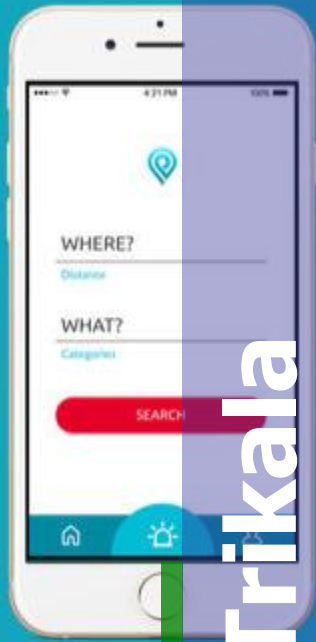


Don't waste time and money looking for a parking spot.

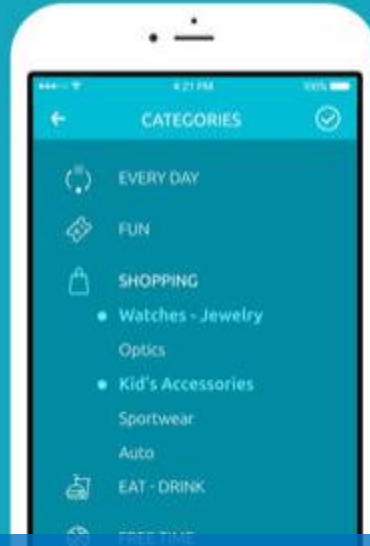
PARKGENE smart, fast affordable parking to bring tips!



Find what you are looking for around you!



Choose what you need.



Save for later what you are interested in.



Discover the offers and hot spots in the area.



smartTrikala

Other apps!

Plision: volunteer management / market location

Parkguru: smart parking in the city

Novel ones on the go with the use of open data





Skills

We recently distributed several STEM kits to all the public schools:
55 Mindstorms Lego kits,
50 WeDo 2.0 Lego kits,
60 Arduino Starter kits
and trained teachers in partnership with WRO Hellas

smarTrikala



Skills

Training Programs:

Techtalents school

Cisco Academy

Hellenic Open Source Lab

(ELLAK)

Campaigns

CrowdHackathon

CodeGirls

STEM



Walk in the city!

Beacons for smart city tours.

You only need a physical web browser on your smartphone

smartTrikala



Transportation?

CityMobi2 driverless buses
pilot project (FP7)

6 months

6 buses

1.490 itinerary

3.580 kilometers

12.138 passengers





Please contact me for more information.

lanthopo@teilar.gr

<http://smart.trikalacity.gr>

Thank you for your attention!



http://de.teithessaly.gr/story/en-US/108/ANTHOPOULOS_Leonidas_Associate_Professor.html

<https://scholar.google.gr/citations?user=oh6zqcUAAAAJ&hl=el&oi=ao>

https://www.researchgate.net/profile/Leonidas_Anthopoulos,

<https://gr.linkedin.com/in/https://gr.linkedin.com/in/leonidasanthopoulos>

