

Internet Of Things

Les défis du développement applicatif

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The background of the slide is a dark gray network diagram. It consists of numerous small white circles (nodes) connected by thin white lines. Some of the nodes are larger and contain white icons: a telephone handset, a refrigerator, a laptop, an airplane, a traffic light, a train, a share symbol, a globe, and a computer monitor. The overall theme is digital connectivity and technology.

1

Concept

The concept

Extension of
the Internet...

To physical world

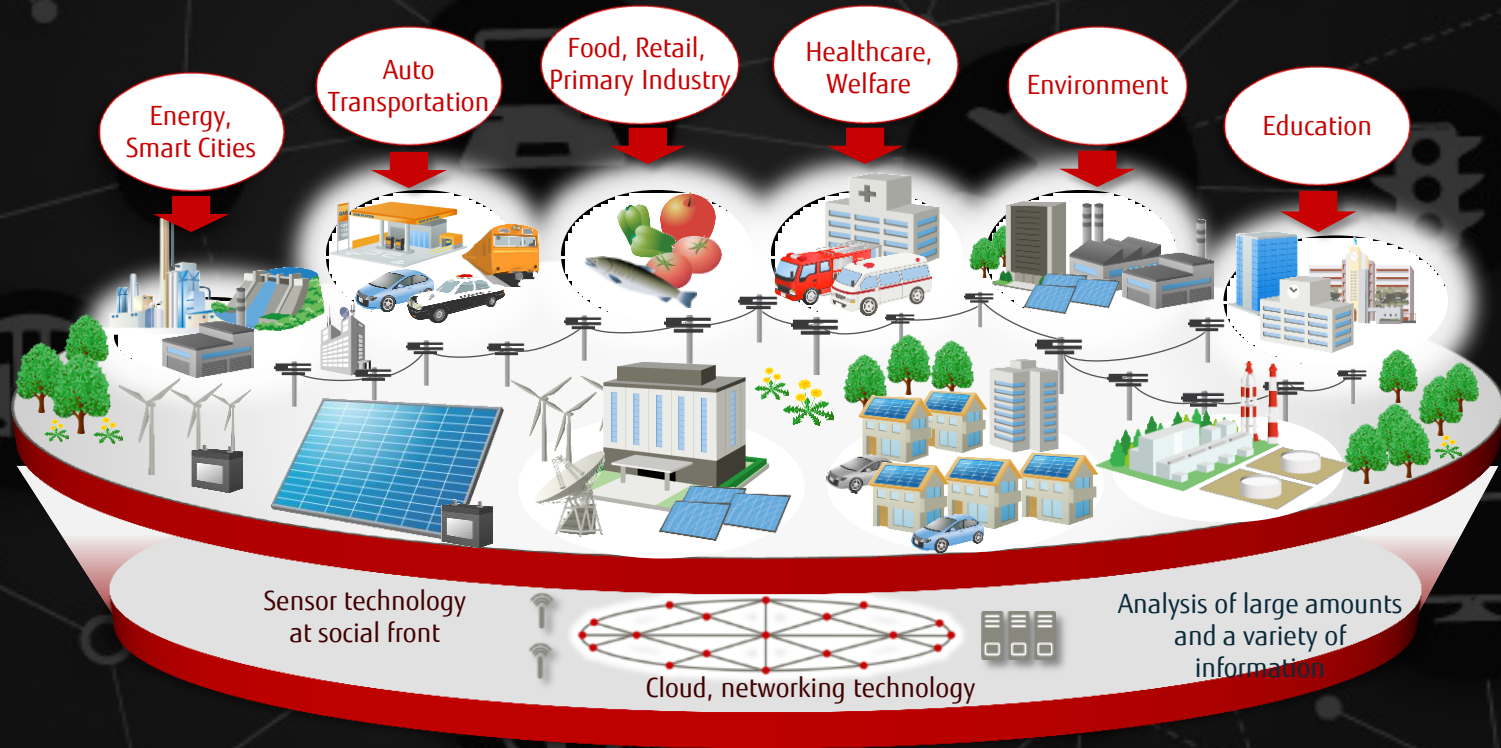


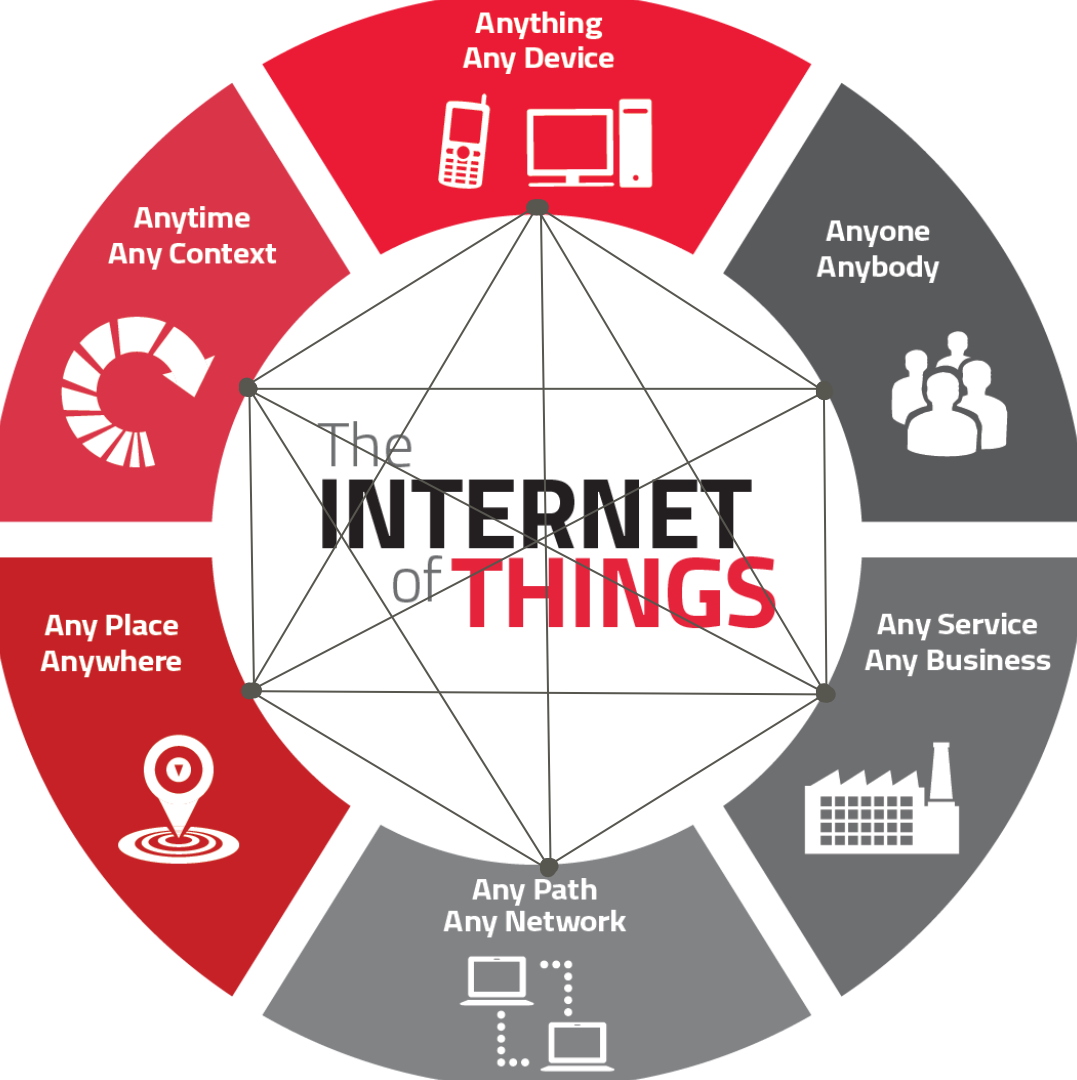
Gives to the Internet

sensory capabilities

Enabling **M2M, M2H and H2M** communications to exchange useful information and create **new types of services** and new values for humans

Applications fields





Explosion
of possibilities

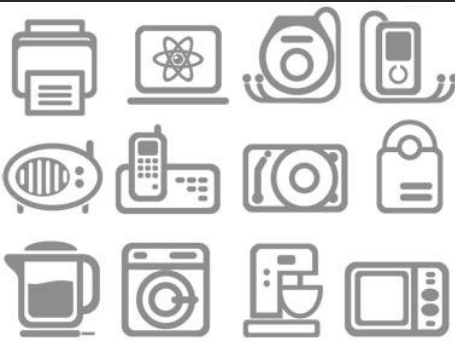
The background is a dark gray network diagram. It consists of numerous small white circles (nodes) connected by thin white lines (edges). Some nodes are larger and contain white icons: a telephone handset, a refrigerator, a laptop, an airplane, a traffic light, a train, a share symbol, a globe, and a computer monitor. The overall pattern suggests a complex, interconnected system or network.

2

Approach

Technologically

Interaction between
"things"



Having an
individual digital
identity



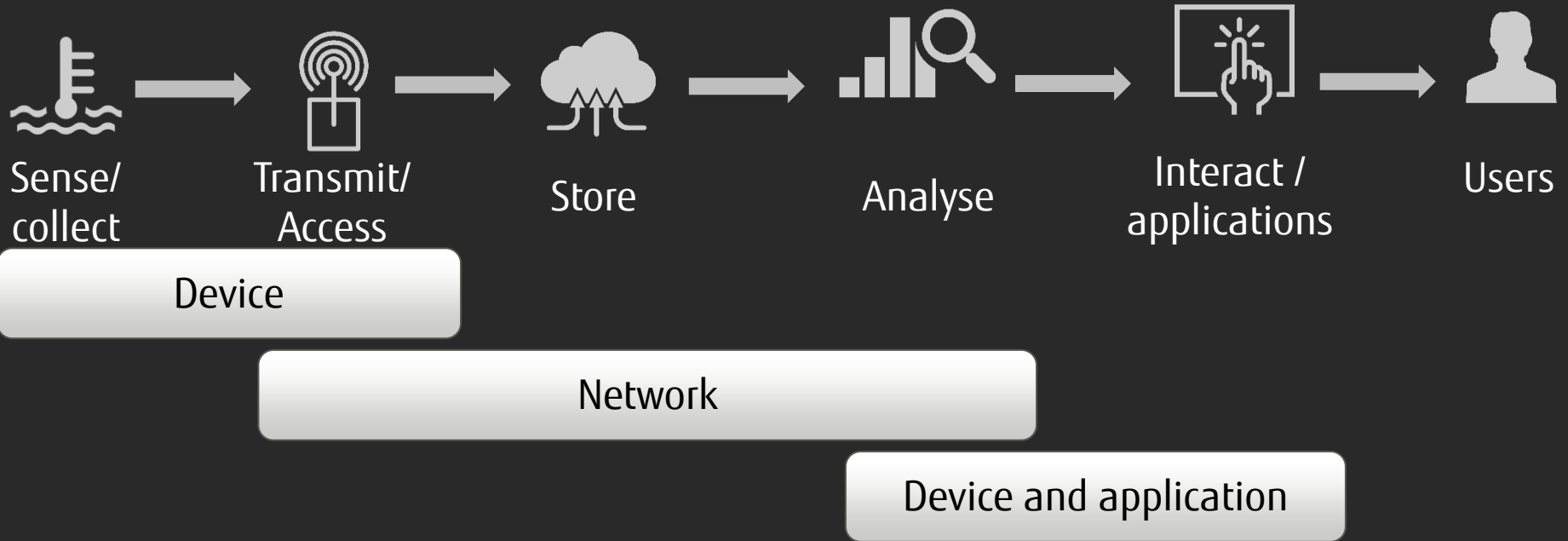
Operating in
a smart space

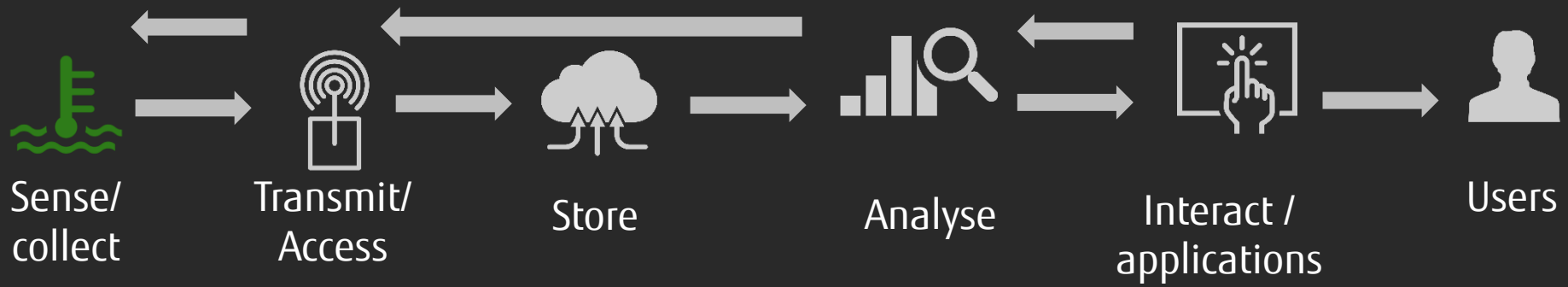


With intelligent
interfaces to
communicate



The path

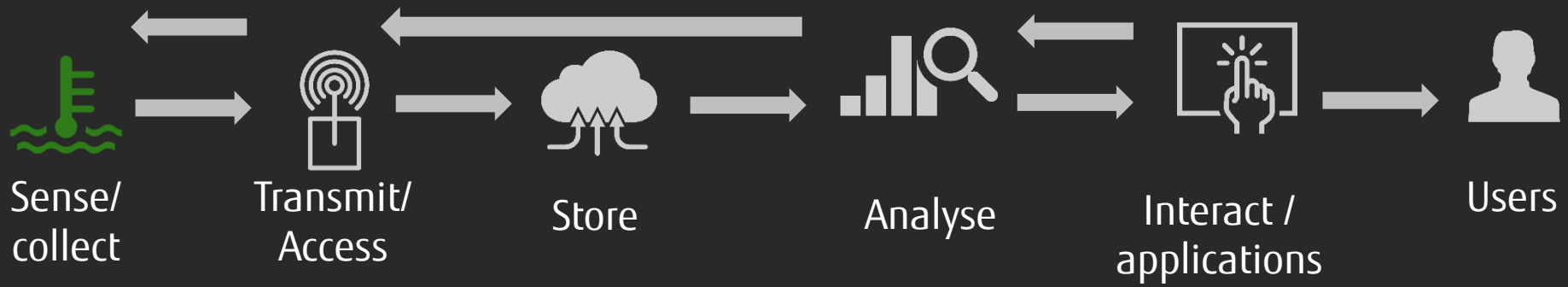




Anatomy of a “Thing”

- Hardware
- Built for a specific “thing”
- Limited functionalities
- Control interface
- Input/Output
- Power
- Sometimes “local storage”





Collect information
using captors :

- movement,
- temperature,
- sound,
- pressure,
-



RECHARGEABLE BATTERY

Up to 10 days of use on a single charge.

VIBRATION MOTOR

Powers your silent alarm clock & reminds you to move.

PRECISION MOTION SENSOR

Accurately tracks your movement and sleep activity.

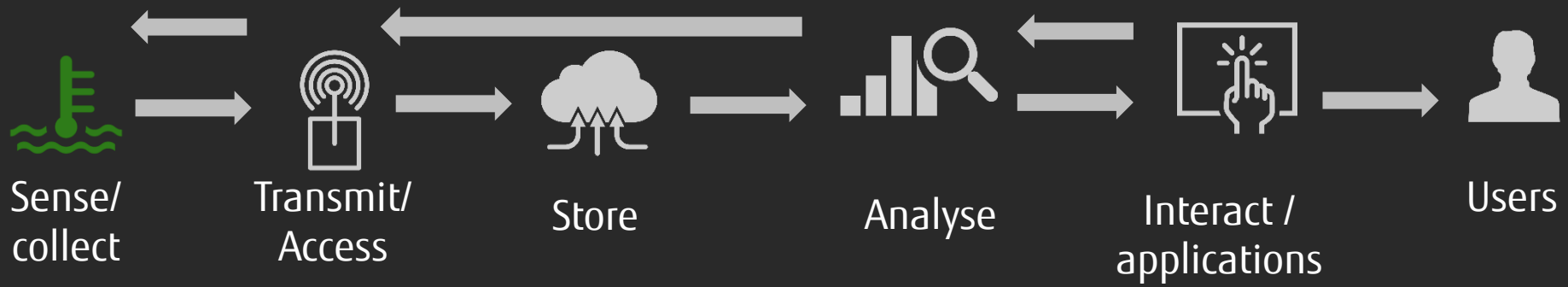
3.5MM PLUG

Syncs your band with the app on your phone.

SWEAT-PROOF & WATER-RESISTANT*

Wear the band while showering or working out.

* Water-resistant up to 1m.

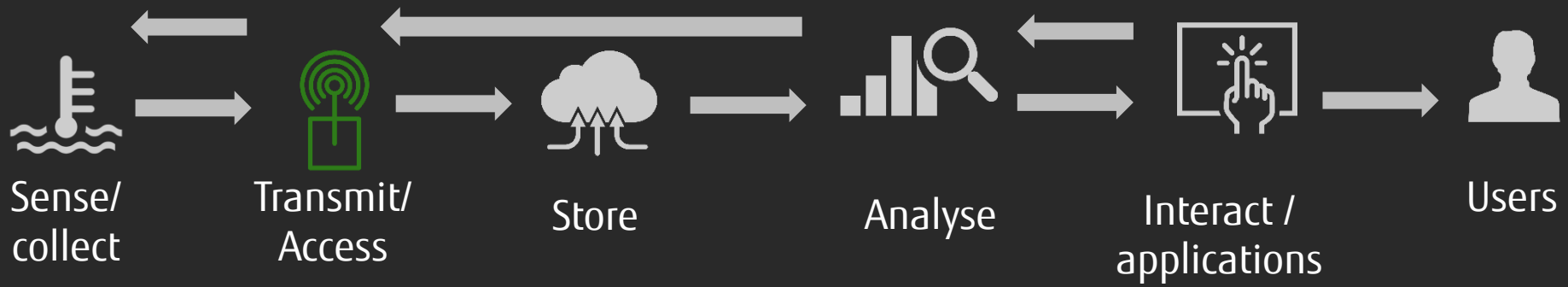


Collect data coming
from other things

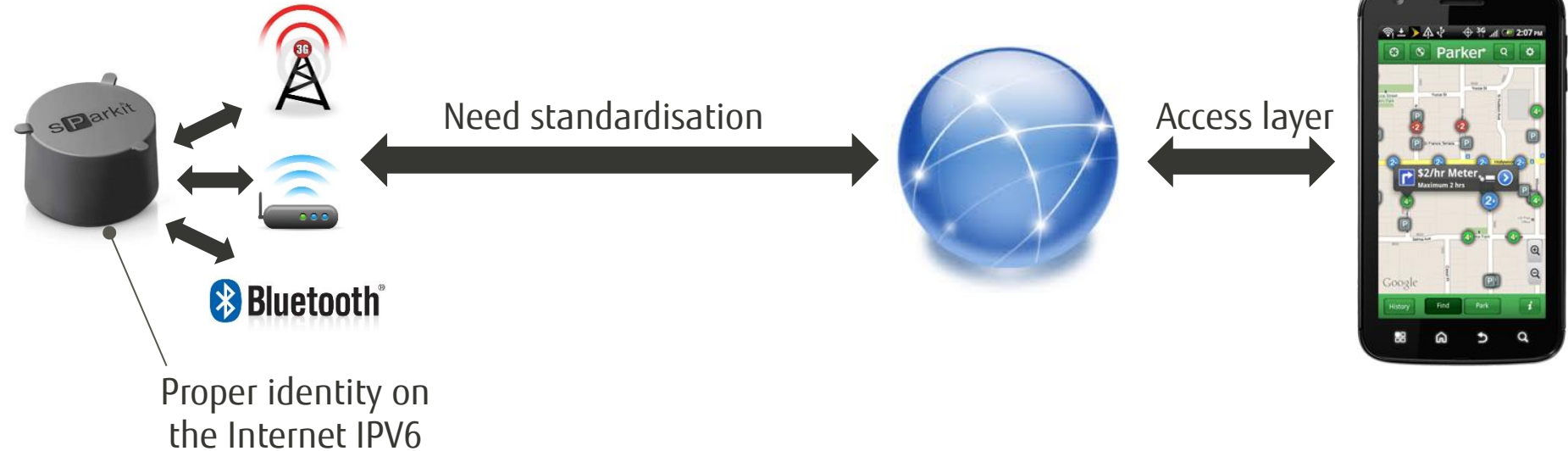
- **Bluetooth,**
- **Wifi,**
- **RFID,**
- **...**

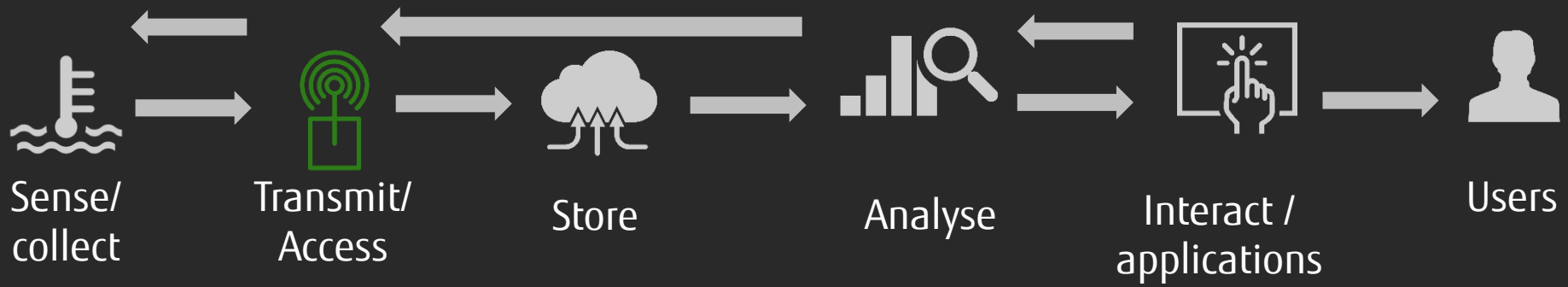
Fliike : Physical Facebook counter





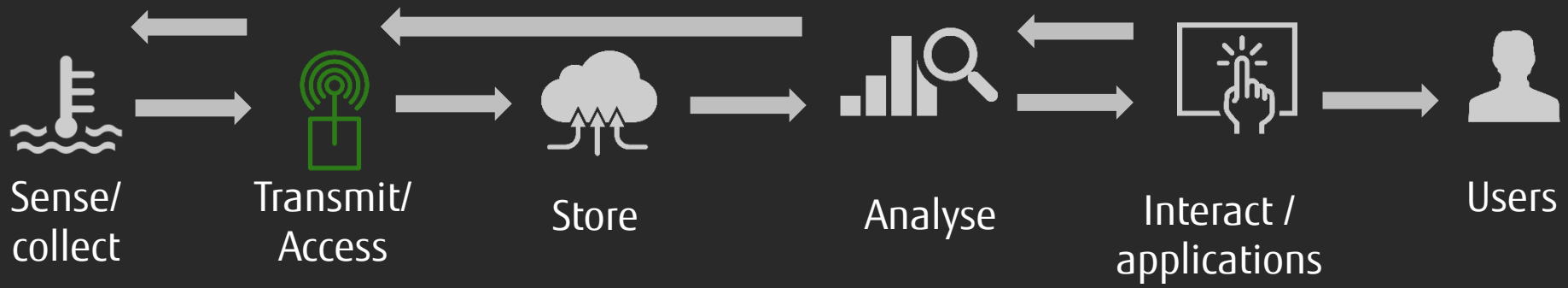
Directly :



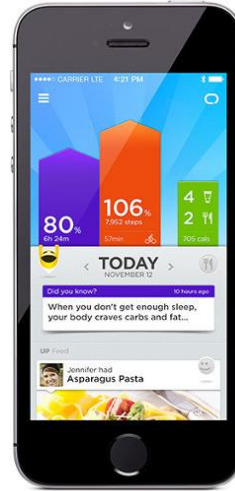


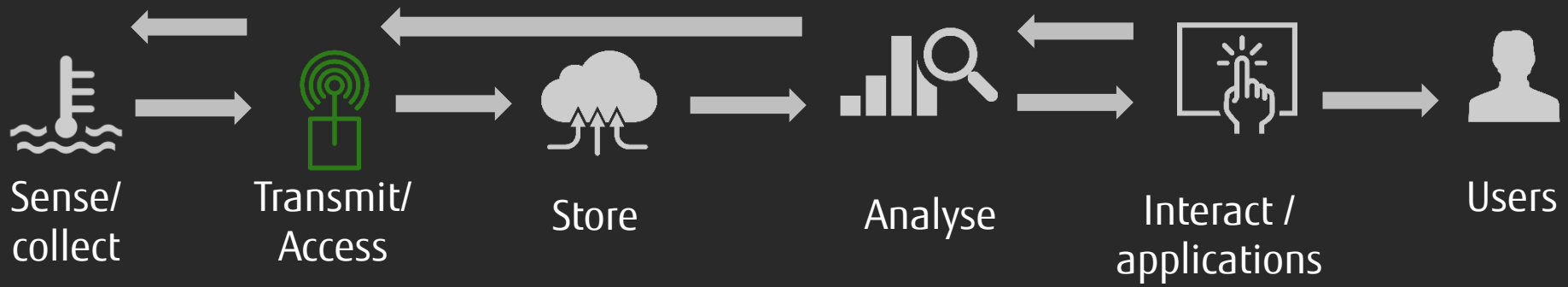
BUT

A “thing” is not necessary directly connected to the IOT network



Indirectly :





For the access layer :

- Need standardization (heterogeneous devices, proprietary, ...)
- Using API to capture information coming from device



Protocols Landscape

CoAP

HTTP

MQTT

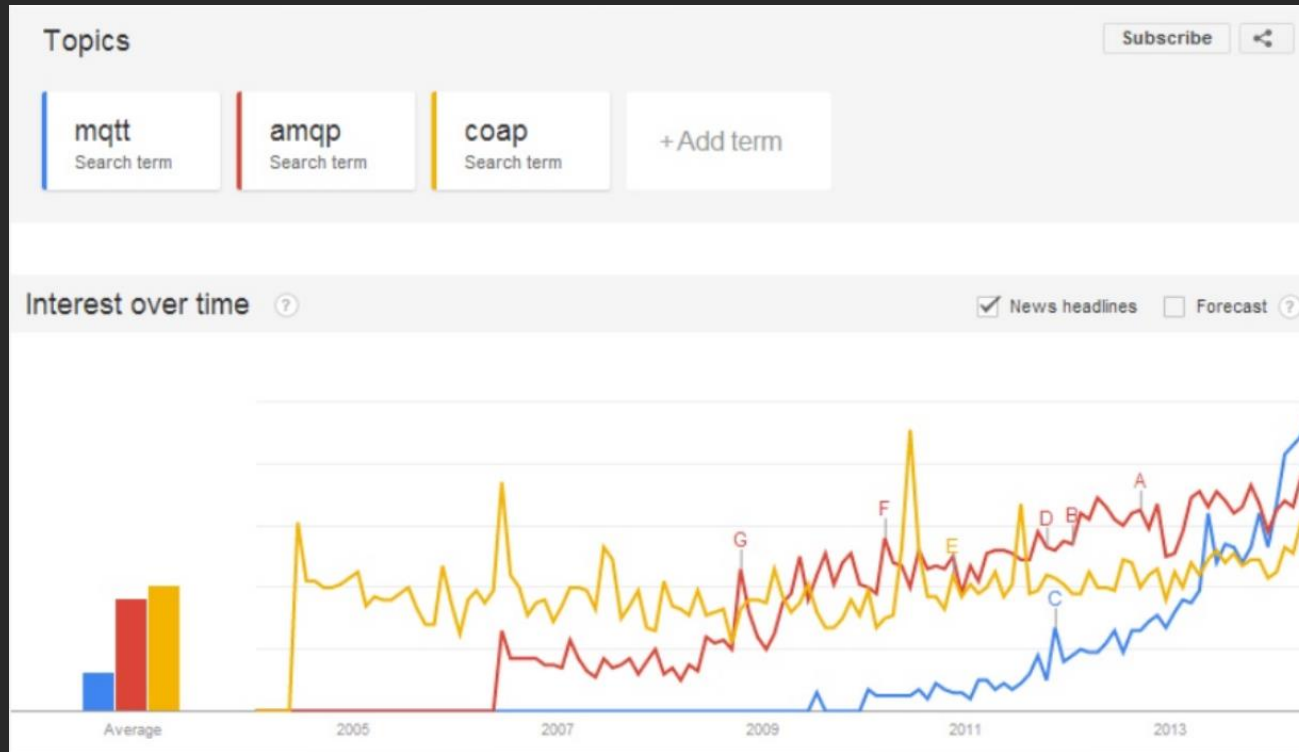
DDS

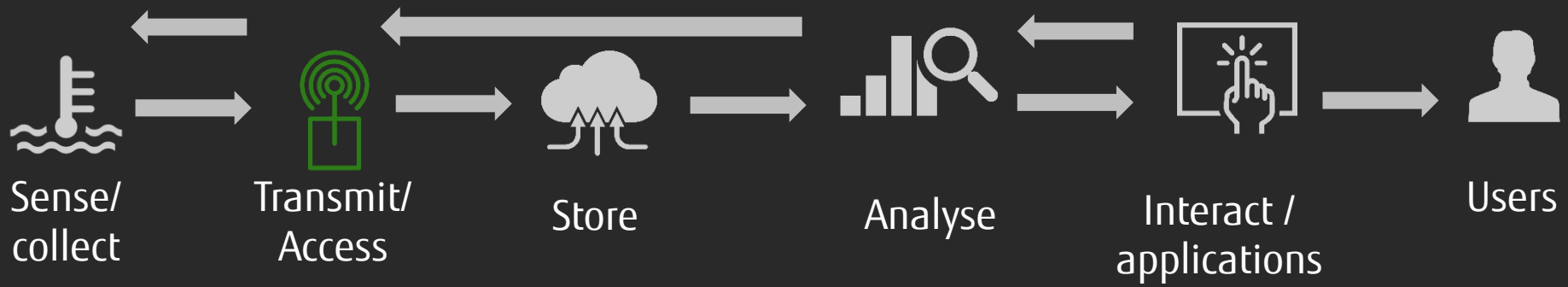
XMPP

AMQP

STOMP

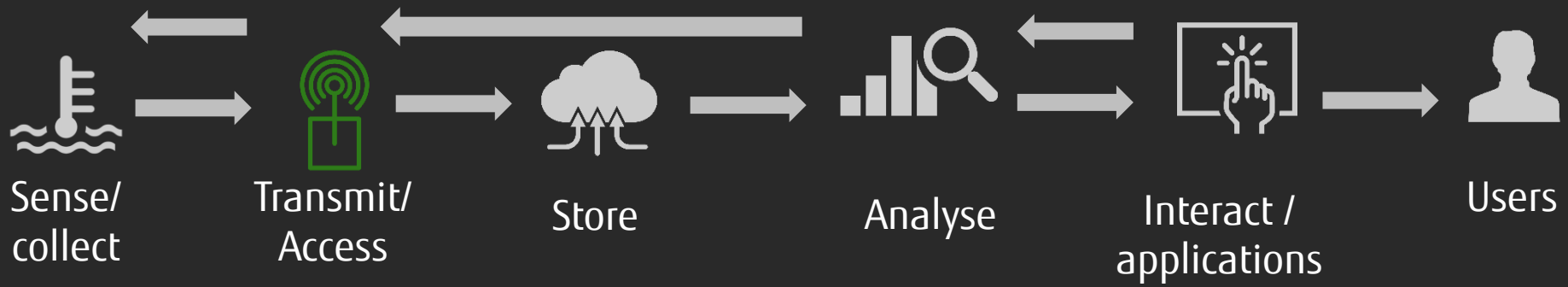
Protocols Landscape Trends

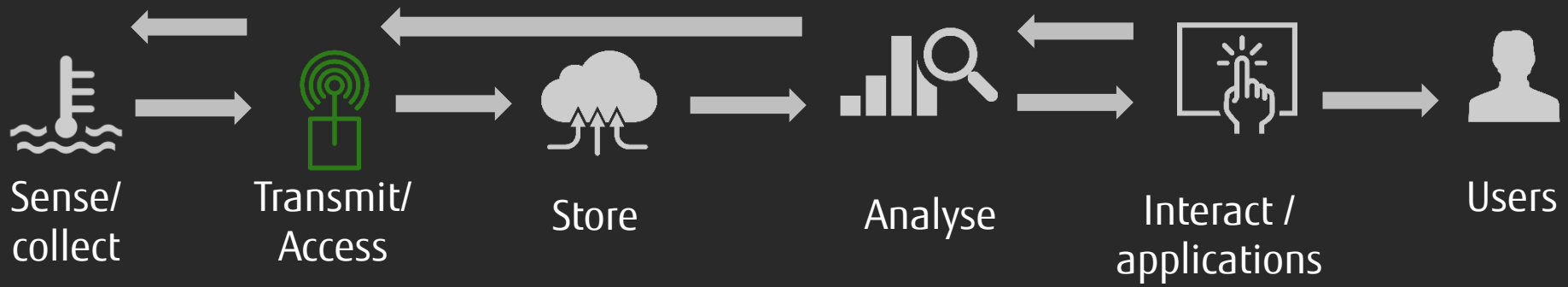




Coap : The Web of Things Protocol

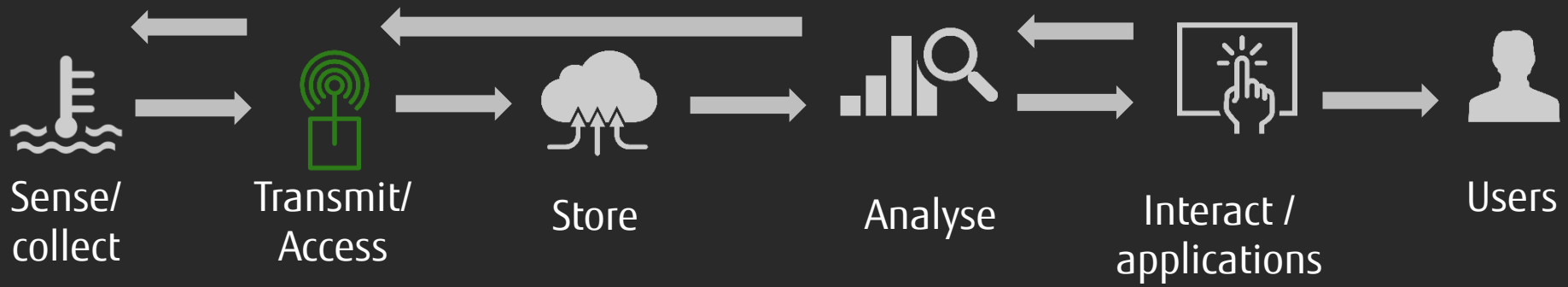
- HTTP-Like based on UDP
- Status, code, ...
- Restful protocol
- Compatible with HTTP
- Additional features for M2M
- Confirmable messages '(or not)

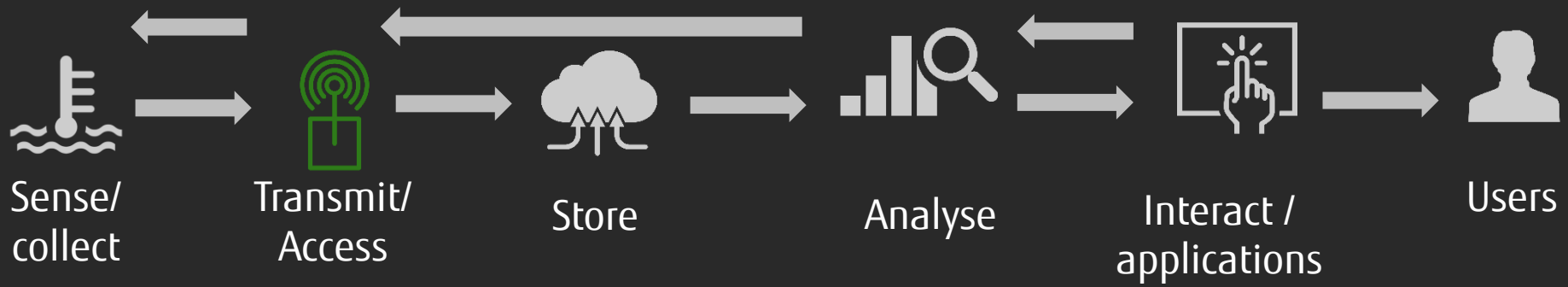




separate response/response back after a while





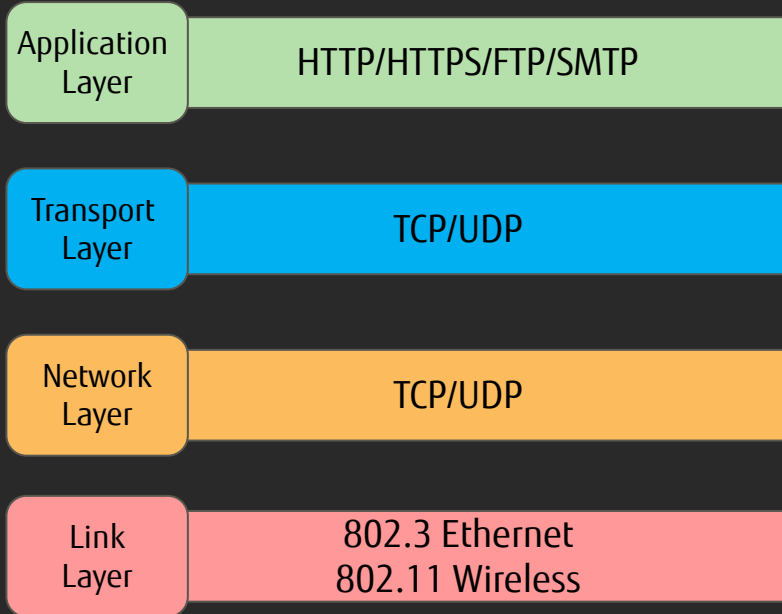


CoAP : Proxies

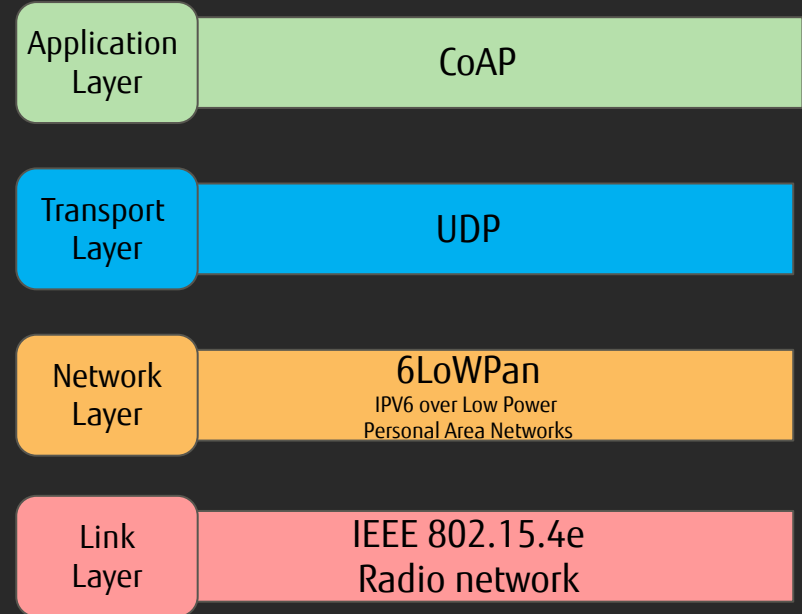
- Squid 3.1.9 (transparent HTTP/Coap Mapping)
- jCoap Proxy
- Californium cf-proxy

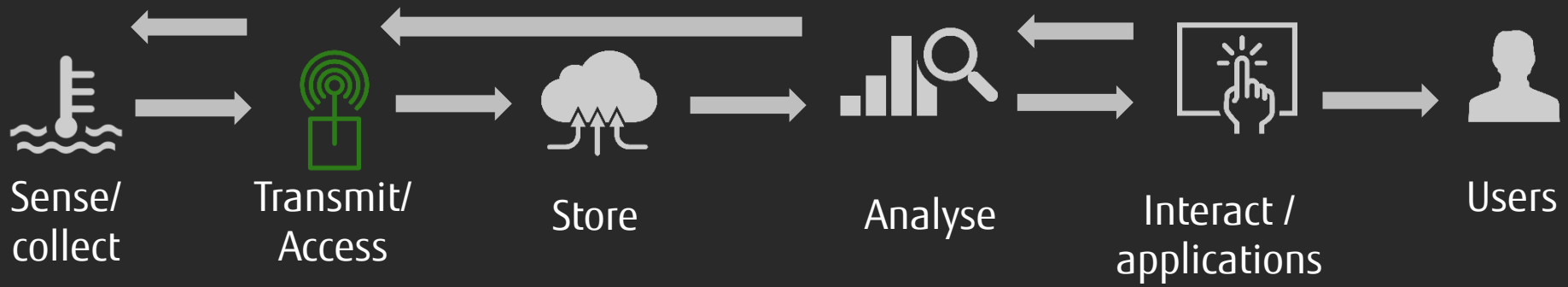
Network architecture Sample

Classical Stack

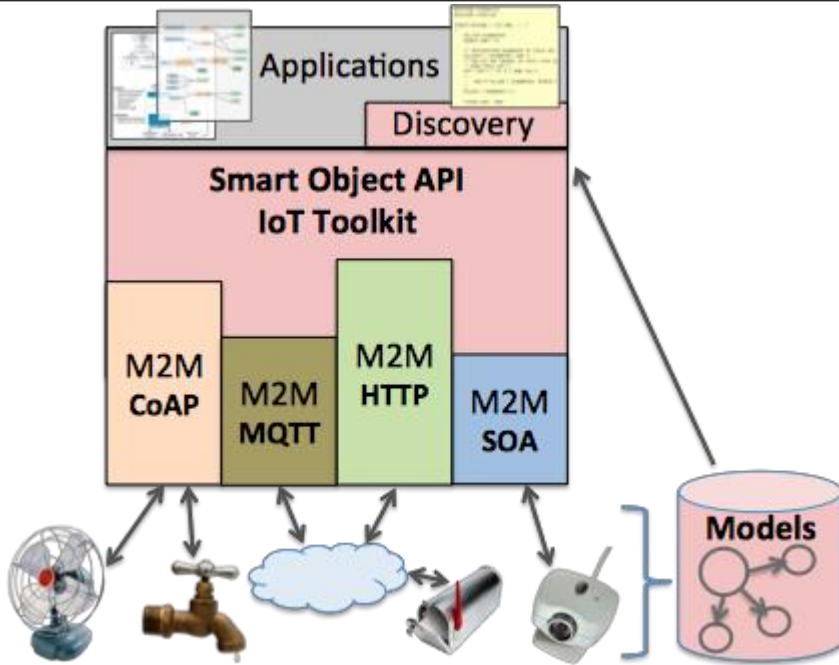


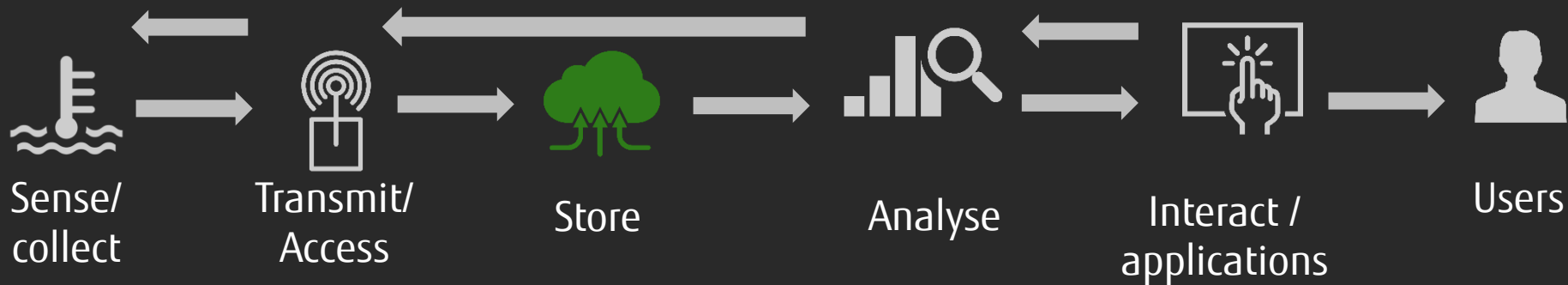
IOT Stack





Importance of API's





Historical Data Archiving



Pre-computed Data



In-Memory
real-time Data



Real-time Complex Event Processing
Distributed Pub/Sub Messaging



millions of simultaneous persistent bi-directional connections
millions of messages per second



Libelium Smart World



Sense/
collect

WHAT TO DO WITH
ALL THE DATA
COMING FROM
ALL SENSORS
THAT WILL BE AVAILABLE TOMORROW

Air Pollution

Detect levels of toxic pollutants like carbon monoxide, nitrogen dioxide, sulfur dioxide, and particulate matter.

Forest Fire Detection

Monitoring of combustion gases and preemptive fire conditions to define alert zones.

Wine Quality Enhancing

Monitoring soil moisture and trunk diameter in vineyards to control the amount of sugar in grapes and grapevine health.

Californian Care

Monitoring of health and well-being of athletes.

Sportsmen Care

Vital signs monitoring in high performance centers and fields.

Structural Health

Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.

Smartphones Detection

Detect iPhone and Android devices and in combination with other sensors work with WiFi or Bluetooth.

Access Control

Access control to restricted areas and detection of people in non-authorized areas.

Radiation

Distributed measurement of radiation levels in nuclear power plants and other industrial facilities.

Electromagnetic Levels

Measurement of the energy radiated by cell stations and WiFi routers.

Traffic Congestion

Monitoring of vehicles and pedestrian affluence to optimize driving and walking routes.

Smart Roads

Warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.

Smart Lighting

Intelligent and weather adaptive lighting in street lights.

Intelligent Shopping

Getting advices in the point of sale according to customer habits, preferences, presence of allergenic components for them or expiring dates.

Noise Urban Maps

Sound monitoring in bar areas and centric zones in real time.

Water Leakages

Detection of liquid presence outside tanks and pressure variations along pipes.

Vehicle Auto-diagnosis

Information collection from CarBus to send real time alarms to emergencies or provide advice to drivers.

Item Location

Search of individual items in big surfaces like warehouses or harbours.

Waste Management

Detection of rubbish levels in containers to optimize the trash collection routes.

Smart Parking

Monitoring of parking spaces availability in the city.

Golf Courses

Selective irrigation in dry zones to reduce the water resources required in the green.

Quality of Shipment Conditions

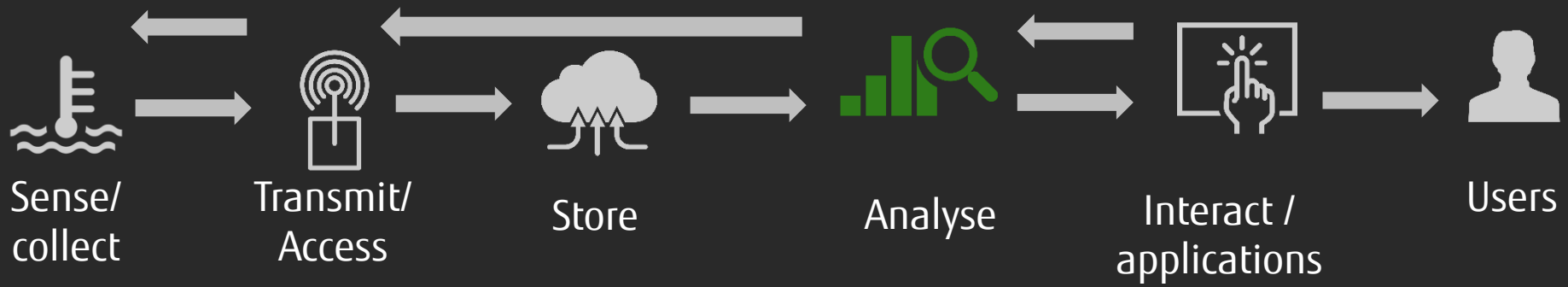
Monitoring of vibrations, strokes, container openings or cold chain maintenance for insurance purposes.

Water Quality

Study of water suitability in rivers and the sea for fauna and eligibility for drinkable use.

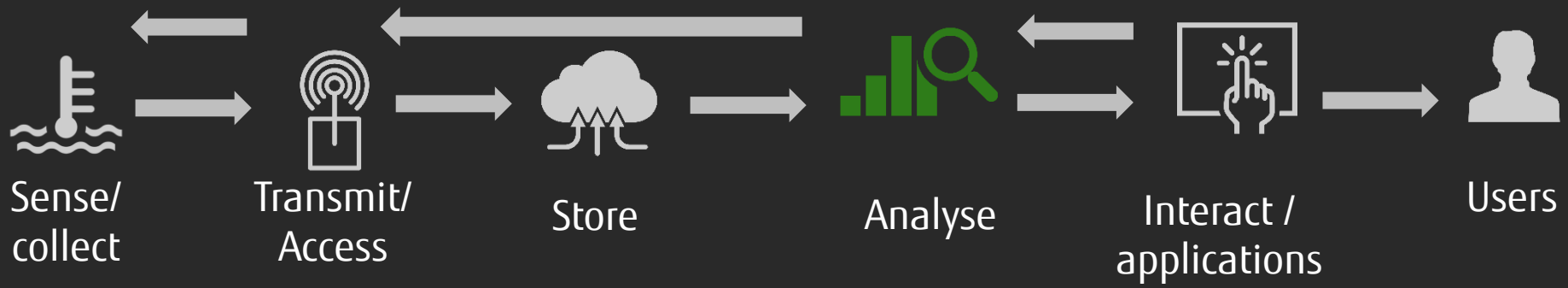


Users



Threat data coming from sensors





Self learning



"Think service and not object"

"There are plenty of connected devices out in the market today, from Fitbits to garden sensors that use a home's Wi-Fi network to tell you when to water your plants;

But the key to building out a true internet of things experience isn't in being able to connect devices to the web, but building a service based around that connectivity" Stacey Higginbotham, Gigacom.com

New Services

Before



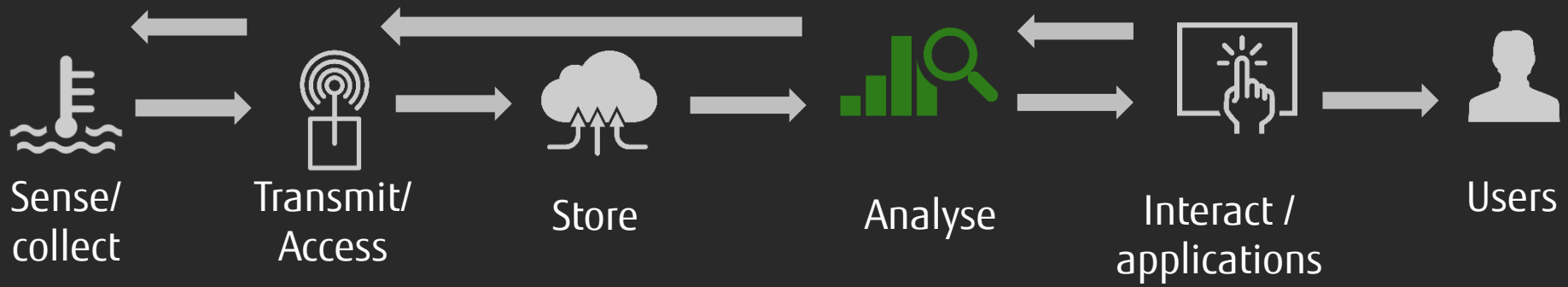
After



Cloud App's
Combine data's

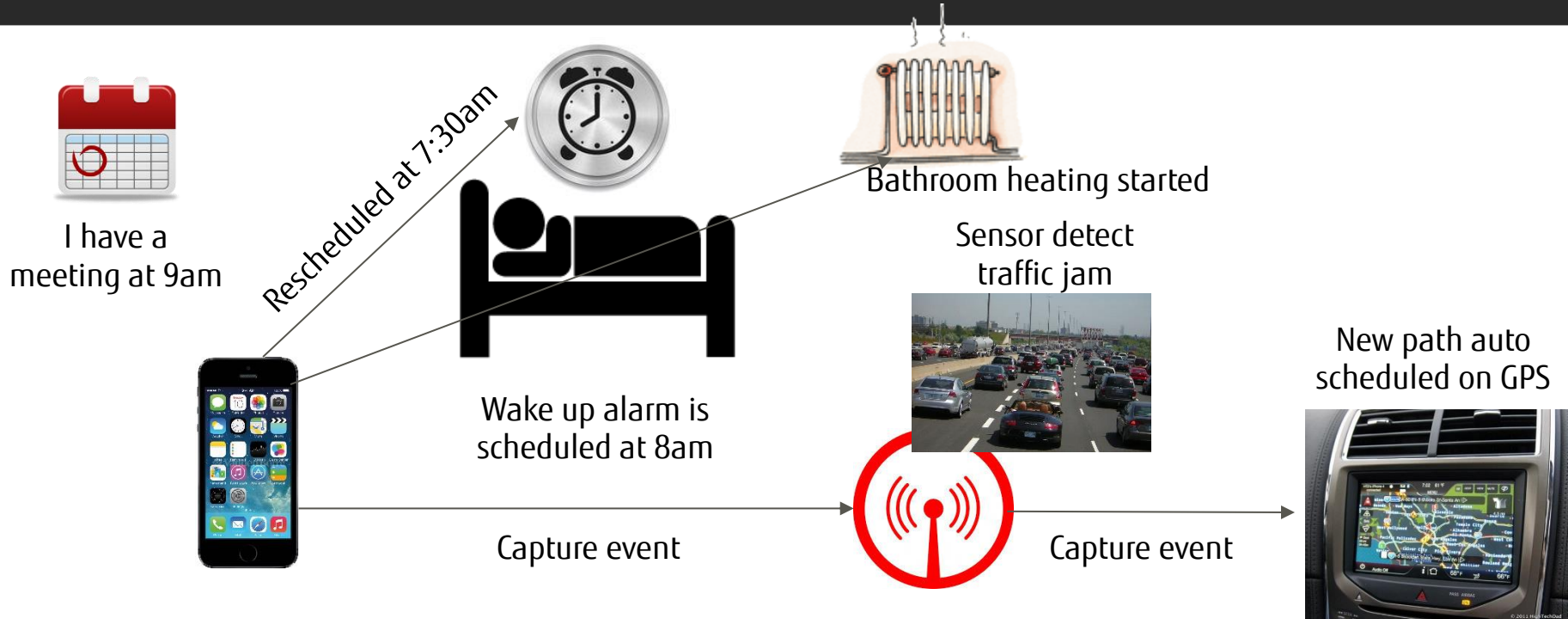
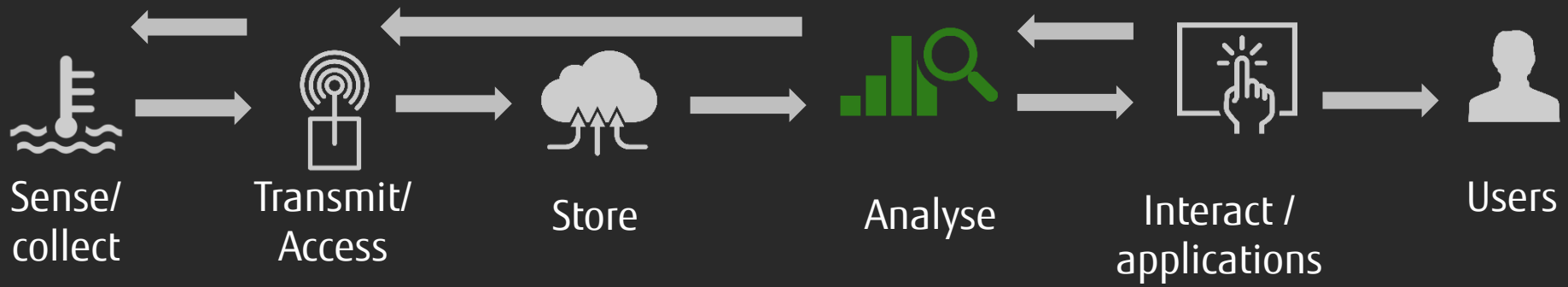


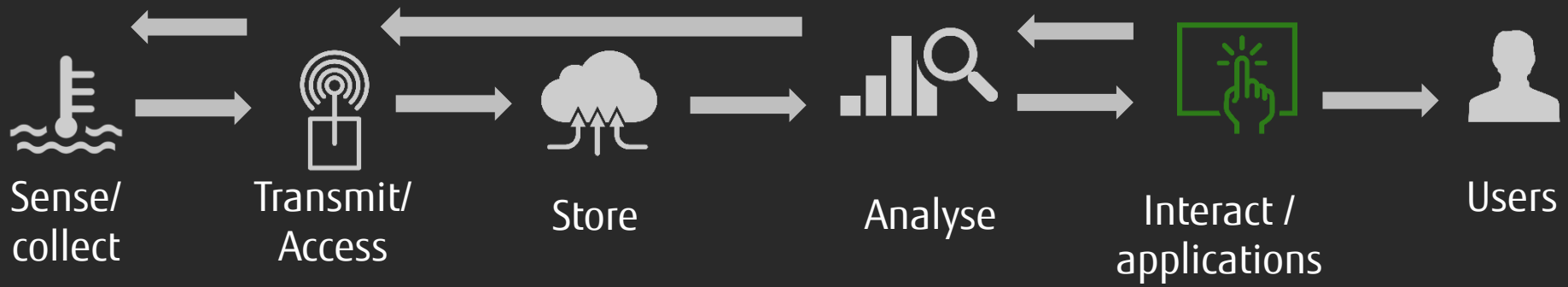
Create new
indicators
and services



Aggregate information

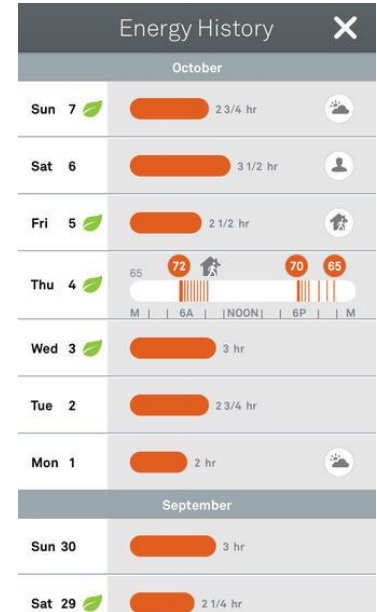
- Combine data's coming from all "things"
- Create scenarios
- Analyse/combine them and propose new services
- BIG DATA → SMART DATA
- Real Time analysis capacities

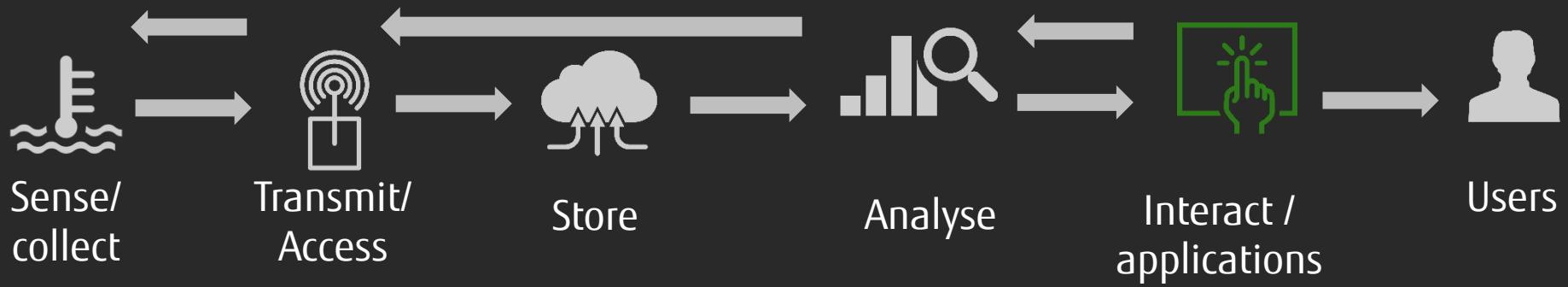




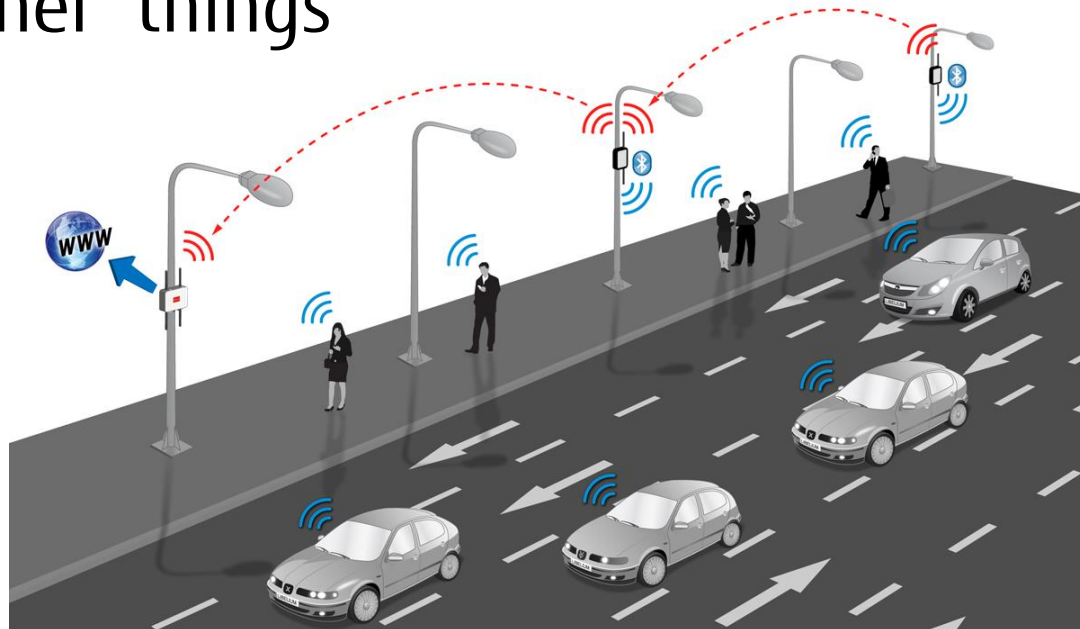
Interact

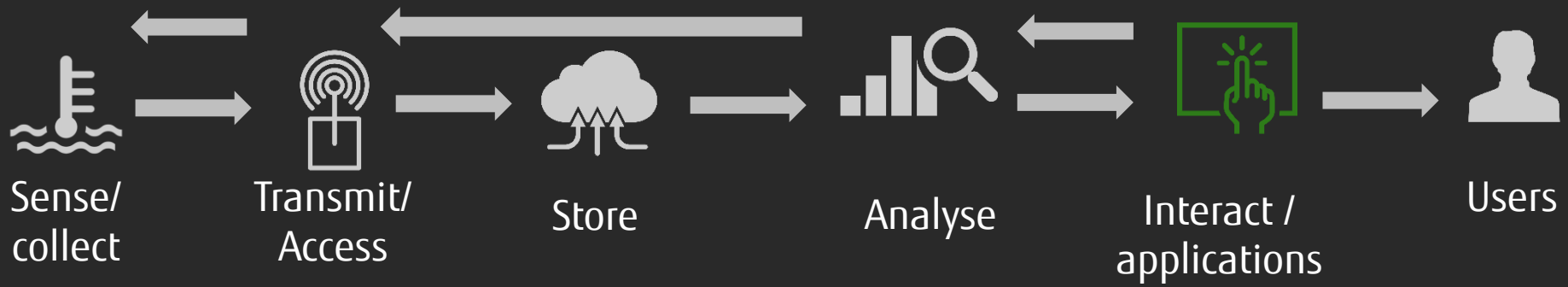
- Interaction with the device should as simple as possible
- For complex actions use a dedicated one (smartphone, tablet, pc)





Automate actions with other “things”

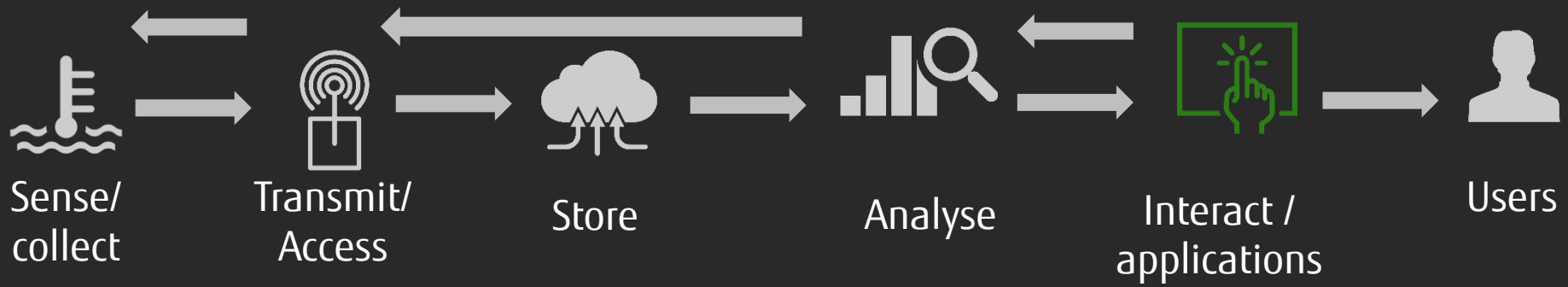




Open API to allow automation with dedicated platforms



IFTTT is pronounced like "Lift" without the "L."



Open API to allow automation with dedicated platforms

My Plant can send email when it needs water :)

by [parrot](#) 113 151

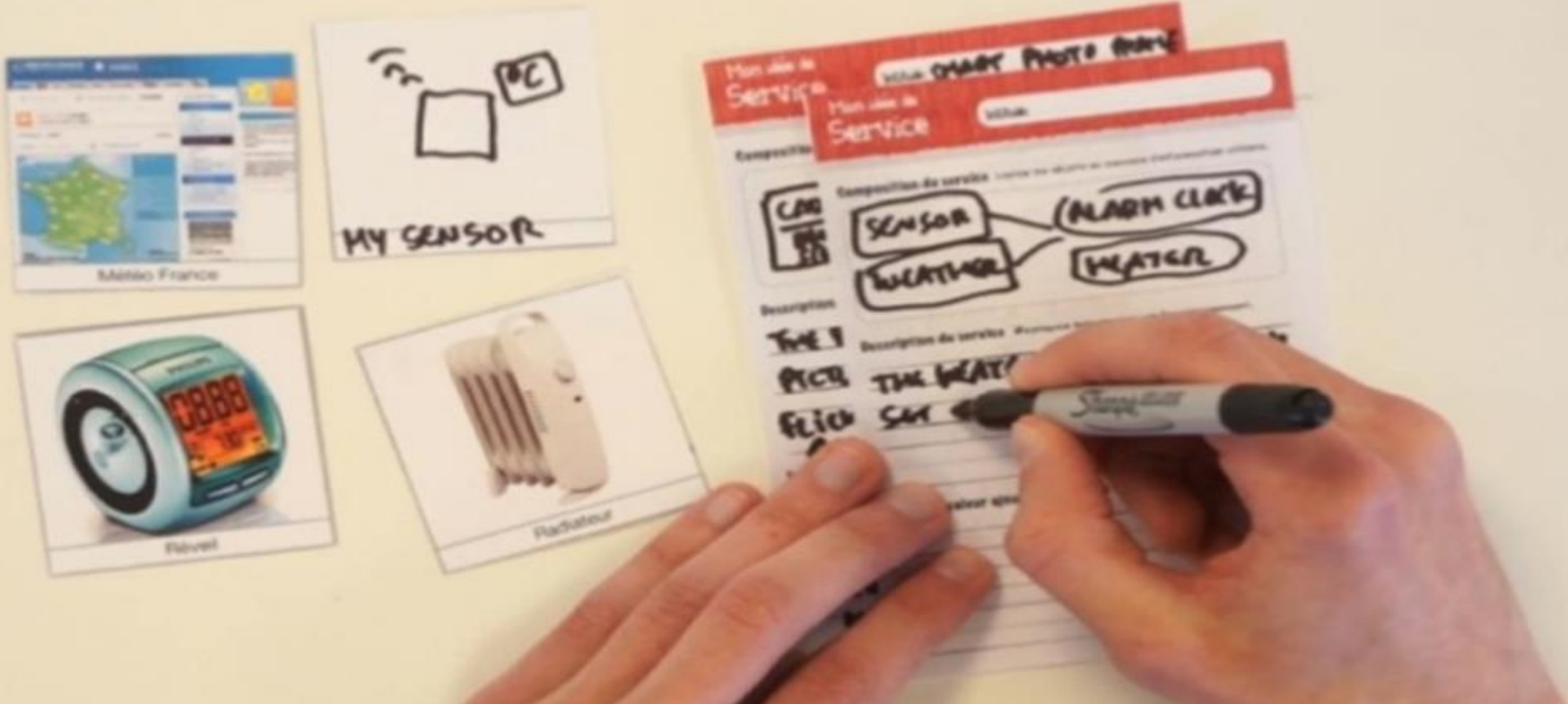
If current temperature rises above 21°C, then enable a quick action

by [honeywell](#) 42 8

Add an iOS reminder when my check engine light comes on

by [automatic](#) 997 140

A new way to create applications



Consumer Apps

Harnessing the

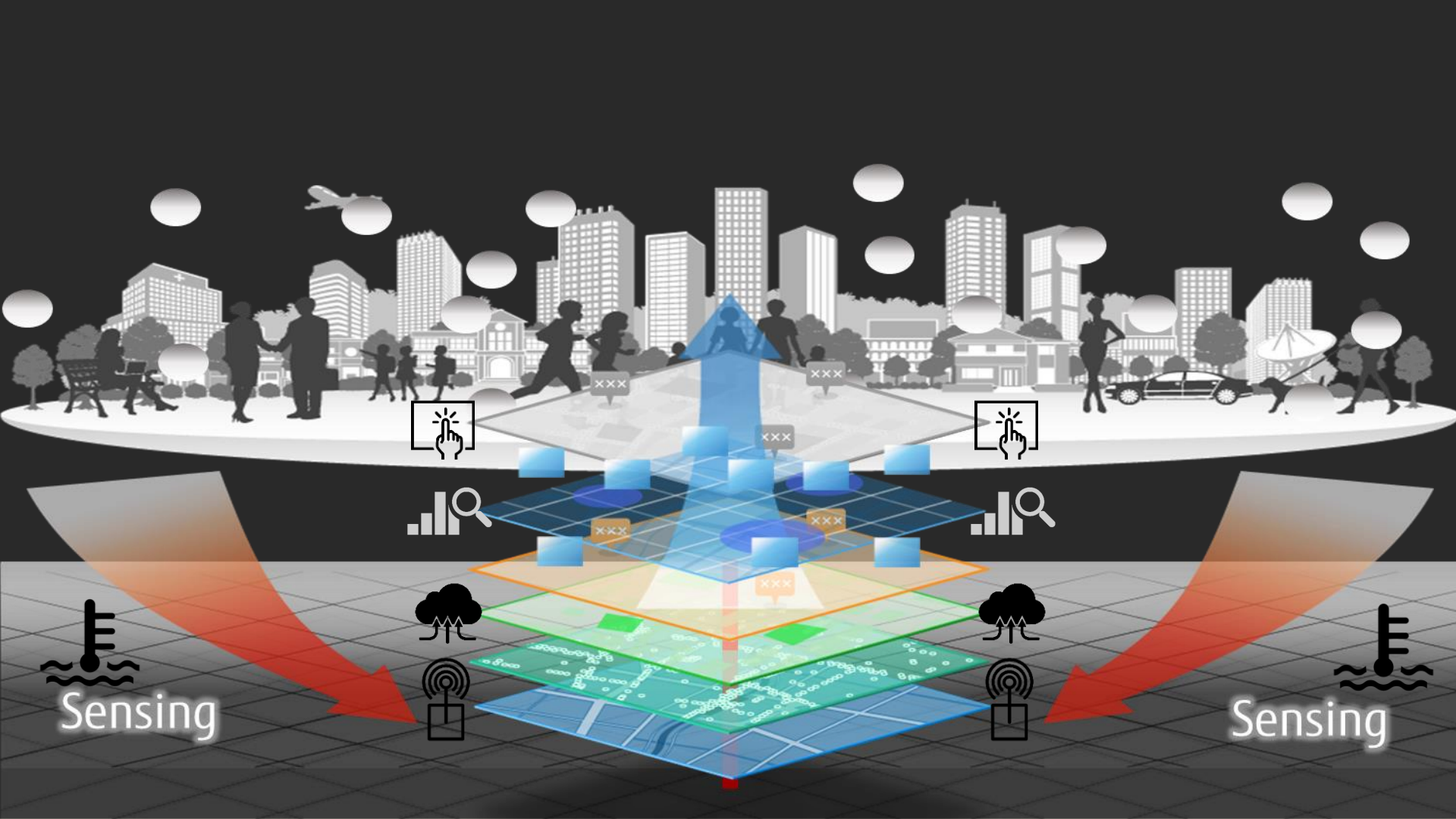
Business Apps

CREATIVITY

of the Application Developers

Scientific Apps

Industrial Apps



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3

Reflection

Responsibility



Security



Confidentiality



Conclusion

- Standardisation
 - Open API's
 - Real time analysis
 - Big data storage
 - Simple of usage
-
- Think in terms of services

Conclusion



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