Overview

A graph-centric Web of Things platform comprising

- A massive graph database for digital representations of physical objects with :
  - their properties (e.g. functionalities, location, variant...),
  - their relationships (e.g. part-of, adjacent-to, sensor-for, actuated-by...).
- Extensible set of tools and APIs for :
  - search, navigation, reasoning, analytics.

An in vivo experimentation platform

- Privoding actual access to things and devices for the monitoring and the control of their shared environment.
- Connecting (southbound) device manufacturers and network operators with (northbound) IoT applications developers.
- Open to third party tools for developers.

... where users define their security rules and other access modalities

- Fine-grained visibility and access control of/to things' avatars;
- Access modalities (security, configuration, price...) to actual physical things from their avatars.

... and choose their business models

- Thing'in baseline modle is open, two-sided info-mediation platform & marketplace connecting IoT data providers and users.
- Subsets of the graph may be managed with limited access.
- The overal added value is in sharing & interconnetion of IoT information at large.

---

www.thinginthefuture.com

Contact
contact.thingin@orange.com

Thing'in
The Web of Things

Graphing the Web of Things, together!

A multi-sided integrative research platfom to fuel innovations in Web of Things technologies, usages, services and business models.

Inside Thing'in
A multi-scale graph for WoT information mediation

**Nodes of the graph store digital representations
(a.k.a. avatars/twins/shadows) of connected and non-connected:**
- Things, objects, devices, spatial entities, physical systems and their subsystems at all scales.
- High-level « property graph » meta-model.
  - nodes have properties, relationships may have properties.

Semantic referencing of graph, ab initio or post hoc
- All nodes, relationships and properties are:
  - Uniquely identified by URIs.
    - Part of larger linked data cloud.
  - Typed with referencee to:
    - Standardized cross-domain information model.
    - External domain-specific-ontologies.

High-level and effective navigation & query language
- Geospatial query
- Graph matching (e.g. finding patterns in the graph, a subgraph in the graph).

Access modalities
- Interfaces to networked functionalities of physical devices from Thing'in.
- With princing and contracts if they apply.

Built-in security & privacy
- Data from physical objects is sensitive...
- Thing'in does not store raw data strams generated by all sensors and data sources it will reference.
- Thing'in partners manage their own access rules.
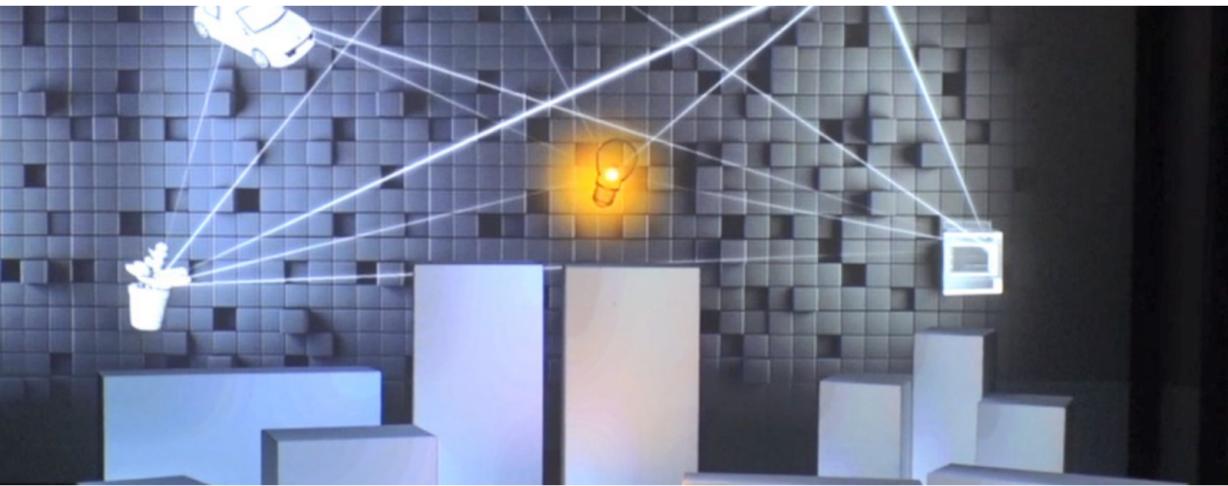
Evolving an experimental integrative research platform

Orange proposes to build the Web of Things collaboratively

- as a full-fledged graph abstracting all kinds of connectivity, not only as a set of disconnected resources accessed through web protocols
- as an open, shared, yet managed and curated platform.

The Thing'in platform will provide enablers and APIs for developers, data providers & data users, object manufacturers.

Integrative research
Investigate research challenges in all areas where ?

Integrate data from different partners using different IoT networks and platforms

Shared value creation
Partners benefit from shared ntework effects on both sides of the Thing'in platform.

All stand to gain by interconnecting and sharing data that is still mostly maintained in solos and represented in domain-specific formats

Hands-on experimentation
Thing'in will scale through shared experimentation involving users from both sides of the platform
- Device owners, manufacturers, contractors
- Application developers, smart home/building/ city/industry/agriculture /...operators

Challenges of the Thing'in platform
- Shared references of physical things, keeping owners in charge of information disclosure.
- Evolving a shared model for the description of things, their categories, properties & relationships.
- Maintaining proper separation of concerns between different scales and domains of the graph while keeping the benefits of interconnetion.
- Managing proper distribution of the platform.

Inside Thing'in
A multi-scale graph for WoT information mediation

Smart Building: management of emergencies (fires, floods, etc.). Thing'in could:
- Simulate an emergency situation in a virtual reality environment on the basis of object descriptions and relationships
- Run actual evacuation of occupants and intervention of emergency responders actuation of various things (e.g. door-locks, lights, screens, speakers, etc.) beyond their initial usage.

Smart Industry & Logistics: « things » lifecycle management. Thing'in could:
- Leverage a blockchain in a micro-services architecture that augments objects with lifecycle functions from their production to their recycling through their purchase, sale, renting
- Visualize geo-located things and their trajectories in a virtual or augmented reality display

Smart City: intelligent car parking. Thing'in could:
- Cross-reference traffic and parking information for smart navigation to closest parking place taking into account both street congestion and parking occupancy
- Provision parking space rental service (like AirBnB) from aggregated offer of private citizens making individual private parking spaces available for short durations