Open APIs for Open Minds

Fast Prototype IoT and Smart Environments Applications

October 20, 2020 – PSI 5120

fabio.cabrini@usp.br

pervasive and high performance computing
pcd
computação pervasiva e de alto desempenho

Fórum Brasileiro de Internet das Coisas

REDE BRASILEIRA DE CIDADES INTELIGENTES & HUMANAS

FIWARE Lab São Paulo

Helix

ABINC ASSOCIAÇÃO BRASILEIRA DE INTERNET DAS COISAS

USP

FIWARE

Prof. Ms. Fábio Henrique Cabrini

Helix co-founder & CEO and FIWARE Evangelist

Main Location: São Paulo, Brazil

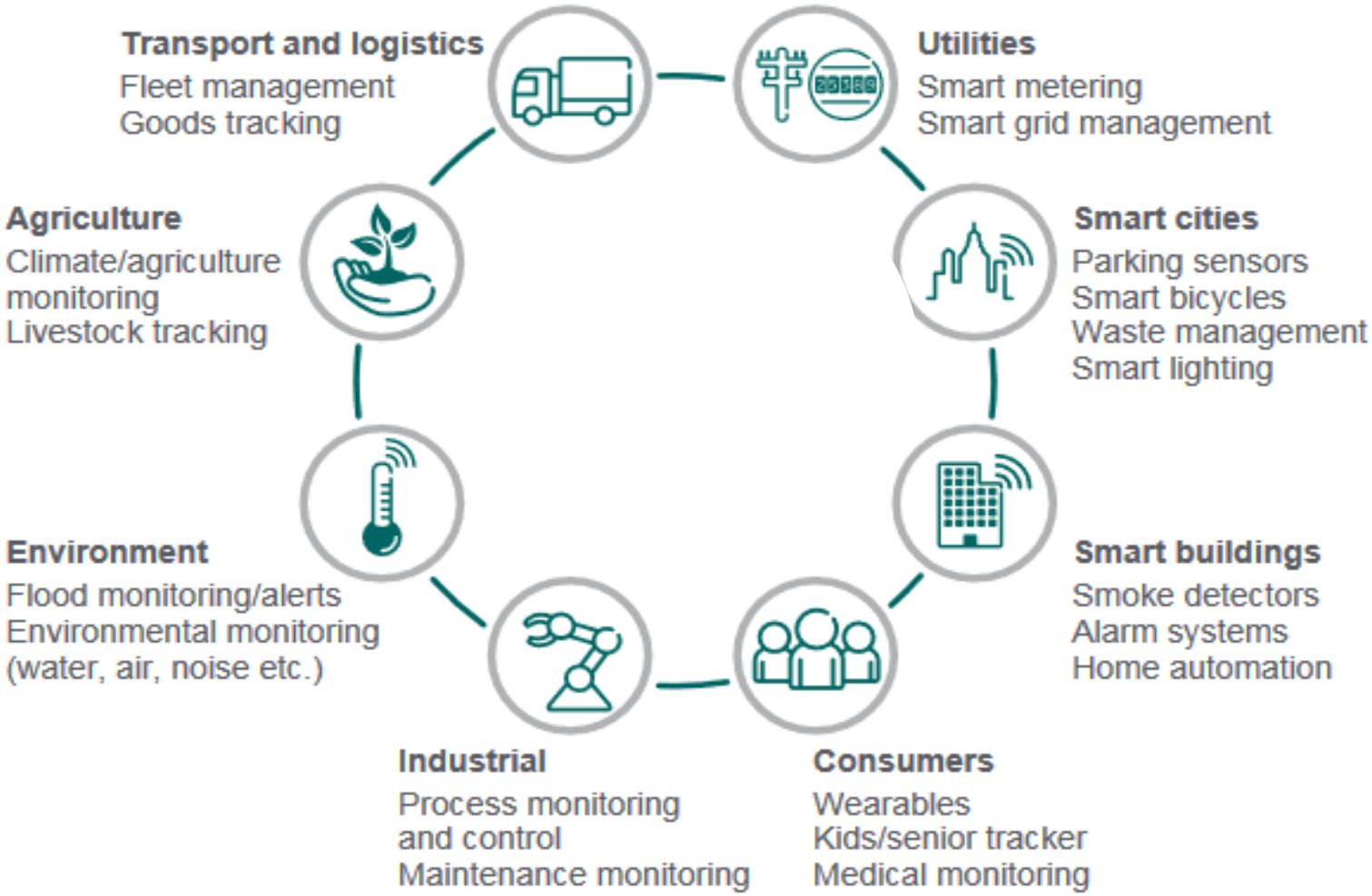
Master in Wireless Sensor Network / PhD student @ EPUSP

FIWARELAB São Paulo

fabio.cabrini@usp.br

Helix USP UNIVERSIDADE DE SÃO PAULO

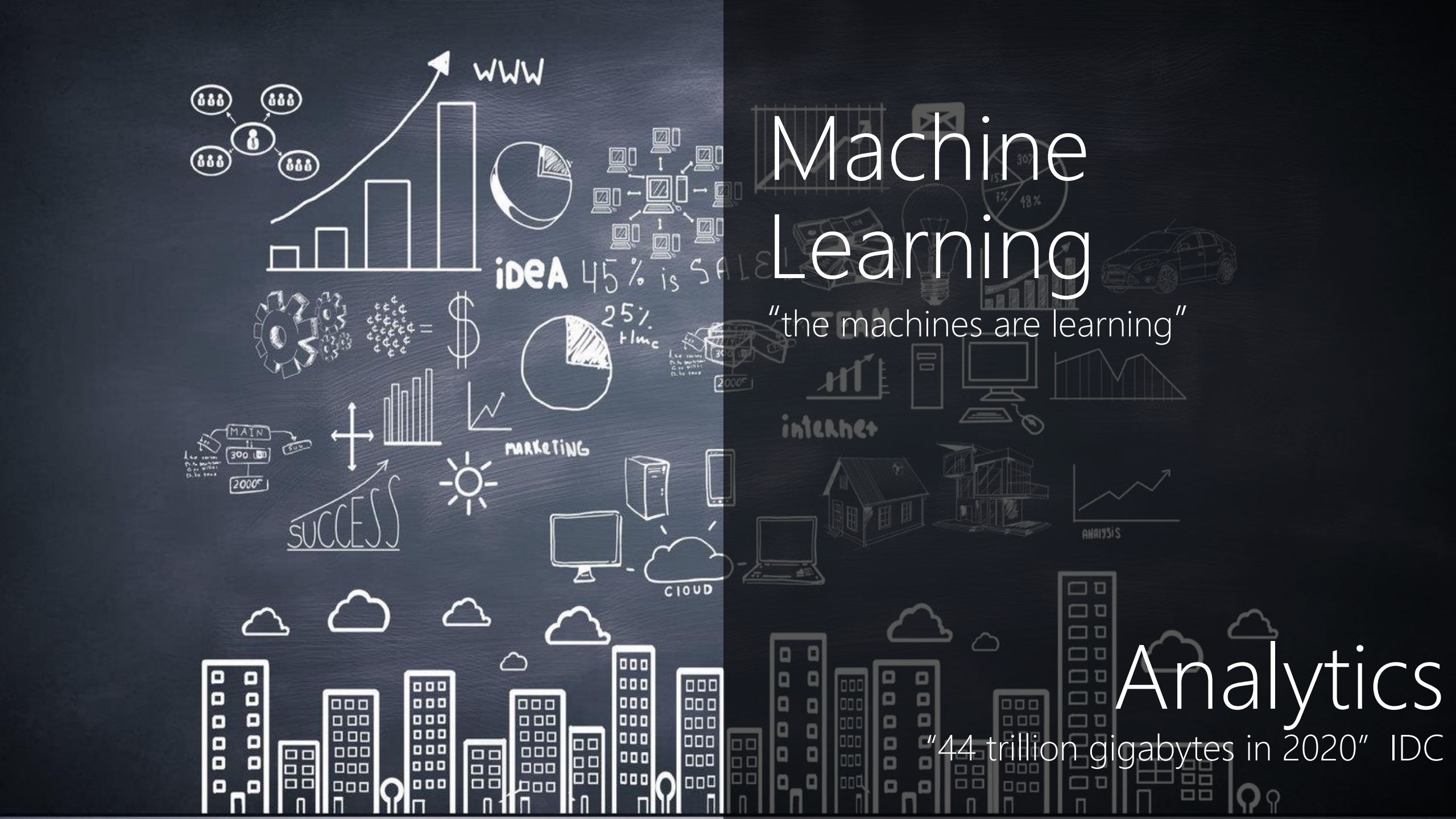
Smart Environments



Source: Ericsson White Paper Uen 284 23-3278 - 2016

Smart Environments

enabling technologies

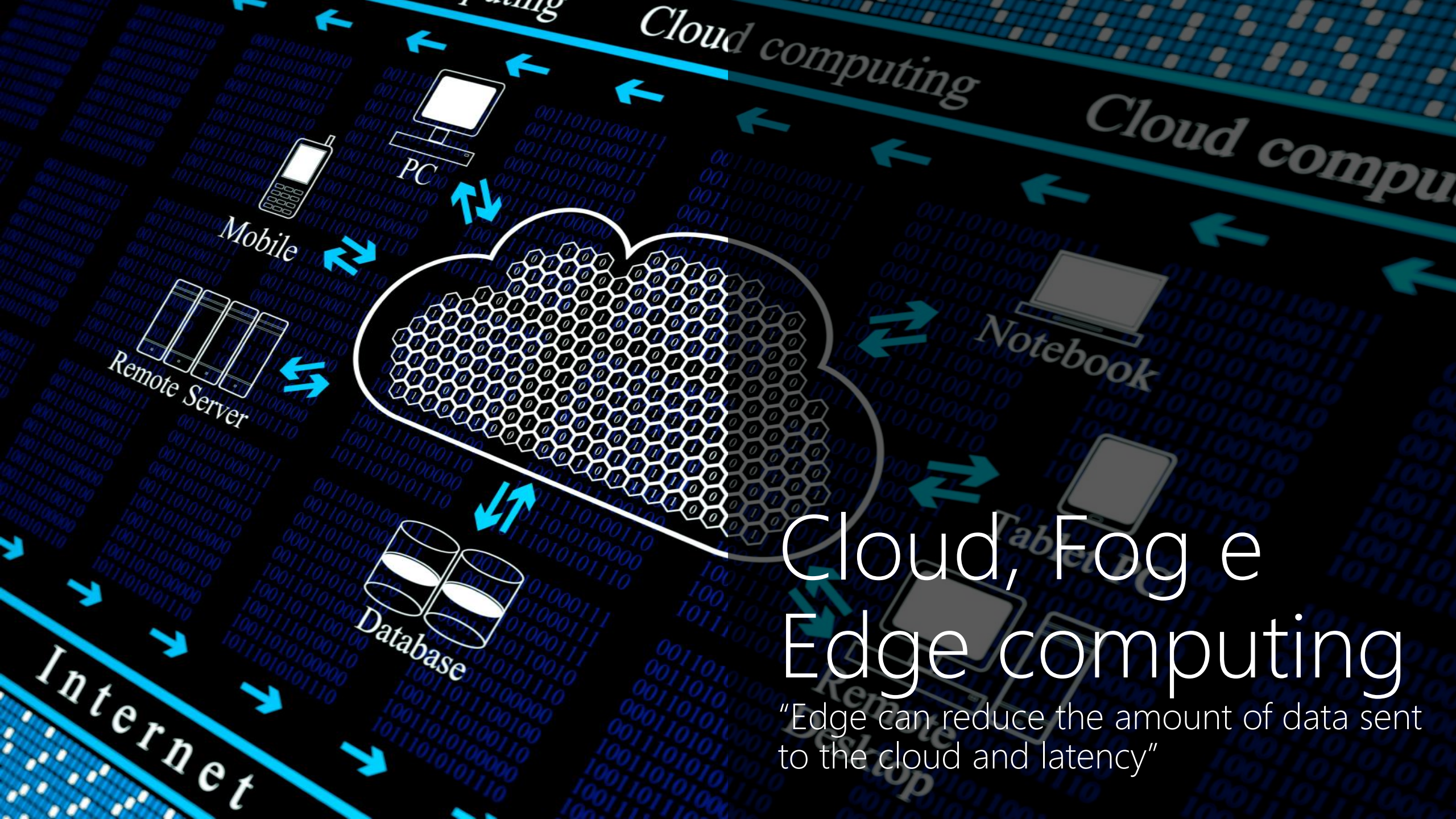


Machine Learning

"the machines are learning"

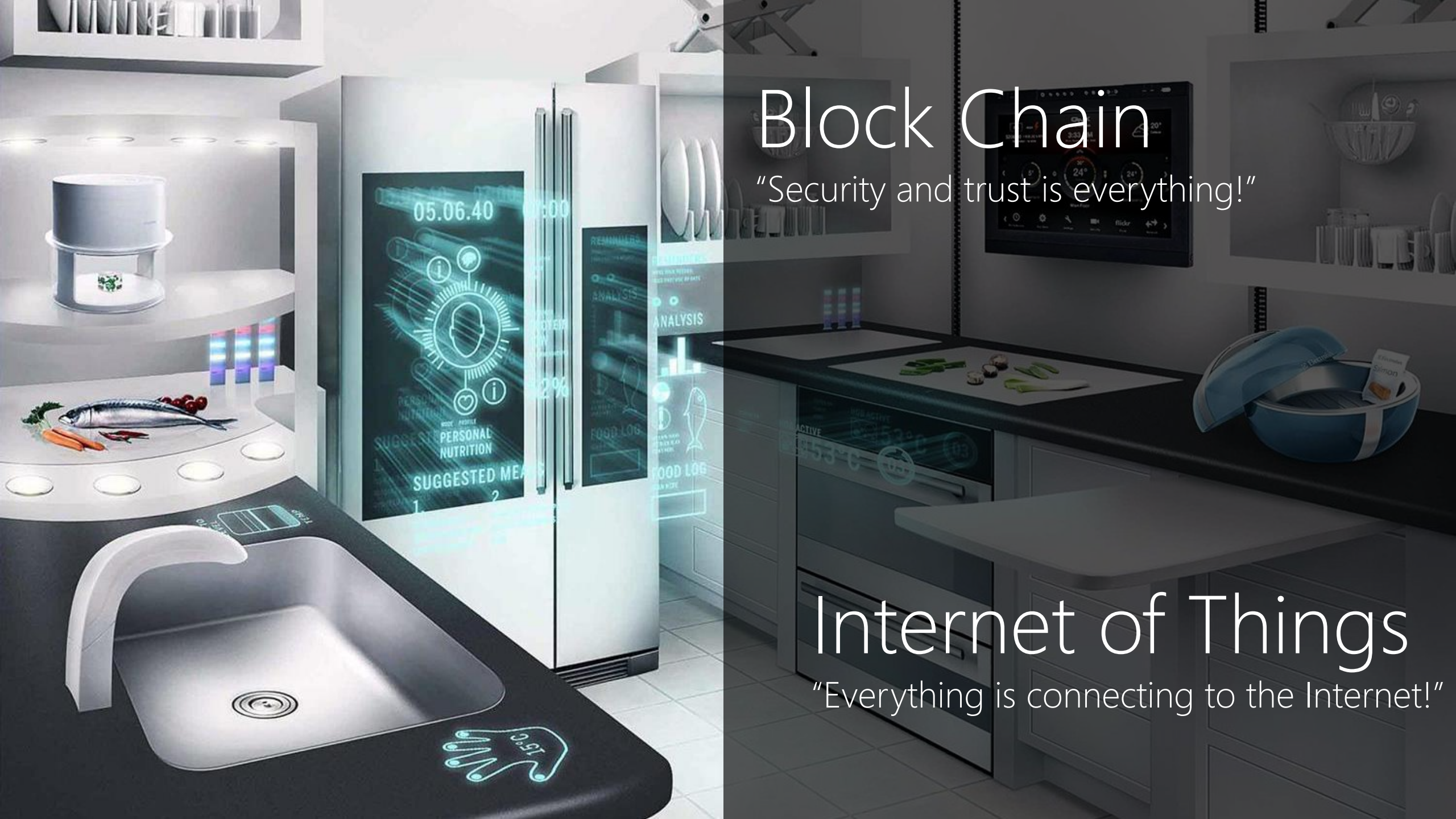
Analytics

"44 trillion gigabytes in 2020" IDC



Cloud, Fog e Edge computing

"Edge can reduce the amount of data sent to the cloud and latency"



Block Chain

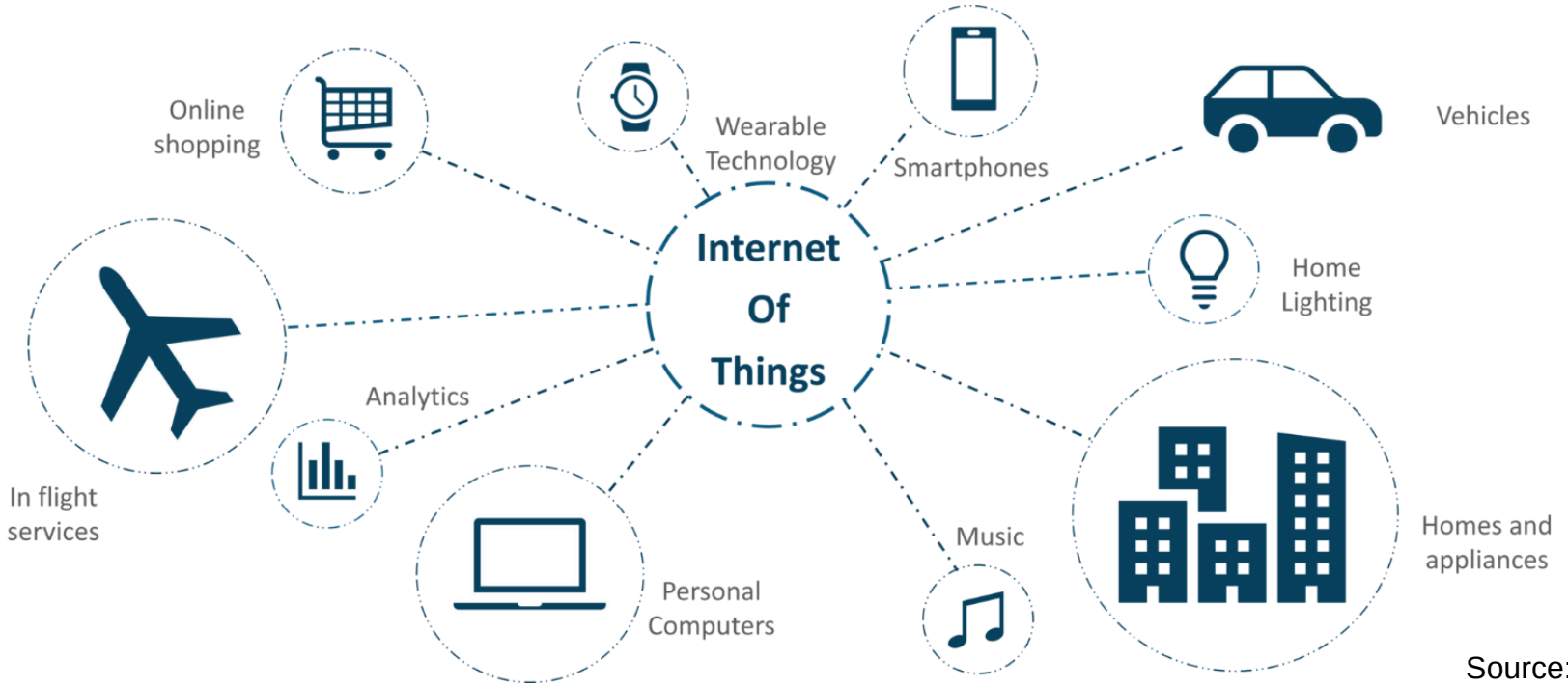
"Security and trust is everything!"

Internet of Things

"Everything is connecting to the Internet!"

"The Internet of Things (IoT) can be understood as a set of large-scale communication, processing and storage technologies capable of interconnecting devices and objects to the Internet, which through transducers and actuators gain the ability to integrate the physical and virtual world."

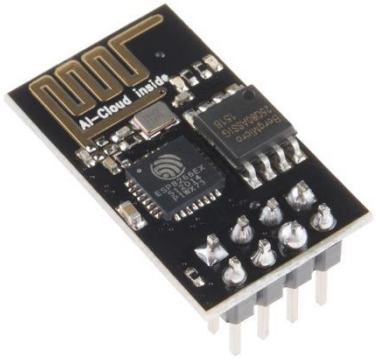
*R. Khan, S. U. Khan, R. Zaheer, and S. Khan, "**Future internet: the internet of things architecture, possible applications and key challenges**", in Frontiers of Information Technology (FIT), 2012 10th International Conference on. IEEE, 2012, pp. 257–260.*



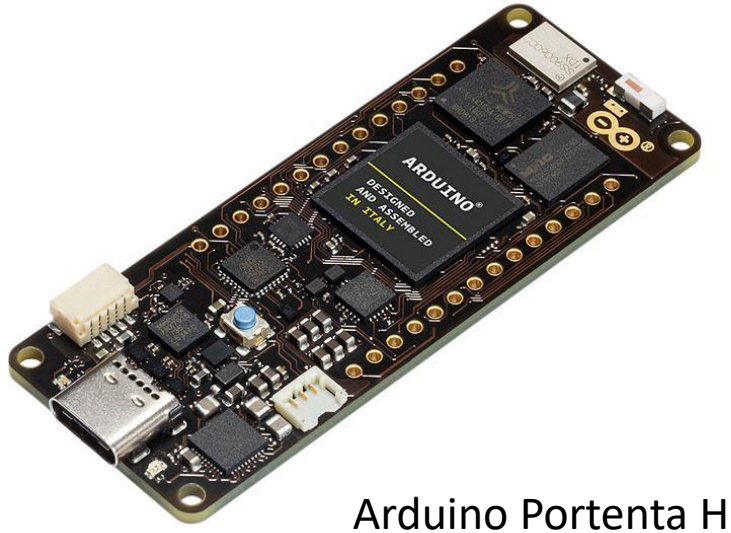
Source:https://canopytools.com/what-is-iot/

Hardware

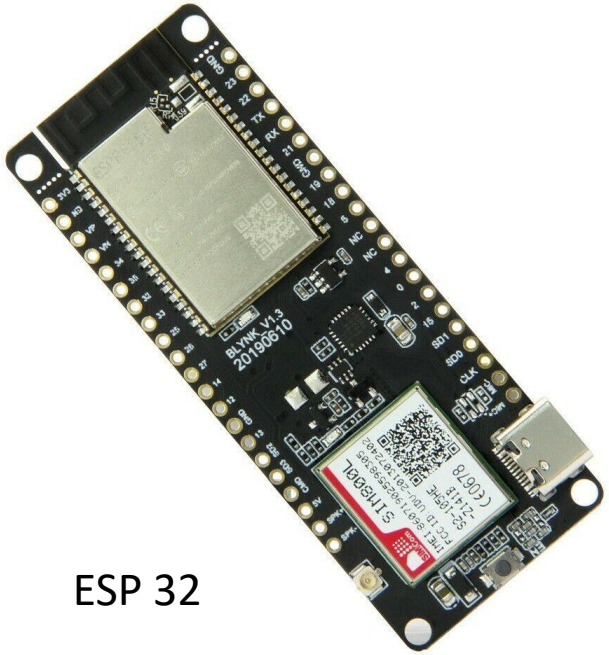
Rasp 4



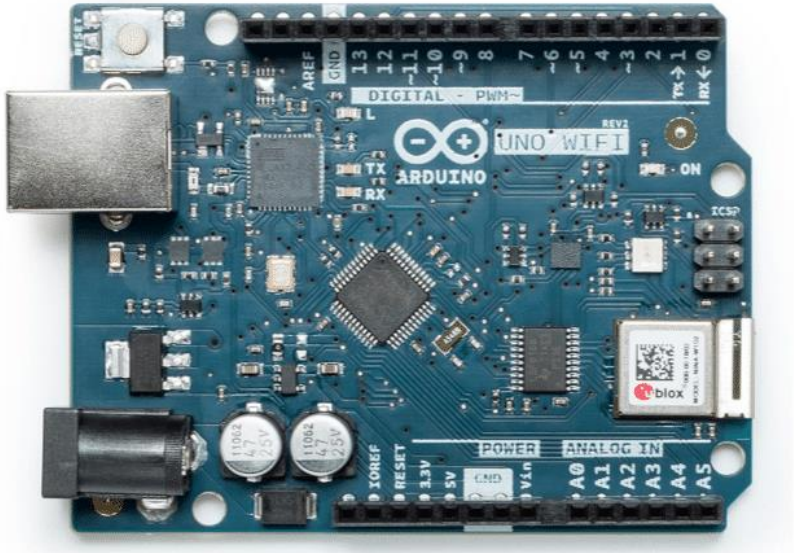
ESP 8266



Arduino Portenta H7



ESP 32



Arduino Wi-Fi

ARDUINO

Sensors

Grove - Digital Light Sensor

Grove - Light Sensor

Grove - Temperature and Humidity Sensor

Grove - Barometer Sensor

Grove - Dust Sensor

Grove - Gas Sensor

Grove - Temperature Sensor

Grove - Air Quality Sensor

Grove - Temperature and Humidity Sensor Pro

Grove - Gas Sensor(O_2)

Sensors

Grove - 3-Axis Digital Compass

Grove - 3-Axis Digital Accelerometer(±1.5g)

Grove - 3-Axis Digital Gyro

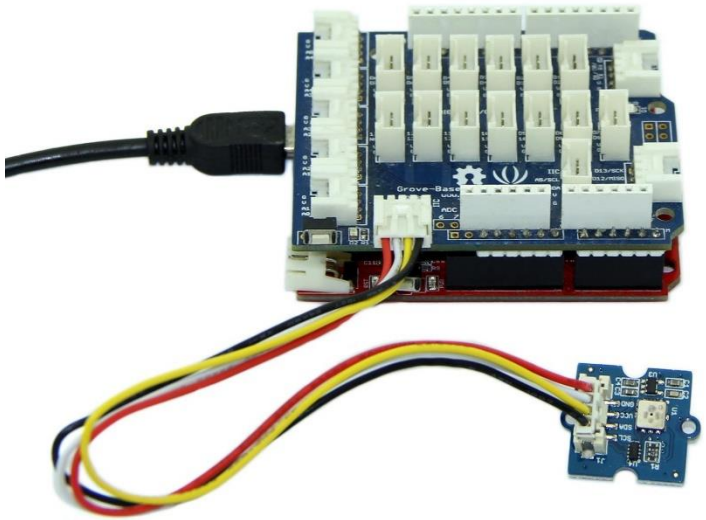
Grove - Collision Sensor

Grove - 3-Axis Analog Accelerometer

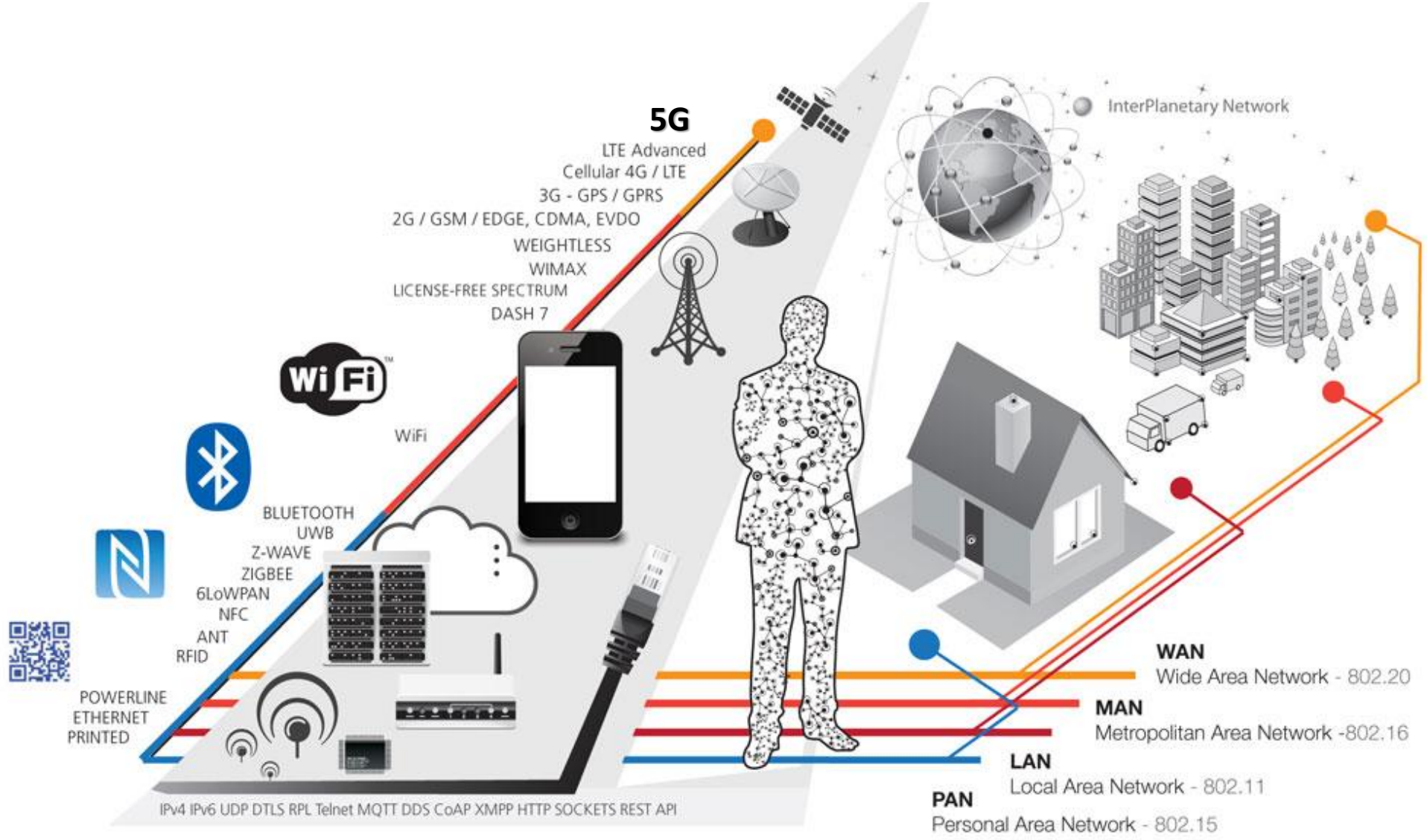
Grove - 3-Axis Digital Accelerometer(±16g)

Grove - 6-Axis Accelerometer and Compass V1.0

Grove - Single Axis Analog Gyro



Wireless Communication Technologies

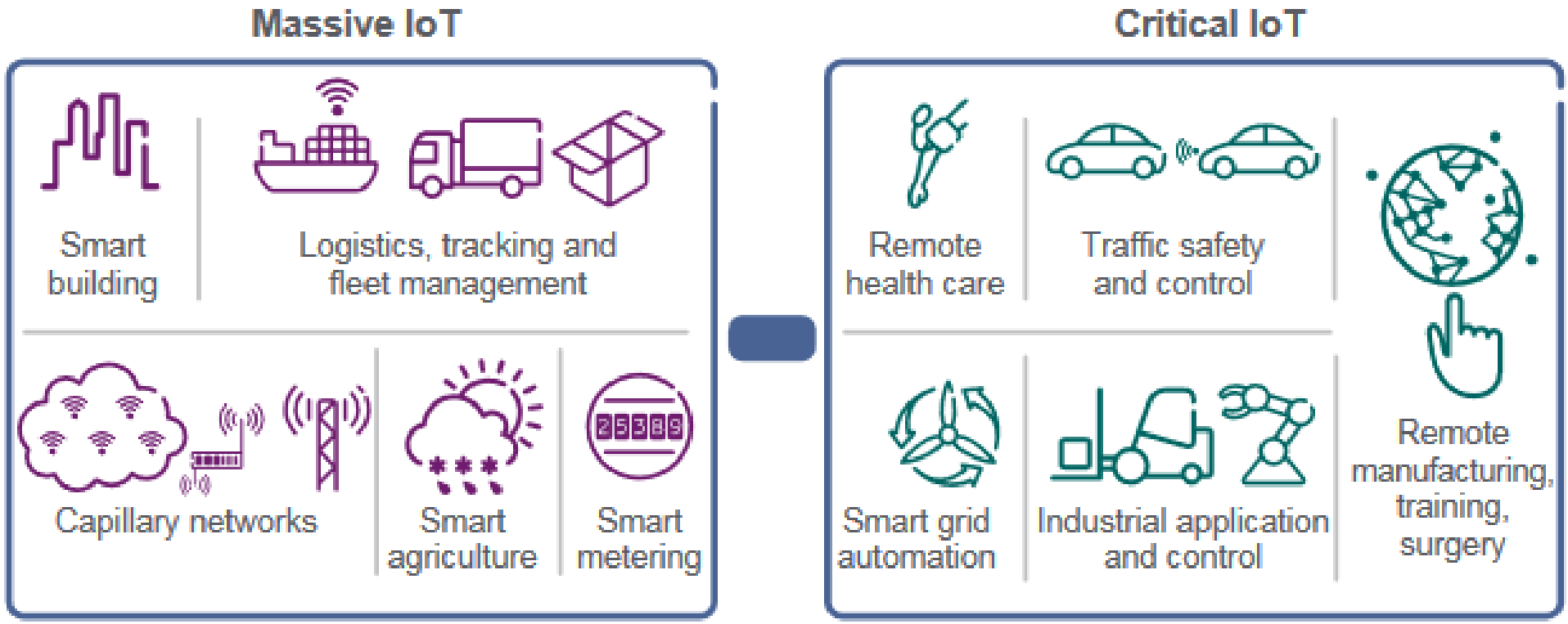


LoRaWan


LoRa
LIGHTING PANEL CONTROL AND MONITORING UNIT
LoRaWAN™ GATEWAY
IP COMMUNICATION
inteliLIGHT® LAMP CONTROLLER
inteliLIGHT® StreetLight Control Software in the cloud or on the local server
MUNICIPAL WIRELESS NETWORK
ELECTRICAL VEHICLE CHARGERS
CITY SENSORS
TRAFFIC MONITORING
SECURITY INFRASTRUCTURE
NEAR ZERO STREET LIGHTING ENERGY COST

IoT Requirements

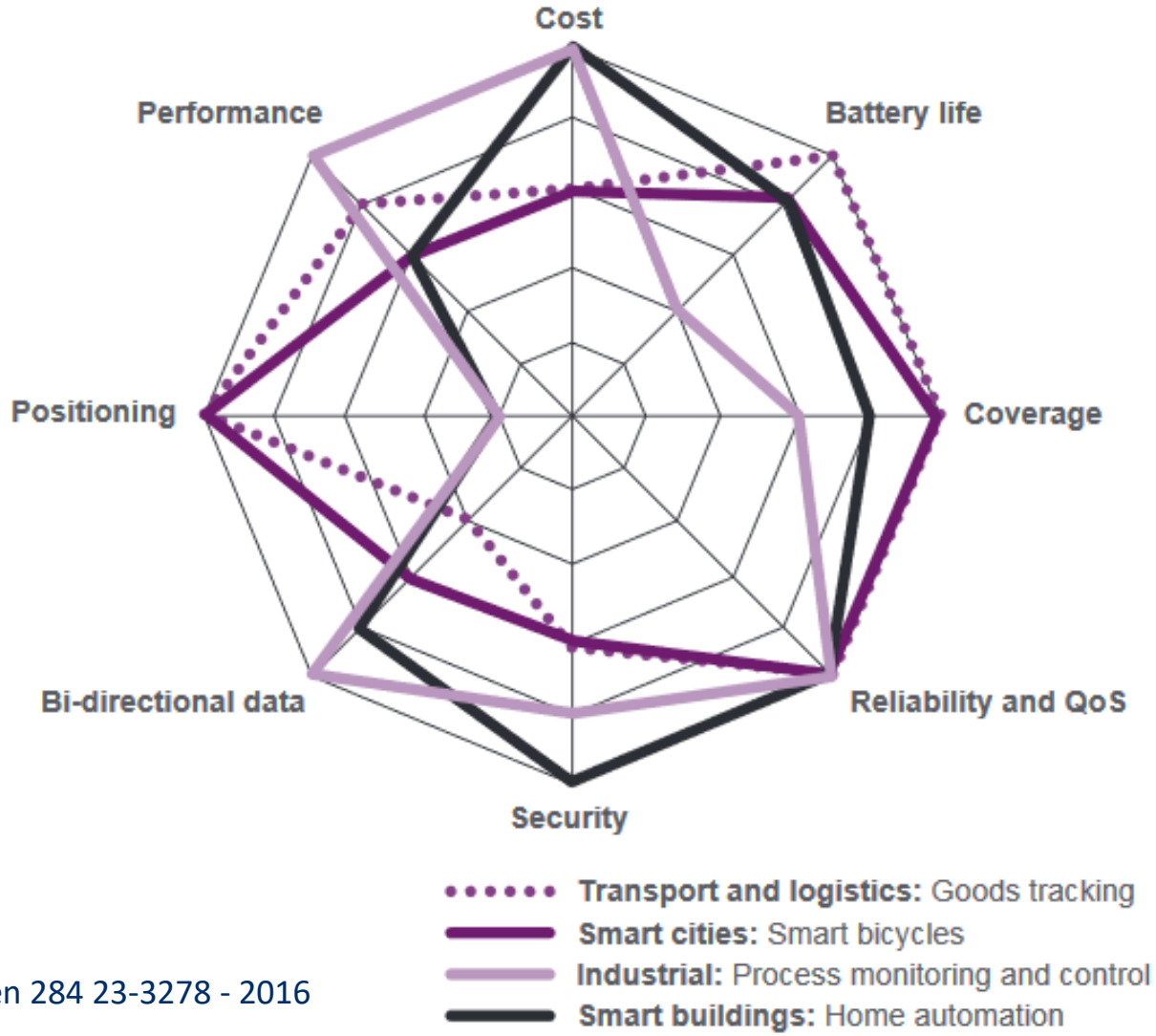
Differing requirements for Massive and Critical IoT applications.



Source: Ericsson White Paper Uen 284 23-3278 - 2016

Device and connectivity

requirements for sample IoT use cases.



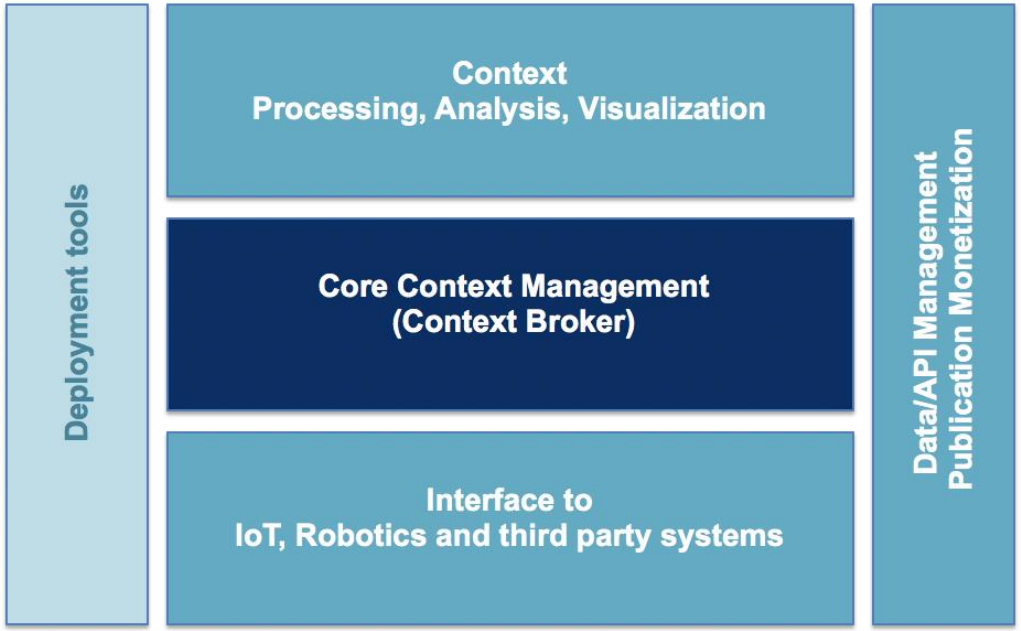
Source: Ericsson White Paper Uen 284 23-3278 - 2016

Helix

FIWARE

Open Apis for Open Minds

This is FIWARE!

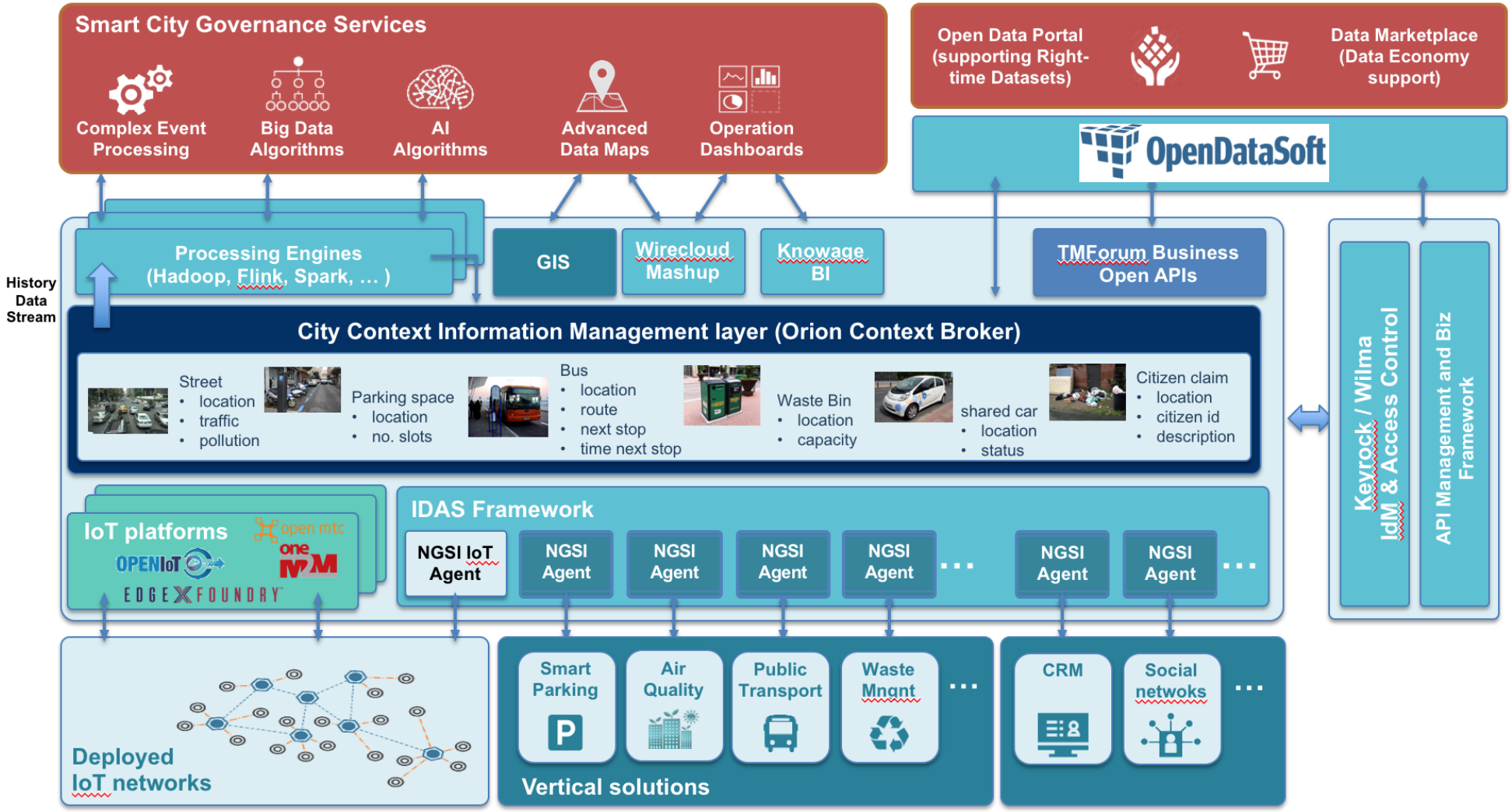


A scalable open source platform to access and manage heterogeneous context information through open APIs.

A standard for exchange of context information:
FIWARE-NGSI (Next Generation Service Interface)

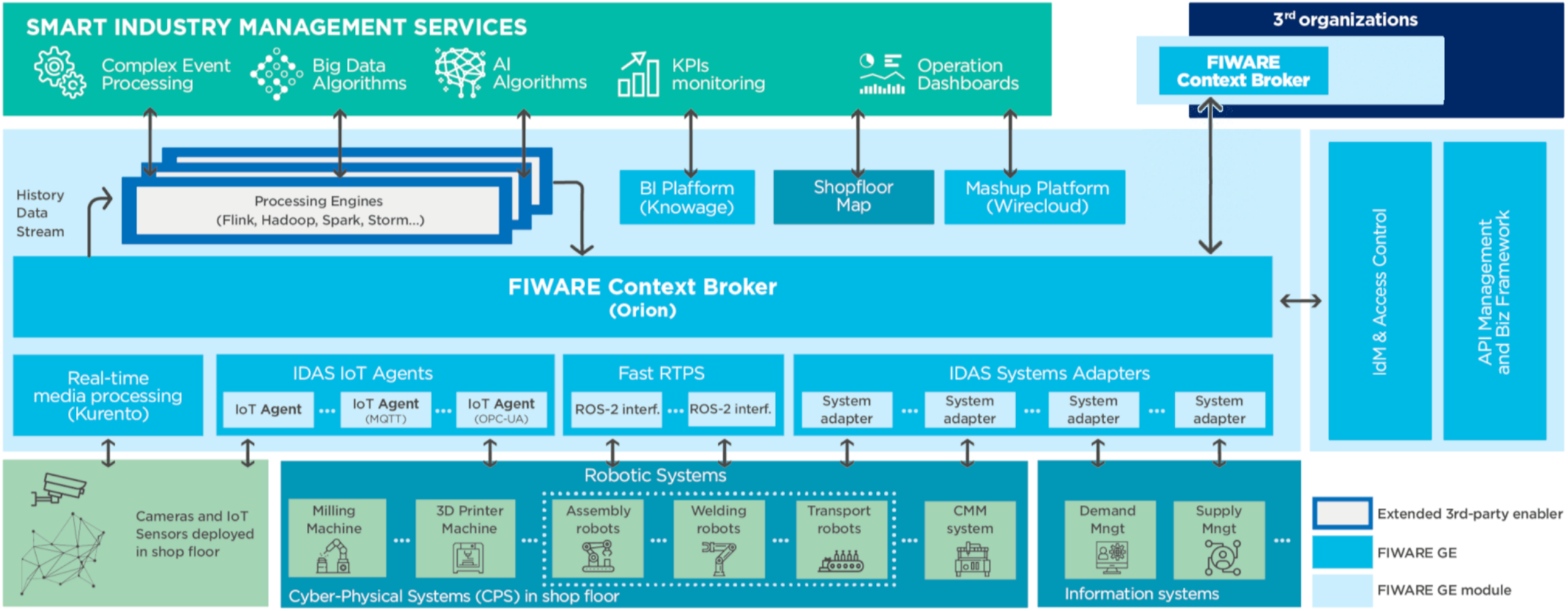
Generic Enablers and Solutions to provide Smart Services with the FIWARE

Hybrid Reference Architecture for Smart Cities

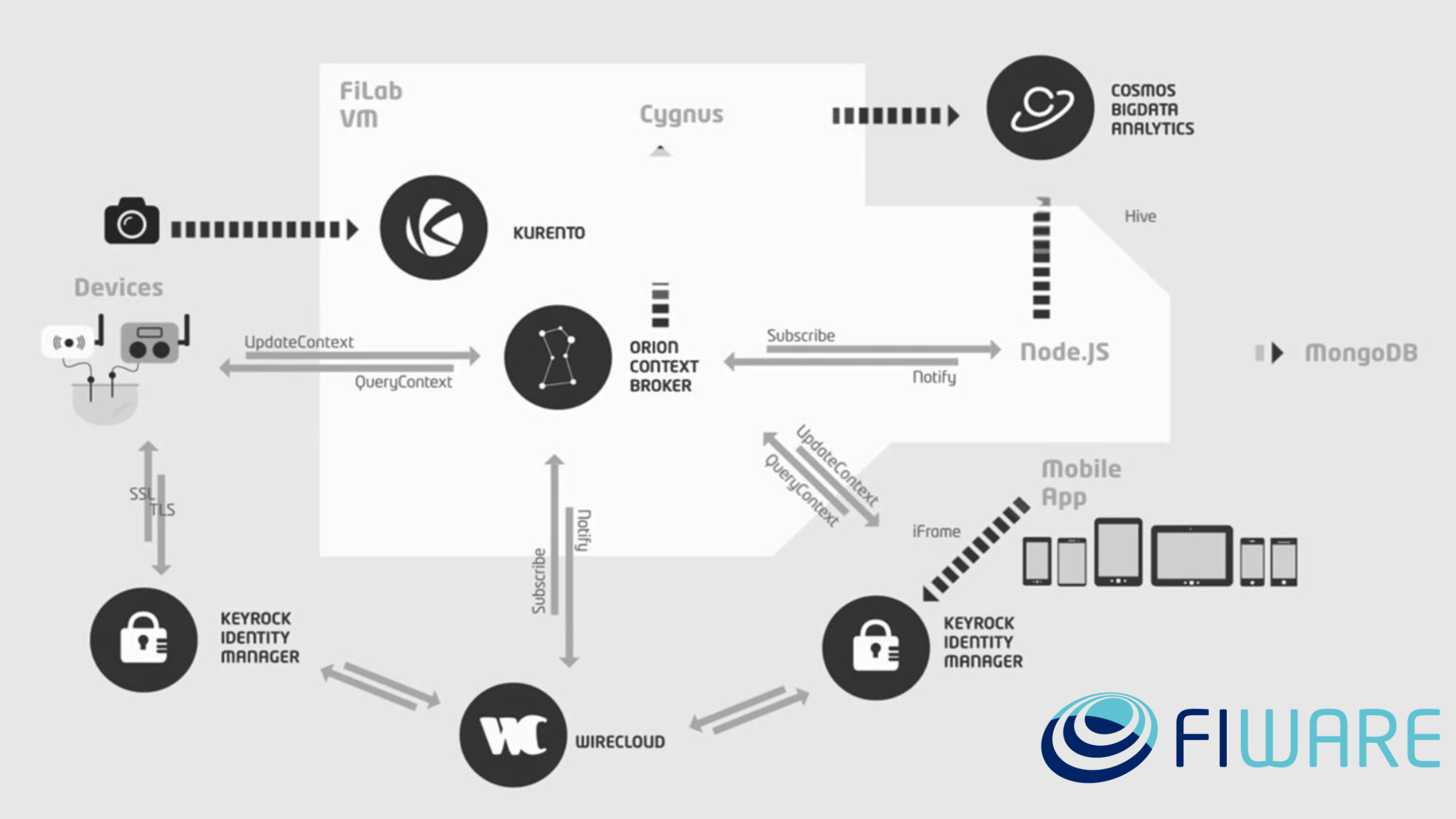


FIWARE

Hybrid Reference Architecture for Industry 4.0



FIWARE


FiLab
VM
Cygnus
COSMOS
BIGDATA
ANALYTICS
KURENTO
Hive
Devices
UpdateContext
QueryContext
ORION
CONTEXT
BROKER
Subscribe
Notify
Node.JS
MongoDB
SSL
TLS
Subscribe
Notify
UpdateContext
QueryContext
Mobile
App
iFrame
KEYROCK
IDENTITY
MANAGER
KEYROCK
IDENTITY
MANAGER
WIRECLOUD
FIWARE

Location

FIWARE

Helix

Platform

Powered by FIWARE

Helix

Sandbox

Open platform based on microservices to improve POCs, Startups and Research

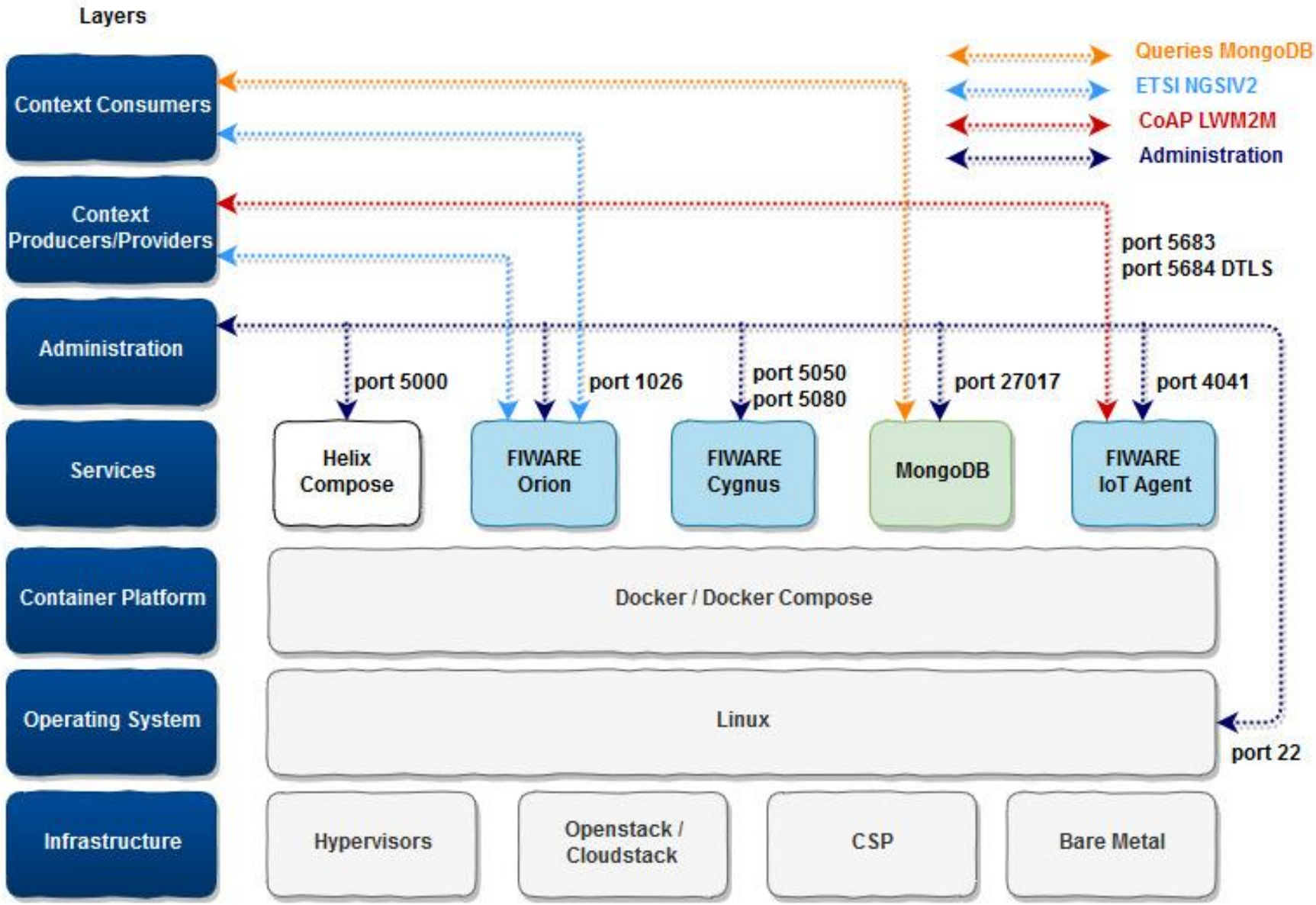
Powered by FIWARE

Helix Sandbox is an open source platform designed to POCs (Proof of Concept), Startups (Minimum Viable Product), Students and Scientific Researches.

- Innovative Microservice Architecture
- Agnostic Cloud Service Provider
- Agnostic Hypervisors
- Faster to deploy a wide variety of IoT applications
- Easier Web Interface
- Multi Cloud
- NGSI v2 Compatible ETSI
- Main Fiware Generic Enablers
- CEF (Connecting Europe Facility) ready!

Helix SandBox Architecture

Helix



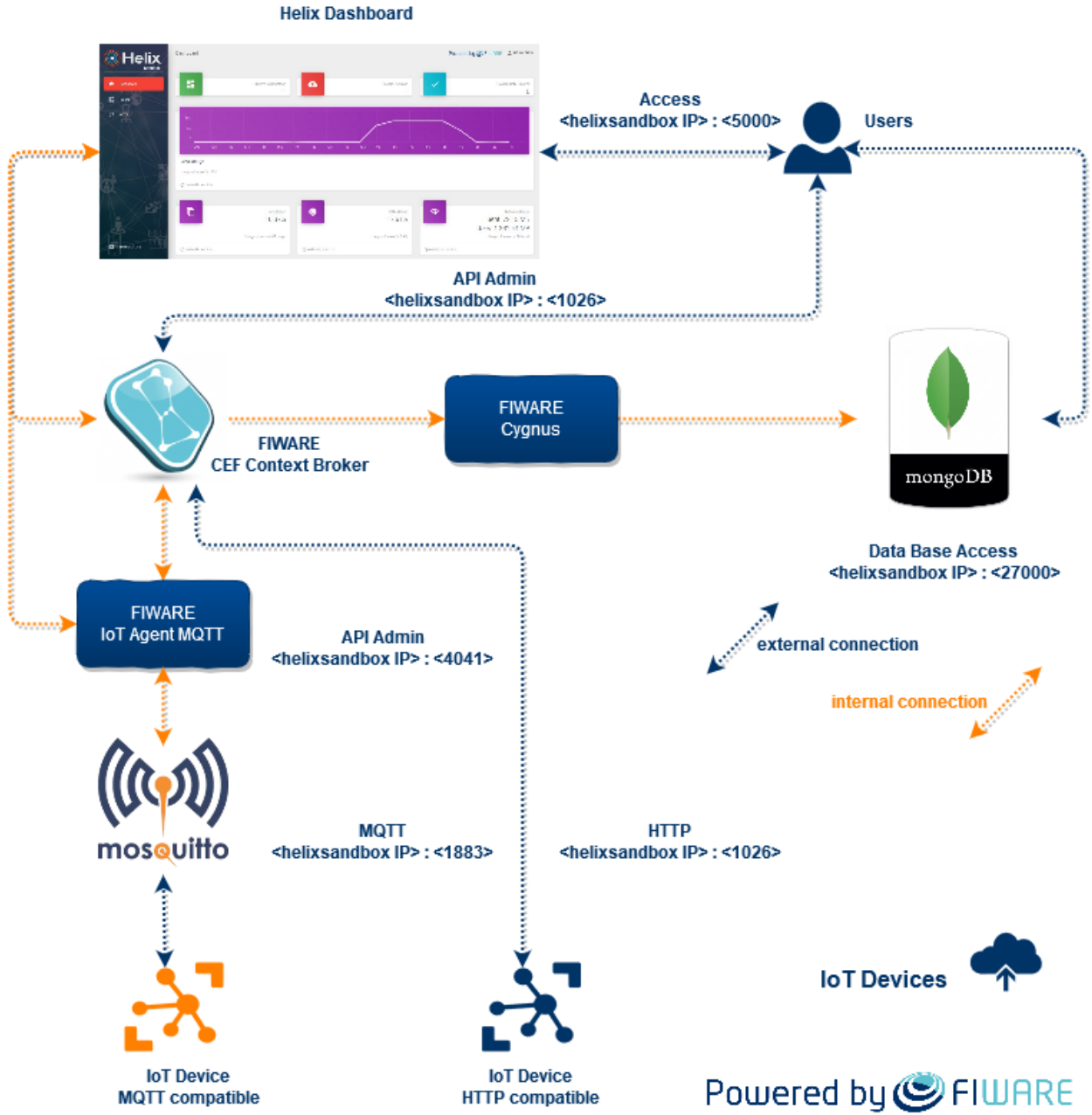
Helix

Sandbox

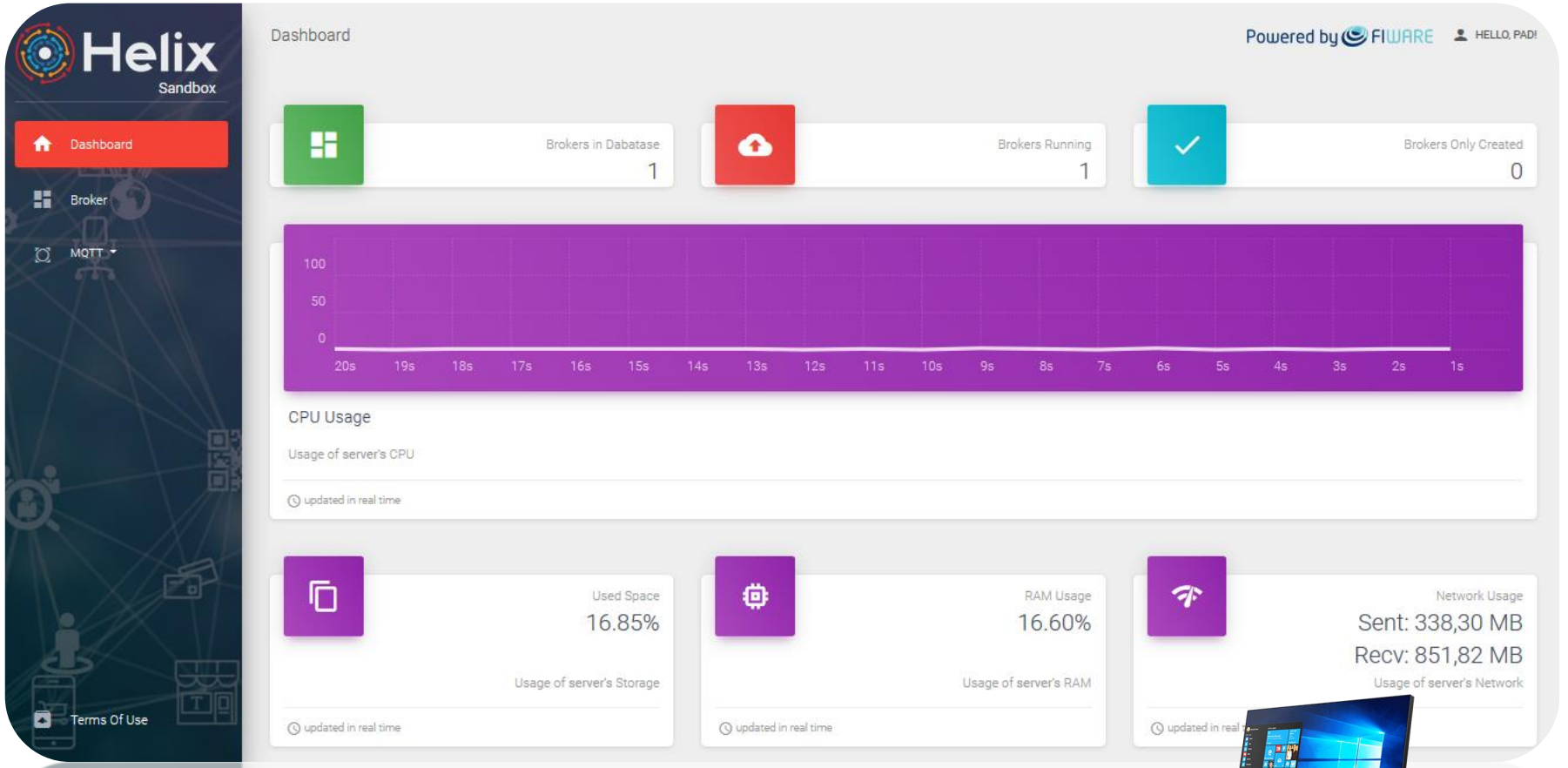
Powered by FIWARE

Helix Sandbox NG Architecture

Helix



Google Cloud



Install and Setup Helix Sandbox

ubuntu

1st Create VM on AWS

Amazon EC2

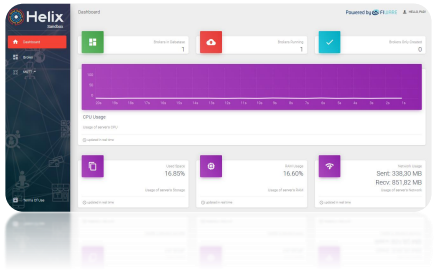
3rd Follow Walkthrough

Helix

GitHub

5th Enjoy Helix Sandbox

2nd Security rules

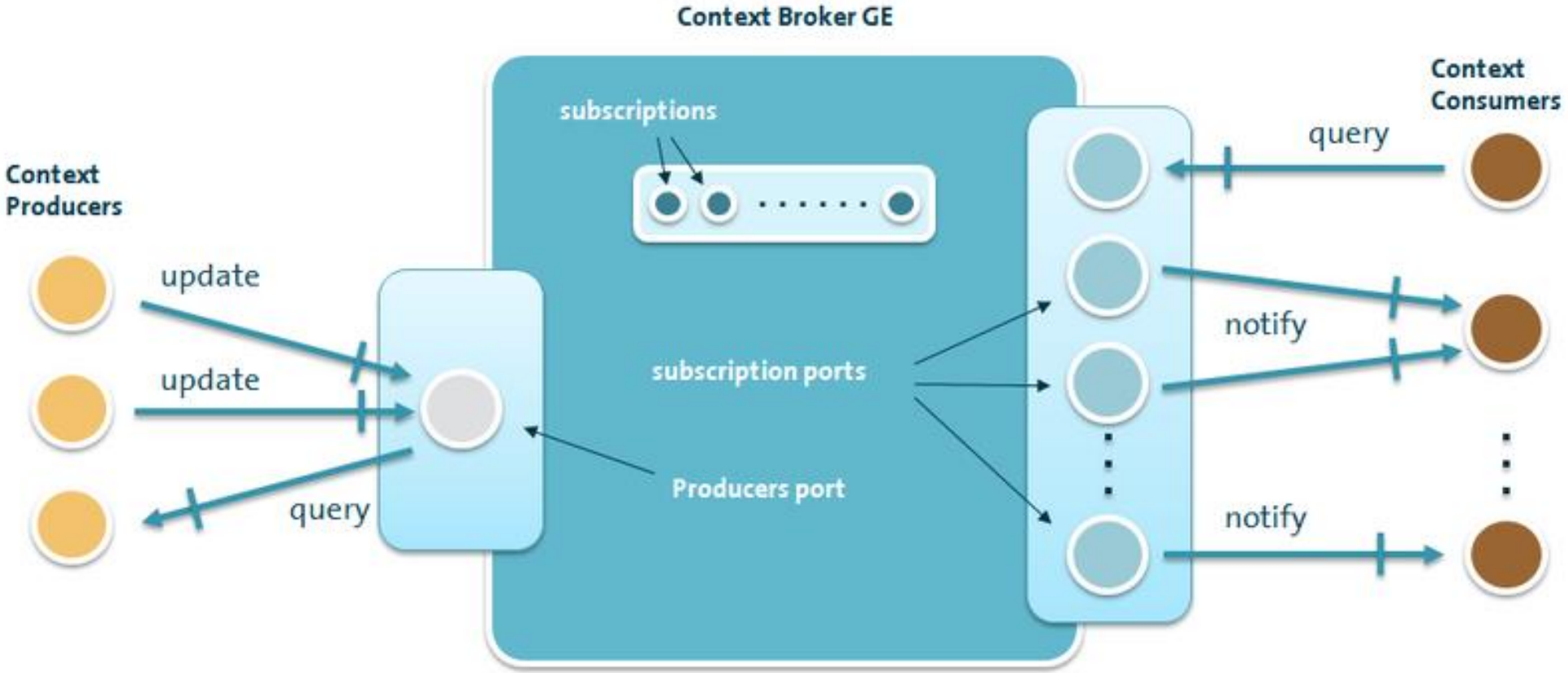


4th Set admin password

Helix

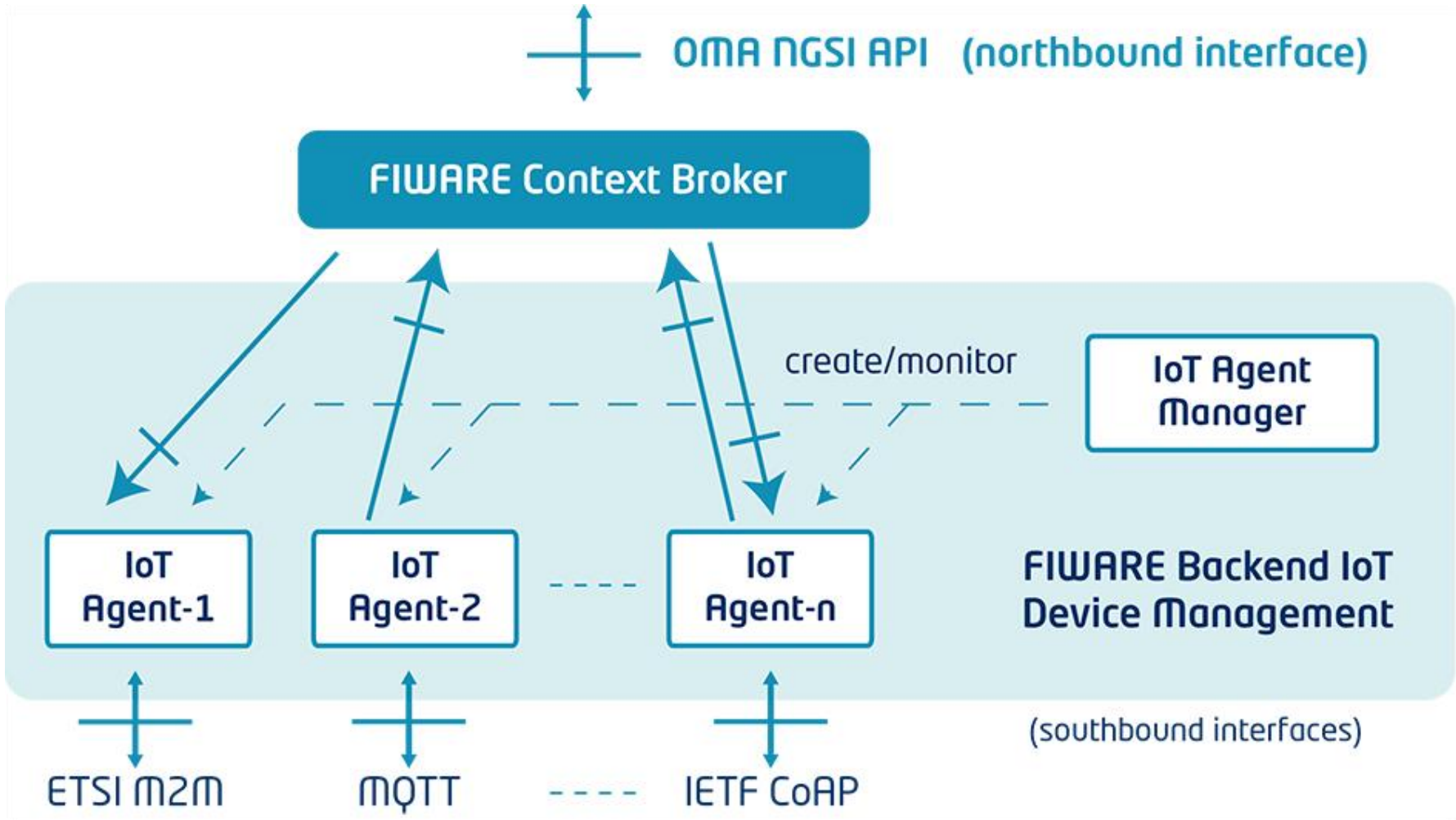
Powered by FIWARE

CEF Context Broker GE - Orion



Powered by FIWARE

IoT Agents (gateways)



Proof of Concept – Urban Noise Level

USP UNIVERSIDADE DE SÃO PAULO

ipt INSTITUTO DE PESQUISAS TECNOLÓGICAS

Helix Platform

FIWARE

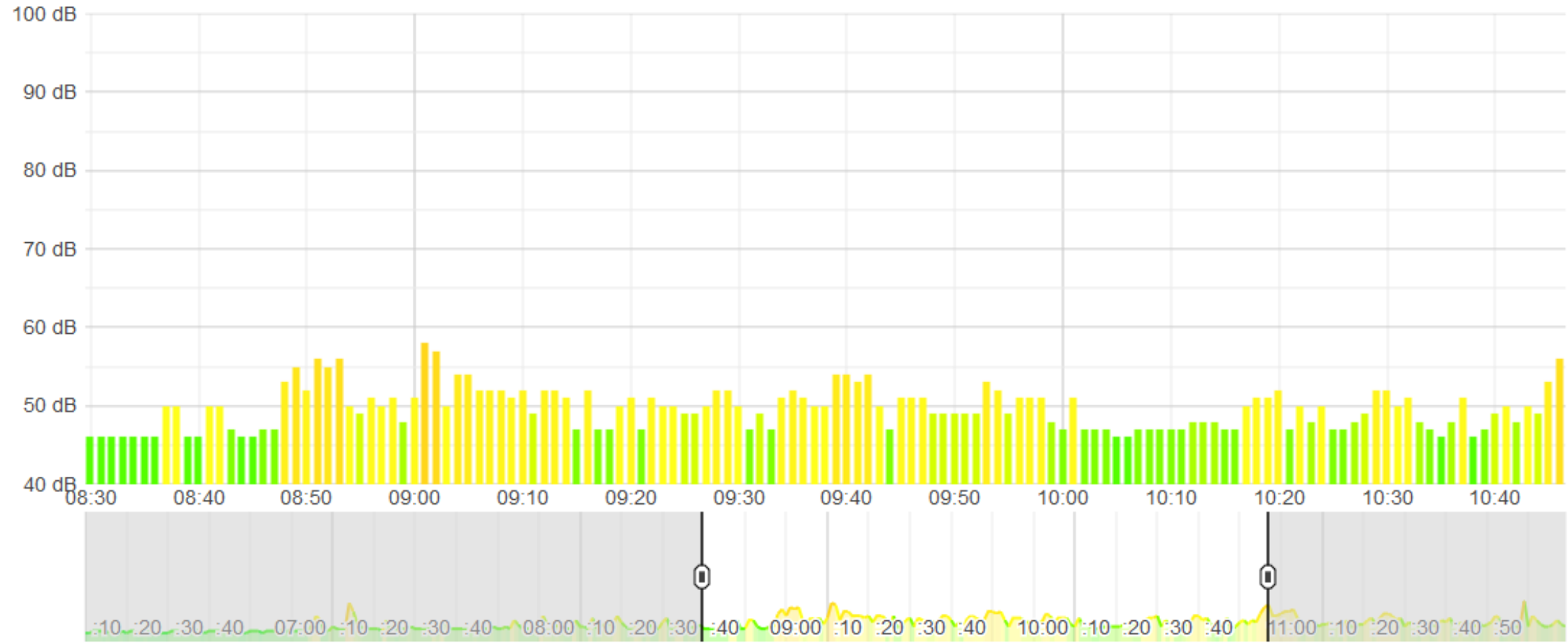

Barulhômetro
Sobre
Dados obtidos
Entenda mais
Projetos relacionados
Mapeamento de Ruído Urbano
Legislação
Conheça o IPT
Compartilhe
ipt
GOVERNO DO ESTADO SÃO PAULO
Ruído Agora
74 dBA
Situação ontem
dia
ruim
noite
bom
52 dBA
Dados do Largo da Batata - Prova de conceito laboratorial

Dados

Dados do Largo da Batata.

Voltar

Medição do dia 21/02/2019 no período da Manhã Buscar



Hands on

Helix

Sandbox

Hands on

You can design and deploy a smart house using Helix Sandbox!

```
{
  "id": "urn:ngsi-ld:entity:001",
  "type":  "iot",
  "temperature": {
  "value": 0,
  "type":  "float"
  },
   "humidity": {
  "value": 0,
  "type":  "float"
 }
}
```


freeboard
beta
Pricing
Login
Visualize the Internet of Things.
Ridiculously simple dashboards for your devices.
START NOW
https://freeboard.io

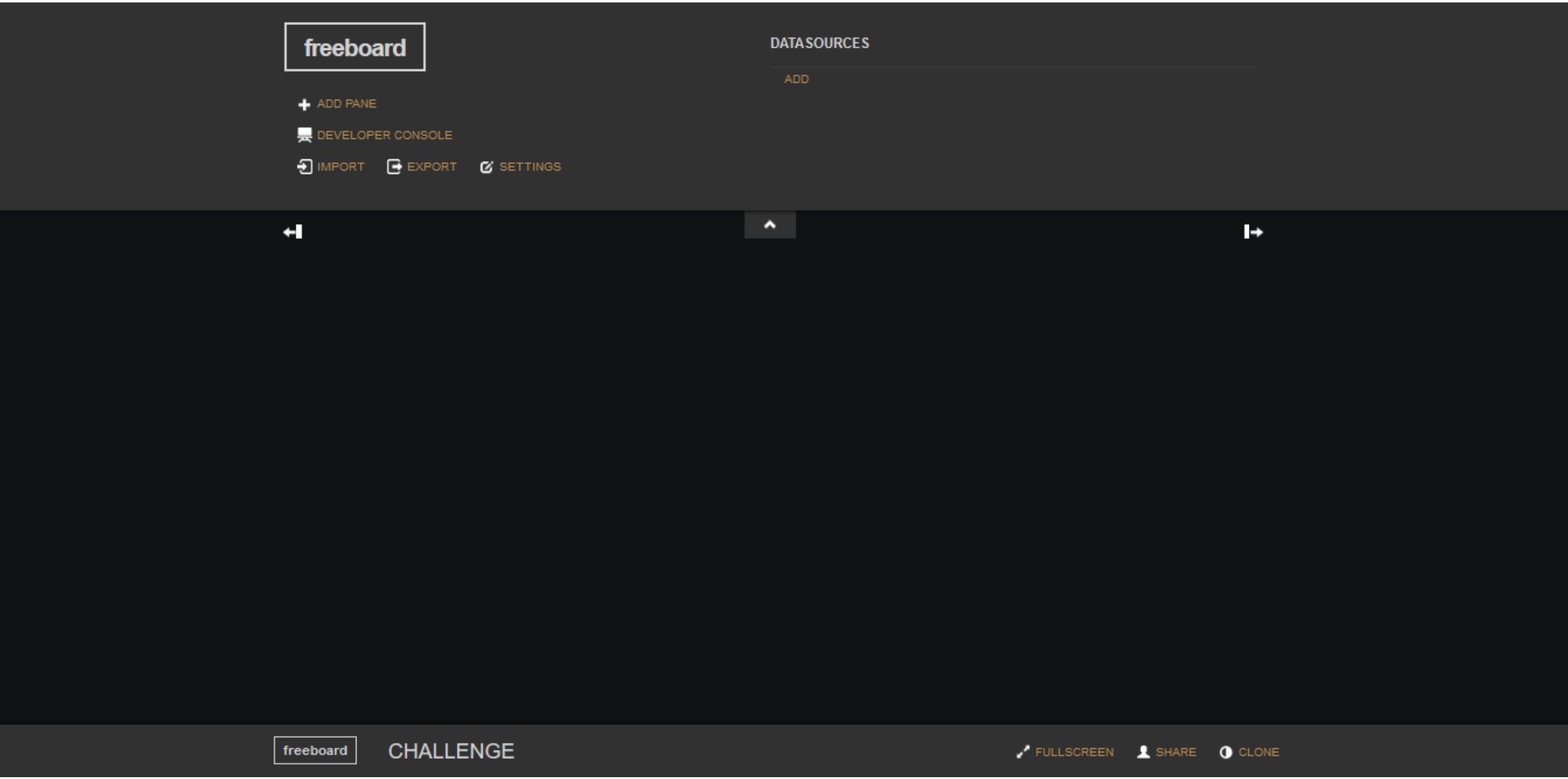
freeboard My Freeboards Shared With Me My Account Sign Out

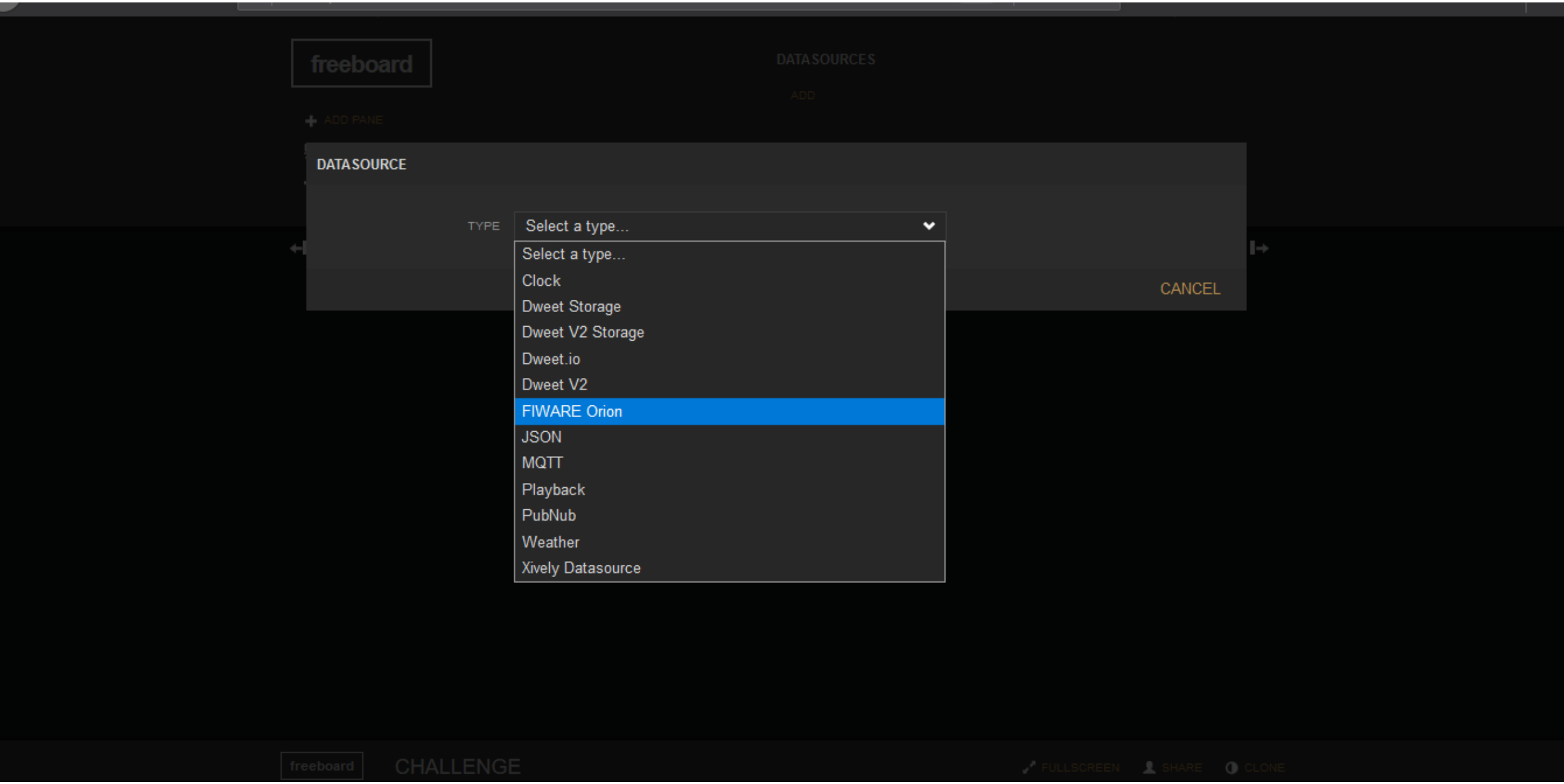
My Freeboards

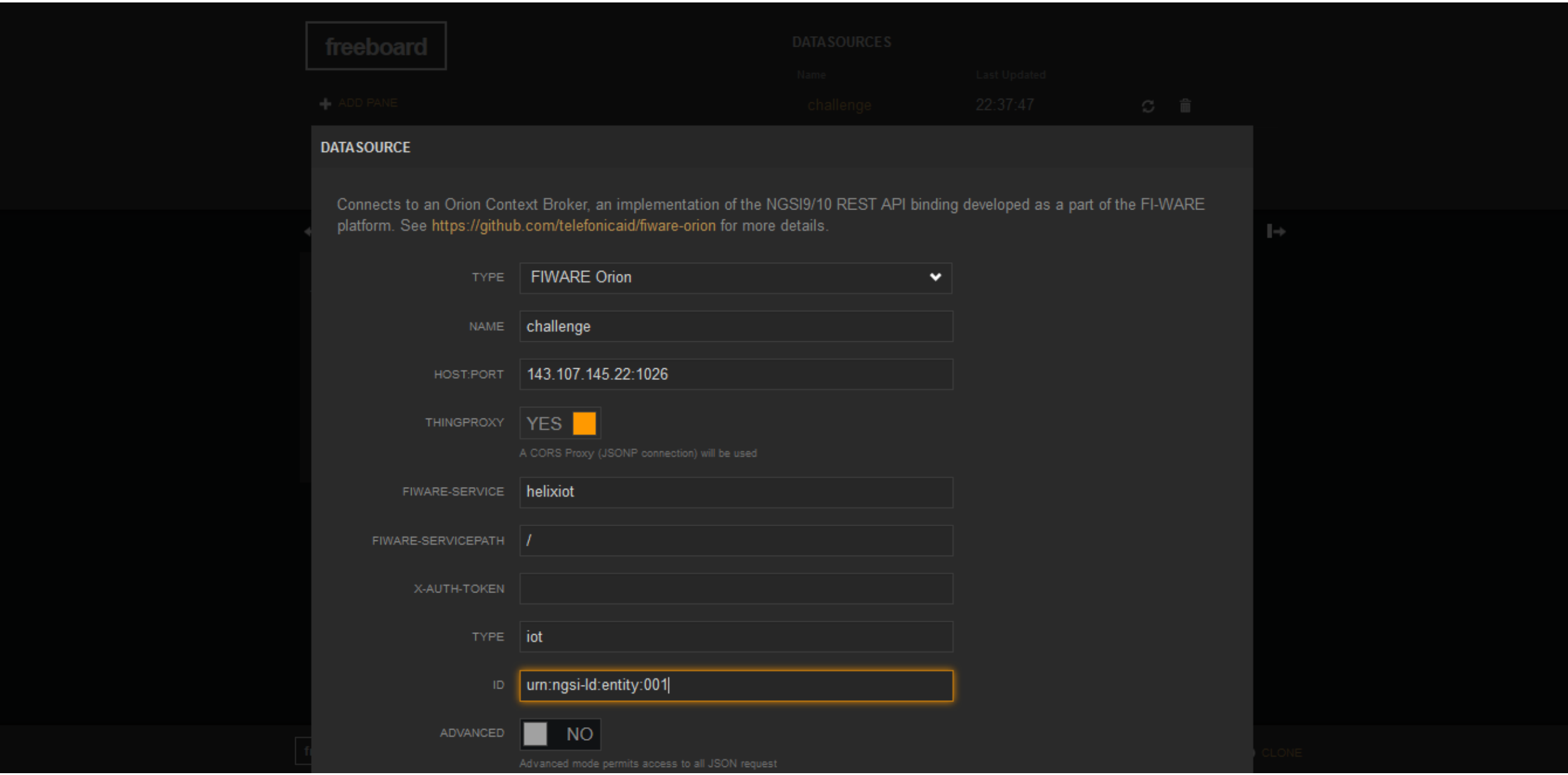
challenge Create New

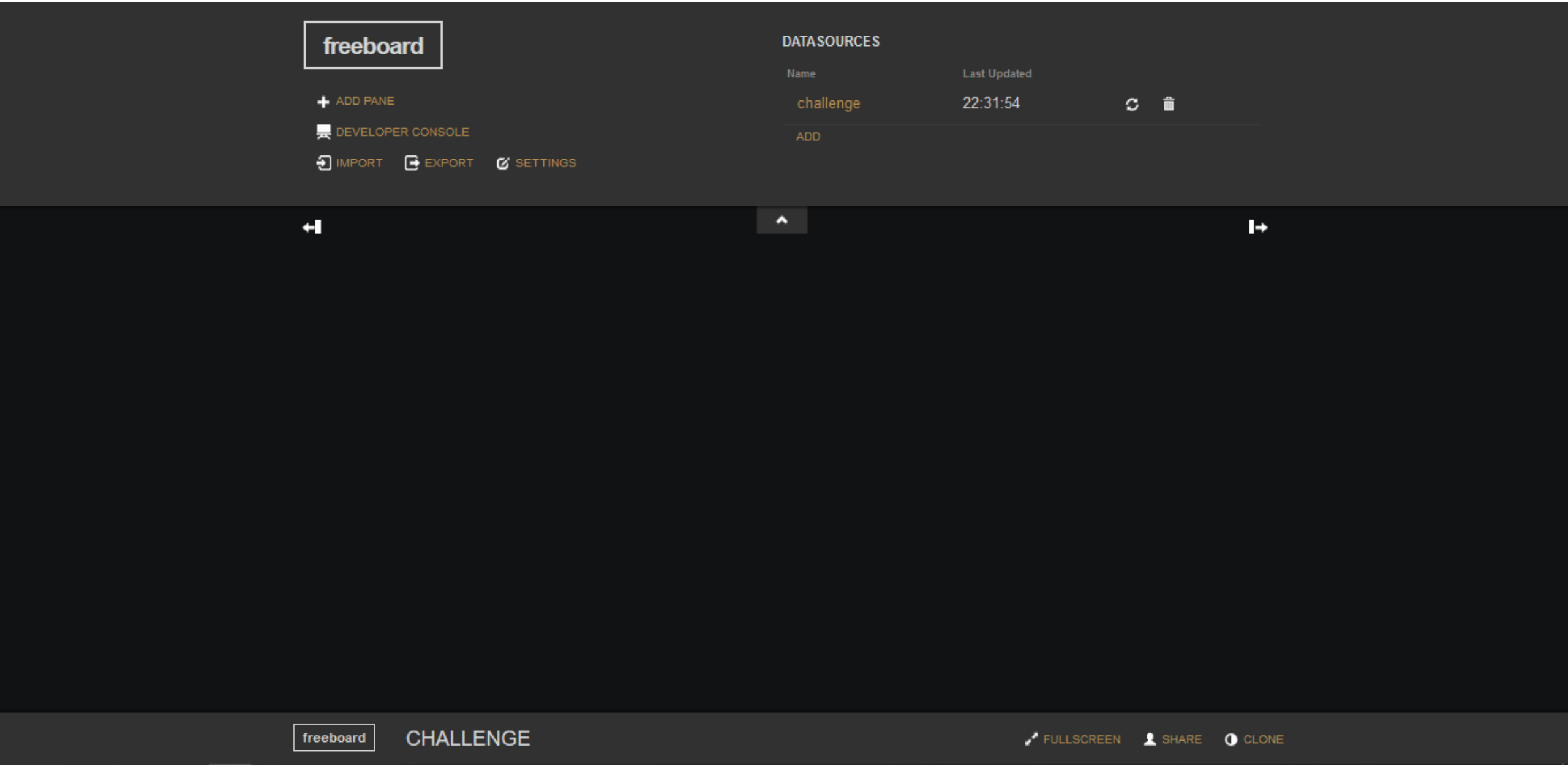
Looks like you don't have any freeboards created yet. Why don't you Try a Tutorial ?

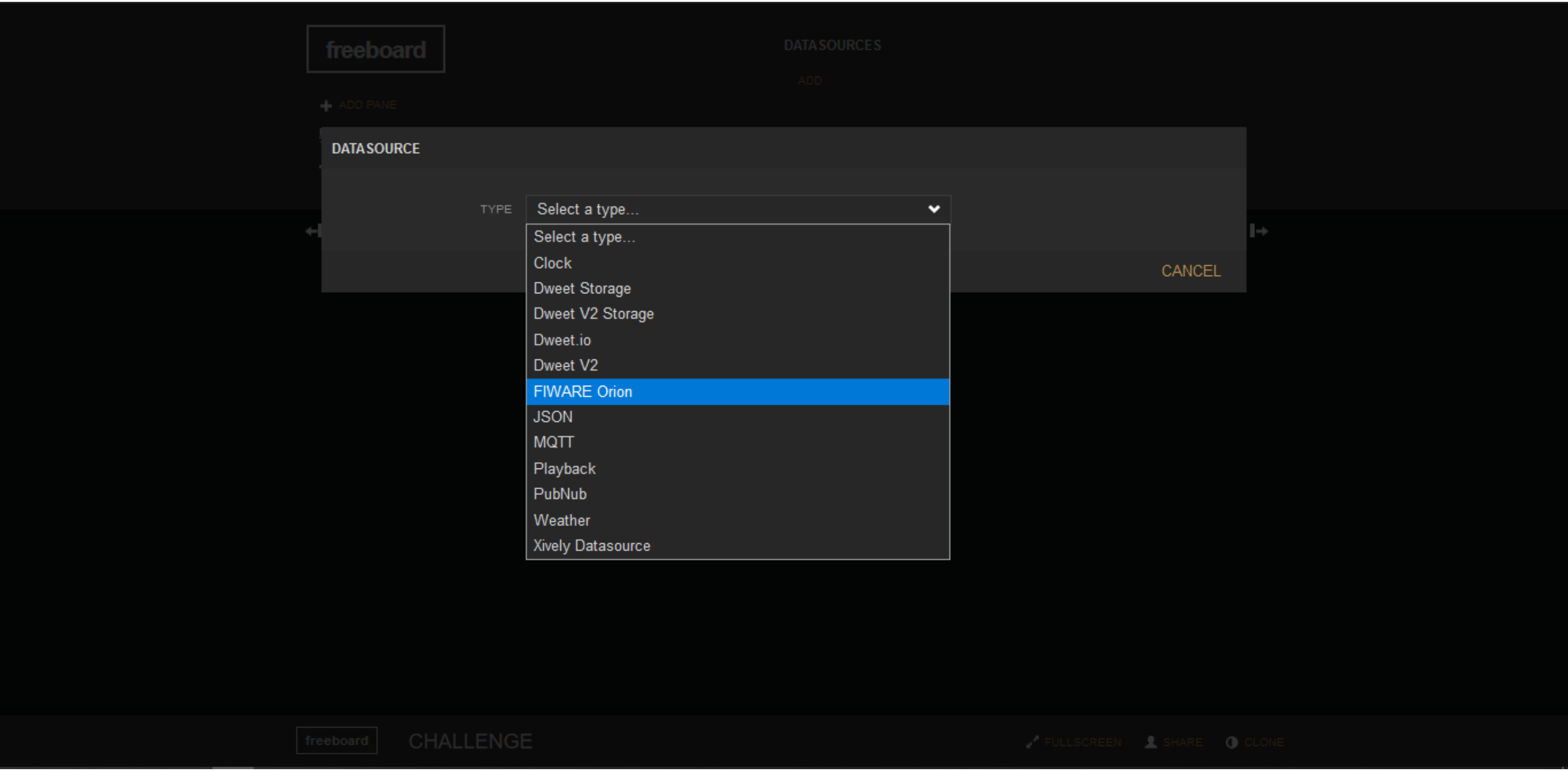
Home | Sign Out

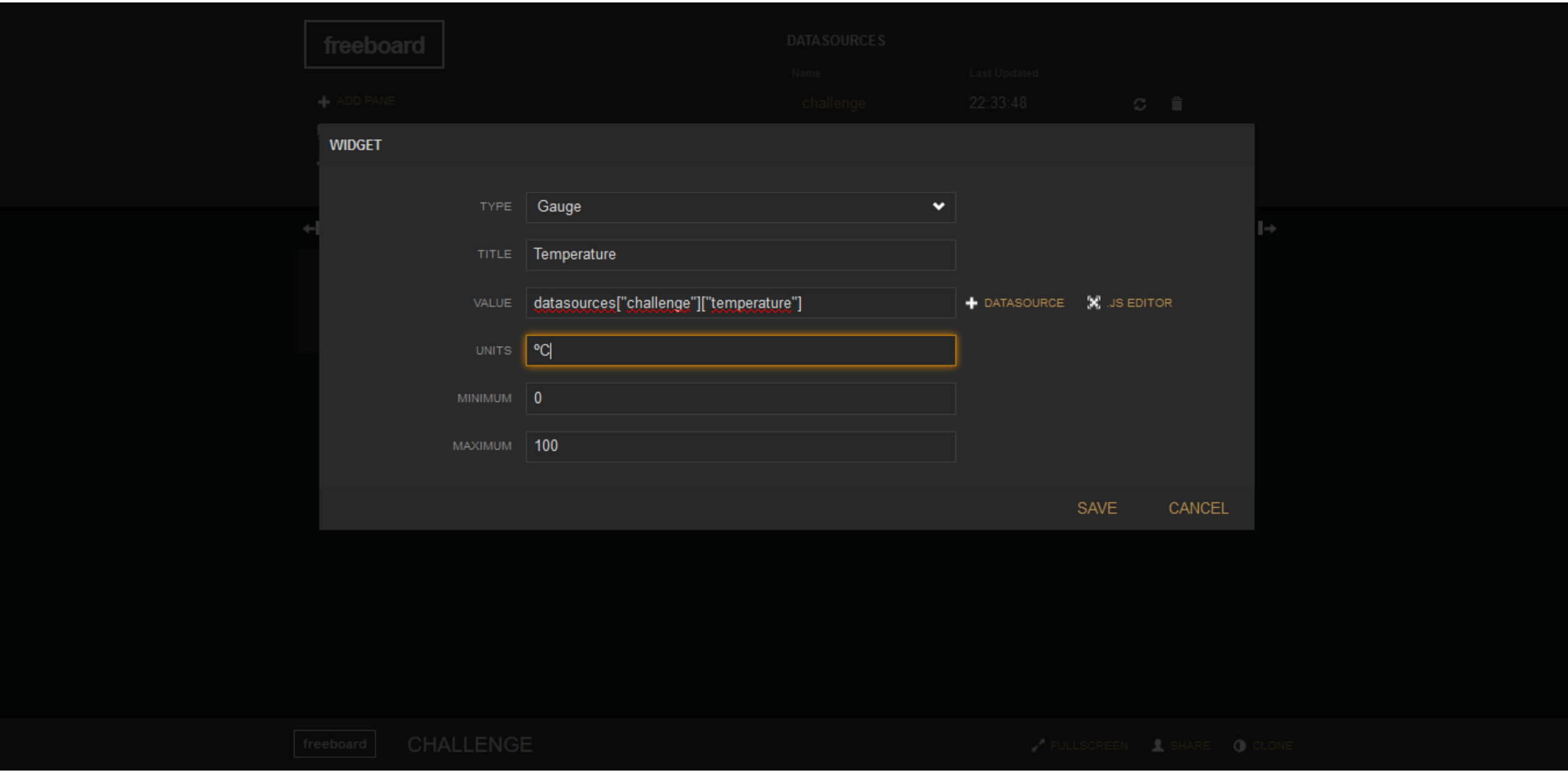

freeboard
ADD PANE
DEVELOPER CONSOLE
IMPORT
EXPORT
SETTINGS
DATASOURCES
ADD
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE

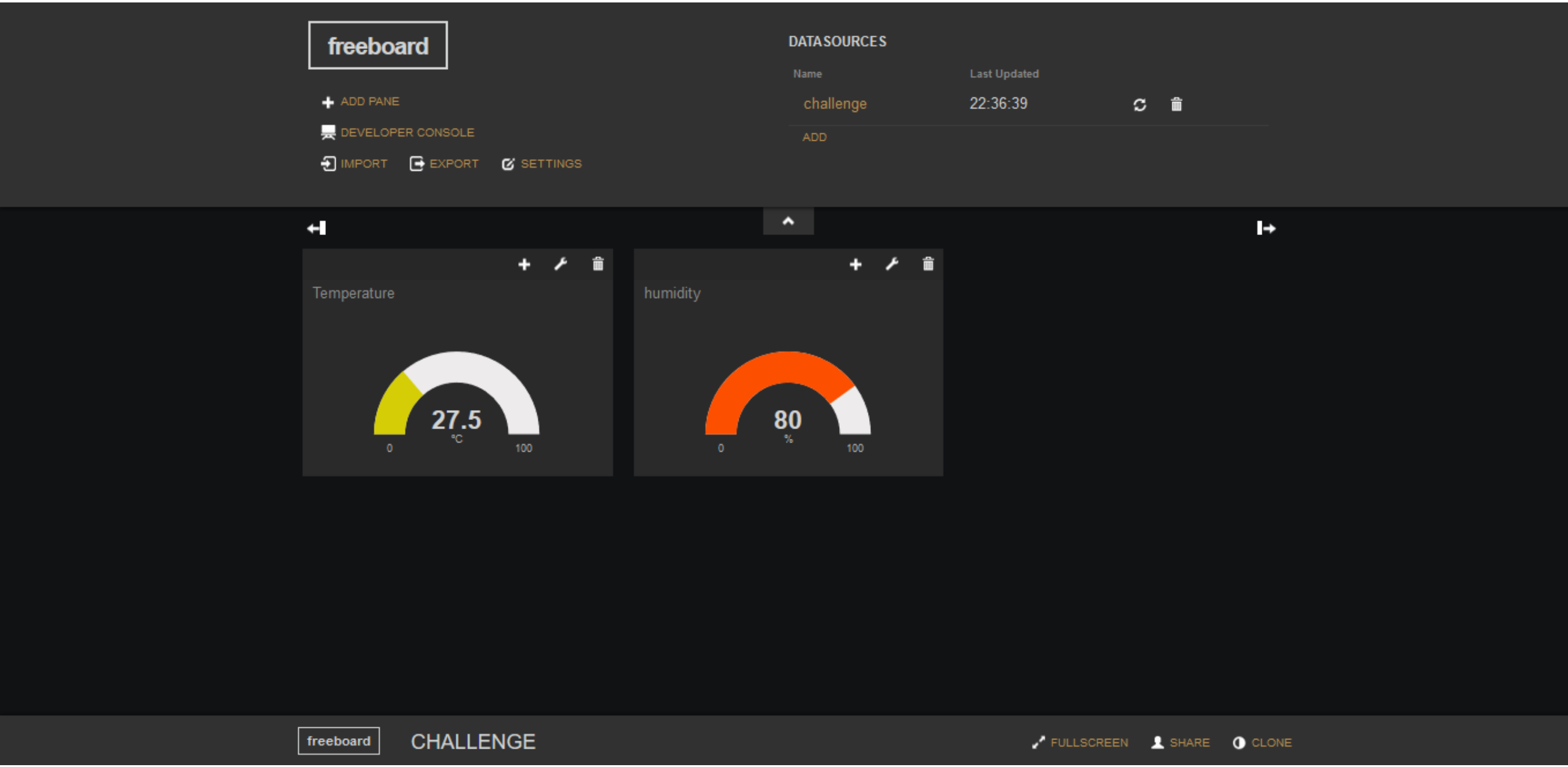

freeboard
DATASOURCES
ADD
ADD PANE
DATASOURCE
TYPE
Select a type...
Select a type...
Clock
Dweet Storage
Dweet V2 Storage
Dweet.io
Dweet V2
FIWARE Orion
JSON
MQTT
Playback
PubNub
Weather
Xively Datasource
CANCEL
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE


freeboard
DATASOURCES
Name
Last Updated
ADD PANE
challenge
22:37:47
DATASOURCE
Connects to an Orion Context Broker, an implementation of the NGSI9/10 REST API binding developed as a part of the FI-WARE platform. See https://github.com/telefonicaid/fiware-orion for more details.
TYPE
FIWARE Orion
NAME
challenge
HOST:PORT
143.107.145.22:1026
THINGPROXY
YES
A CORS Proxy (JSONP connection) will be used
FIWARE-SERVICE
helixiot
FIWARE-SERVICEPATH
/
X-AUTH-TOKEN
TYPE
iot
ID
urn:ngsi-ld:entity:001
ADVANCED
NO
Advanced mode permits access to all JSON request


freeboard
ADD PANE
DEVELOPER CONSOLE
IMPORT
EXPORT
SETTINGS
DATASOURCES
Name
Last Updated
challenge
22:31:54
ADD
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE


freeboard
DATASOURCES
ADD
ADD PANE
DATASOURCE
TYPE
Select a type...
Select a type...
Clock
Dweet Storage
Dweet V2 Storage
Dweet.io
Dweet V2
FIWARE Orion
JSON
MQTT
Playback
PubNub
Weather
Xively Datasource
CANCEL
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE


freeboard
DATASOURCES
Name
Last Updated
ADD PANE
challenge
22:33:48
WIDGET
TYPE
Gauge
TITLE
Temperature
VALUE
datasources["challenge"]["temperature"]
DATASOURCE
.JS EDITOR
UNITS
ºC
MINIMUM
0
MAXIMUM
100
SAVE
CANCEL
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE

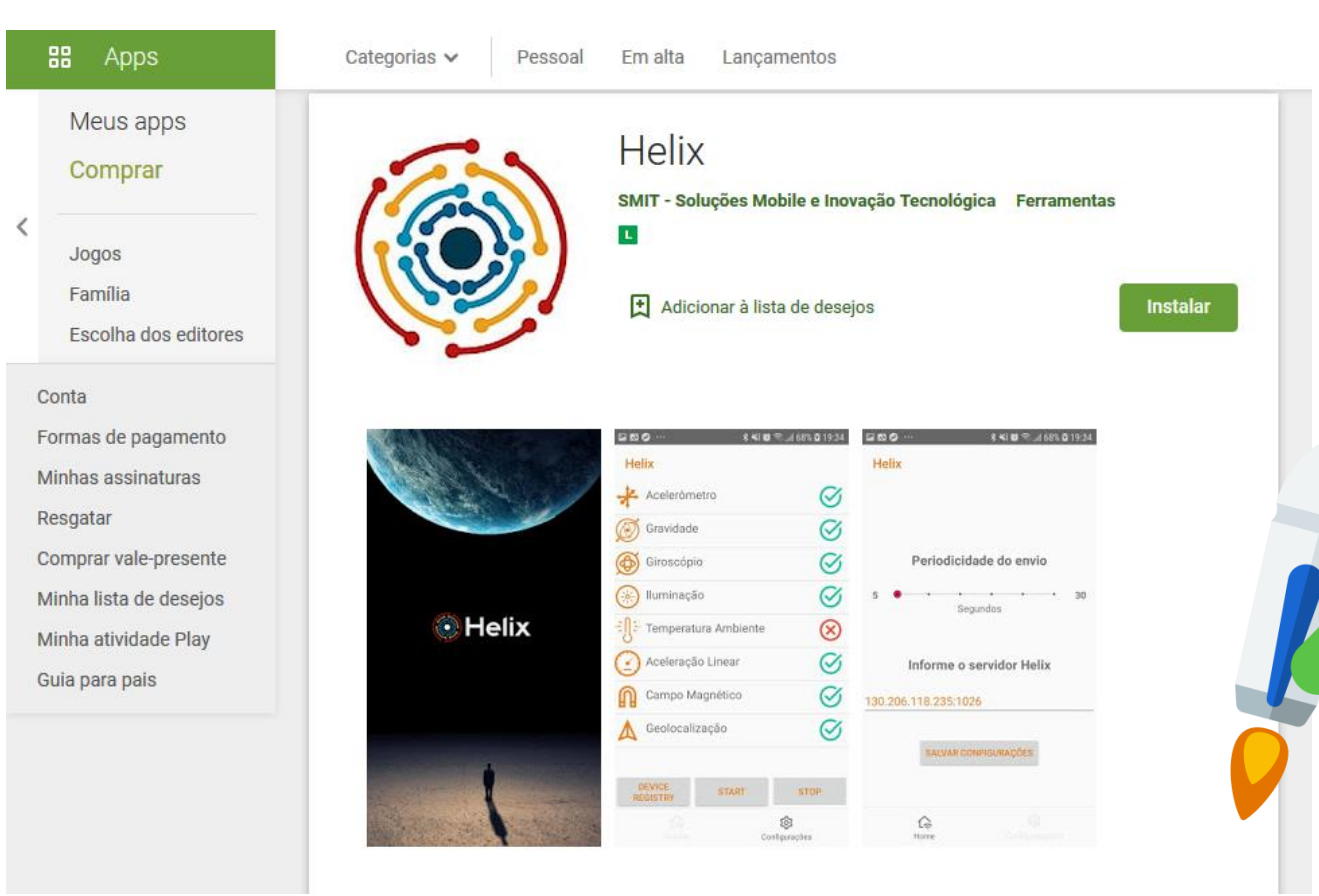

freeboard
ADD PANE
DEVELOPER CONSOLE
IMPORT
EXPORT
SETTINGS
DATASOURCES
Name
Last Updated
challenge
22:36:39
ADD
Temperature
27.5
°C
0
100
humidity
80
%
0
100
freeboard
CHALLENGE
FULLSCREEN
SHARE
CLONE

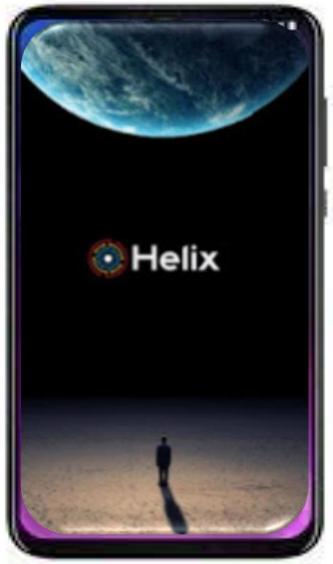
Challenges

Helix

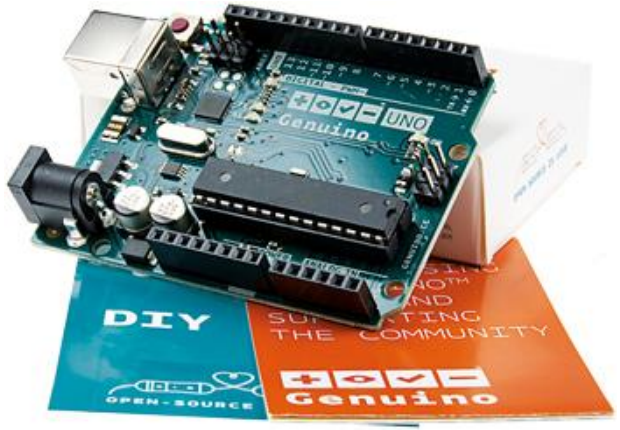
Sandbox

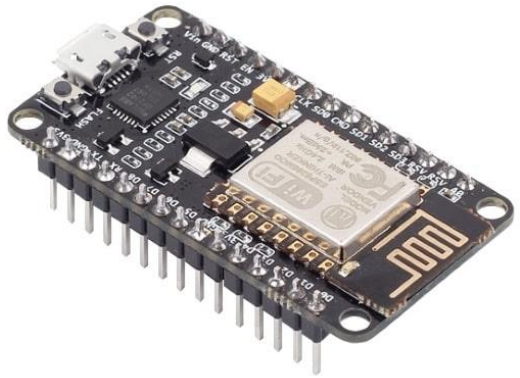
Challenge 1 – Helix app





Challenge 2 – IoT





[Sketch Arduino Uno]

Arduino

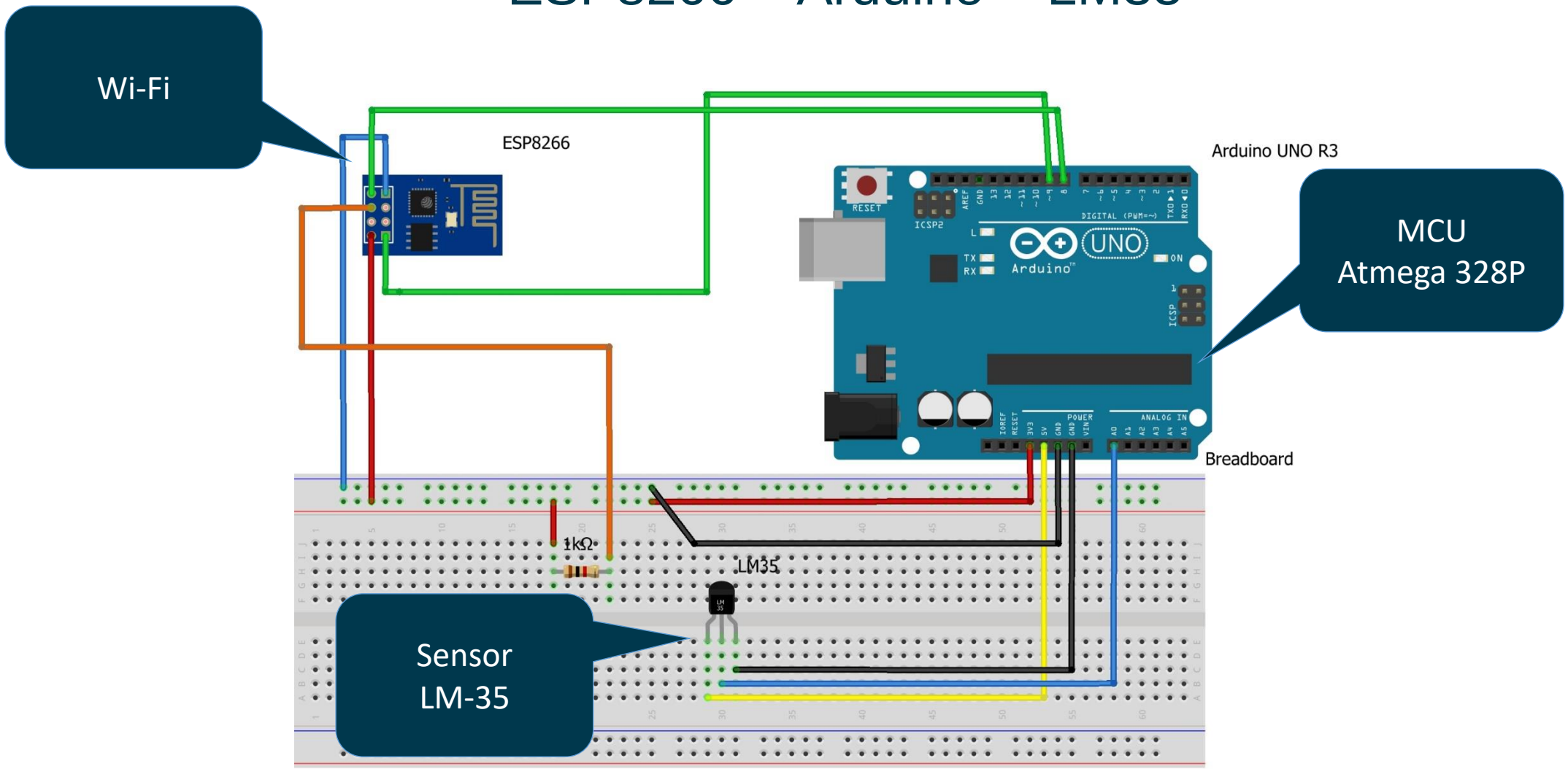
- 32KBytes Flash
- 2KBytes RAM
- 1KByte EEPROM
- MCU 8bits
- 16MHz

[Sketch NodeMCU]

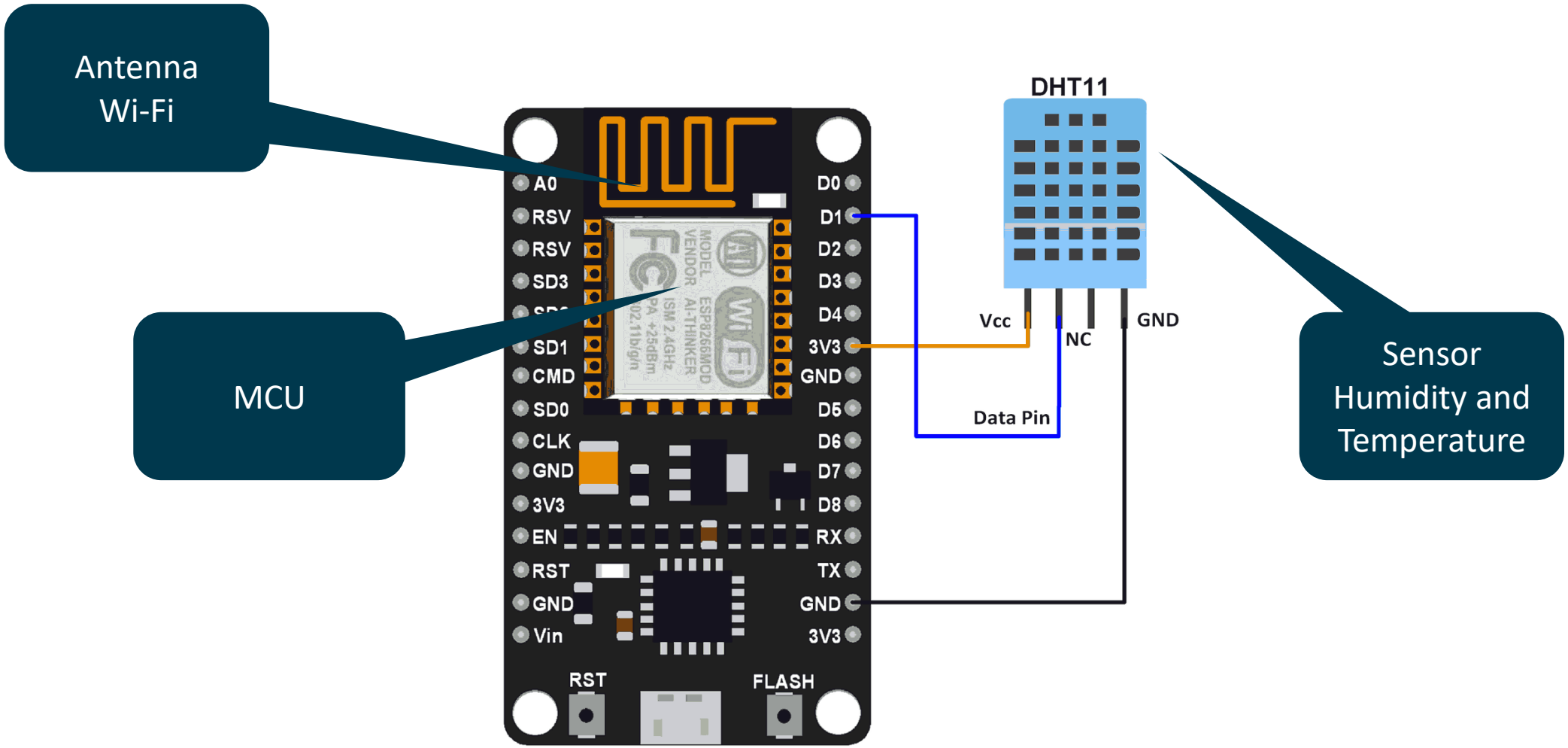
NodeMCU ESP8266-12 v2

- 4MBytes Flash
- 64KBytes instruções RAM
- 96KByte dados RAM
- MCU 32bits
- 80MHz/160MHz
- Wi-FI IEEE802.11 b/g/n

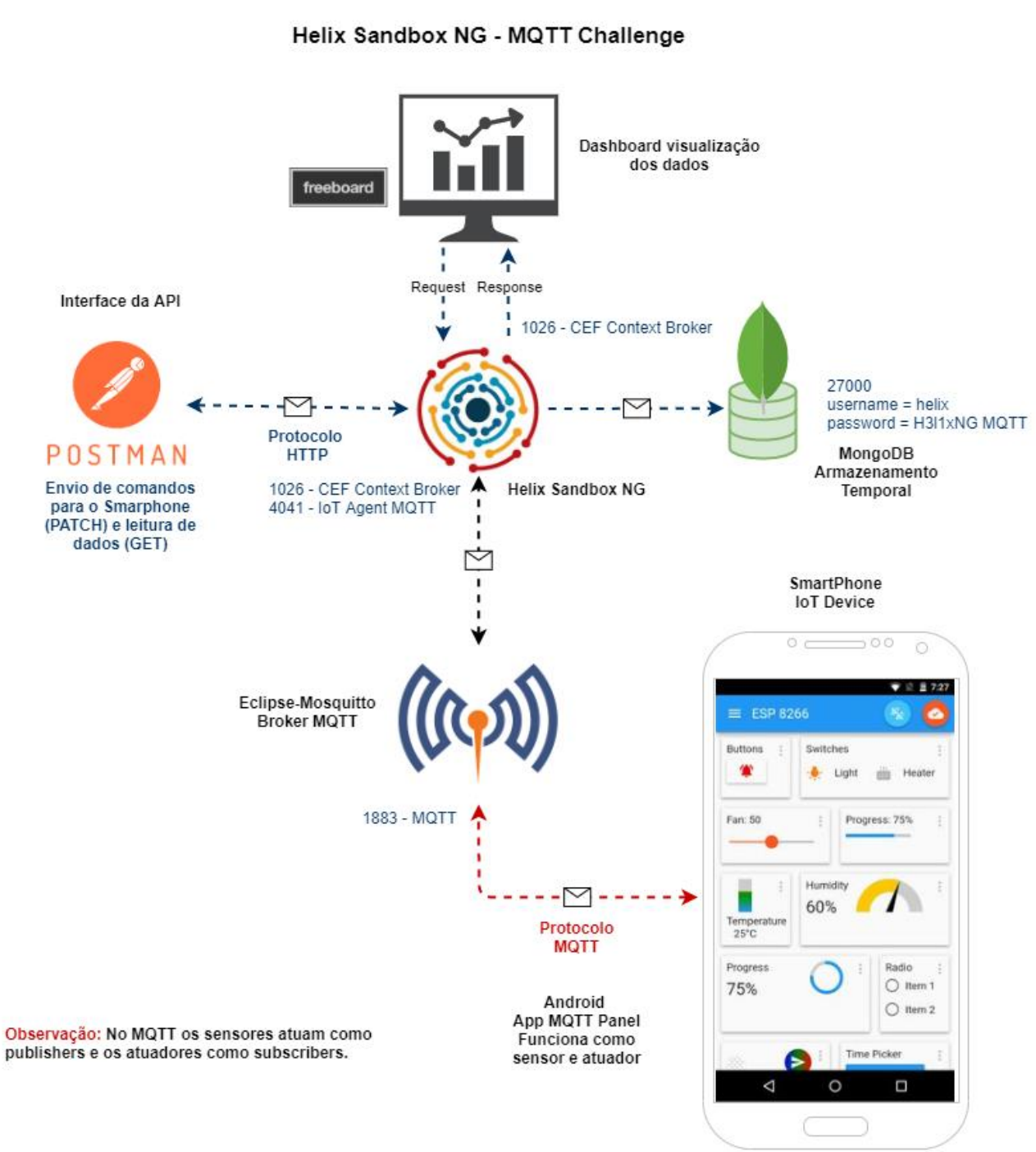
ESP8266 + Arduino + LM35



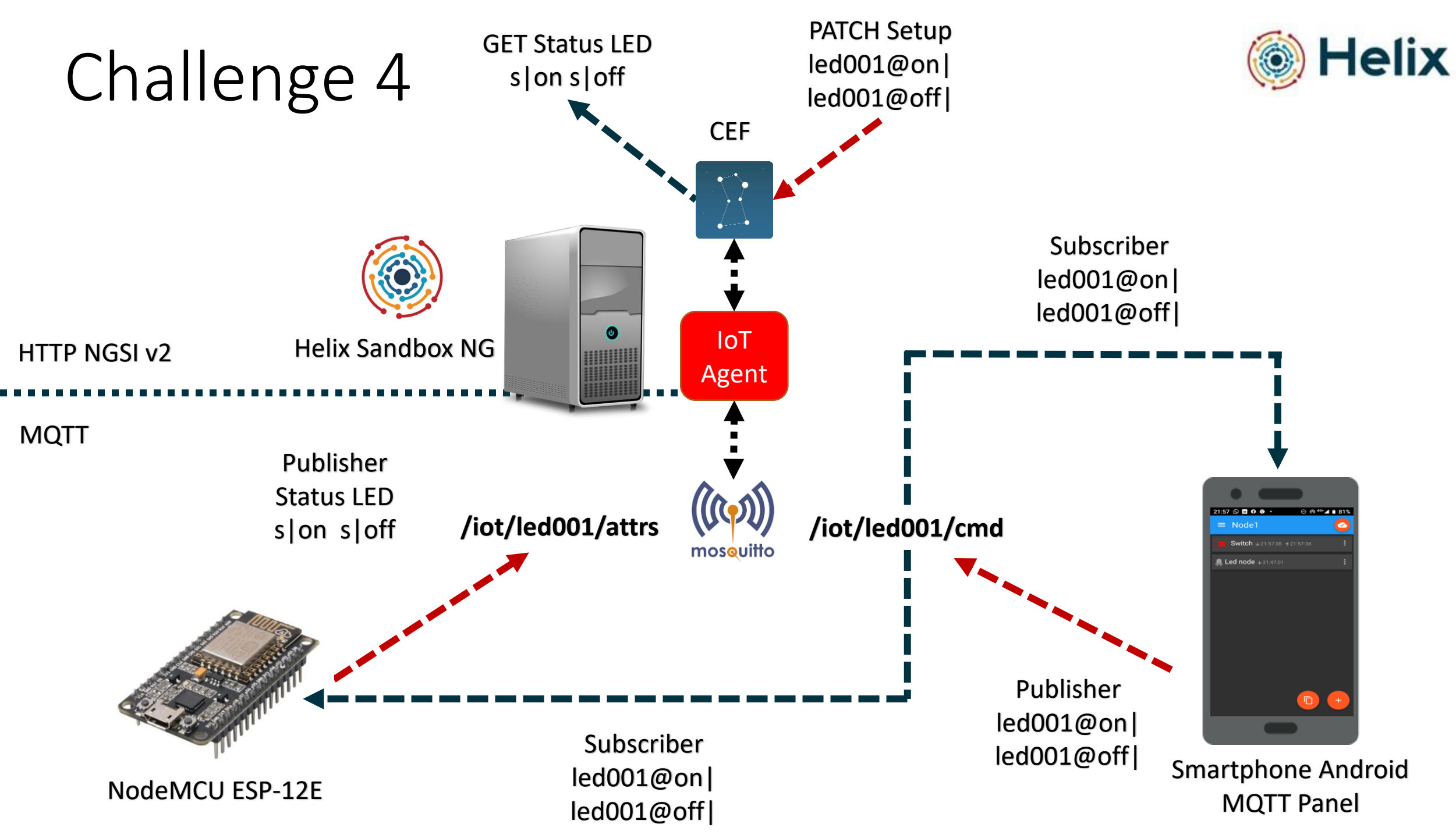
NodeMCU v2 + DHT-11



Challenge 3 – MQTT



Challenge 4


GET Status LED
s|on s|off
PATCH Setup
led001@on|
led001@off|
CEF
Helix Sandbox NG
HTTP NGSI v2
MQTT
IoT
Agent
Subscriber
led001@on|
led001@off|
Publisher
Status LED
s|on s|off
/iot/led001/attrs
mosquitto
/iot/led001/cmd
NodeMCU ESP-12E
Subscriber
led001@on|
led001@off|
Publisher
led001@on|
led001@off|
Smartphone Android
MQTT Panel

Links

Fiware
https://www.fiware.org

Fiware Market Place
https://marketplace.fiware.org/pages/solutions/fee10a6a7755e554686664fd

Fiware Catalogue
https://www.fiware.org/developers/catalogue/

Helix
https://gethelix.org

Helix GitHub
https://github.com/Helix-Platform/Sandbox-NG

IEEE paper
https://ieeexplore.ieee.org/document/8905583

Postman
https://www.postman.com/

Freeboard
http://freeboard.io/

FiwareLab São Paulo
https://www.facebook.com/br.sp.fiwarelab

Thanks!

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