



Δημιουργώντας το οικοσύστημα του 'Ιντερνετ των Αντικειμένων

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Ινστιτούτο Πληροφορικής και Τηλεπικοινωνιών
ΕΚΕΦΕ 'ΔΗΜΟΚΡΙΤΟΣ'

Ημερίδα «Στατιστικές και Μαζικά Δεδομένα (Big Data)



Quiz of the day

IoT is a lot more than...

- a. Connecting a device to a cloud server
- b. Collecting, storing, processing and analysing data
- c. Building real-time dashboards and analytics
- d. All of the above and even more



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Overview

- Introduction to IoT Trends and Applications
- IoT Definitions and Ecosystem
- The concept of Everything as a Service
- The expected marketplace
- The SYNAISTHISI IoT PaaS
- Use cases Using SYNAISTHISI
- The Big Data Europe Project
- Future Expectations



Internet of Things (IoT)

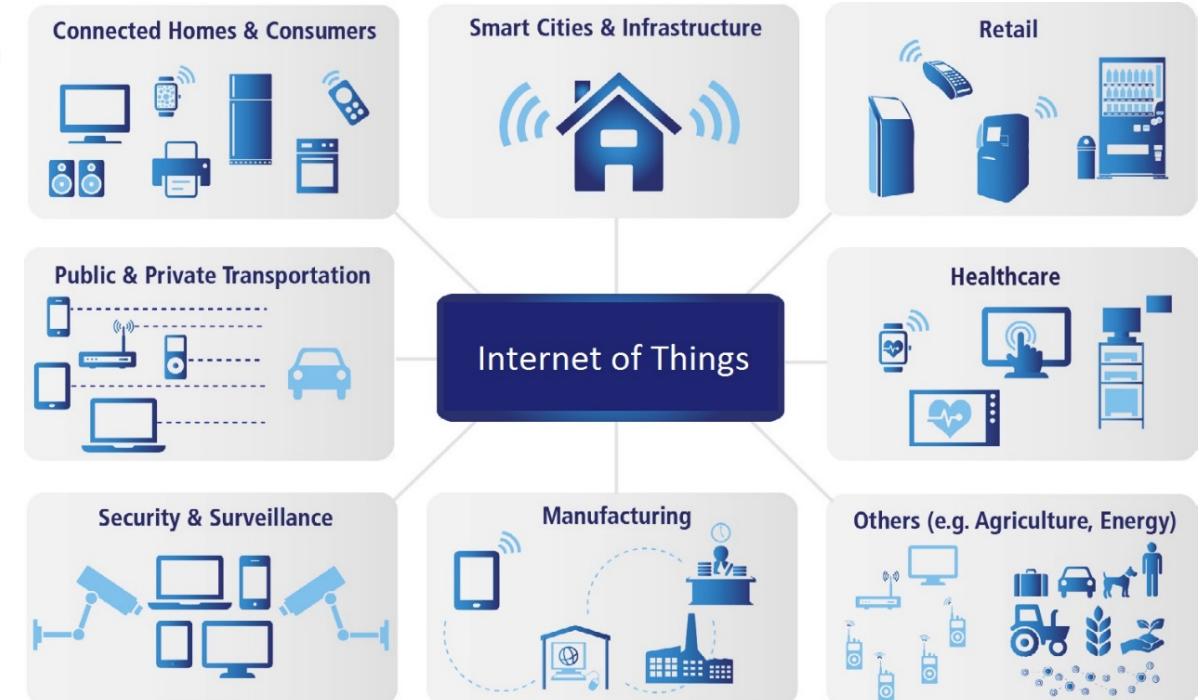
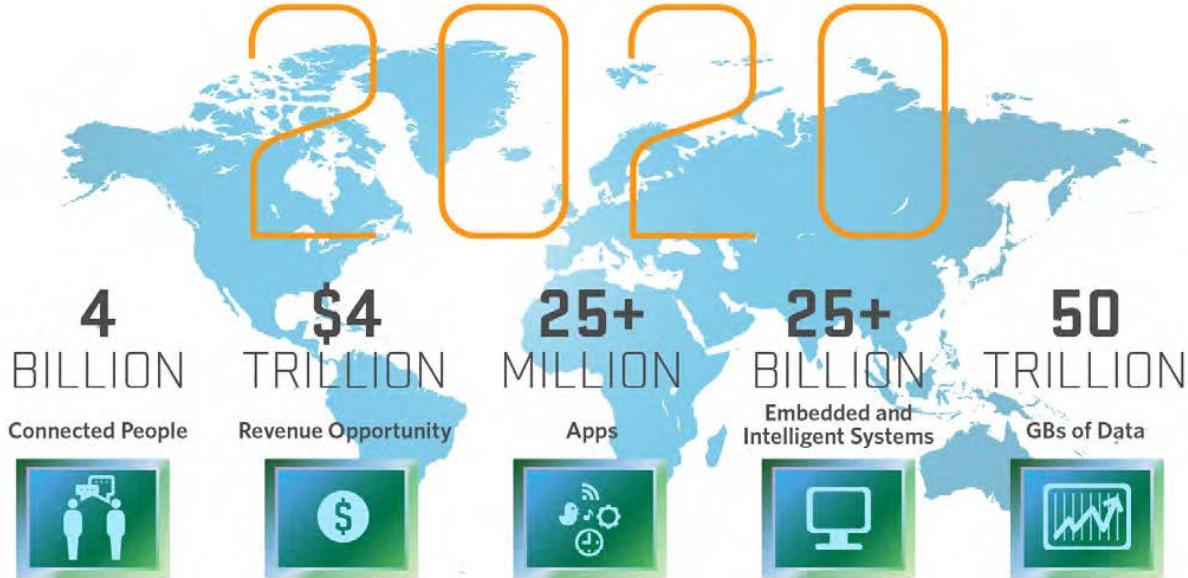
The Internet of Things (IoT) has been defined in Recommendation ITU-T Y.2060 (06/2012) as a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies.

- IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications.





IoT Trends & Areas of Application





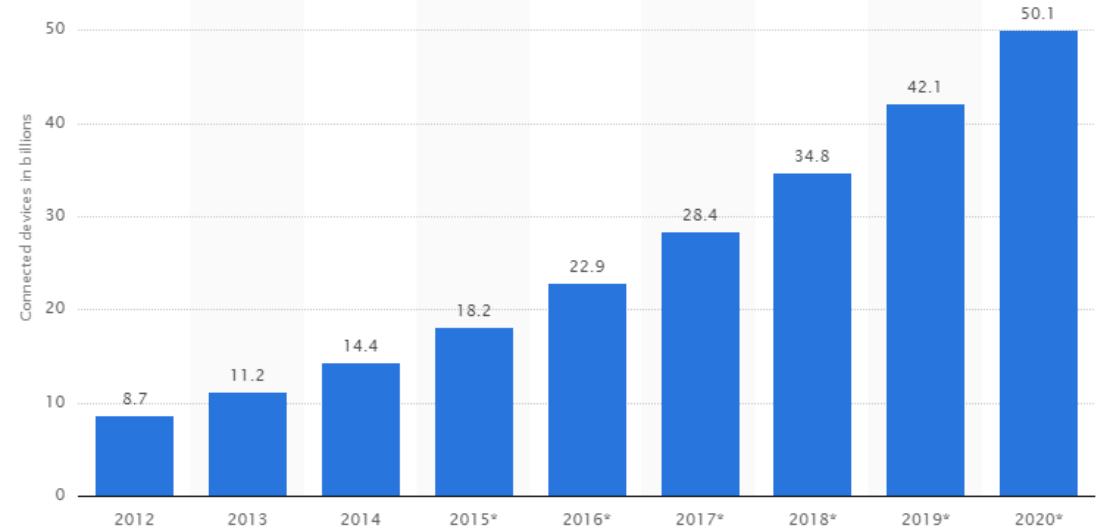
Connected Devices



Gartner Says 6.4 Billion Connected "Things" Will Be in Use in 2016, Up 30 Percent From 2015

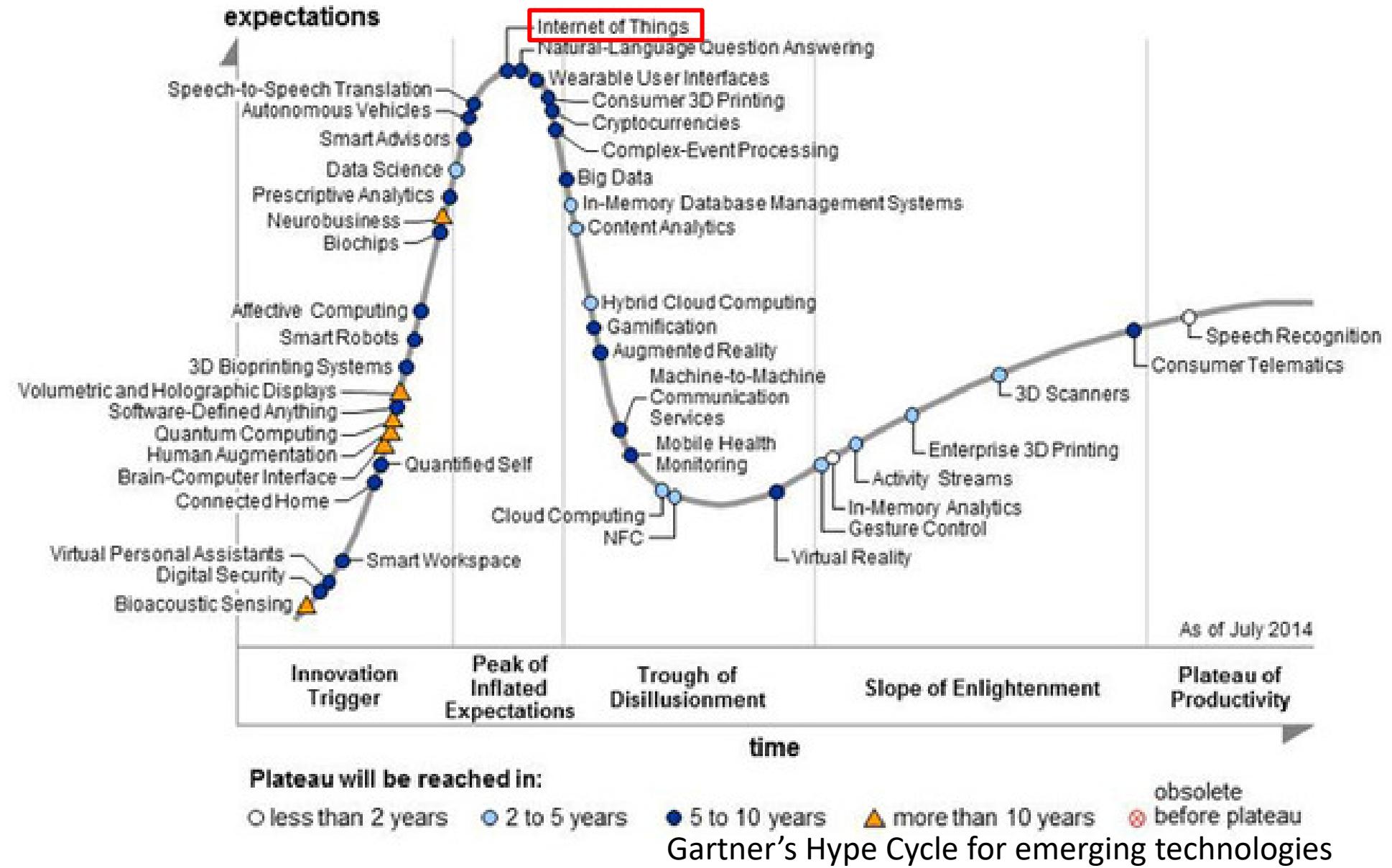
ABI Research: The installed base of active wireless connected devices will exceed 16 billion in 2014, about 20% more than in 2013. The number of devices will more than double from the current level, with 40.9 billion forecasted for 2020. 75% of the growth between today and the end

'INTERNET OF THINGS' CONNECTED DEVICES TO ALMOST TRIPLE TO OVER 38 BILLION UNITS BY 2020
Total Device Base Driven by Surge in Connected Industrial Applications

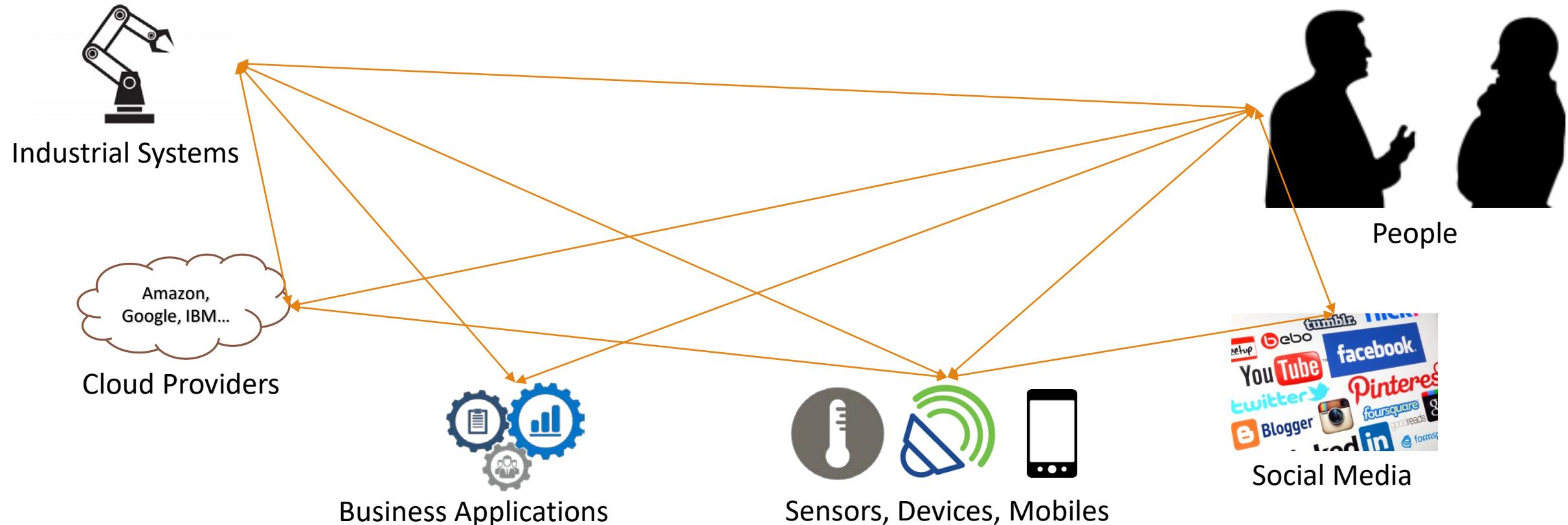




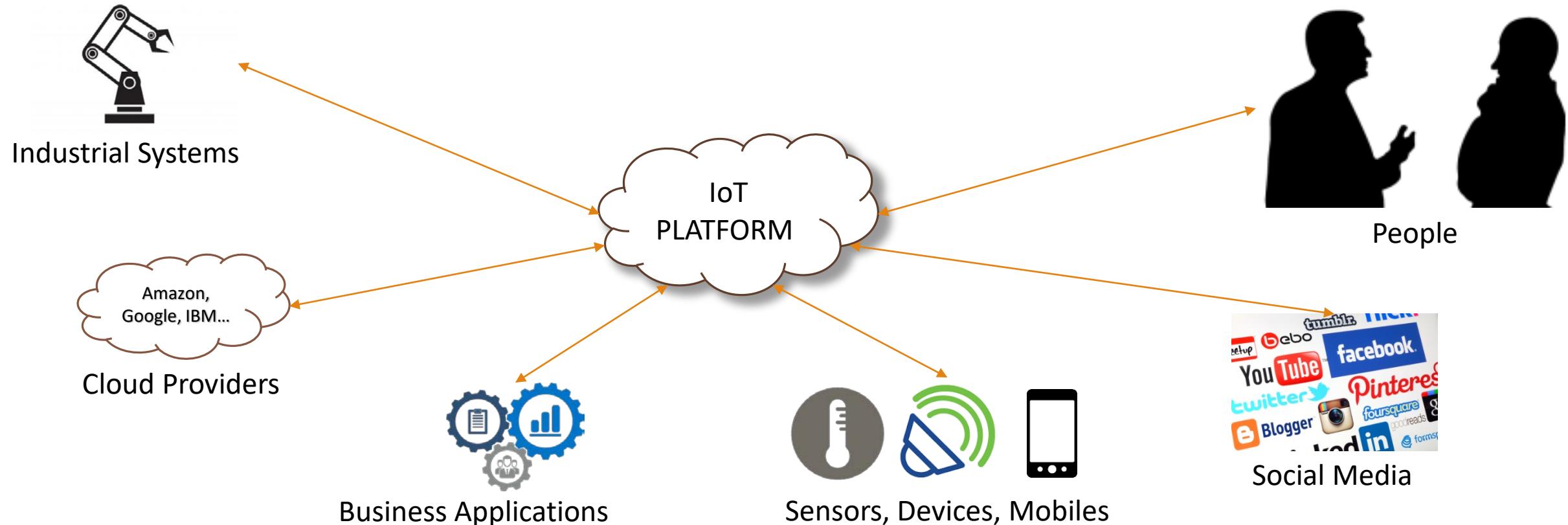
Hype or not?



M2M now includes People, Systems, & “Things”



An IoT Ecosystem



Main Challenges in IoT

Industry Fragmentation & Lack of Shared Infrastructure

Lack of Common Standards: Well-documented APIs could be a start towards open standards.

Scalability and Interoperability

Battery Life: Energy from unconventional power sources is a must for the billions of connected devices expected by 2020.

Data Sharing and Control: Privacy and Security issues.

Support Ambient Intelligence: On-demand service composition and service procurement.

(Sources: Forbes, Sandhill.com)





Everything as a Service

Roads, railways, water supply, electricity, queuing monitoring, parking availability...
will participate in a
Global Service Ecosystem

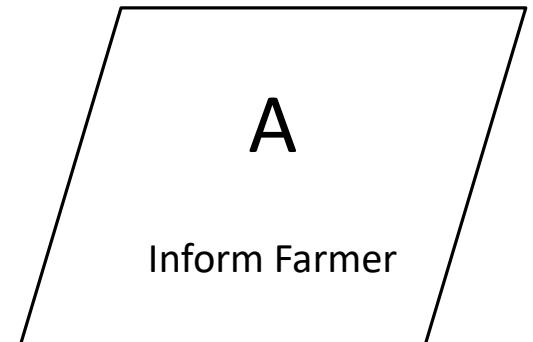
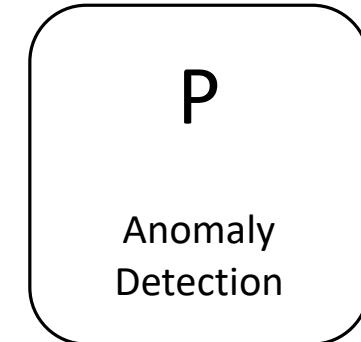
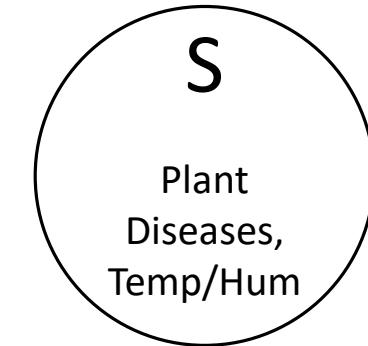


Types of Services

Sensing

Processing

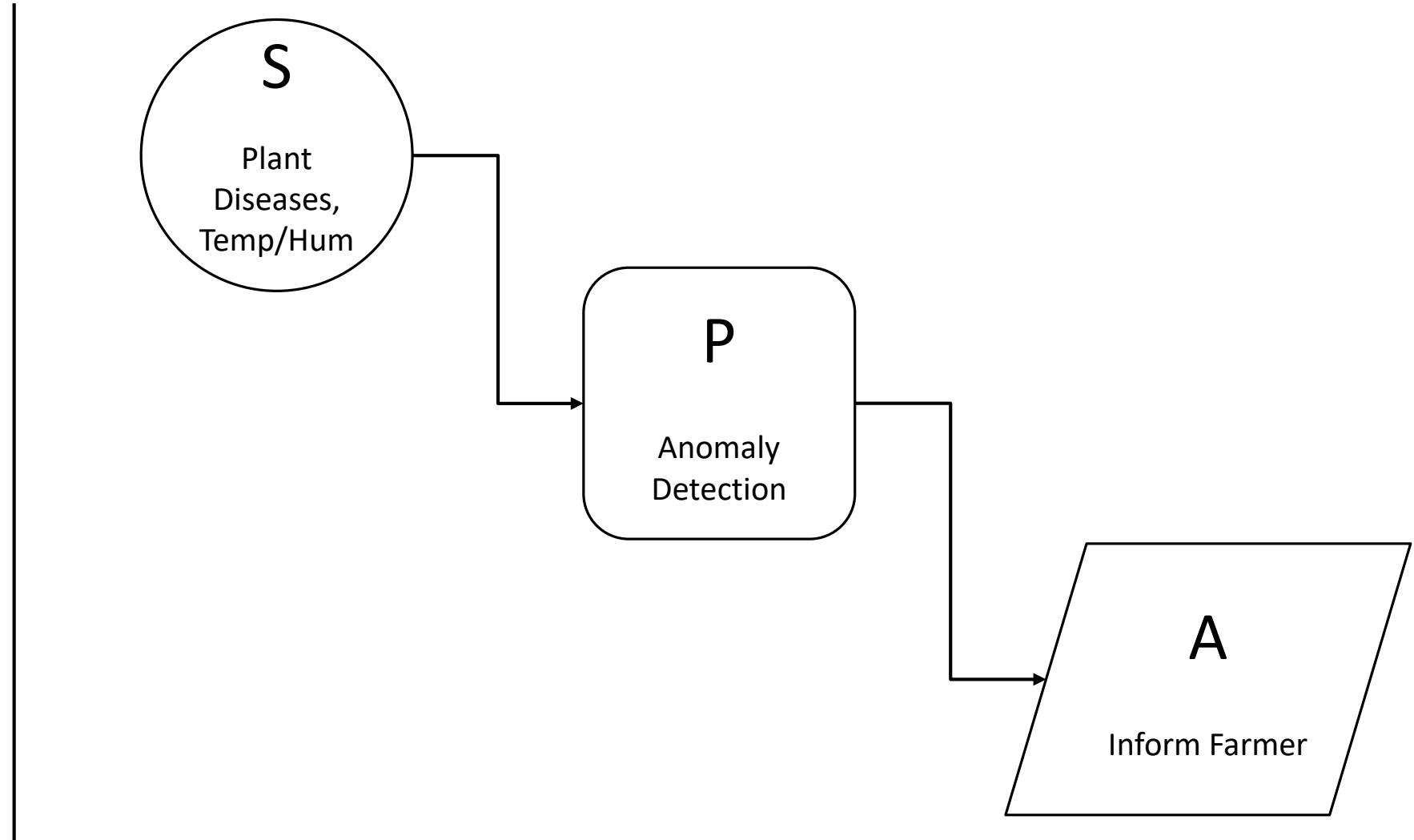
Actuation



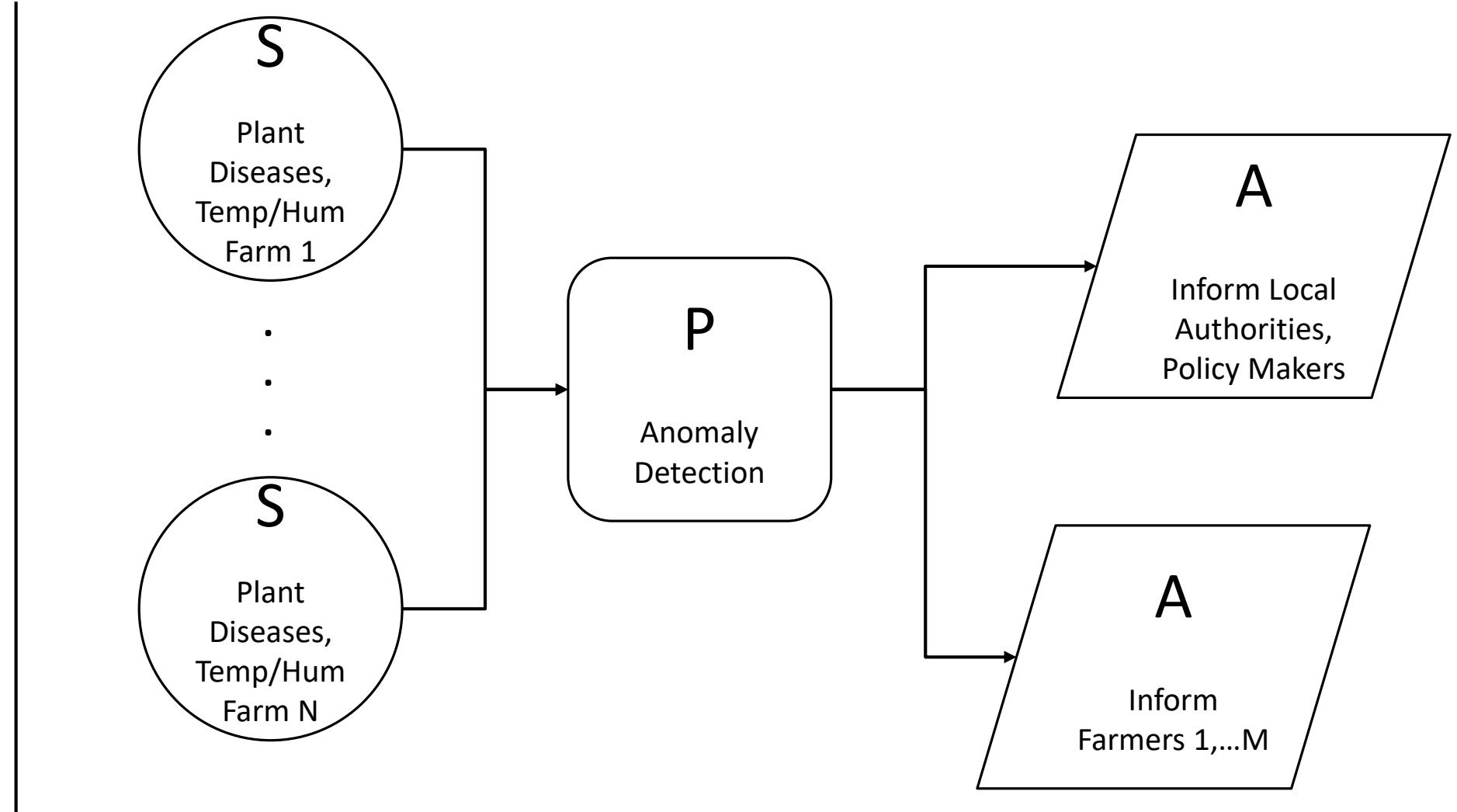


A Simple Service Composition

Sensing
Processing
Actuation



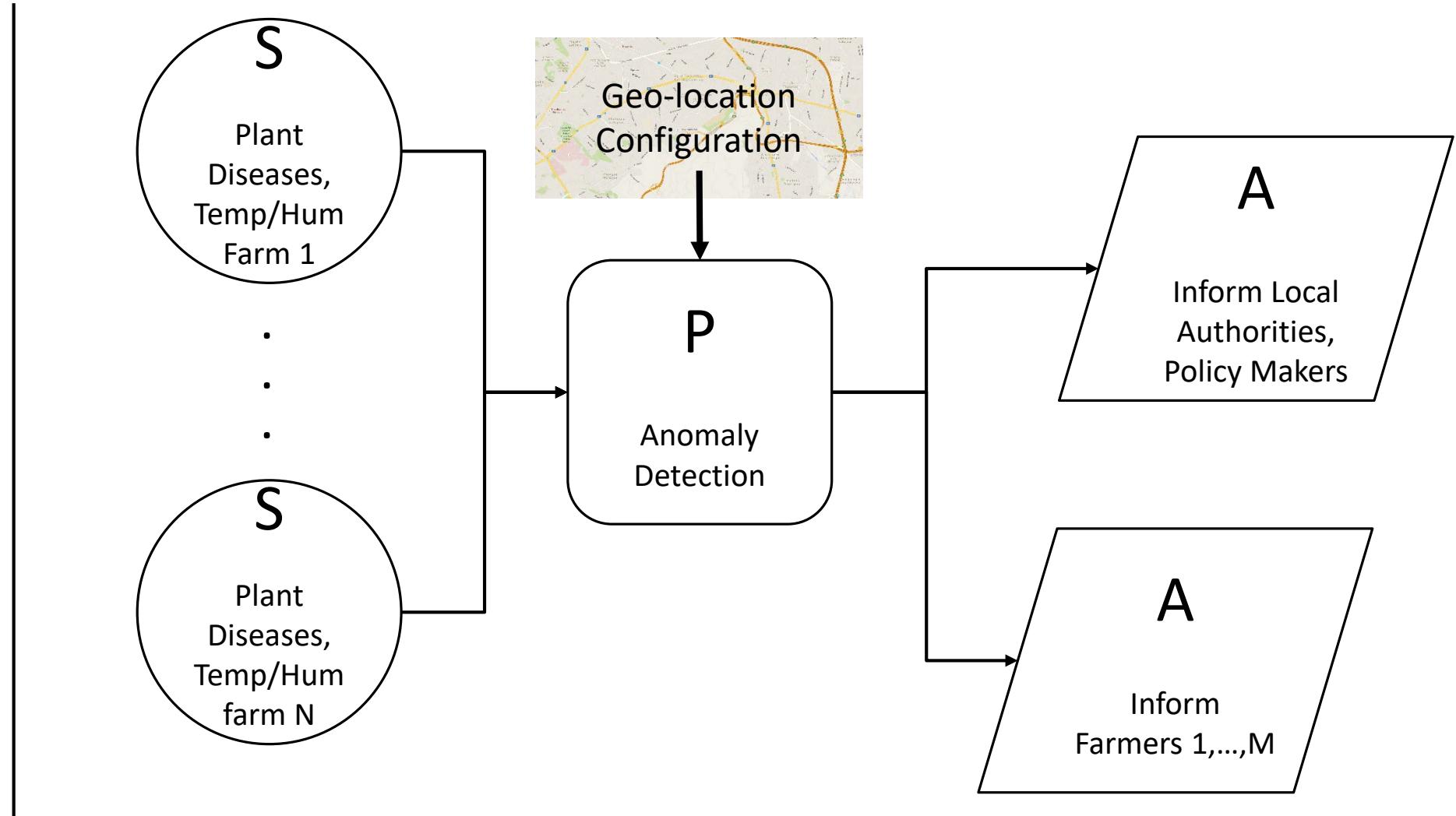
Sensing
Processing
Actuation





An Advanced Service Configuration

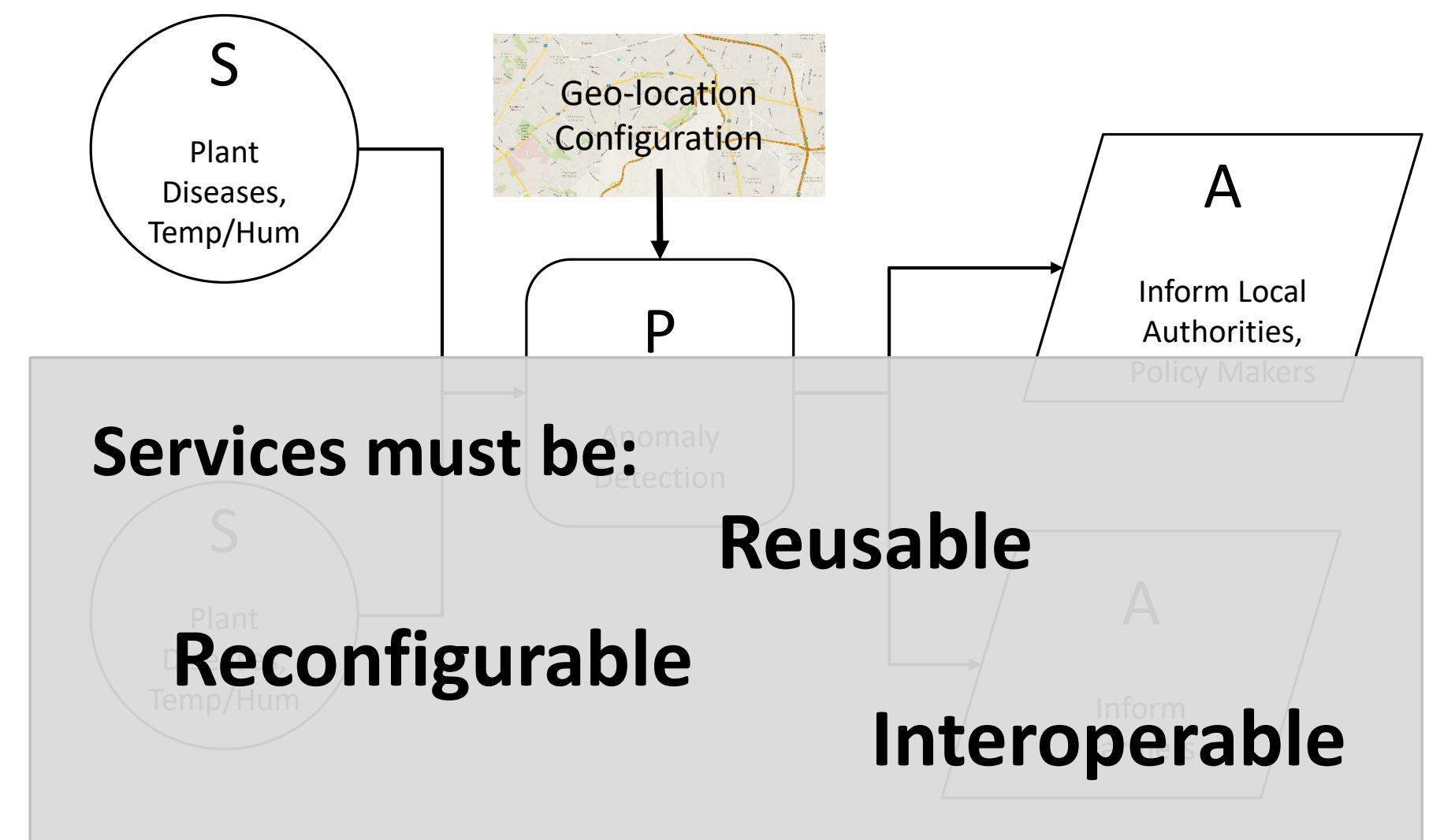
Sensing
Processing
Actuation





An Advanced Configuration

Sensing
Processing
Actuation





Seemingly Unconnected Services

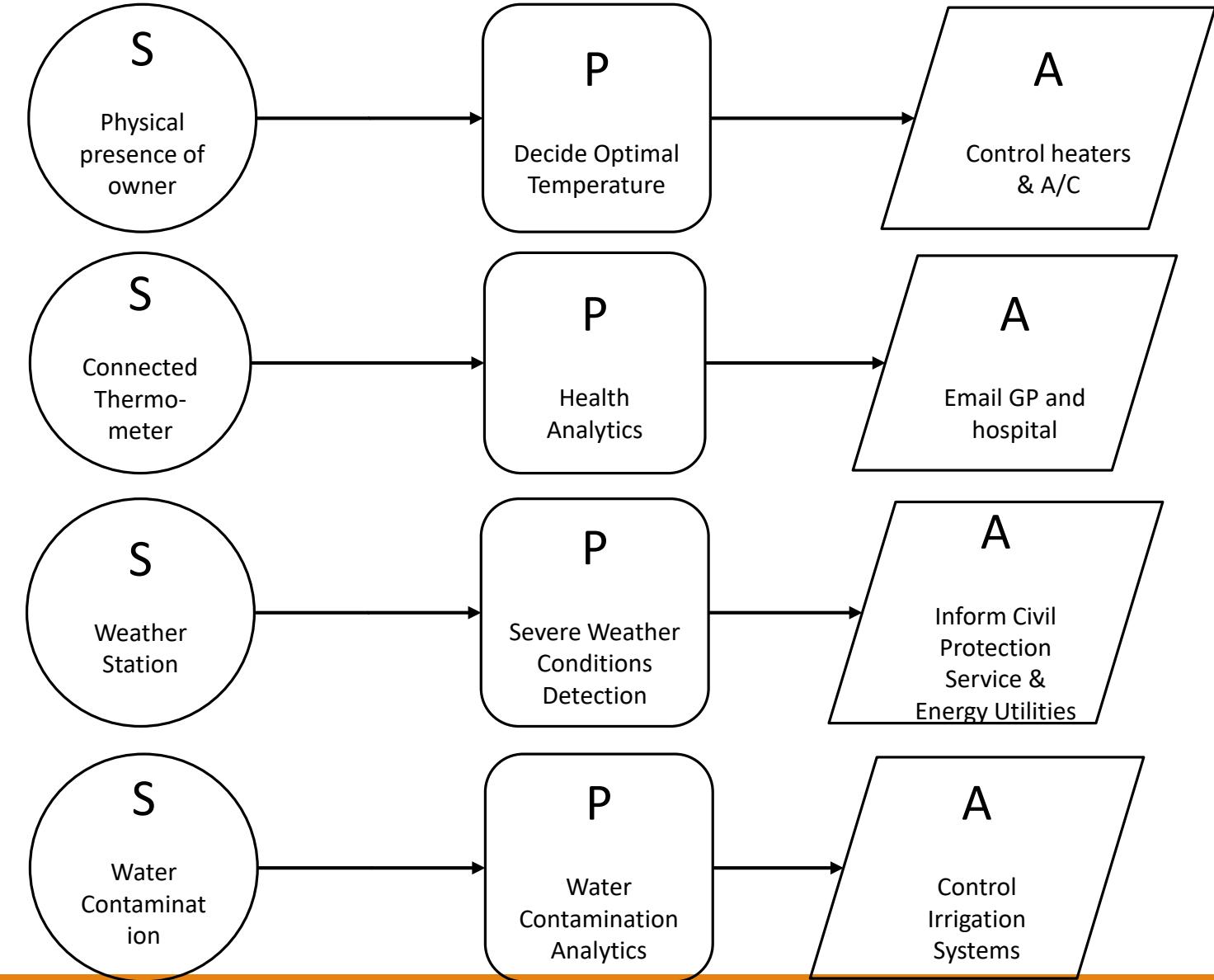


Smart Home

Healthcare

Smart Cities

Smart Agriculture





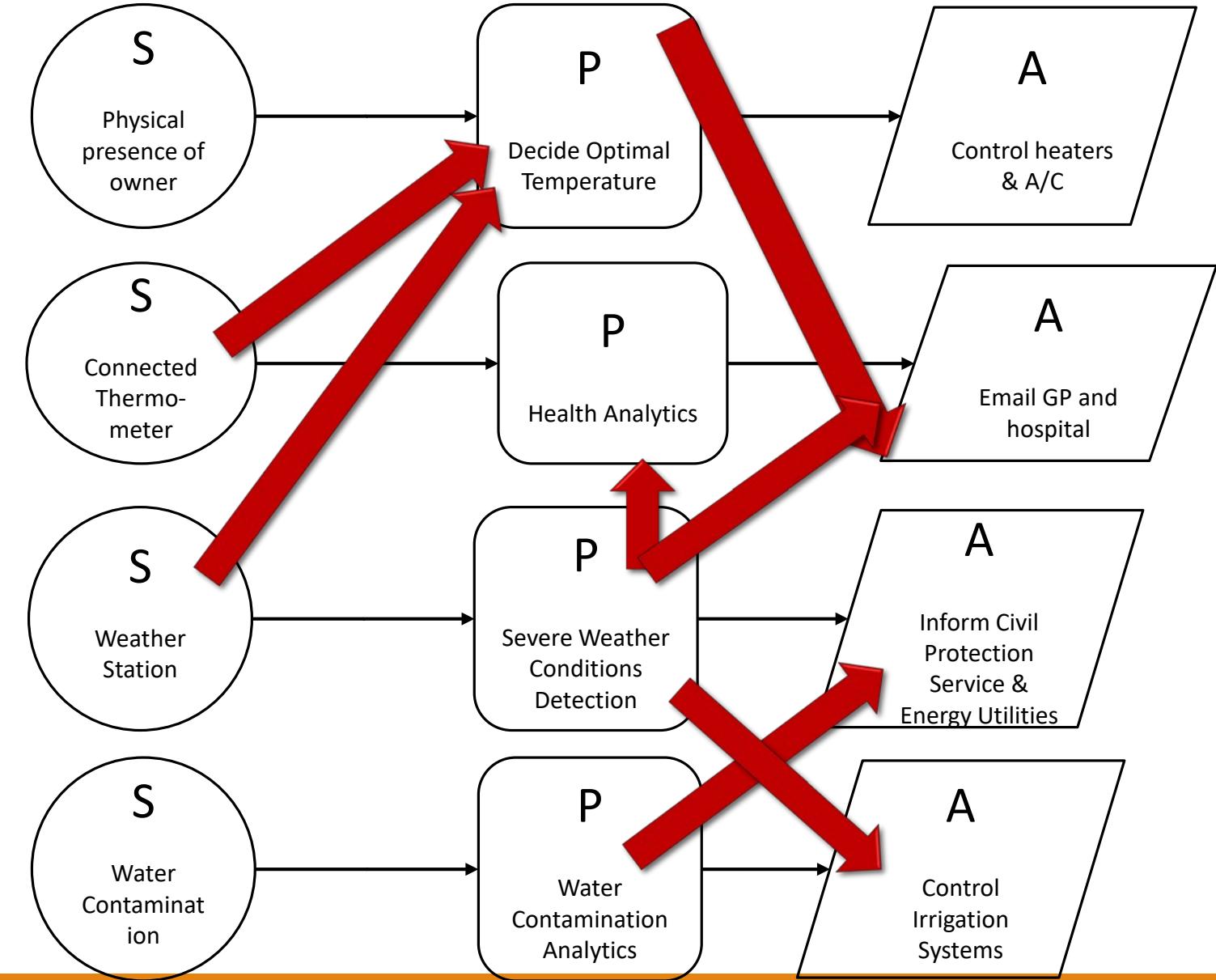
A global Services Composition View

Smart Home

Healthcare

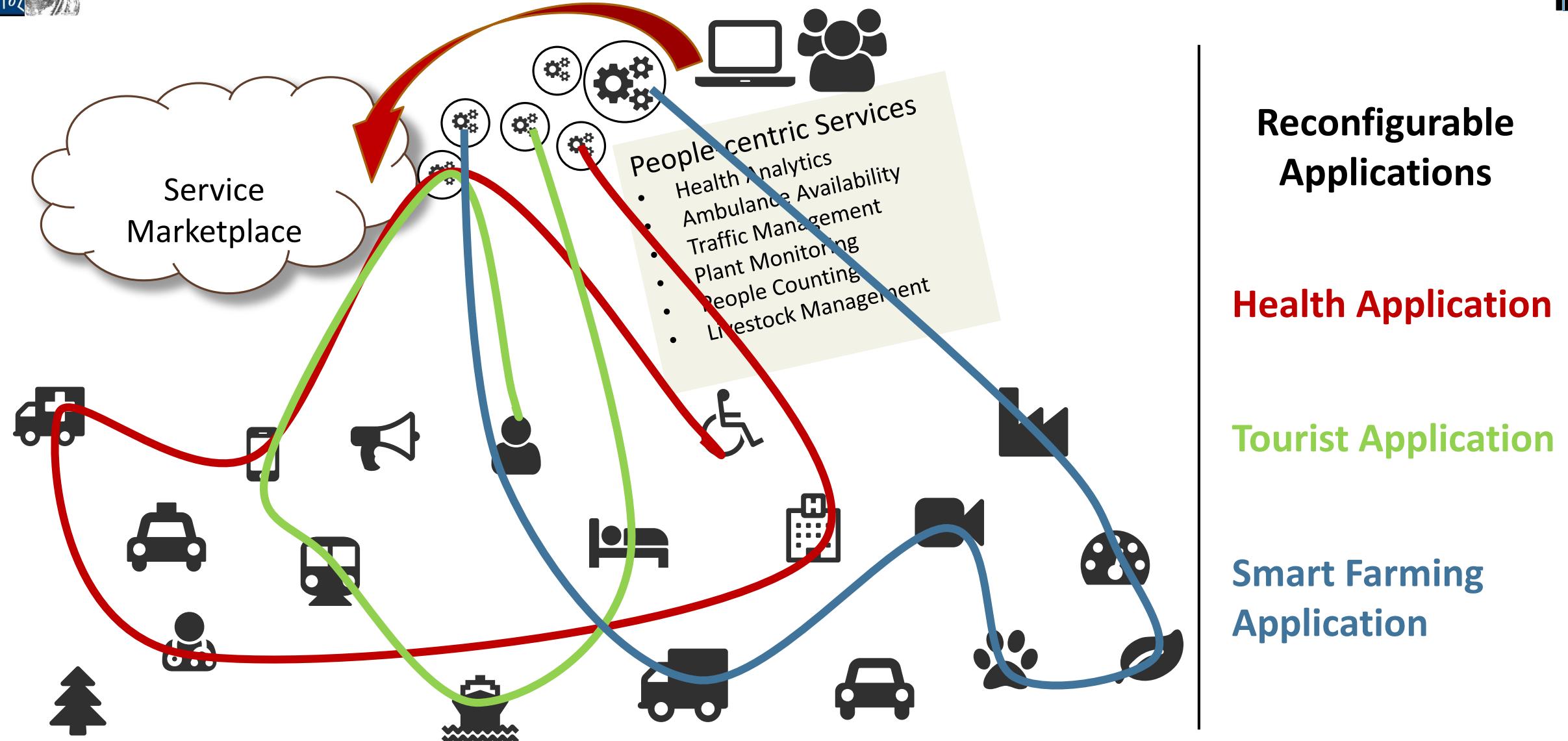
Smart Cities

Smart Agriculture



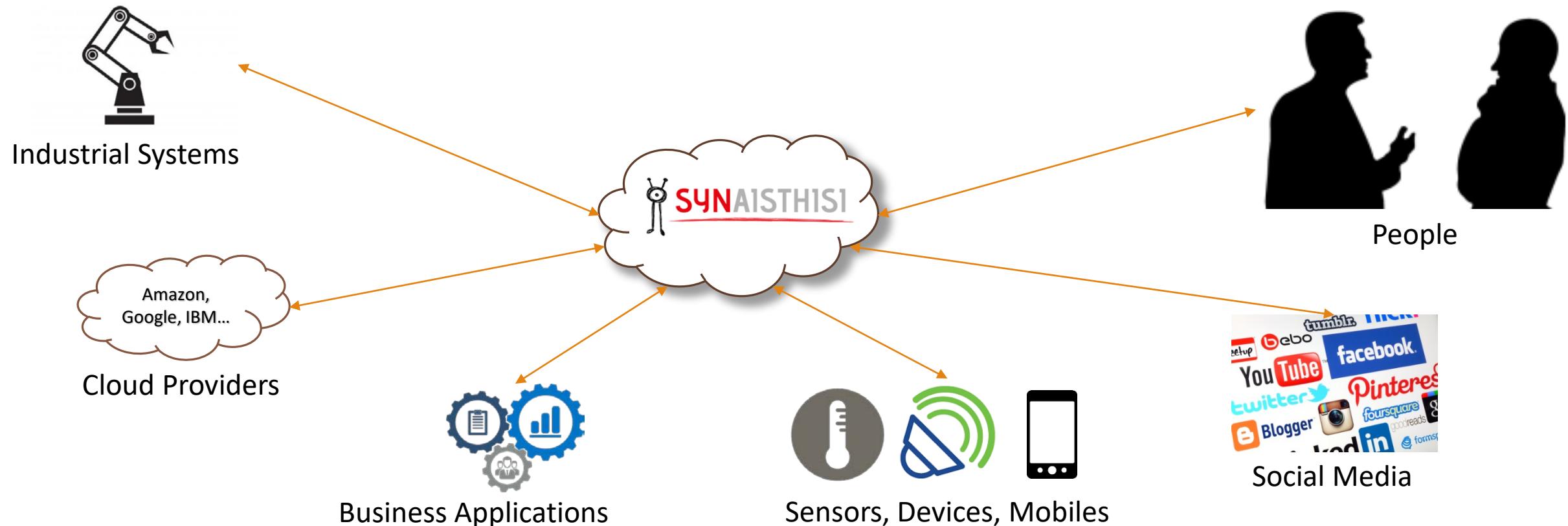


The IoT Ecosystem





SYNAISTHISI platform

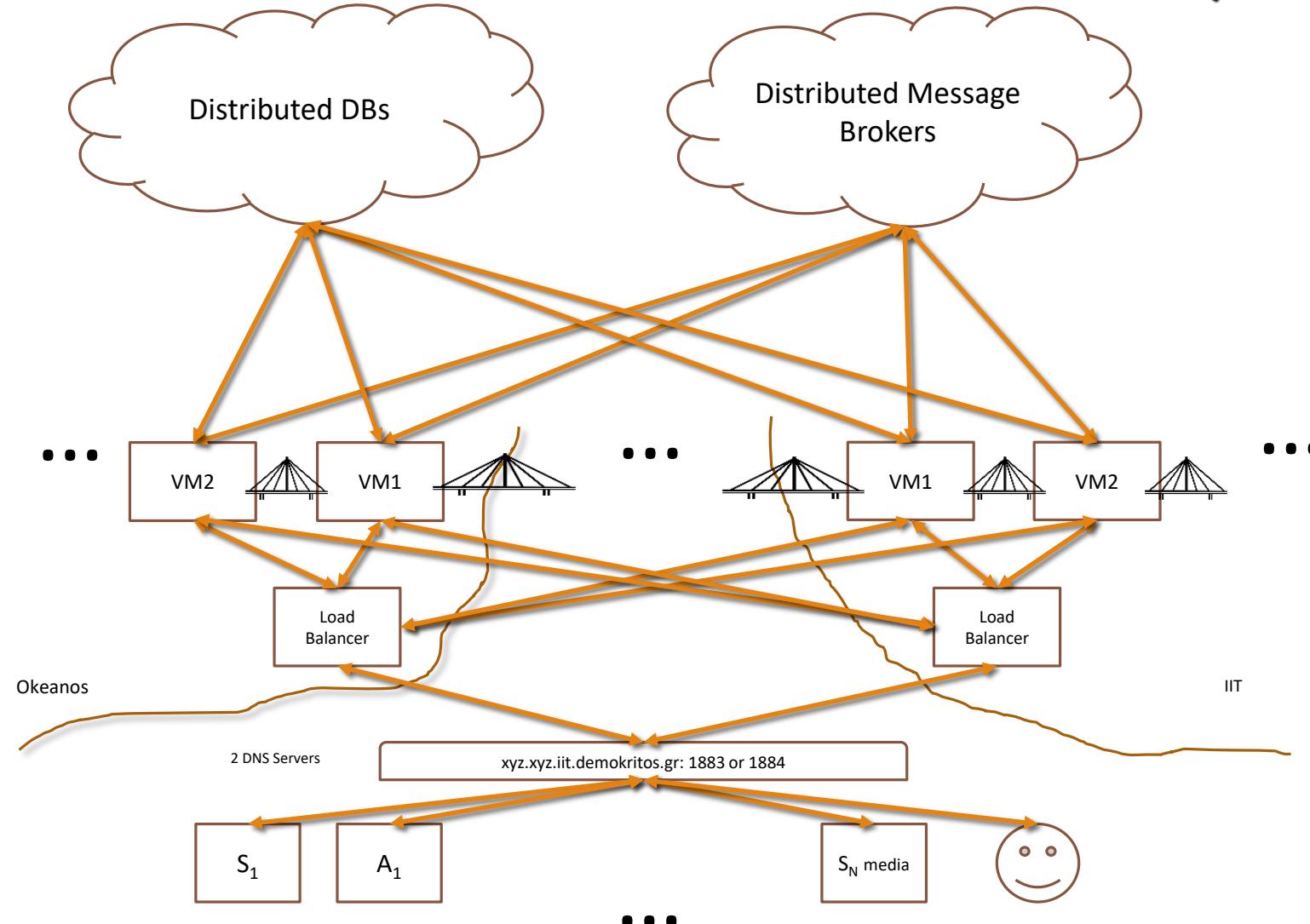




SYNAISTHISI IoT Platform



Replica Sets
One write – many read





A Horizontal Platform for Multiple Verticals



Scale-out seamlessly to match the growing needs

Operate over multiple data-centres

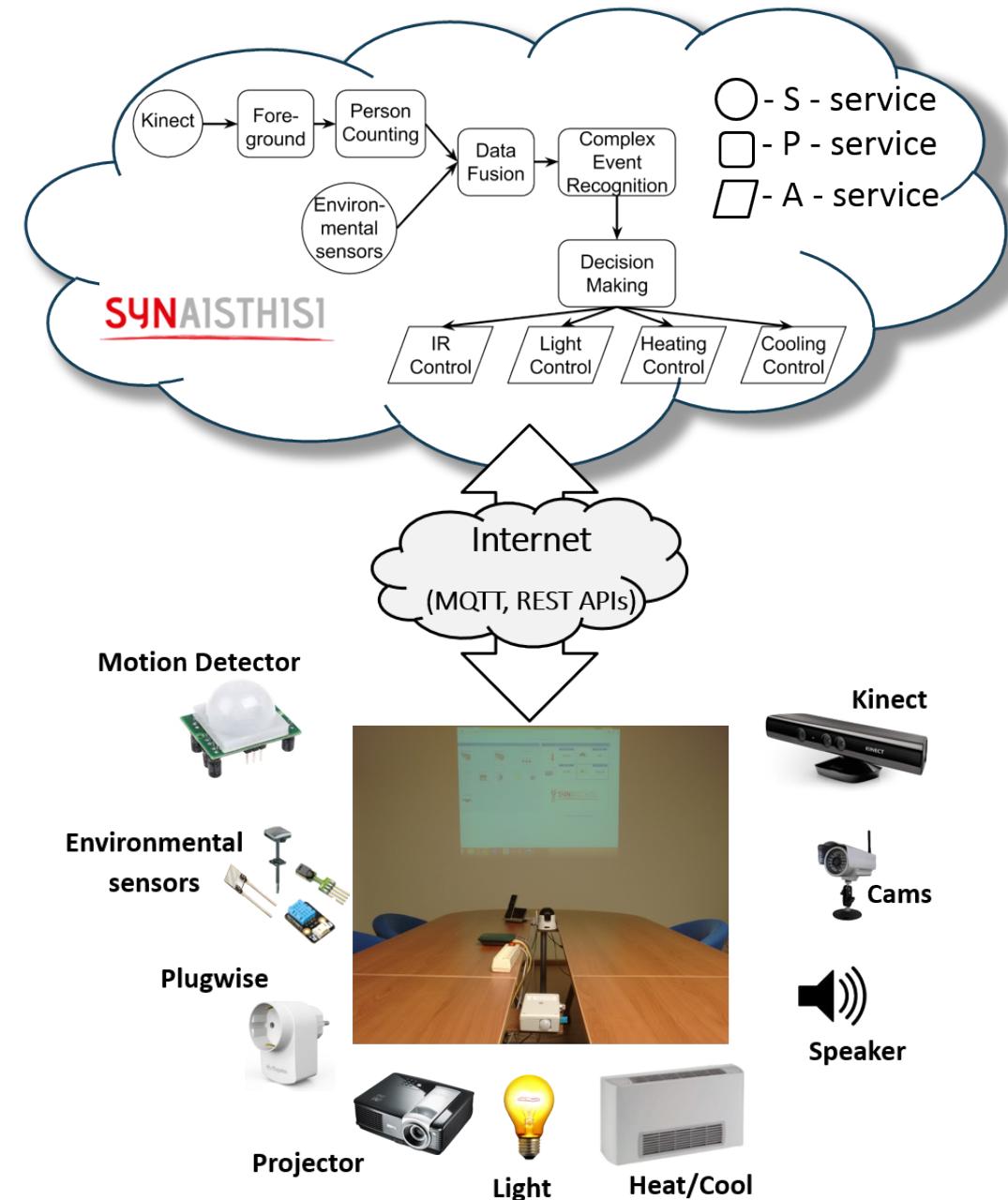
Support Open Protocols

Horizontally scalable

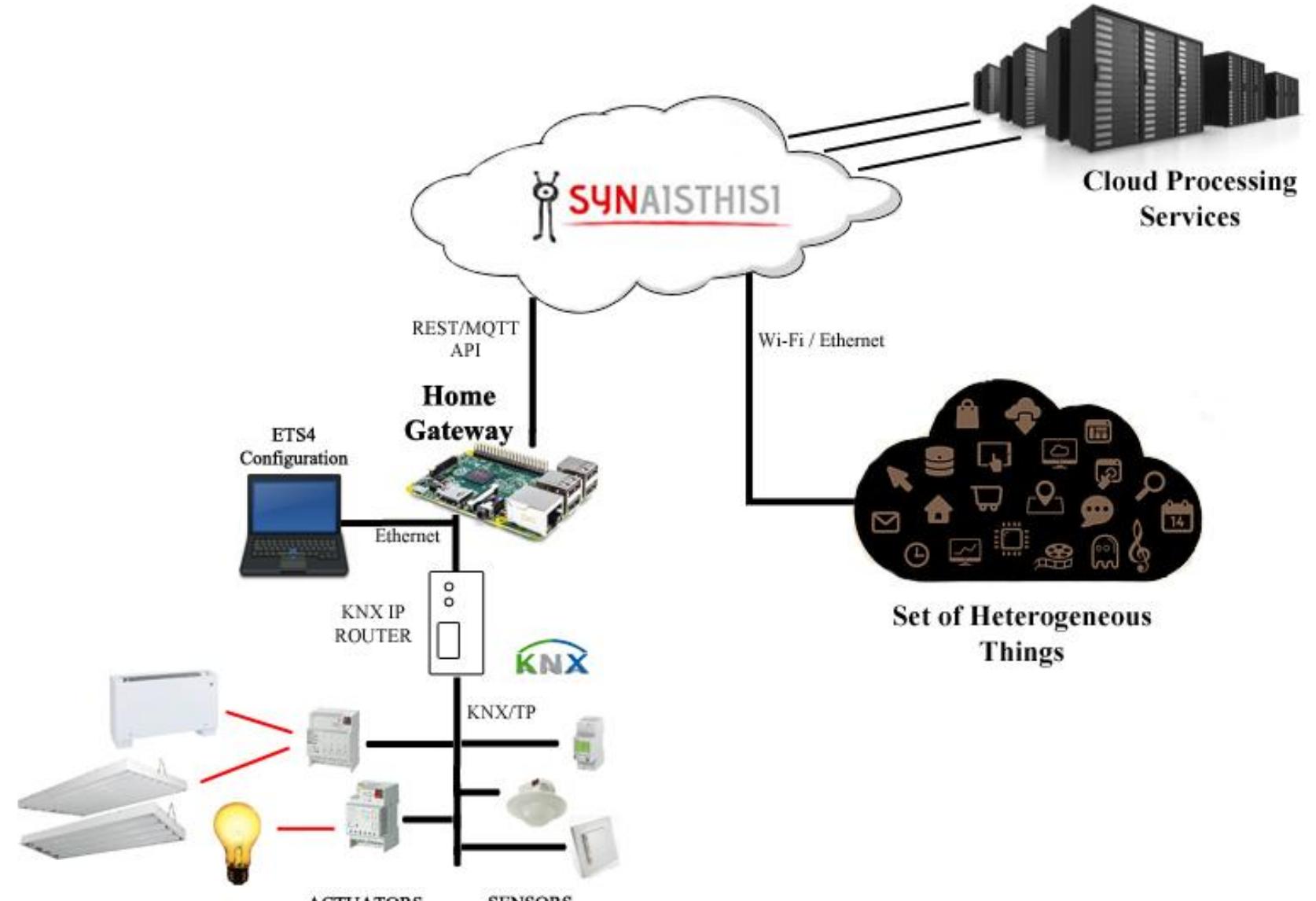
Flexible Deployment



Smart Room Use Case



Home Energy Management Use case



Available Services | [Connect](#)

Press to Disconnect

/service_manager/service/Service-CS_office-LightsControlApp/status

ENABLED

Name	Creator	Description	Input Parameters	Status (Press to Toggle)
Service-CS_office-LightsControlApp	Charilaos Akasiadis	The Service-CS_office-LightsControlApp is responsible for the autonomous control of lighting in the office. Input Parameters: -t Timeout (sec) to turn off lights when presence is no longer detected -T Timeout (sec) to turn off lights when brightness is high -L Lower LUX threshold (below which lights turn on in case of presence) -U Upper LUX threshold (above which lights turn off regardless of presence) Example -t480 -T120 -L100.0 -U300.0	Input 1 Input 2 Input 3 Input 4	ENABLED
Service-KNXstoreToDB-More	Charilaos Akasiadis	The Service-KNXstoreToDB-More is responsible for storing values to a mysql database on the cloud every 15 seconds. Input: -h -u -p -d Example: -h83.212.119.210 -ucharis -padminkrypis -dKNXmeasurements	Input 1 Input 2 Input 3 Input 4	DISABLED
Service-SmallCorridorLightsControlApp	Charilaos Akasiadis	The Service-SmallCorridorLightsControlApp is responsible for the automation of lighting of the IIT 1st floor's small west corridor, based on human presence and outdoors brightness (due to the fact that this part of the corridor is usually illuminated sufficiently during sunny weather). Input Parameters: -t Timeout (sec) to turn off lights when presence is no longer detected -T Timeout (sec) to turn off lights when brightness is high -L Lower LUX threshold (below which lights turn on in case of presence) -U Upper LUX threshold (above which lights turn off regardless of presence) Example -t120 -T120 -L35 -U250	Input 1 Input 2 Input 3 Input 4	ENABLED
Service-CorridorLightsControlApp	Charilaos Akasiadis	The Service-CorridorLightsControlApp is responsible for the automation of lighting of the IIT 1st floor's west corridor, based on human presence.		ENABLED
Service-ProximityApp	Georgios Pliaris	The Service-ProximityApp is responsible for the service that notifies the cloud if a user is within the specified range from the office or not. Input: -	Input 1	DISABLED



Consortium of BDE Project

<https://www.big-data-europe.eu>



 **Fraunhofer**
IAIS

 **NCSR
DEMOKRITOS**

 **TenForce**
The Pragmatic Company

 **SEMANTIC WEB COMPANY**
Linking data to knowledge

 **InfAI**
Institut für Angewandte Informatik

 universität bonn

 **W3C**

 **ERCIM**

 **The Open PHACTS**
Foundation

 **VU** UNIVERSITY
AMSTERDAM

 Food and Agriculture
Organization of the
United Nations

 AERO-KNOW

 **КАПЕ**
CRES

 ERTICO
THE CENTER

 **cessda**

 SatCent

 National and Kapodistrian
UNIVERSITY OF ATHENS





EU PILARS in BDE Project



Security

Real-time monitoring,
stream processing and
data analytics, image
data analysis



Health

Heterogeneous data
linking and integration,
biomedical semantic
indexing



Food & Agriculture

Large-scale distributed
data integration



Energy

Real-time monitoring,
stream processing,
data analytics,
decision support



Transport

Streaming sensor
network and
geospatial data
integration



Climate

Real-time monitoring,
stream processing and
data analytics



Social Sciences

Statistical and research
data linking and
integration



BDE: Examples of Big Data Use cases

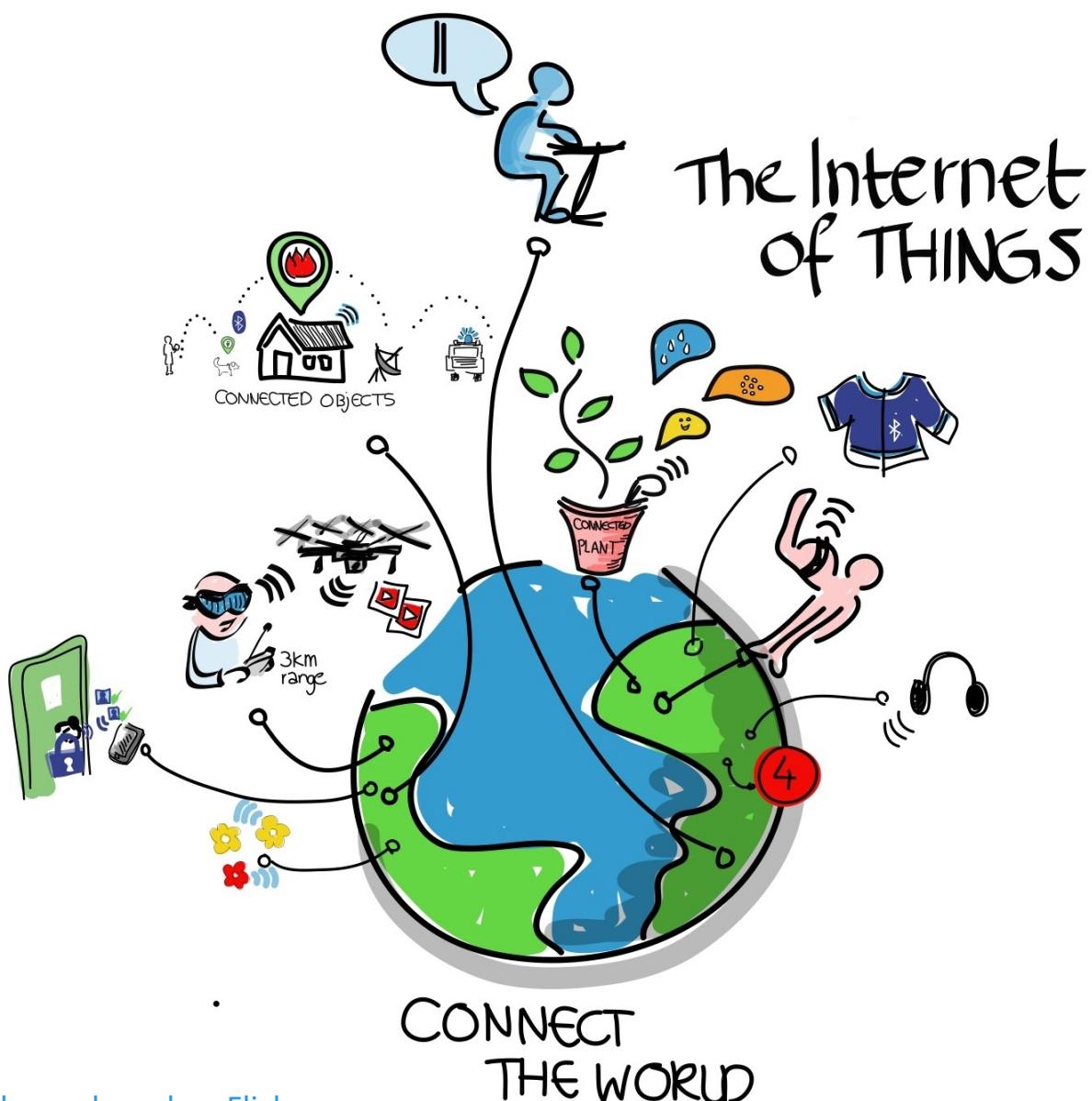
Predictive maintenance (Wind turbine monitoring data)

Downscaling of climatic data

Agro-Food IoT data

Traffic data for conditions estimation

Change detection & verification (Remote and social sensing data)



[Wilgengebroed on Flickr](#)



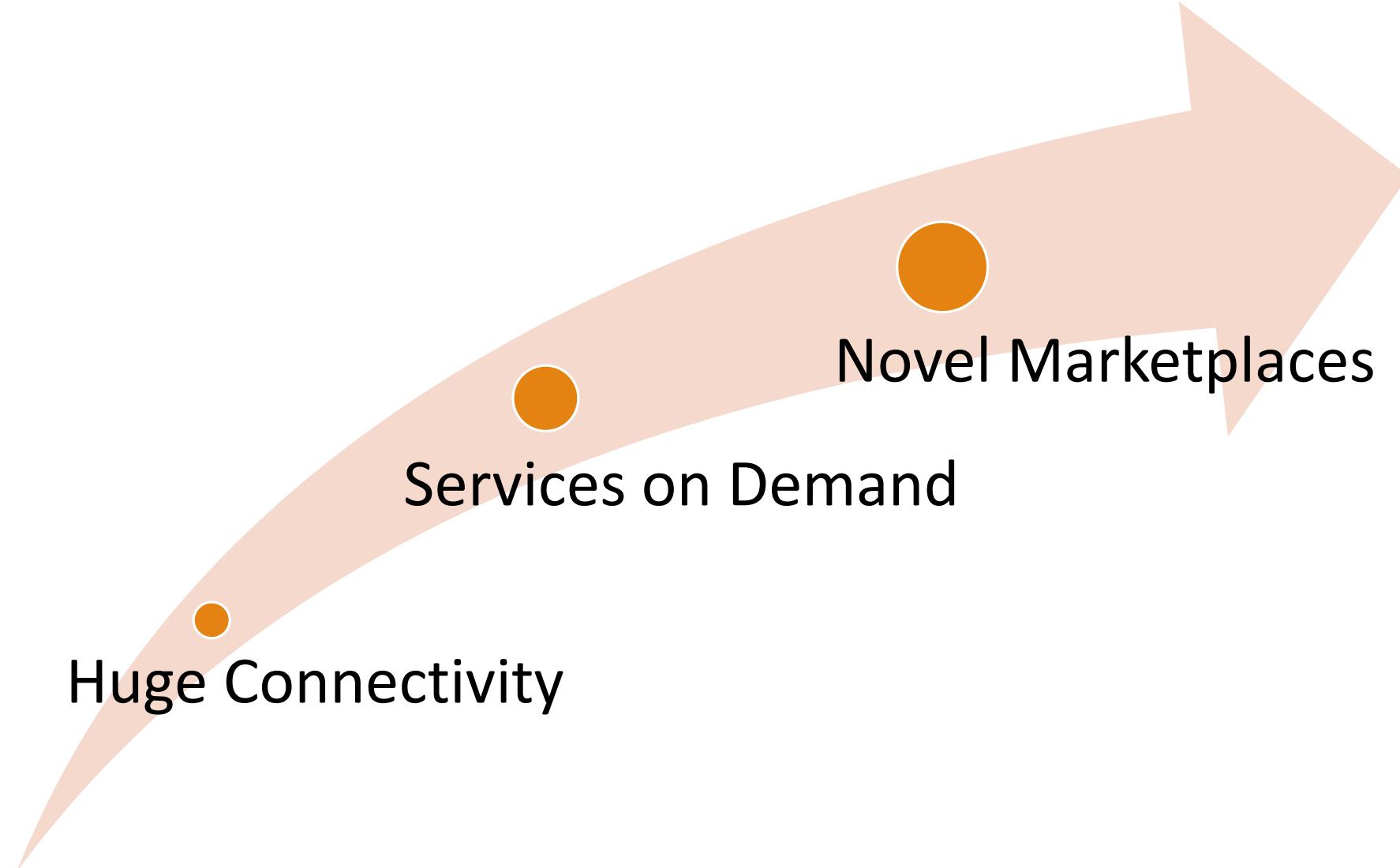
CoAP



REST API



Growing demand...





IoT



Cute
technology!

But it is
expected
this!

IoT + AI + BD + ICT





Towards Smarter Societies and Smart IoT Ecosystem

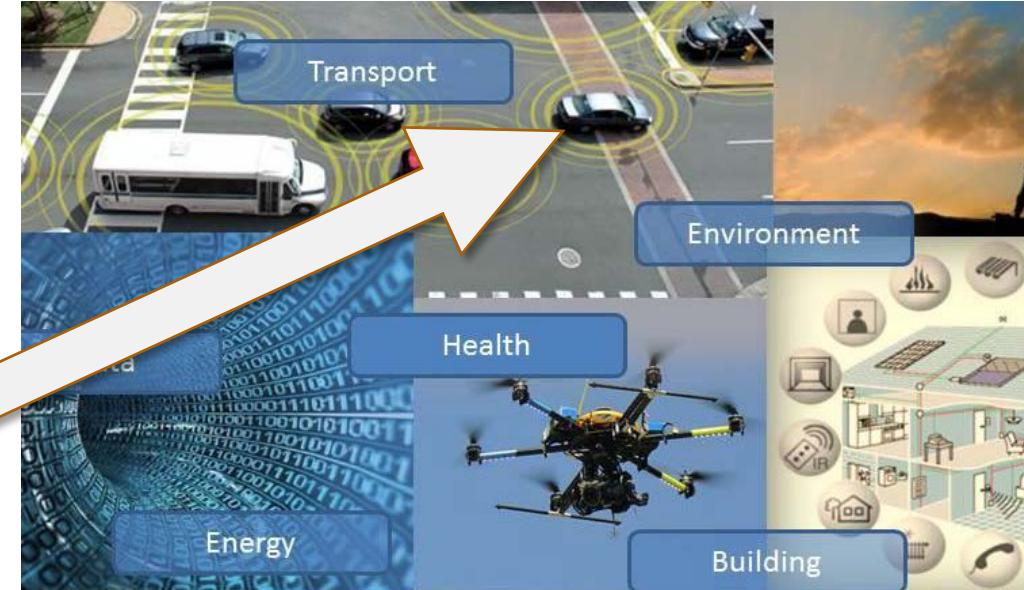
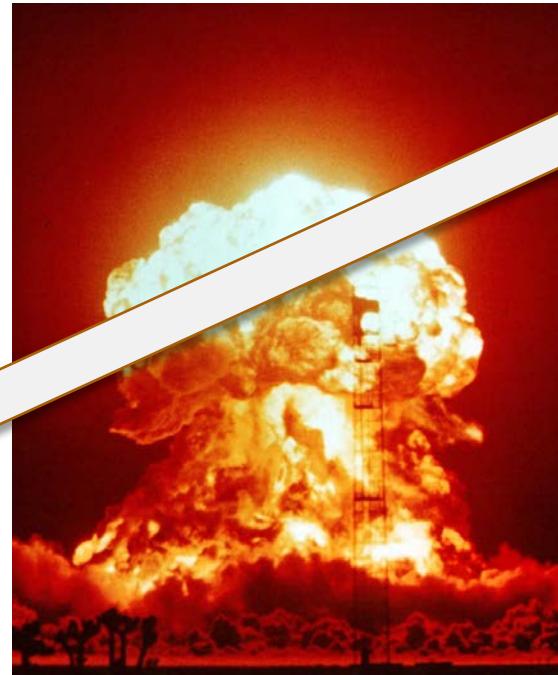
Smarter Societies
and Smart Ecosystem



Current Situation



Technological Explosion





Contact us

Please, visit

<http://iot.synaisthisi.iit.demokritos.gr>