

# WHY ARE WE CREATING ONE **MORE** IOT PLATFORM?

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# TIAGO BARROS - @TGFB



Software Engineer  
Professor



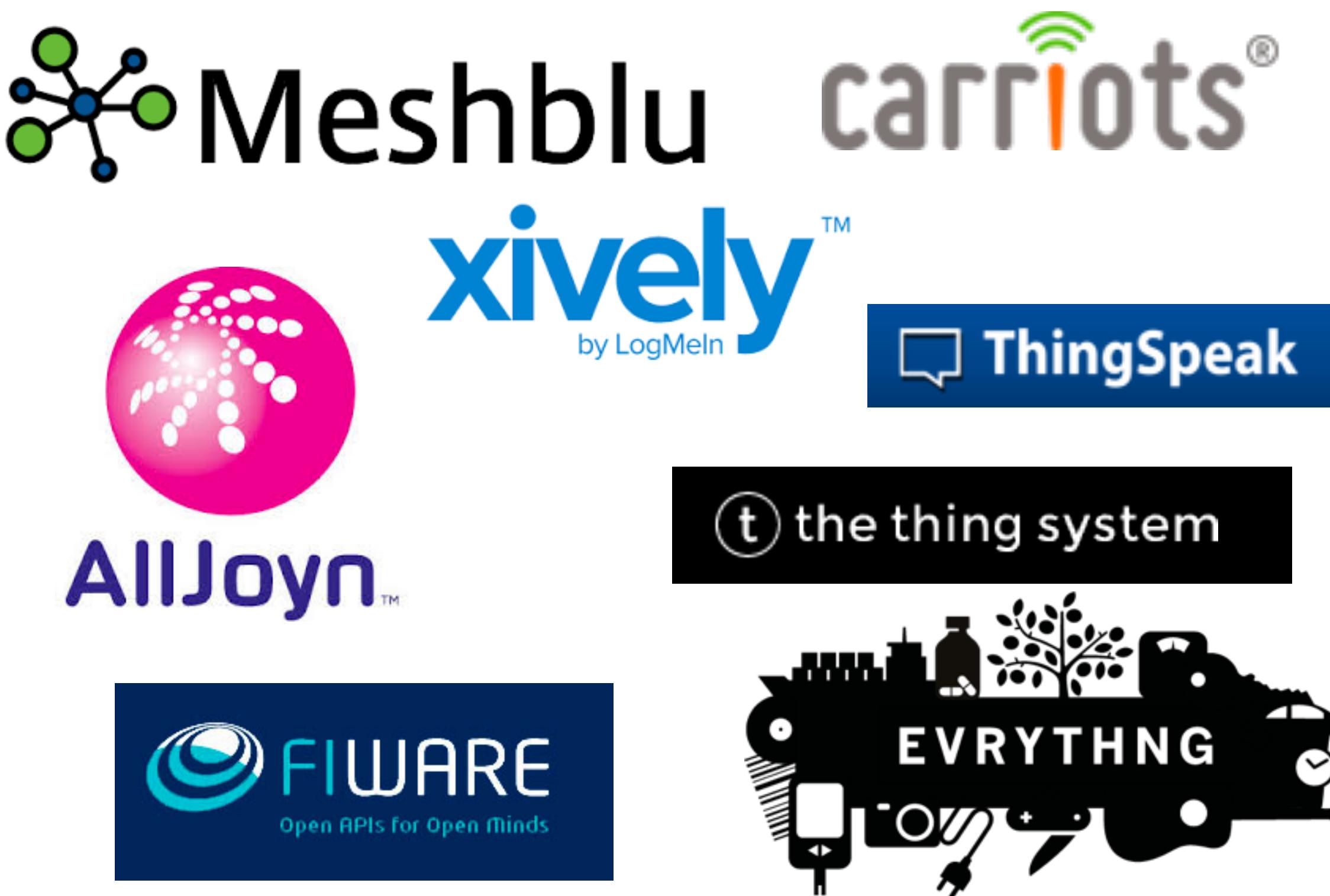
Consultant  
Researcher

current platforms for the

# INTERNET of things

# current platforms for the internet of things

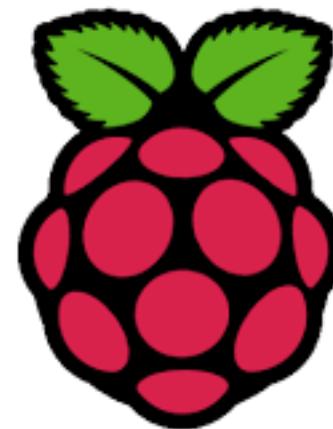
software



cloud services for exchange device's  
data

# current platforms for the internet of things

## hardware



SAM

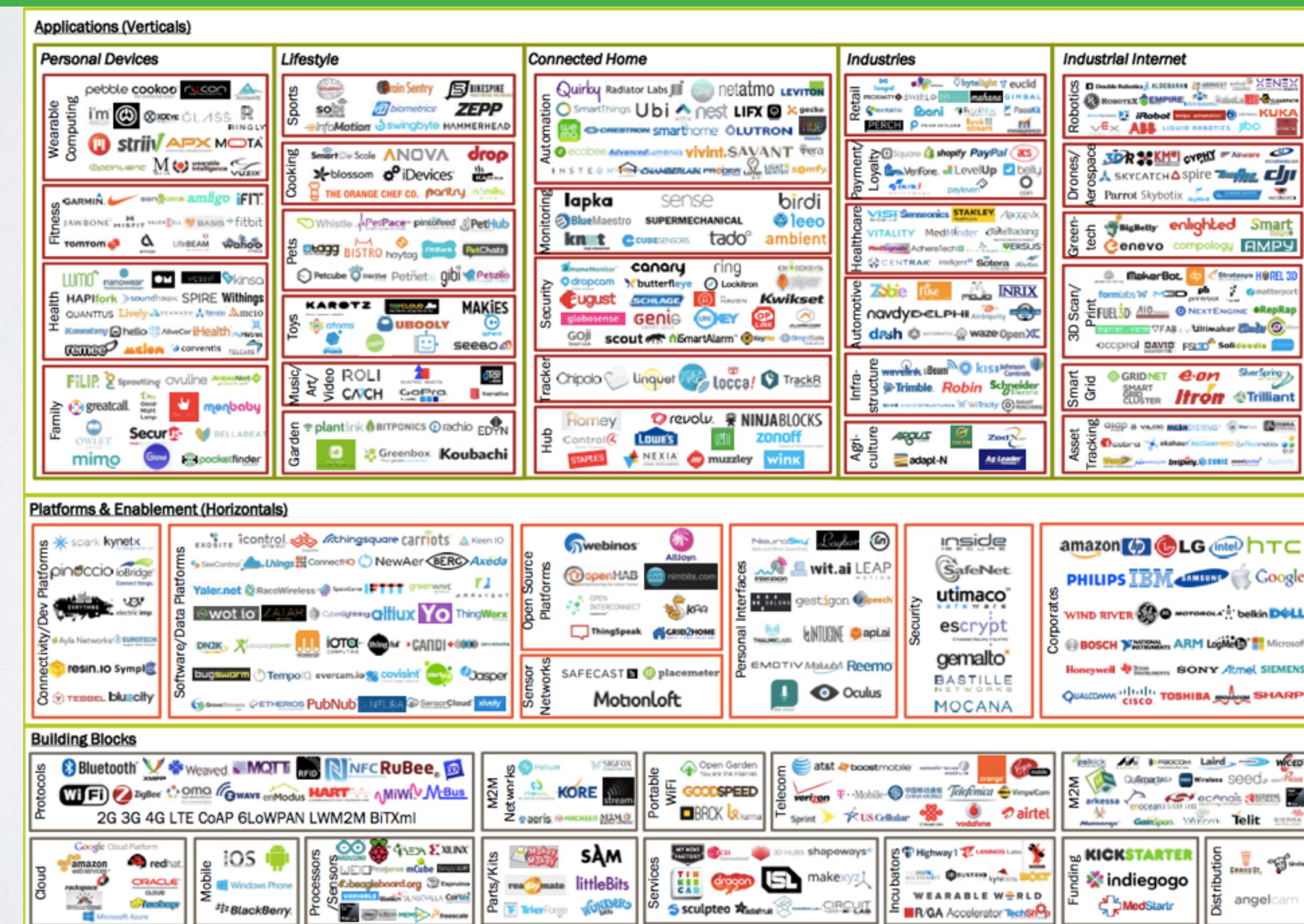


WEIO

**wireless MCUs + sensors for  
developing your application**

# complexity

# current platforms for the internet of things



## Applications (Verticals)

Personal Devices		Lifestyle	Connected Home	Industries	Industrial Internet
Wearable Computing	pebble cookoo re:con ALUMATE i'm WATCH ZEPP RINGLY Striiv APX MOTA Openwave MOTOSENSE VUZIX	Sports brainSentry BIKE SPIKE SOLO biometrics ZEPP InfoMotion swingbyte HAMMERHEAD	Quirky Radiator Labs netatmo LEVITON SmartThings Ubi nest LIFX gecko weMo CRESTRON smartHome OLUTRON INSTEON CHAMBERLAIN PROTECT LIGHTS SENTRY somfy	Retail proximity SWIPELLE mahase GIMBAL kontakto Boni RetailNow PassKit PERCH PRISM SKYLAB BackStream	bytelight euclid proximity PROXIMITY SWIPELLE mahase GIMBAL kontakto Boni RetailNow PassKit PERCH PRISM SKYLAB BackStream Double Robotics ALDEBARAN NAVISET XENEX CLEARPATH ROBOTIX EMPIRE Robots CLEARPATH vEX ABB LIQUID ROBOTICS jibo
Fitness	GARMIN iFIT JAWBONE fitbit TOMTOM LifeBEAM wahoo	Cooking SmartDose Scale ANOVA drop blossom iDevices THE ORANGE CHEF CO. pantry nomiku	lapka sense birdi leeo ambient SUPERMECHANICAL tado	Payment Square shopify PayPal acs Verifone LevelUp belly	Drones/ Aerospace 3DR KMEI CYPHX Airware SKYCATCH Spire Parrot Skybotix skyWind WORKER
Health	WMD nanowear VESSEY kinsa HAPIfork soundhawk SPIRE Withings QUANTUS Lively SCALADE Amico bluetommy hello AliveCor iHealth remee melen corventis TELGARE	Pets Whistle PetPace pintofeed PetHub stagg BISTRO haytag PetChatz Petcube tractive Petnet givi Pebzill	canary ring dropcam butterflye Lockitron globosense genie UNIKEY GOJI scout smartAlarm	Healthcare VISION Senseonics STANLEY STANLEY VITALITY MediFinder MediTracking MediSignals AdhereTech VERSUS CENTRAK intelligent Sotera MyWay	Green-tech BigBelly enlightened Smart Green enevo compology AMPY
Family	FILIP Sproutling ovuline AmberAlert greatcall monBaby SecurIS OWLET mimo	Music/ Art/ Video ROLI CATCH GoPro Narrative	Tracker Chipolo linquet locca! TrackR	Automotive Zobe life MOJO INRIX navdy DELPHI dash	3D Scan/ Print MakerBot Stratasys HOREL 3D formlabs M3D printbot matterport FUEL3D FAB Ultimaker Solidoodle occipital DAVID FS3D Solidoodle
	Garden plantlink BITPONICS rachio EDYN Greenbox Koubachi	Hub Homey revolv NINJABLOCKS Lowe's STAPLES NEXIA muzzle	Infrastructure wavelink uBeam kisi Johnson Controls Trimble Robin Schneider Electric BRIGHT STRUCTURES WiTricity	Smart Grid GRIDNET SMART GRID CLUSTER e-on Itron Trilliant	
		Hub Control4 revolv NINJABLOCKS Lowe's STAPLES NEXIA muzzle	Agriculture AGRUS DACOM ZedR adapt-N Ag Leader	Asset Tracking ASAP MEH SYSTEMS colora ekahau RADIANTRFID Recimation IDT MaxIP Impinj CUBIC assetCloud Apprity	

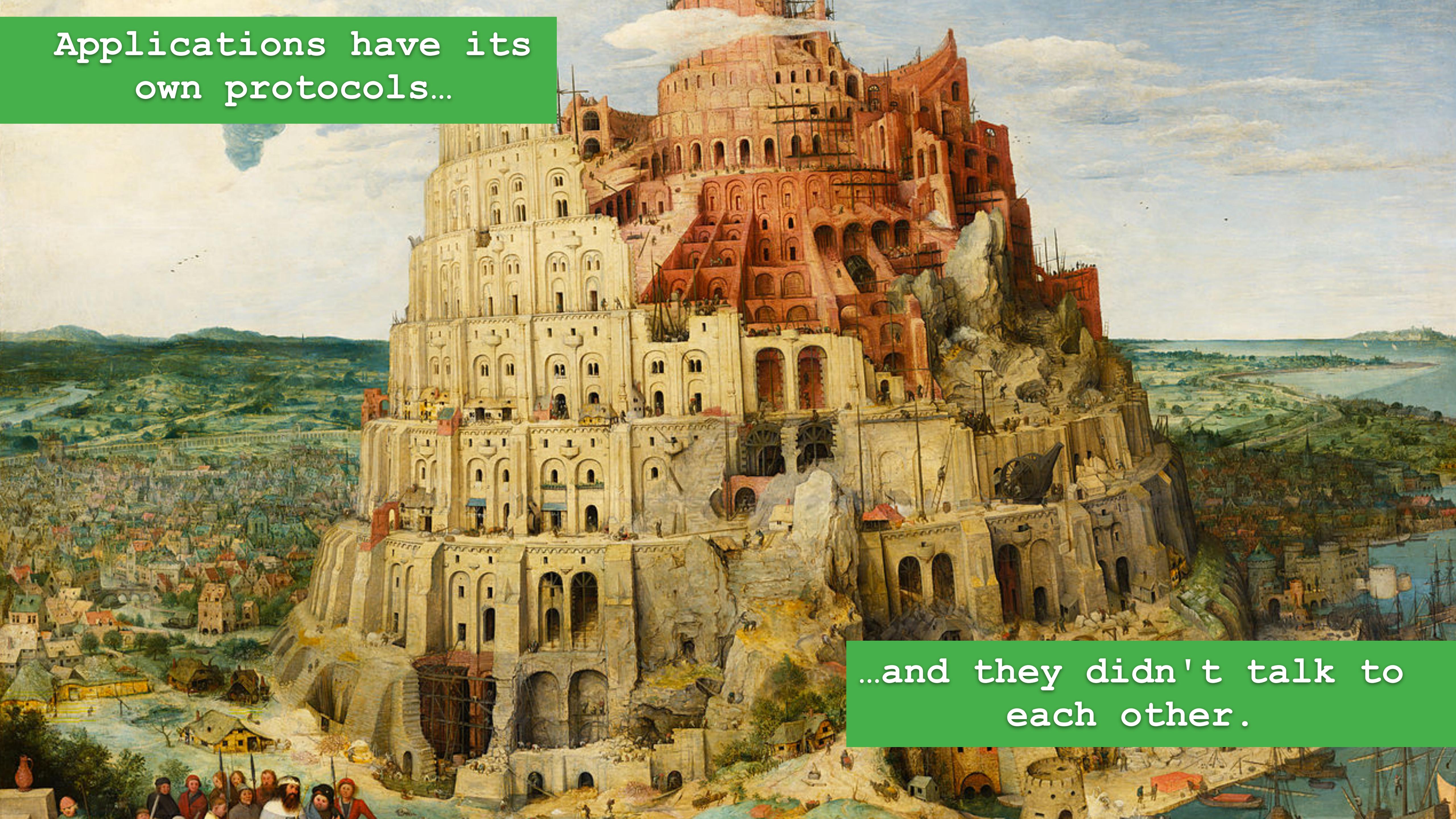
## Platforms & Enablement (Horizontals)

Connectivity/Dev Platforms	spark kynetx painciao ioBridge electric imp Ayla Networks EUROTECH resin.io Sympli TESSEL bluecity	Software/ Data Platforms icontrol thingsquare carriots Keen IO SeeControl Uthings ConnectHO NewAer BERG Axeda Yaler.net RacoWireless SpaceCats IFTTT greenWWD ARRAYER ewoto ZATAR CyberLightning altlux Yo ThingWorx DN2K peoplepower IOTech COMPUTING thingful CANDI bugswarm TempoIQ evercam.io covisint alerto Jasper GroveStreams ETHERIOS PubNub NEURA SensorCloud xively	Open Source Platforms webinos AllJoyn openHAB nimbis.com OPEN INTERCONNECT KAA ThingSpeak GRID2HOME	Personal Interfaces NeuroSky Layber fin Interact gestigon Speech THALMICLAB INTUGINE apLai EMOTIV Maluuba Reemo Oculus	Corporates inside SafeNet utimaco escrypt gemalto BASTILLE NETWORKS MOCANA
Sensor Networks	SAFECAST placemeter Motionloft				

## Building Blocks

Protocols	Bluetooth Weaved MQTT XMPP WiFi ZigBee OMA Z-WAVE enModus HART MiWi M-Bus 2G 3G 4G LTE CoAP 6LoWPAN LWM2M BitXml	Networks Helium SIGFOX KORE stream aeris MRHEED MANO	Portable WiFi GOODSPEED BRICK karma	Telecom at&t boostmobile orange Virgin mobile	M2M palkick f800m Laird WICED QSparks Wireless seed upficus
Cloud	Google Cloud Platform Amazon web services radsat redhat ORACLE CLOUD BlackBerry Microsoft Azure	Mobile iOS Windows Phone BlackBerry	Services readymate littleBits TinkerForge	Services 3D HUBS shapeways dragon makeXYZ sculpteo Adalit CIRCUIT LAB	Incubators Highway1 LEMNOS Labs kytebots BOLT WEARABLE WORLD R/GA Accelerator TechShop
	Processors Arduino rasperry mcube BeagleBoard.org Espruino USBIBLE TINKERPLUX Coriex	Parts/Kits MaKey MaKey SAM	Services TIN KEE CAD	Funding KICKSTARTER indiegogo	Distribution angelcam

Applications have its  
own protocols...

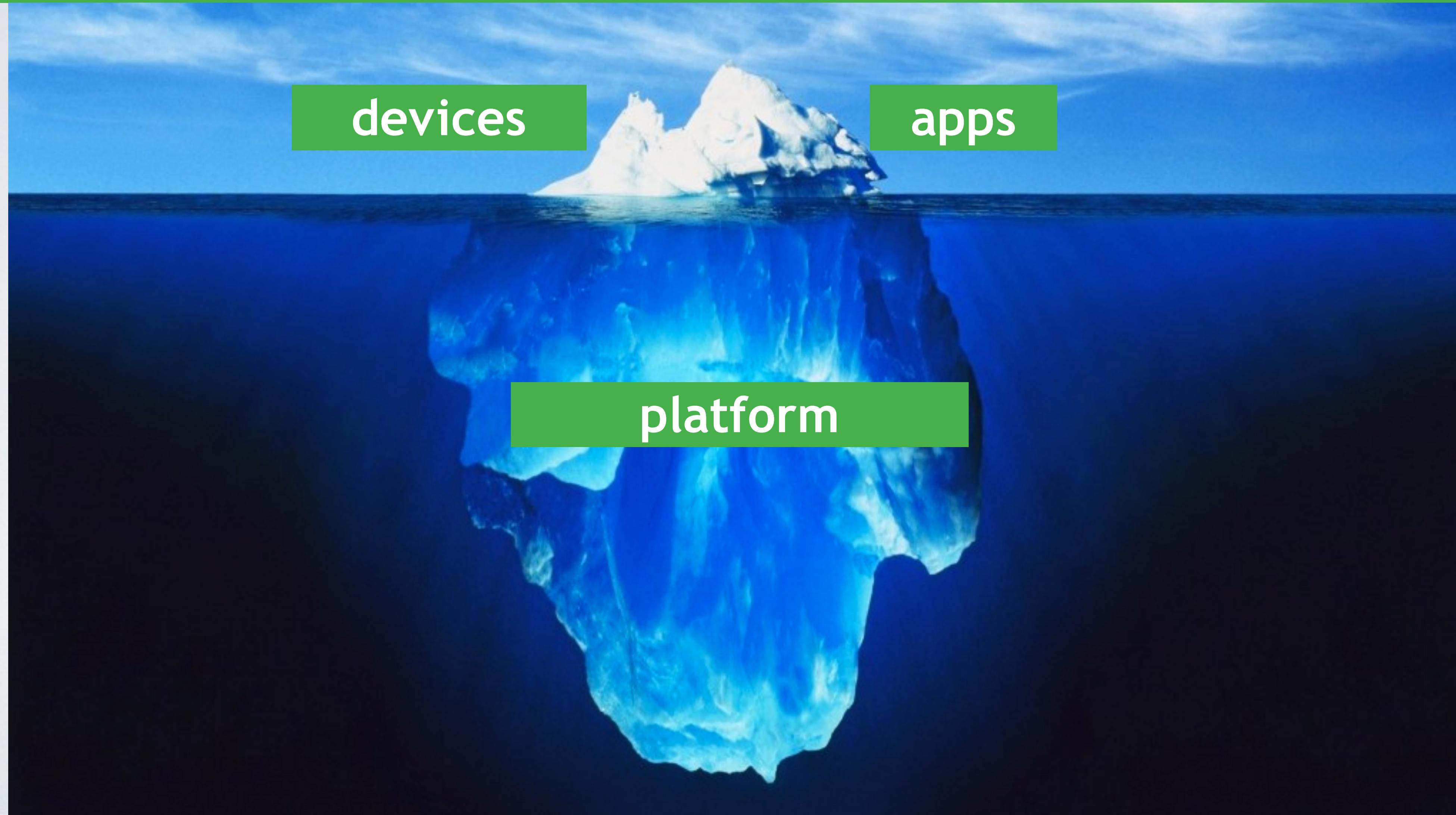


...and they didn't talk to  
each other.

# the internet of things

“It is very difficult to have a unique standard for IoT as we have for the WWW, with HTML and browsers. The THINGS in IoT are so different and the applications as diverse that many standards and protocols will coexist.”

# current platforms for the internet of things



CESAR efforts on

# THE INTERNET of things

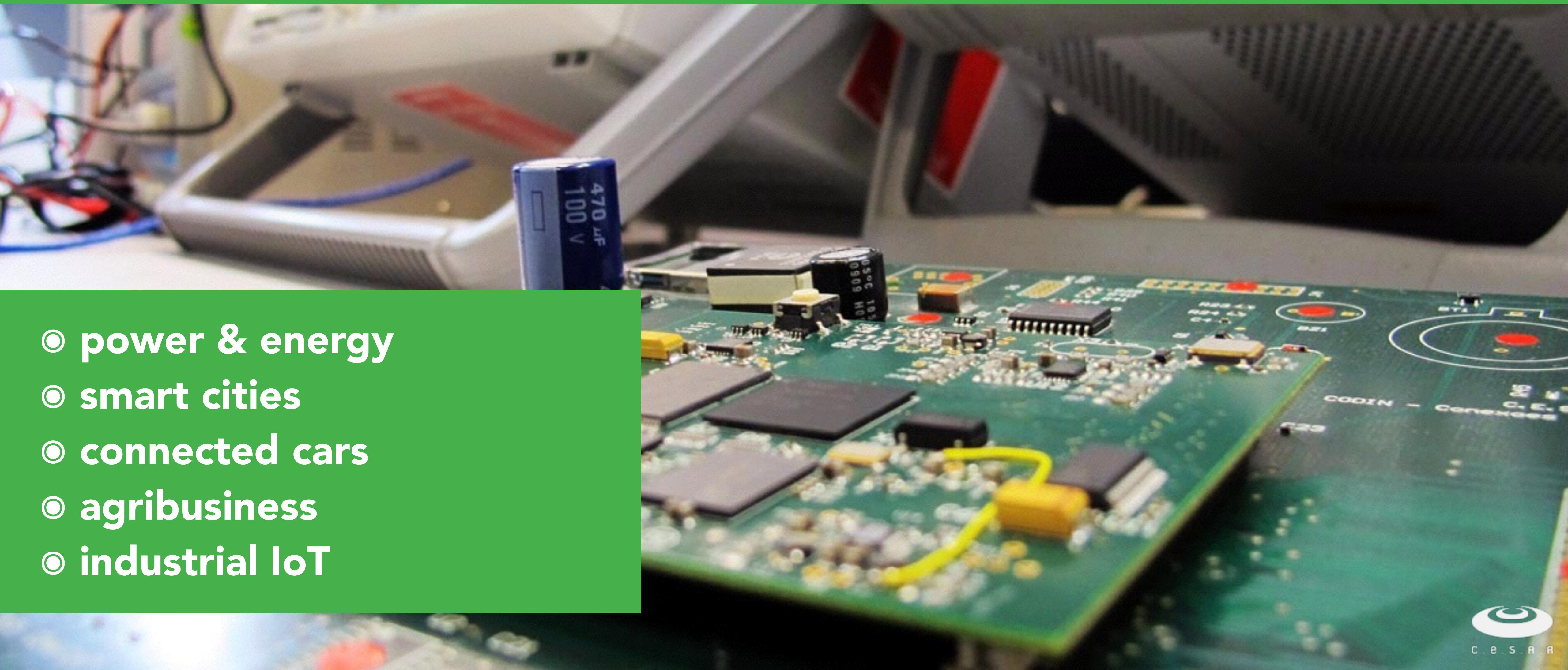
# CESAR IoT Research Lab



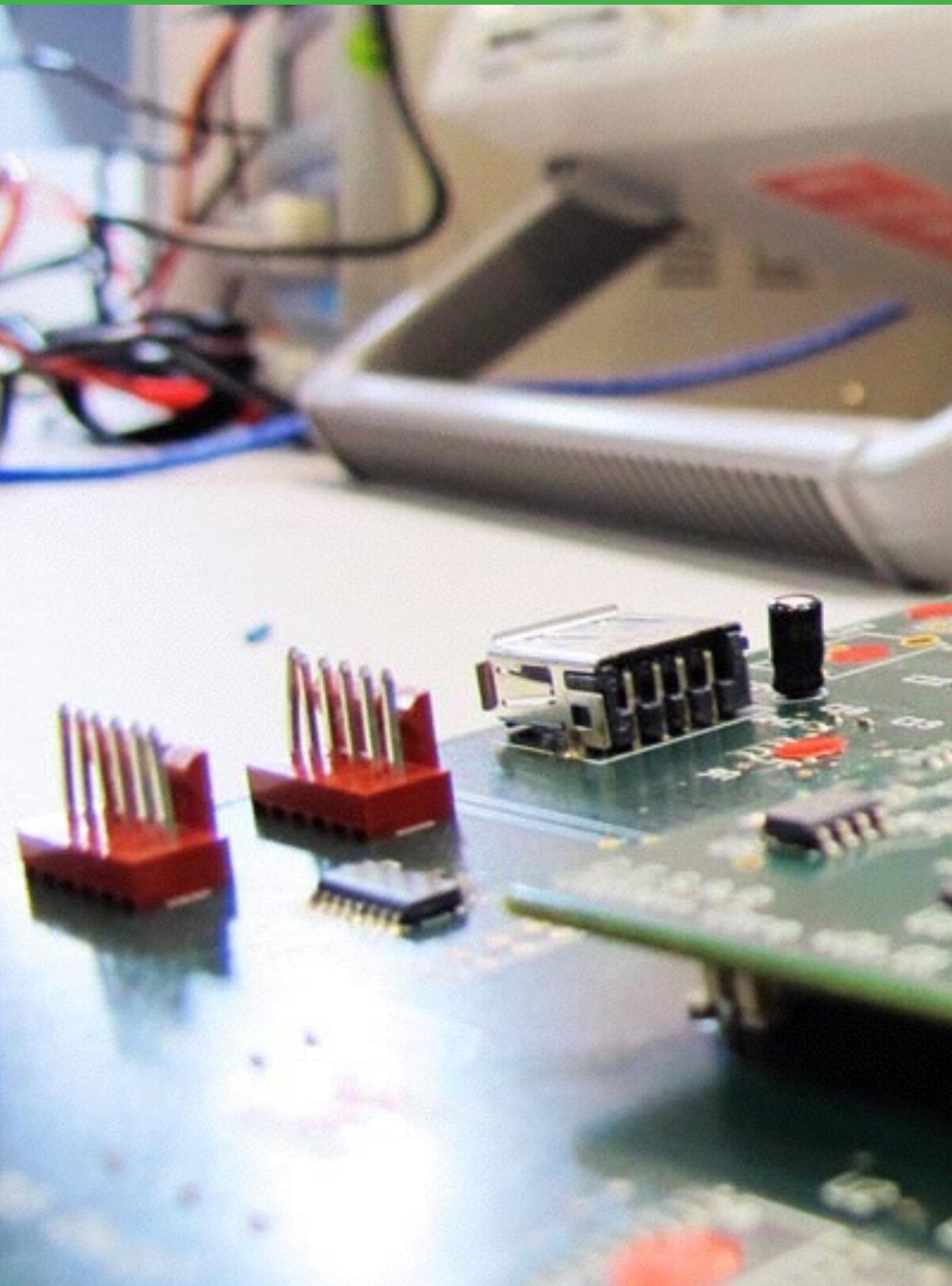
Promote knowledge in IoT internally by creating prototypes for problems or opportunities identified by CESAR.

# CESAR IoT Research Lab

- power & energy
- smart cities
- connected cars
- agribusiness
- industrial IoT



# CESAR IoT Research Lab





# KNoT

KNoT Network of Things

but...



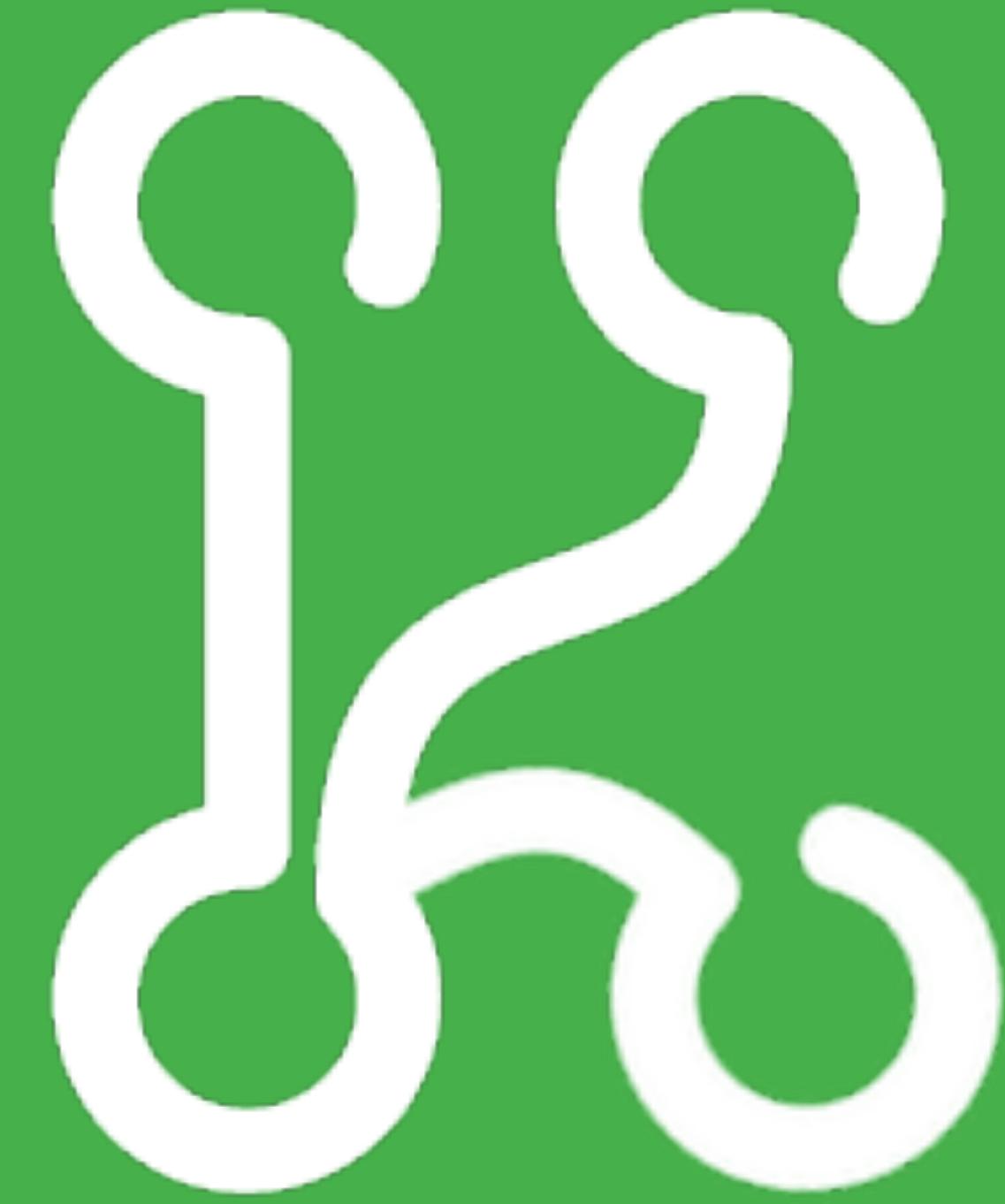
**AVISO AOS PASSAGEIROS**

ANTES DE ENTRAR NO  
ELEVADOR, VERIFIQUE SE O  
MESMO ENCONTRA-SE PARADO  
NESTE ANDAR.

LEI ESTADUAL Nº 9502/97

We are **not** creating **one**  
**more** IoT platform!





# KNoT

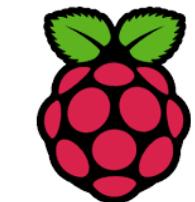
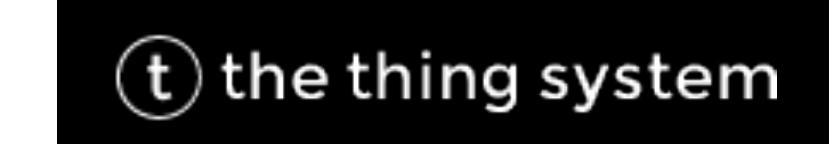
KNoT Network of Things

## meta platform for IoT

bridging the gap between existing platforms  
made on top of them

# IoT platforms

## software

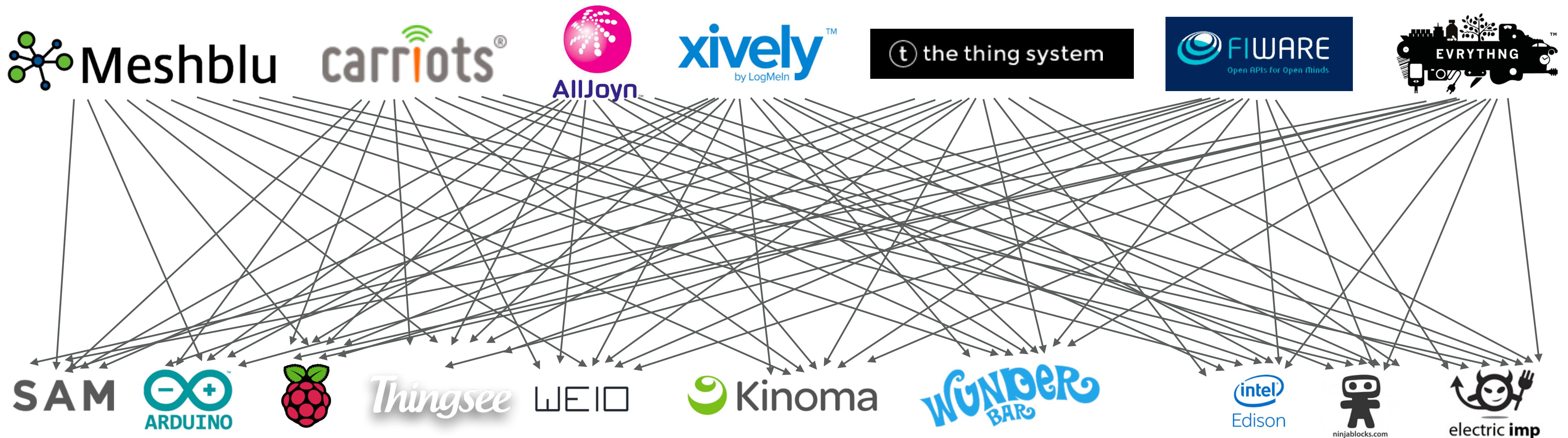


## hardware



# IoT platforms

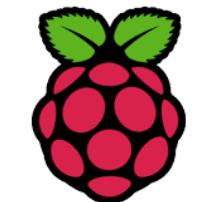
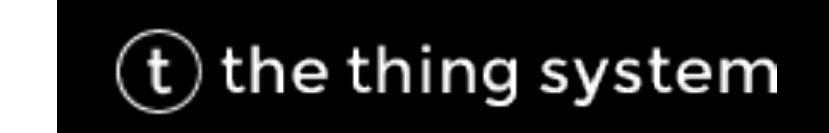
software



hardware

# IoT platforms

## software



## hardware



# IoT platforms

## software



## hardware



# KNoT

KNoT Network of Things

**open source, hardware &  
software**

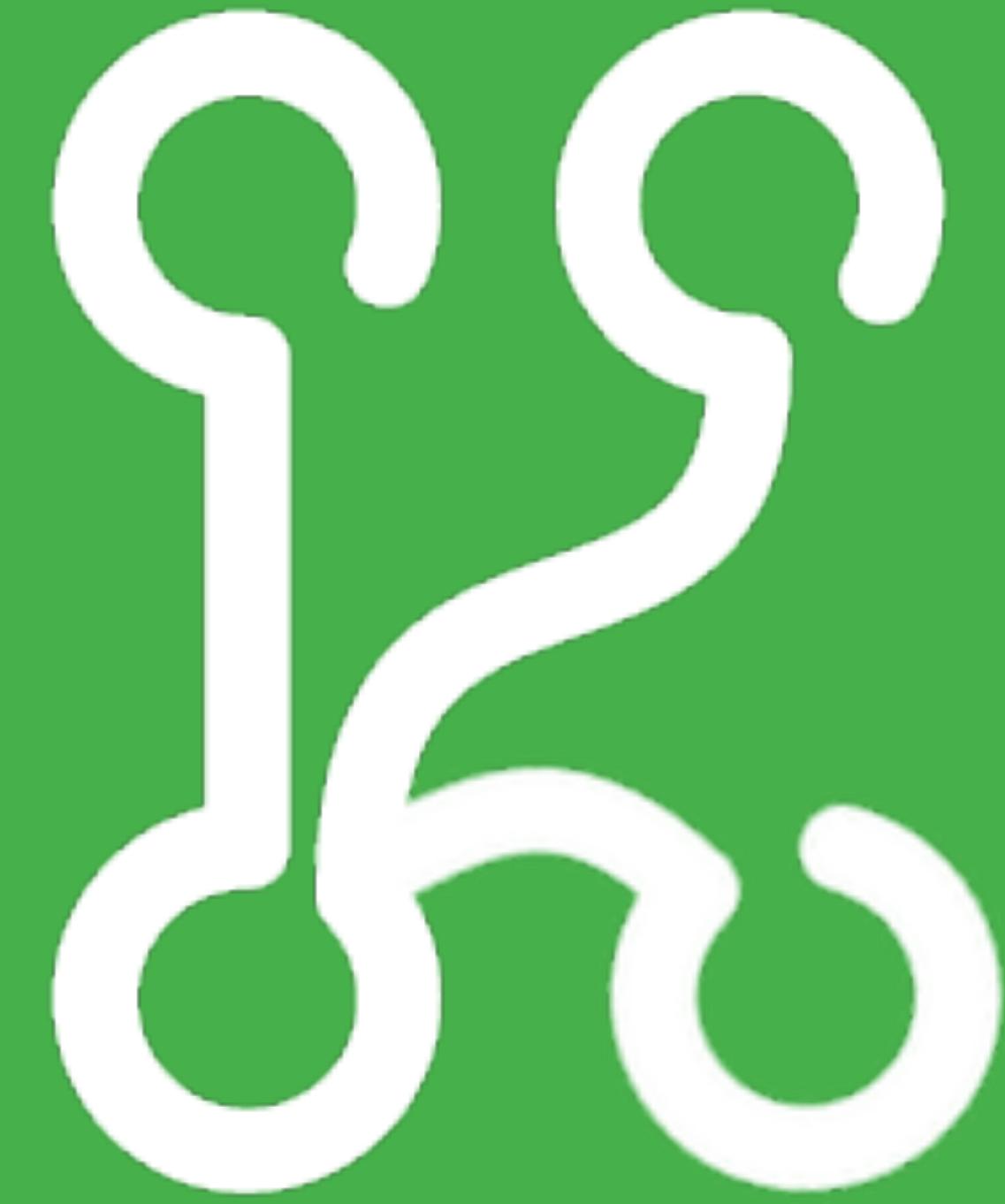


# KNoT

KNoT Network of Things

## multi protocol

for the physical (multi radios), data link, transport  
and network layers



# KNoT

KNoT Network of Things

**end to end**

**from the device to the app, crossing radios and  
gateways**

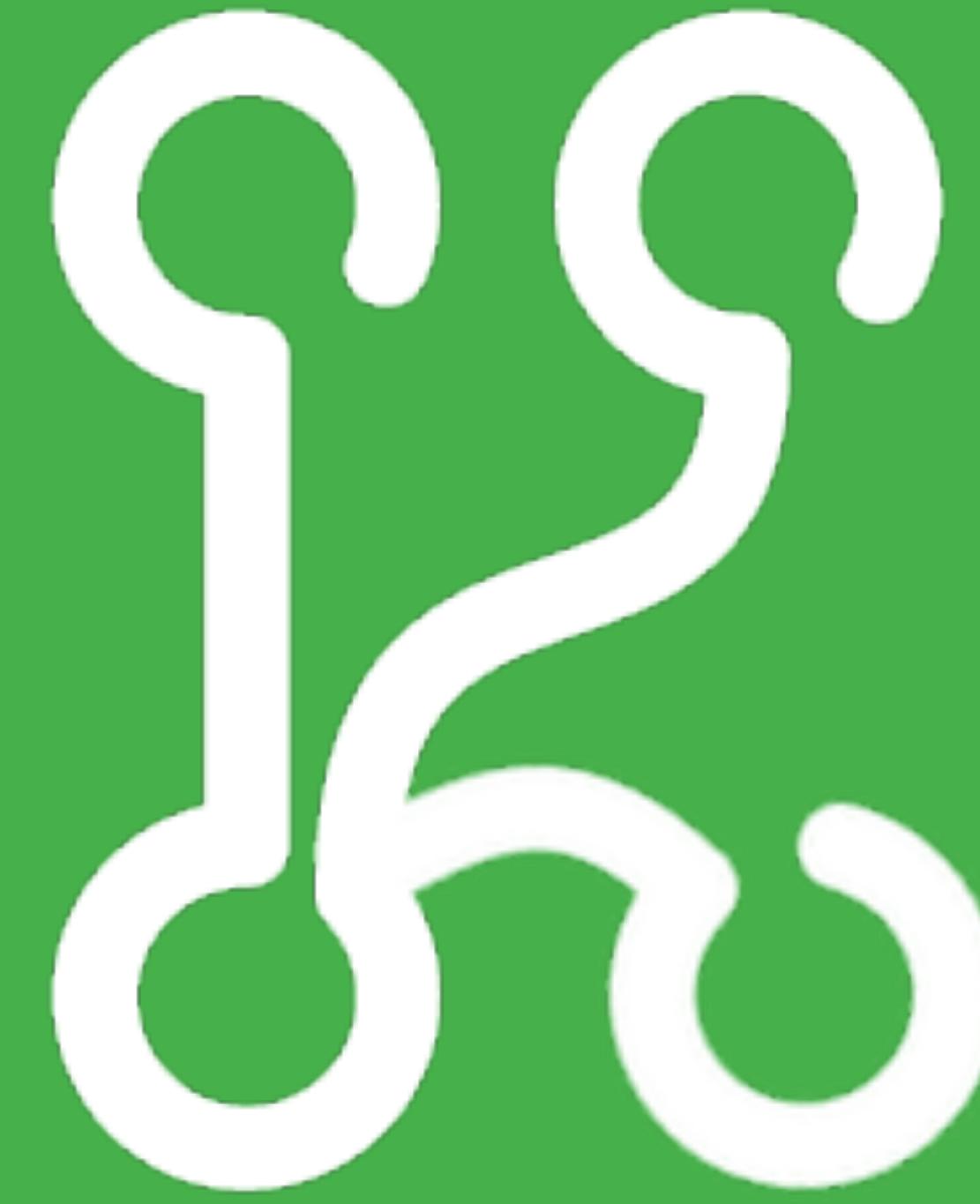


# KNoT

KNoT Network of Things

**data sharing by space and time**

**"to share the data only on monday, 2pm to 3pm"**



# KNoT

KNoT Network of Things

## semantic data model

applications will know the data type of each other



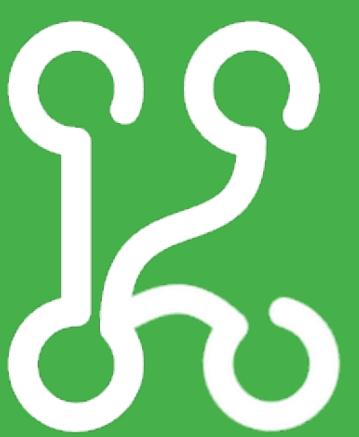
# KNoT

KNoT Network of Things

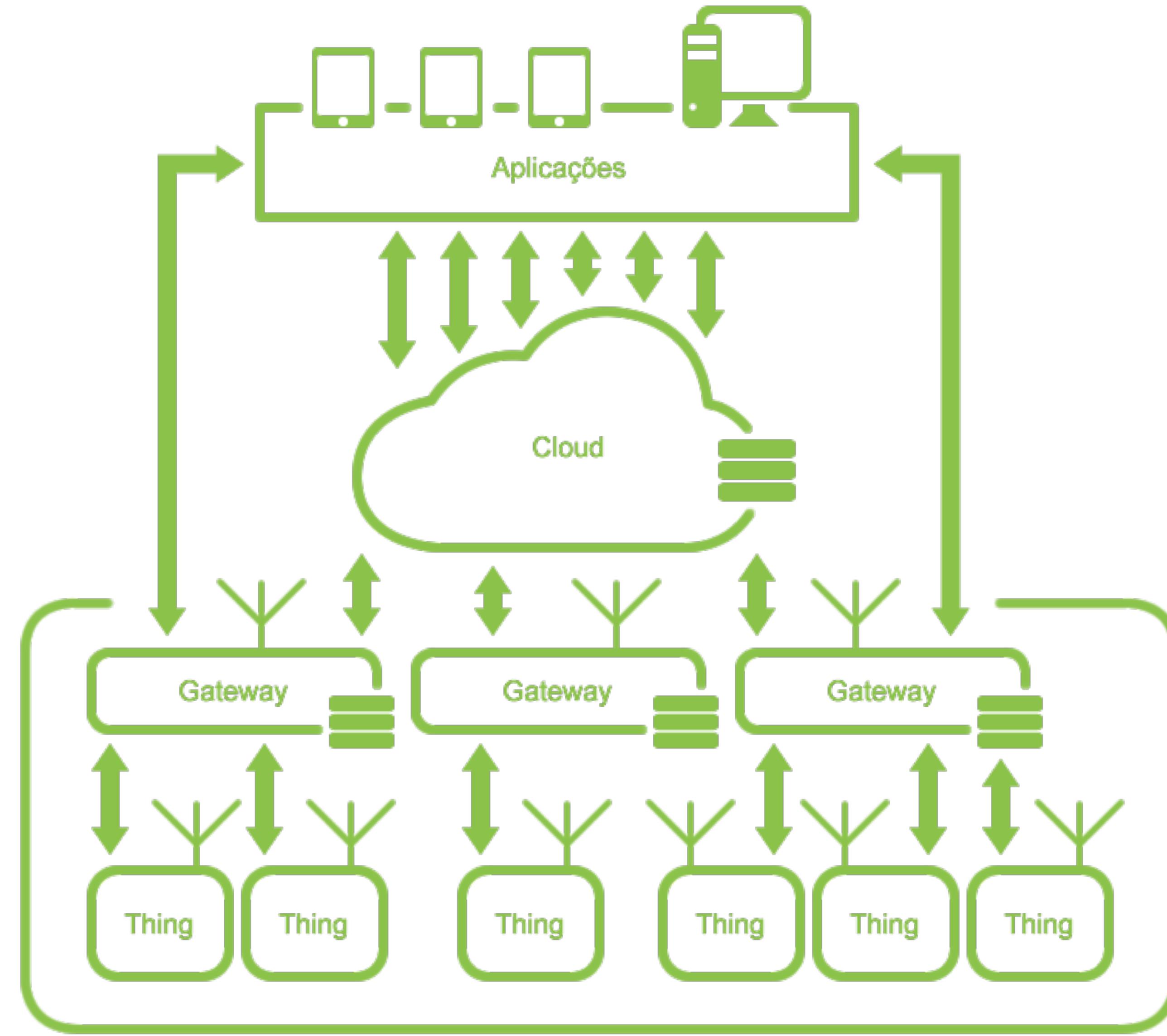
# distributed cloud

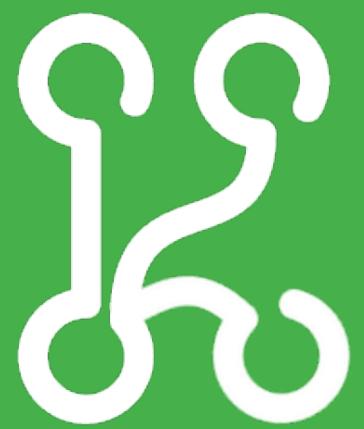
a distributed system can handle billions of devices

# Architecture 1.0



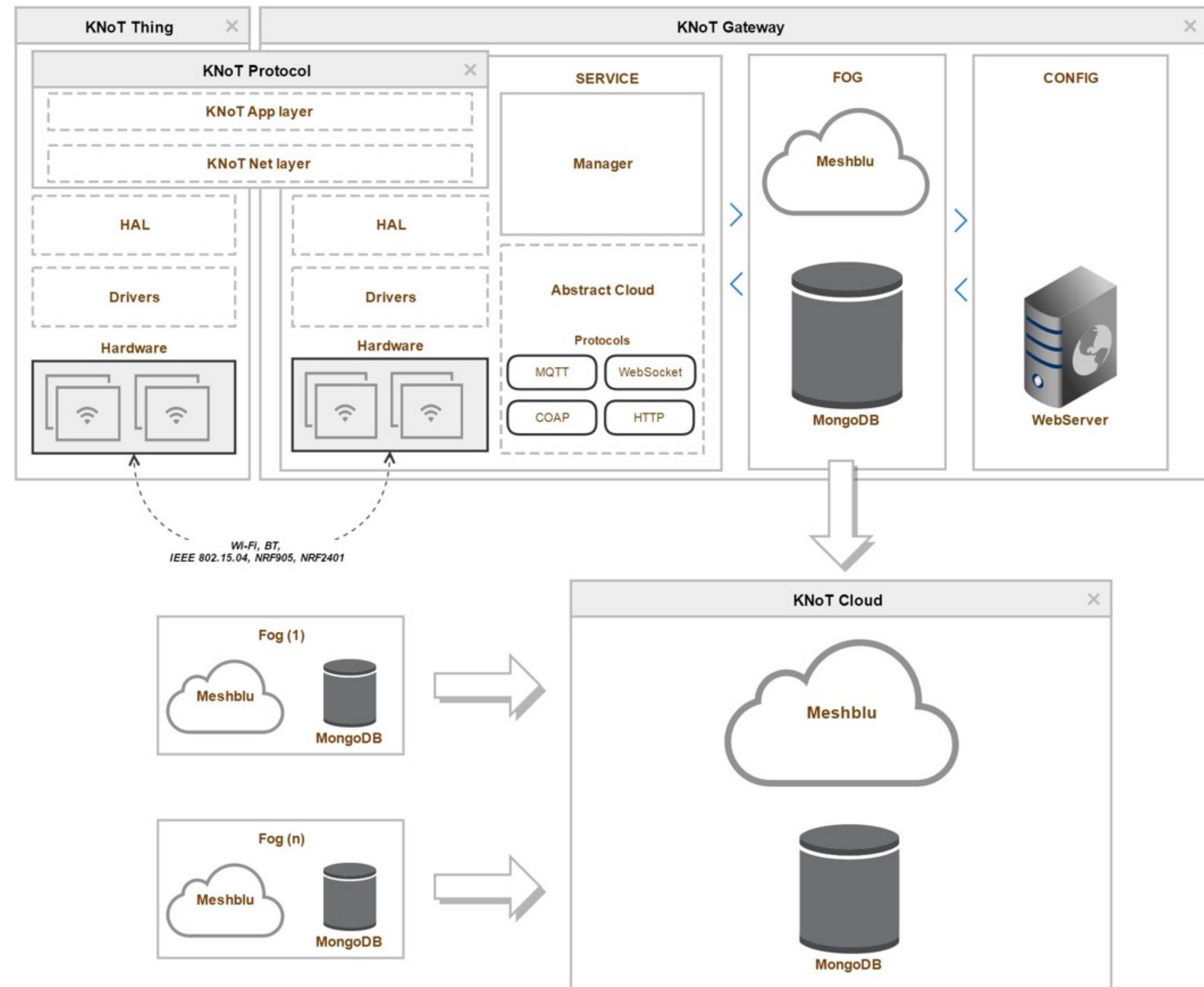
**KNoT**  
KNoT Network of Things

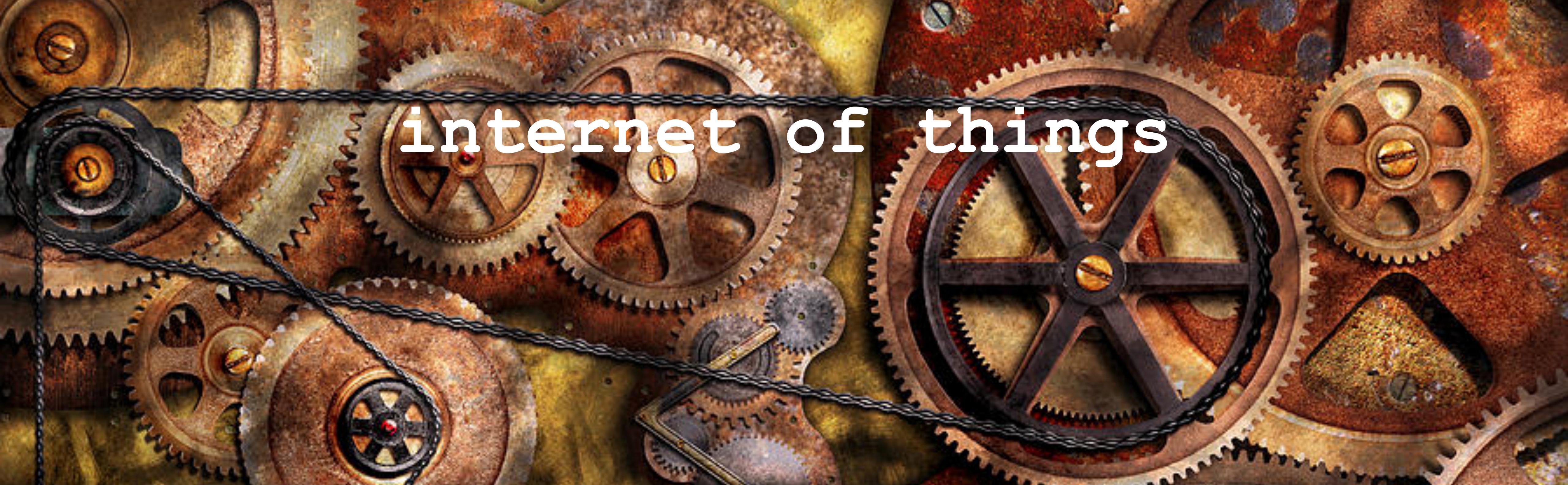




# Architecture 1.0

**KNoT**  
KNoT Network of Things

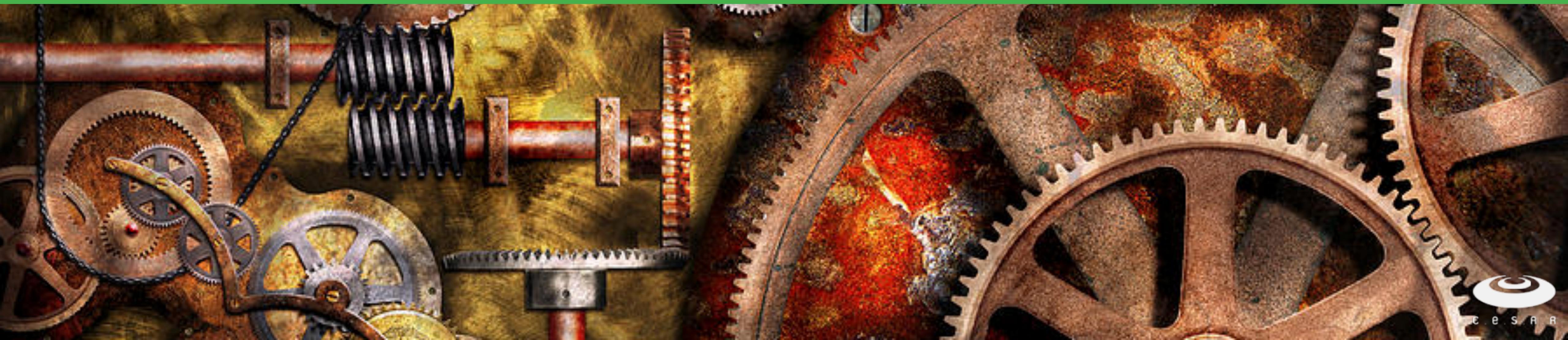




internet of things



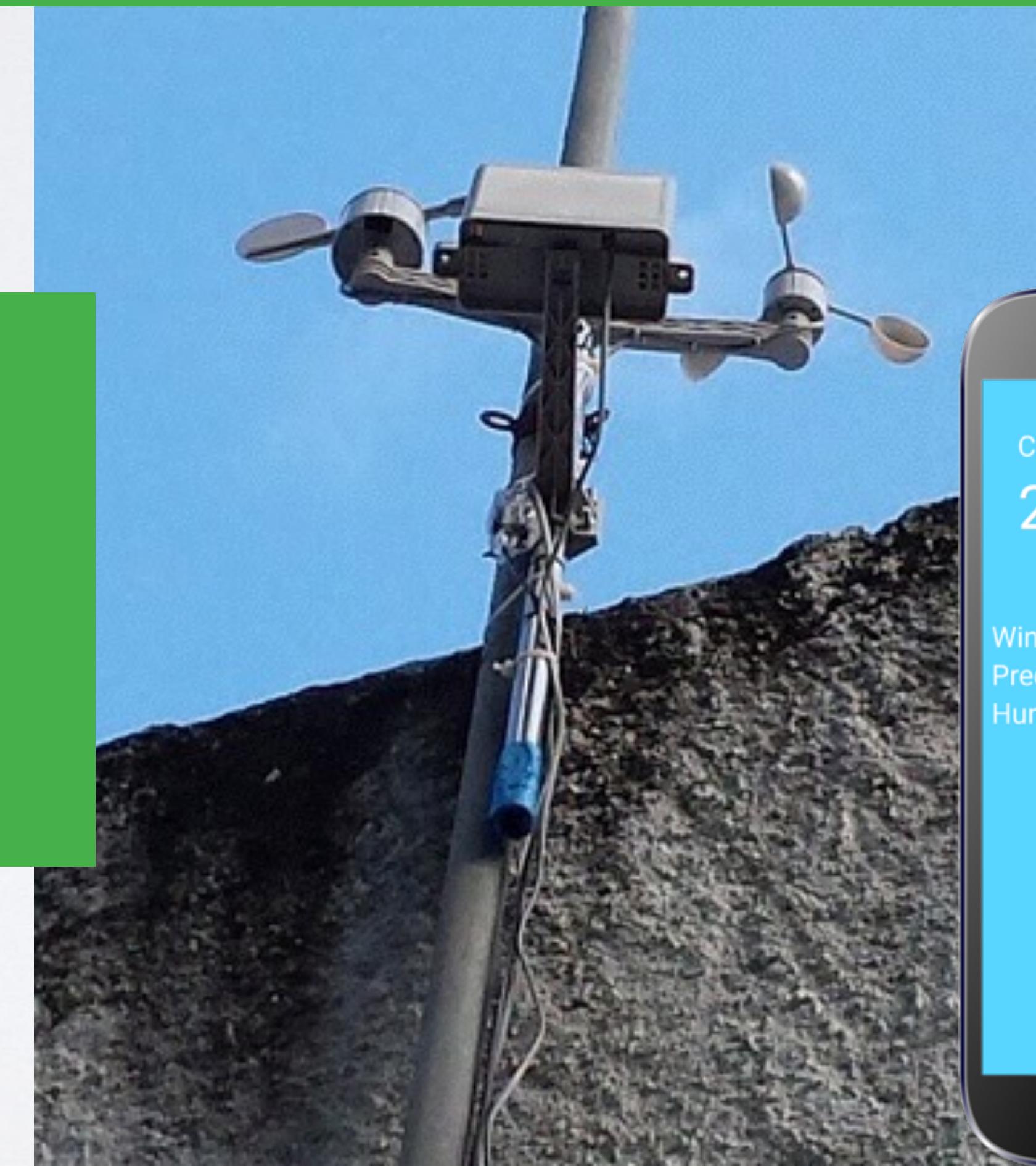
experiments



# experiments

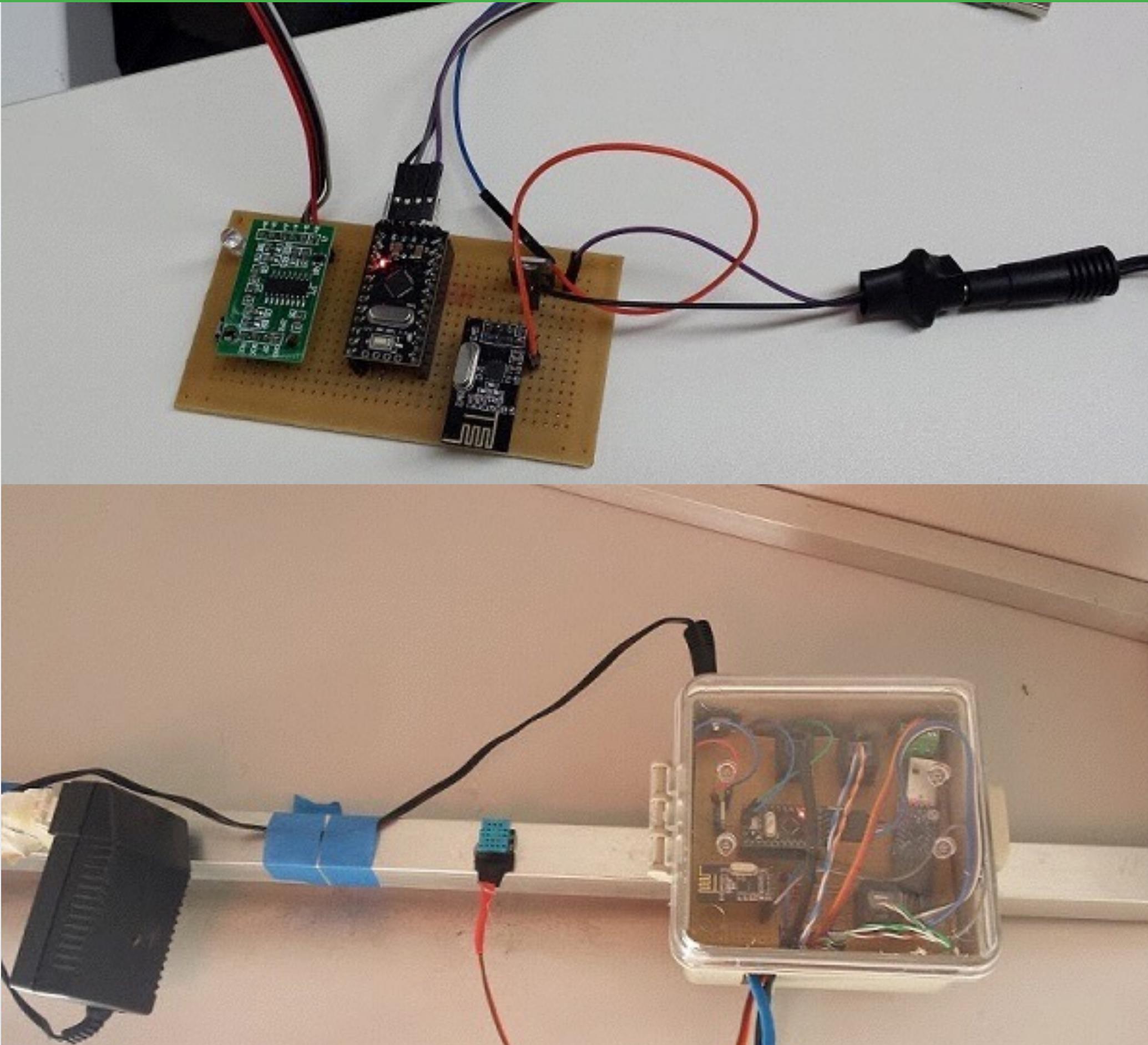
## weather station

**we are developing a weather station that will be integrated to the Irrigation Monitor.**



# experiments

## water volume meter



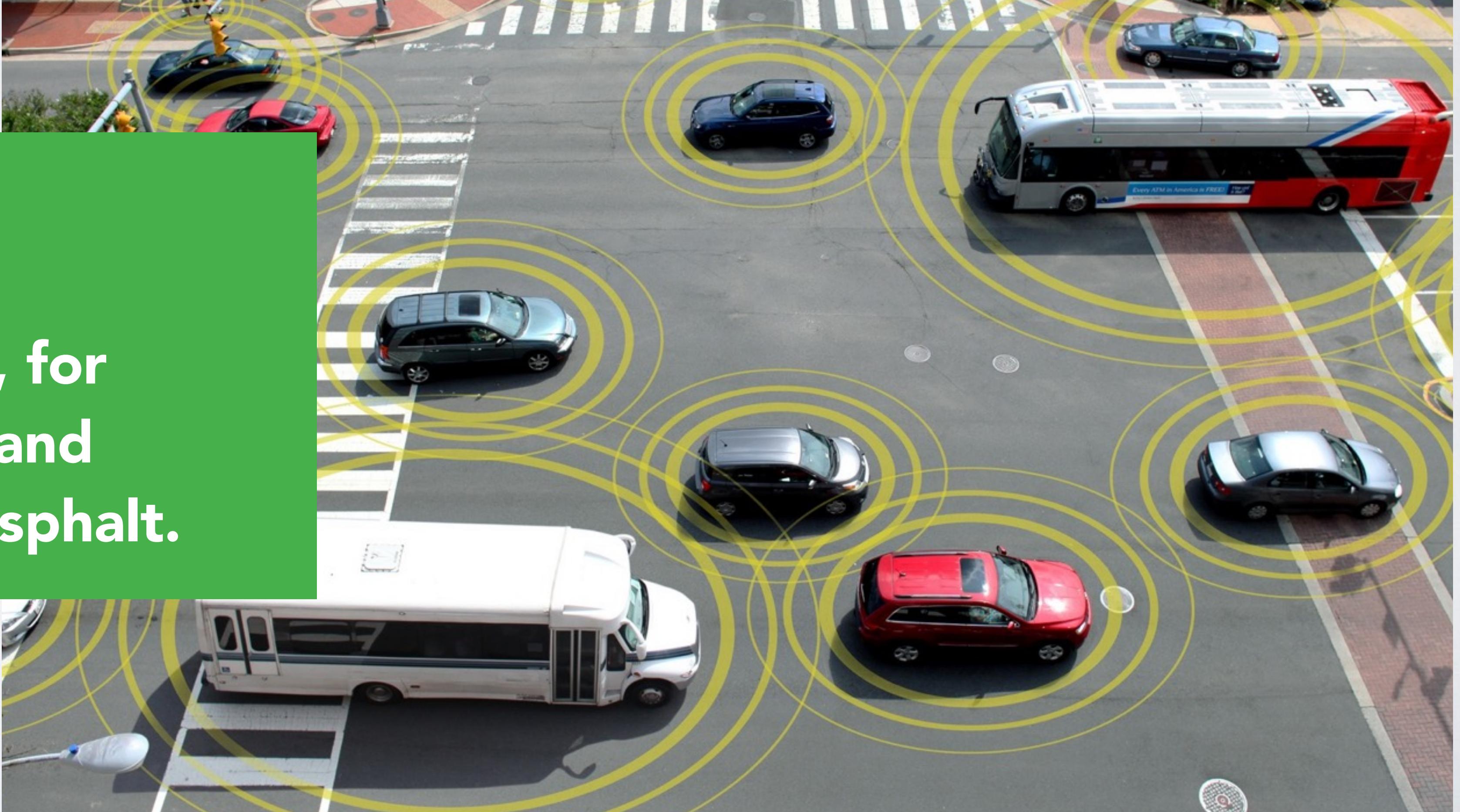
An experiment for measuring water volume of a drinking fountain. It will be used to measure volume of gas on pressurized cylinders.

# experiments

connected cars

S.A.M.B.A

A prototype, that is  
embedded in the car, for  
monitoring flooding and  
irregularities in the asphalt.



# internet of things

cases

# CASE

## Irrigation Monitor

How to improve performance on agriculture, having control and tracking on the central pivot for irrigation?

A service for monitoring central pivots based on the needs and restrictions of infrastructure and connectivity that exist inside the country.

<http://www.monitordeirrigacao.com>

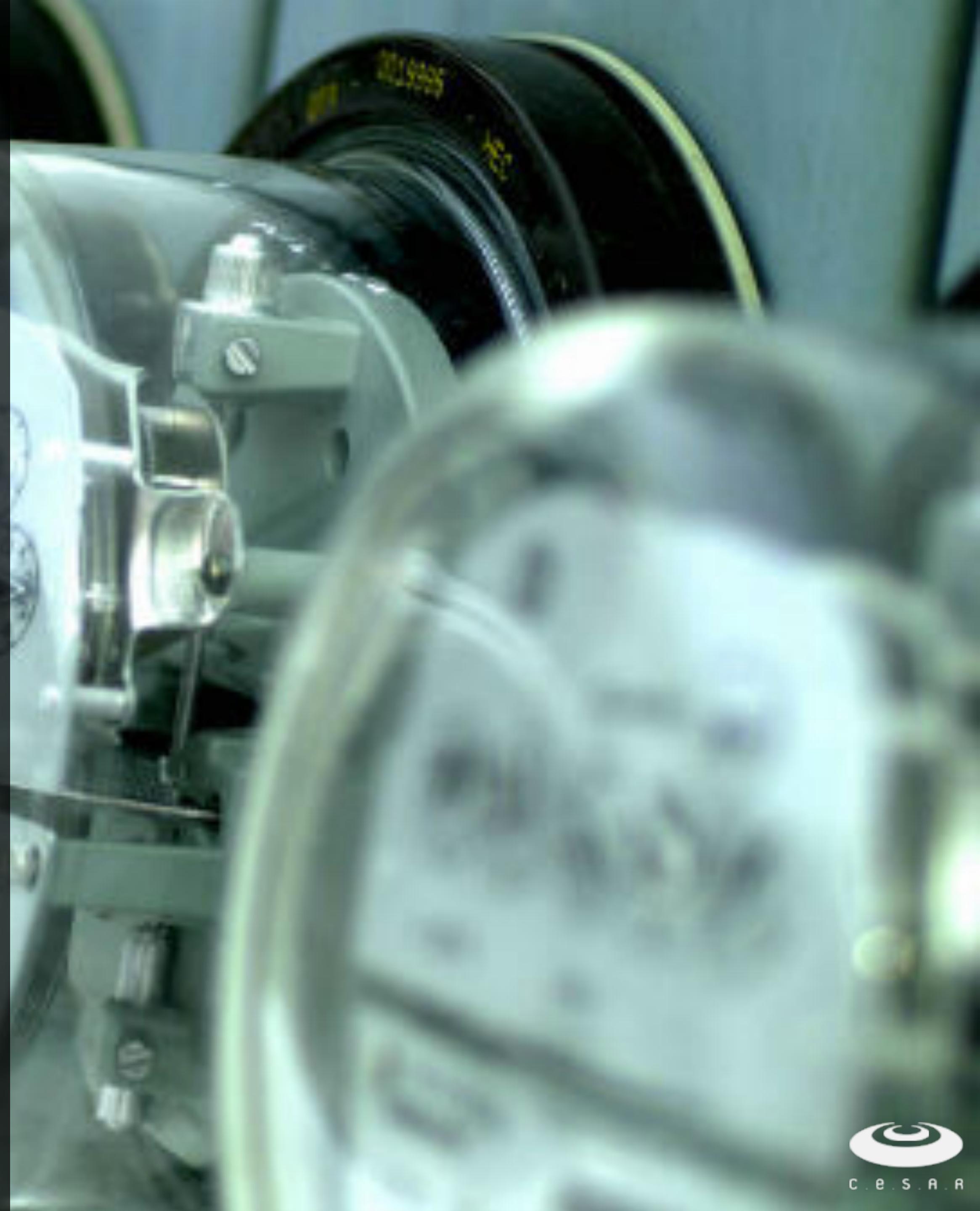


# CASE

## Smart Metering

Technical specification of a Brazilian protocol for automatic and remote data collection of residential and industrial electricity consumption.

It promotes waste reduction and increased operational efficiency.



# INTERNET OF THINGS

# Thanks!



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