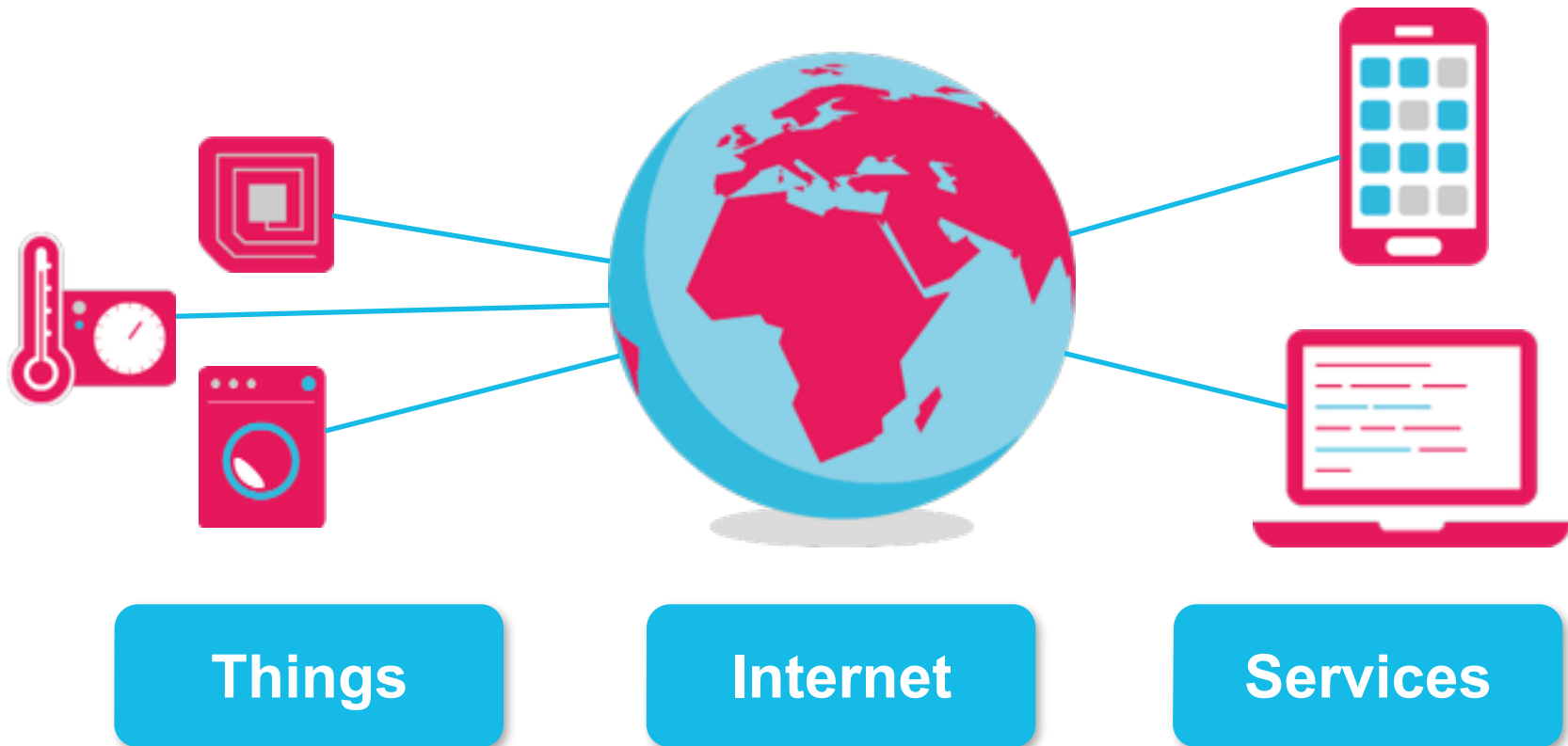# MASHUPS FOR THE INTERNET OF THINGS

glue.things – a Mashup Platform for wiring the Internet of Things with the Internet of Services

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Internet of Things is the network of physical objects that contain embedded technology, communicate and sense or interact with their internal states or the external environment. (Gartner, IT Glossary, 2013)

Things   **Internet**   **Services**

Sense & Control Things

Sense

Communicate

Interact

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Sensors & Actuators

Machine Vision / Optical Ambient Light

Position / Presence / Proximity

Acceleration / Tilt

Motion / Velocity / Displacement

Electric / Magnetic

Temperature

Leaks / Levels

Humidity / Moisture

Force / Load / Torque Strain / Pressure

Acoustic / Sound / Vibration

Flow

Chemical / Gas

Source:
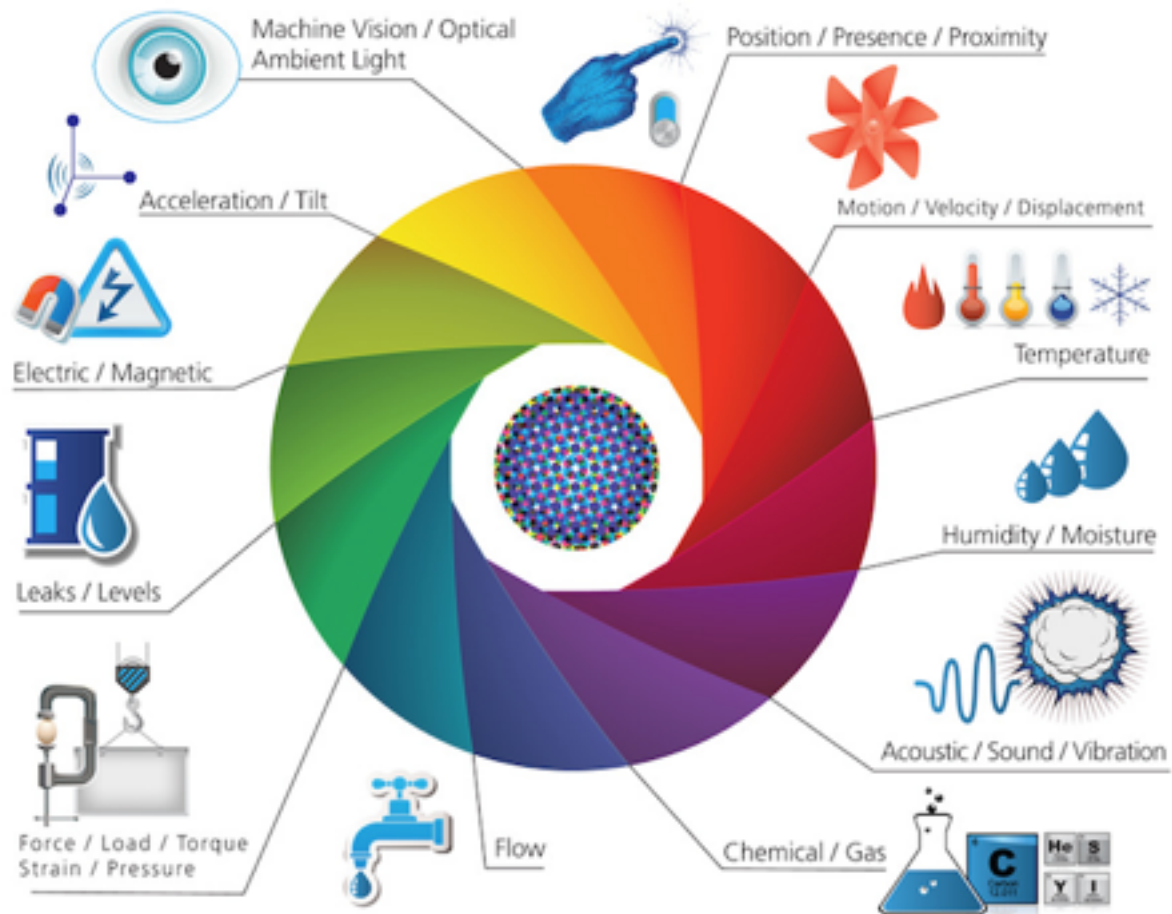
Connectivity
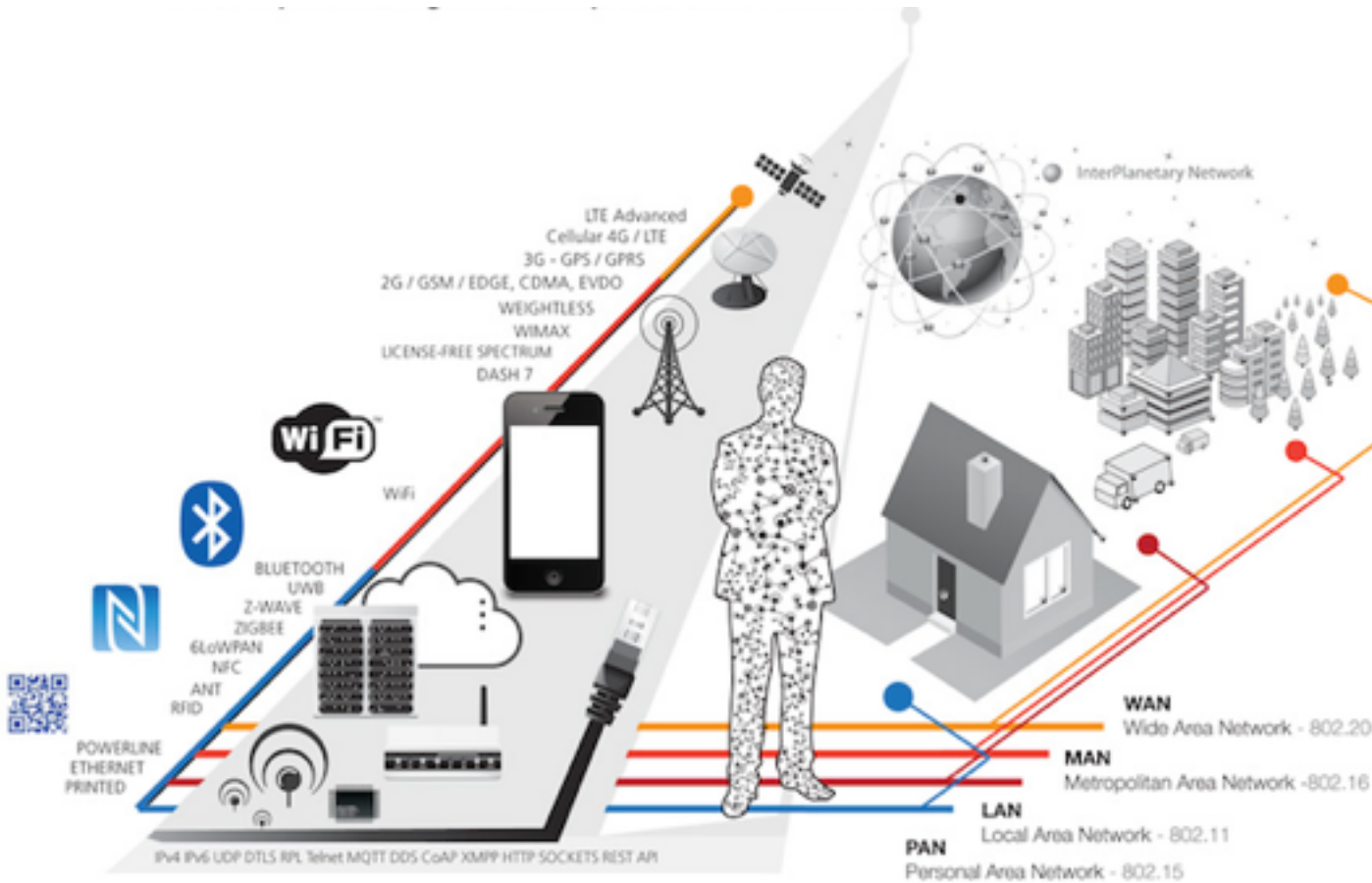
Interactions by People and Processes

Source: Postscapes
Tracking the Internet of Things
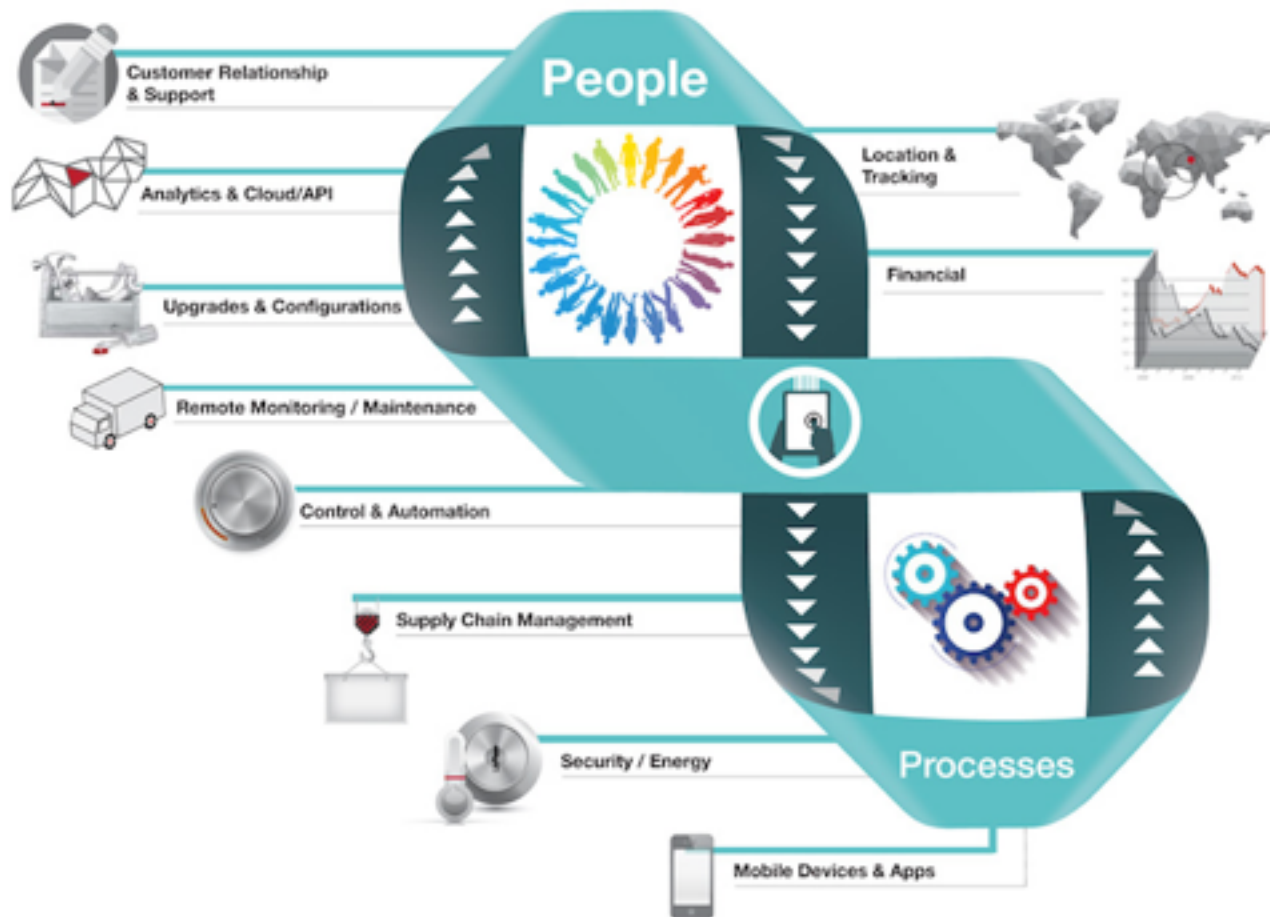
WHAT DOES IT TAKE?

The interactions between these entities are creating needs for **mashup toolkits** to build new types of **applications and services** for the Internet of Things.

Build & Deliver Mobile Apps

Device Communication

Deploy & Manage Back-End

Many APIs to connect and integrate

Management & Data Maintenance
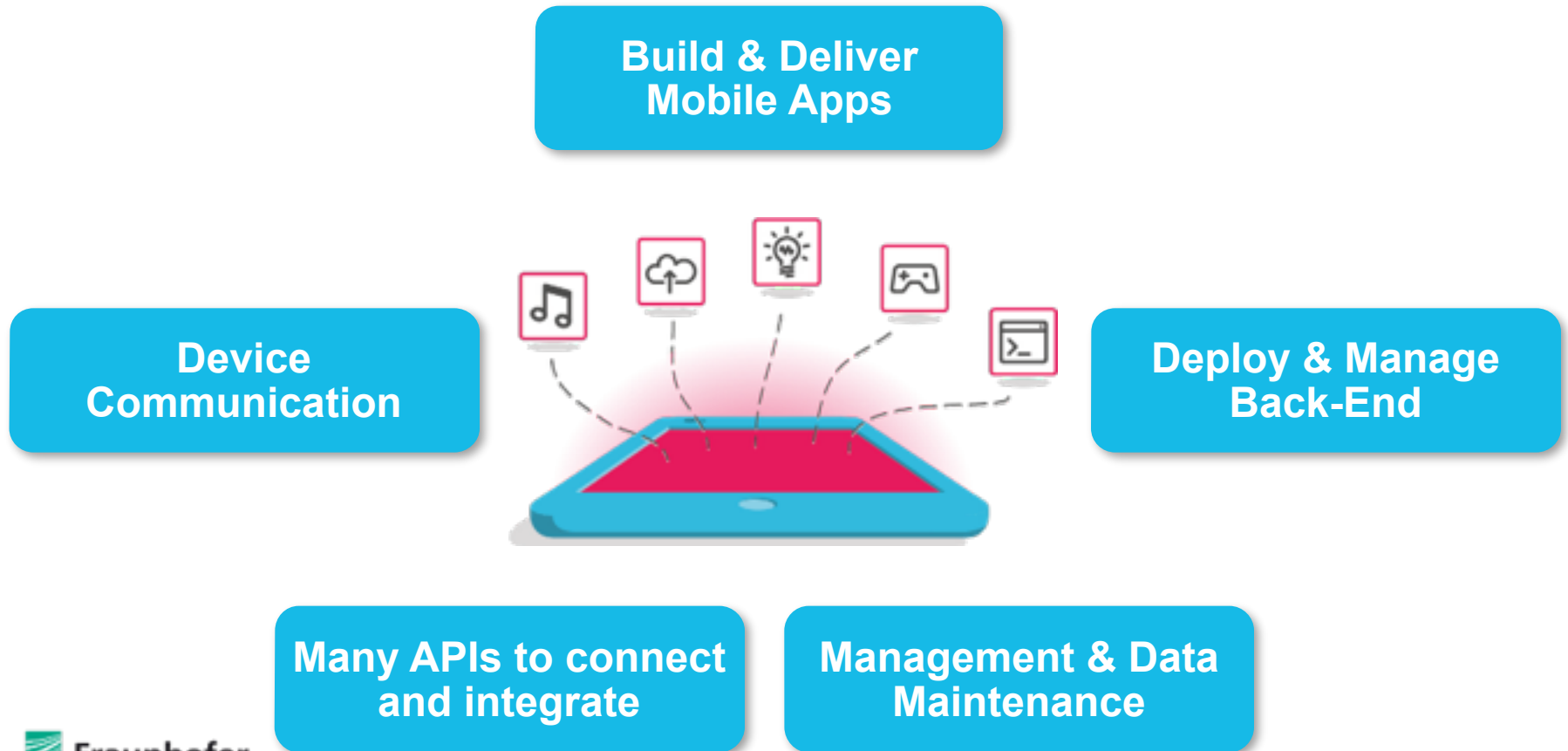
WHAT IS GLUE.THINGS?

glue.things is a mashup toolkit designed for applications and services in the Internet of Things
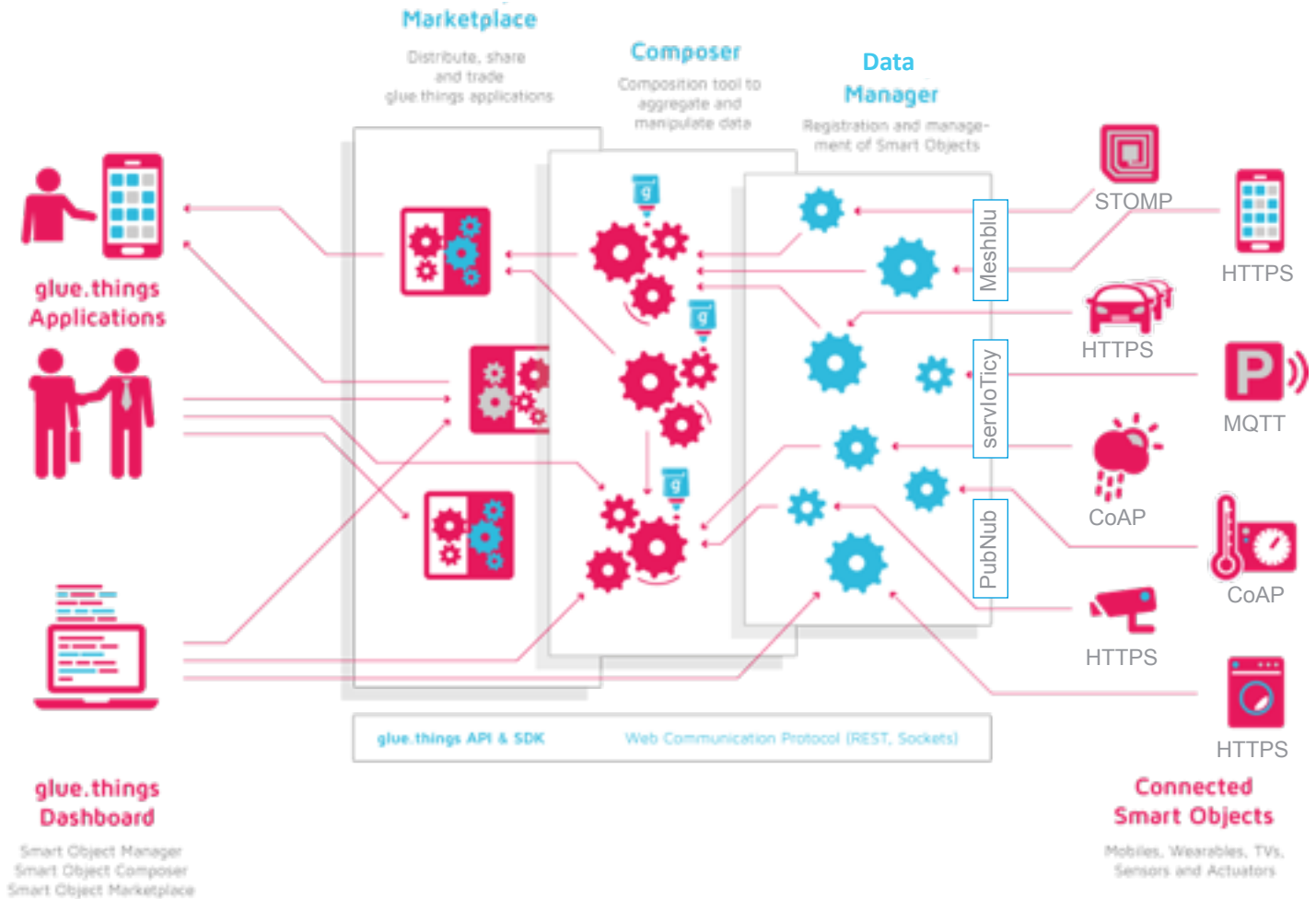
- **Connect** TVs, smartphones, wearable computing devices, and all of the consumer and business tools to the glue.things platform

- Easily **mash together** data streams of these devices and **build** new applications for them

- Finally, **distribute** mashup applications on an open and scalable marketplace

- glue.things provides all the necessary technological components, organized into a **coherent and robust mashup toolkit** covering both delivery and management aspects of device data streams, applications and their integration

HOW CAN APPLICATIONS BE DEVELOPED?

- glue.things offers **a mashup toolkit** (client libraries, REST API, Web-based dashboard) to connect TVs, wearable computing devices, and all of the consumer and business tools to the Internet

- glue.things is a **WoT hub**: supports **device integration** and **real-time communication** (Web Sockets, MQTT and CoAP based on real-time data stream networks such as MeshBlu, PubNub and servIoTicy), data stream mashups, triggers / actions and finally distributed deployment of these mashups

- **Development process** is supported by the **glue.things dashboard:**
  - configure and control data channels, meta-data, fine-grain permissions, conditional triggers, time-series data archiving and interconnection with other devices, apps and services
  - aggregate, manipulate, and mash together device data streams with any Web service, define conditions statements, triggers and actions for these mashups
  - Deploy and run the mashup applications on CloudFoundry, share and distribute them on a marketplace

- Use glue.things client libraries, REST API and dashboard to easily create innovative mashup applications in **three steps**: 1. Connect, 2. Build and 3. Distribute

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GLUE.THINGS DASHBOARD

Data Manager

- Web-based tool for **connecting and registering** any device on glue.thing. Once your device is connected, you will retrieve real-time updates of your device.

- Manage and organize one or multiple devices

- **Monitor** their status and configure **access policies** for applications talking to them

- **Visualize** the output data of your devices in **time series** and predefined **charts**

- **Modify** data channels

- **Token management** for data policies and views on data

- **Select** predefined **Triggers and Actions**

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Home   Platform   Documentation   Blog   About   🔍
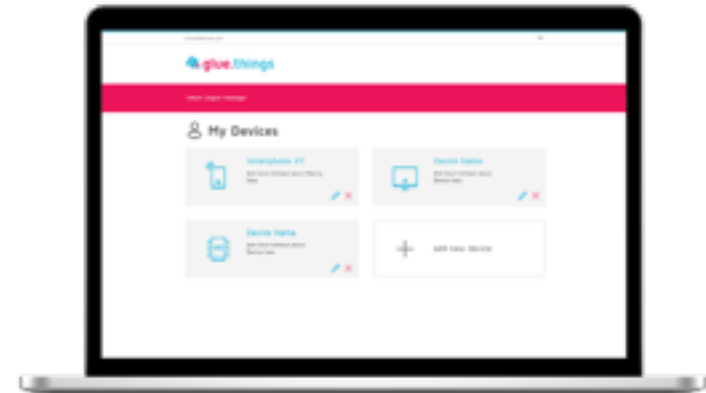
Dashboard

My Streams

|			
Phone: louay	Fame App	My Second drone	Door Bell
Default smartphone	Samsung TV	Door bell 2	Enyport
Parrot drone	Spark 2	Spark 1	My Hue Lamps
WeMo Switch	t1	t2	Roberts Phone

GLUE.THINGS DASHBOARD

Composer

- Provides you the capability to **aggregate, manipulate, and mashup** your device data with any Web service in a visual and intuitive way.

- Powerful mashup editor build on **Node-RED**

- Select your data channels from a collection of **devices and Web services**

- **Click and drop** your data channels on a canvas and connect them with flows

- Combine many data channels into one, **define conditions statements, triggers and actions**

- Deploy your mashup as application on **CloudFoundry**
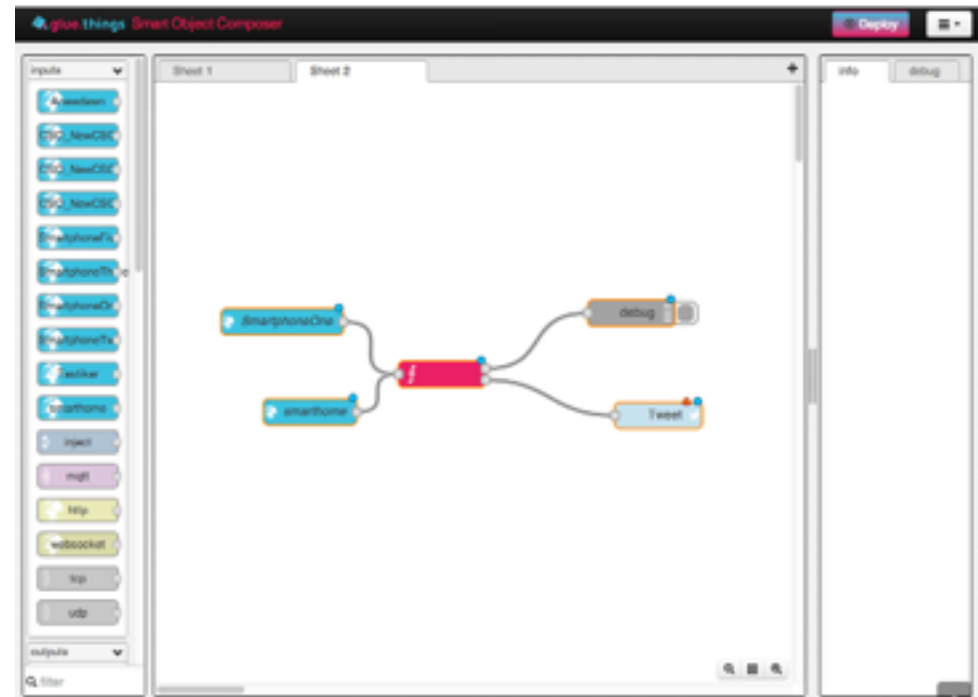
- Mashup applications are deployed as **Node-RED application** on CloudFoundry

- Support of **Multi-tenancy** and **Personalization**

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Dashboard

My Composer

GLUE.THINGS DASHBOARD

Marketplace

- Important to create **network effect**; increasing value of platform

- Distribute and share the **output data** of your devices and the final mashup application on a marketplace

- Define access policies and billing conditions

- Generated **mashups** of device output data and Web services including triggers and actions can be shared and distributed as **application** on a marketplace

- These applications provide **user authentication and authorization** capabilities

- Shared and distributed applications support **APIs** for third party access

- Subscribe to **favorite** mashup applications

- Define public mashups, private mashups and group mashups

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Dashboard

My Automations

Debug FAMIUM App

Debugging automation for the Famium APP

If Fame App Then Switch On Wemo

Showroom Demonstration

This automation displays all flows for our Showroom device installation

IF Door Bell THEN Turn on Philips Hue

If someone rings at the door bell, Philips Hue will be turn on.

APPLICATION EXPERIENCE

Connected Health, Wearables / Quantified Self

- Remote monitor of pulse oximeter

- Connect heart rate monitor alerts when heart rate is high

- Track daily activities and get guidelines for a healthier lifestyle

- Sense, understand and anticipate the behavior and mood of mobile users

Entertainment / Home Management and Automation

- Use head tracking capabilities of headsets for controlling your office tools: switch on / off Skype and your desk phone

- iBeacons for indoor positioning: shopping and room booking guides

- Smart Wireless Lightning and Audio Control

- Home and appliance power monitoring

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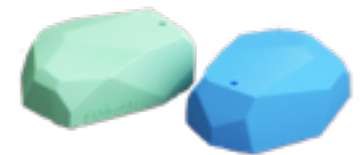
W3C WEB OF THINGS

Various efforts toward standardization for the Internet of Things

W3C Interest Group on the Web of Things

- **Key technologies** for Web of Things: REST, CoAP, XMPP, Web sockets, webRTC, MQTT, XML schema, linked data, JSON, JSON-ld, schema.org, mashups

- The domain is so broad and fragmented. Defining standards is really hard.

- How to break up the vertical software silos? Build the Web of services.

- Web of Things should be an application layer of the Internet of Things

- **Conclusion:** Outline use cases and best practices to build the WoT. This is better as to build new standards.

- **Positioning of glue.things:**
  - Builds on key technologies for the Web of Things
  - Contributes to an **interoperable approach** for connecting the Internet of Things with the Internet of Services

ETSI M2M

ETSI M2M

- ETSI M2M 690 good for **industrial implementations** but not in the connected home and consumer environment.

- Missing concepts regarding device discovery, indoor positioning, data subscriptions, identity management, semantics and meta data

- **Barriers to implement ETSI M2M 690:**

  - is mostly supported by operators

  - less reference implementations

  - the core architecture with two levels to store data is too complex for consumer devices

  - the subscribe / notify mechanism is not appropriate

  - mid interface is good for standardization but prohibitive from a performance perspective

- **Positioning of glue.things:**

  - Provides an **agile platform across devices, communication, data and APIs** by addressing ETSI missing concepts and implementation barriers

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