

Towards Enabling Internet-Scale Context-as-a-Service: A Position Paper

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What is Context-Awareness?

Context “is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves” [1]

[1] Abowd, Dey et al: Towards a better understanding of context and context-awareness, 1999

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“Context is the *dress*ing of a focus” [2]

[1] Abowd, Dey et al: Towards a better understanding of context and context-awareness, 1999

[2] Brézillon and Patrick Brézillon. Context Modeling: Context as a Dressing of a Focus, 2007

What is Context-Management

Getting the ***relevant*** context information from the provider to the consumer in a ***meaningful*** manner

(Provisioning, Inference/Analysis, Deployment, Authorization/Access Control, ...)

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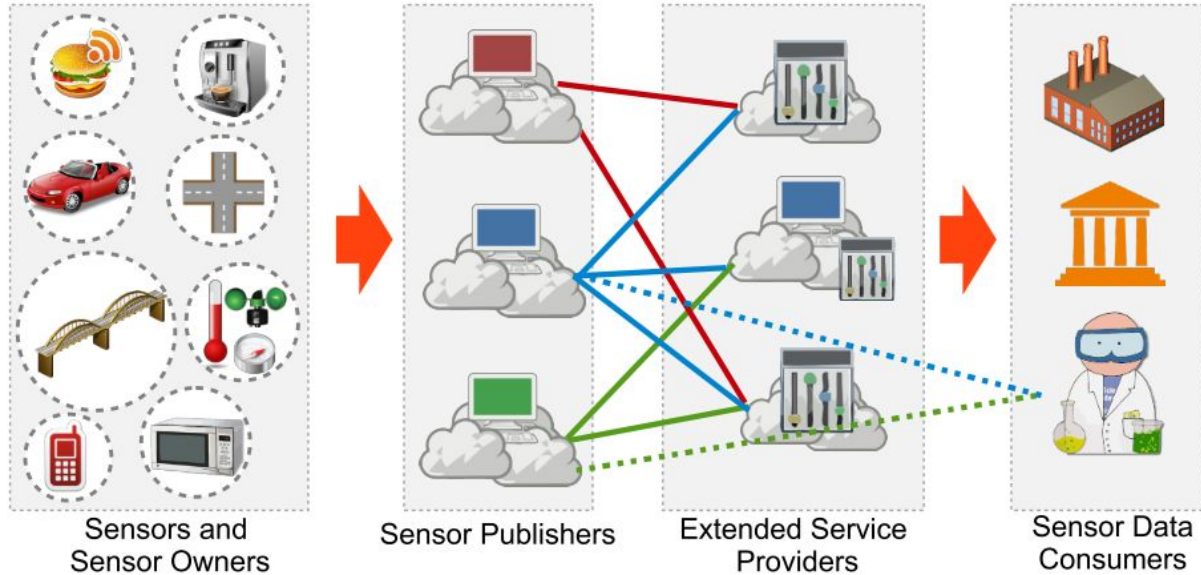
(Provisioning, Inference/Analysis, Deployment, Authorization/Access Control, ...)

Provisioning and Deployment perspective:

- **Search, Discoverability**
- **Control sharing of context**

Sensing as a Service

[Perera et al, 2014]: Sensing as a Service Model for Smart Cities Supported by Internet of Things, Trans. Emerging Tel. Tech.



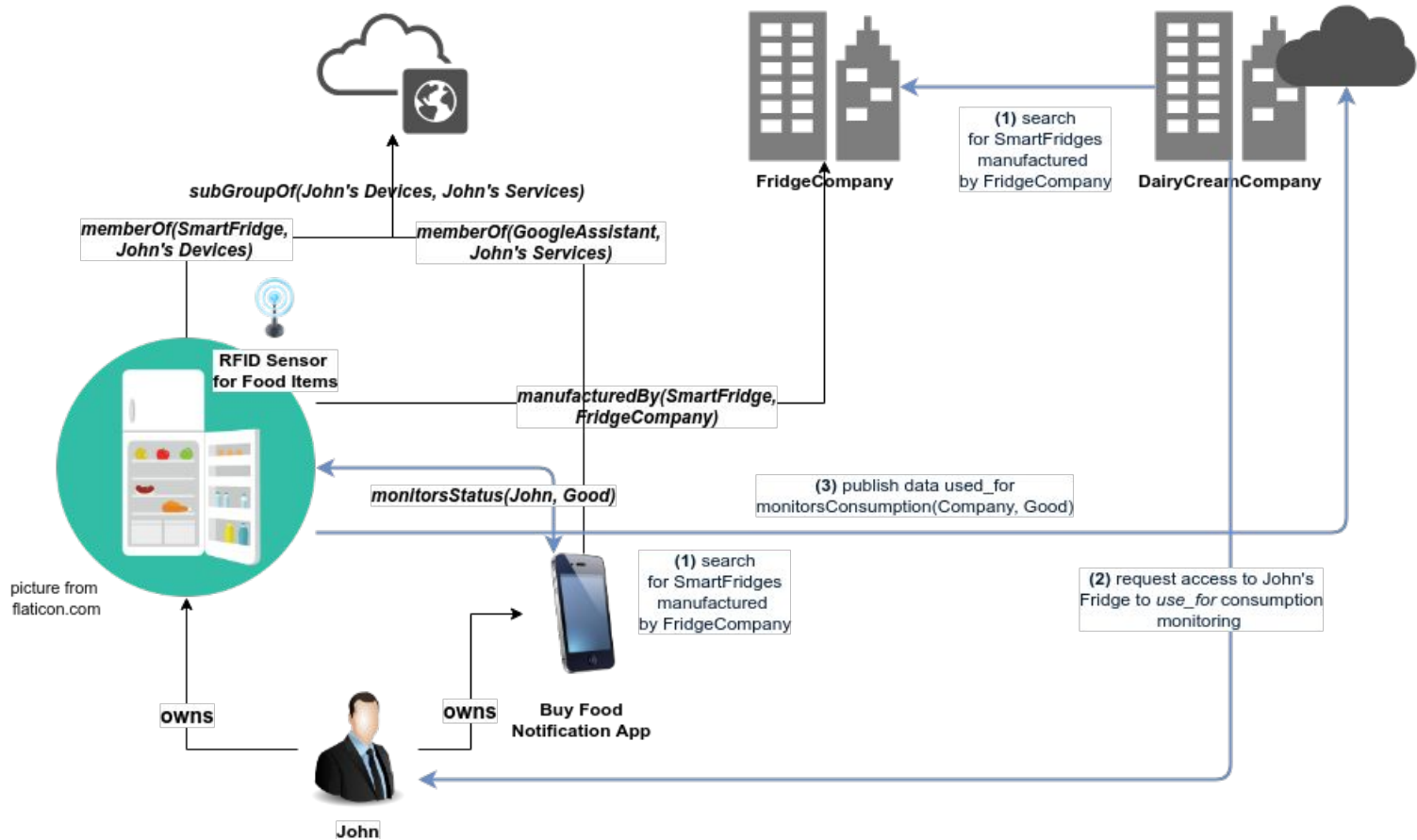
Personal owners
Private/Public Organizations
Data Providers

Common Middleware

- Localized/Aggregated Analytics
- IoT Ecosystem
- Enable creation of new business models

Home Automation
Smart Environments
Smart Cities
Smart Agriculture
Logistics

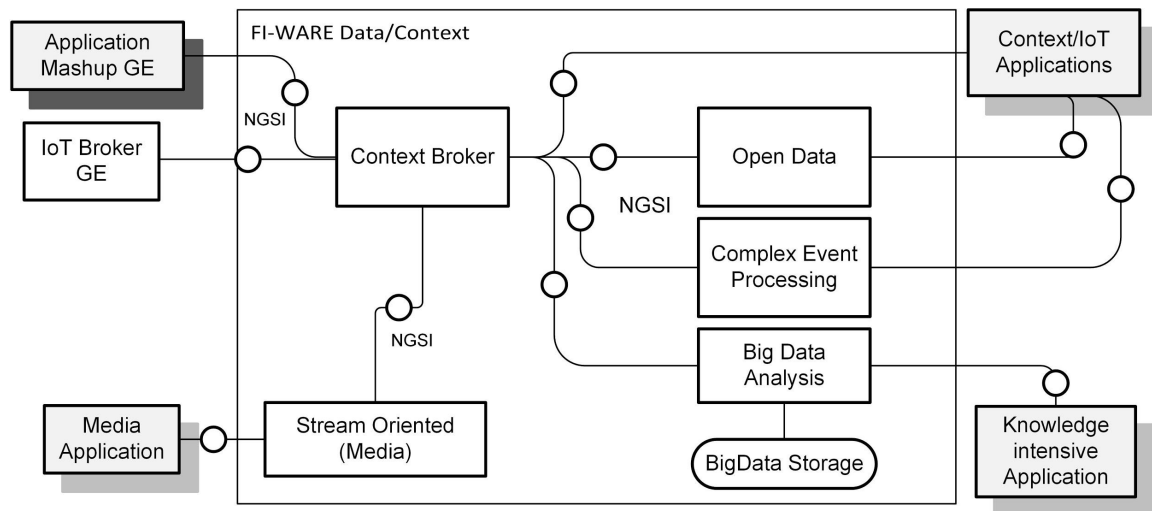
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Sensing as a Service - Scenario

Shortcomings in structuring context information

NGSI-LD¹ and W3C ThingDescription² model content *only* → no explicit information structuring



FI-WARE Context Management Architecture

- ContextBroker has no means to logically split managed context information
- Defines centralized flow
- Federation possible, pot cannot be automatized

¹ https://github.com/FIWARE/NGSI-LD_Experimental/blob/master/doc/NGSI-LD_Information_Model.md

² <https://www.w3.org/TR/wot-thing-description/>

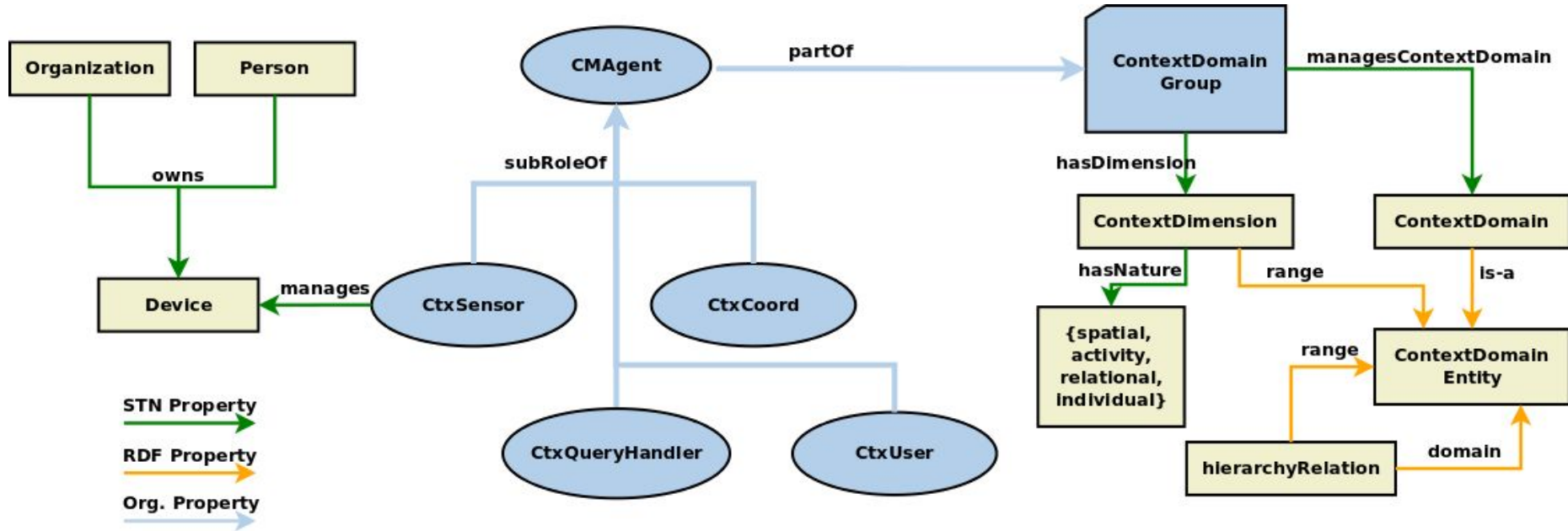
Position

We need **structure** to facilitate *search* and *discoverability*

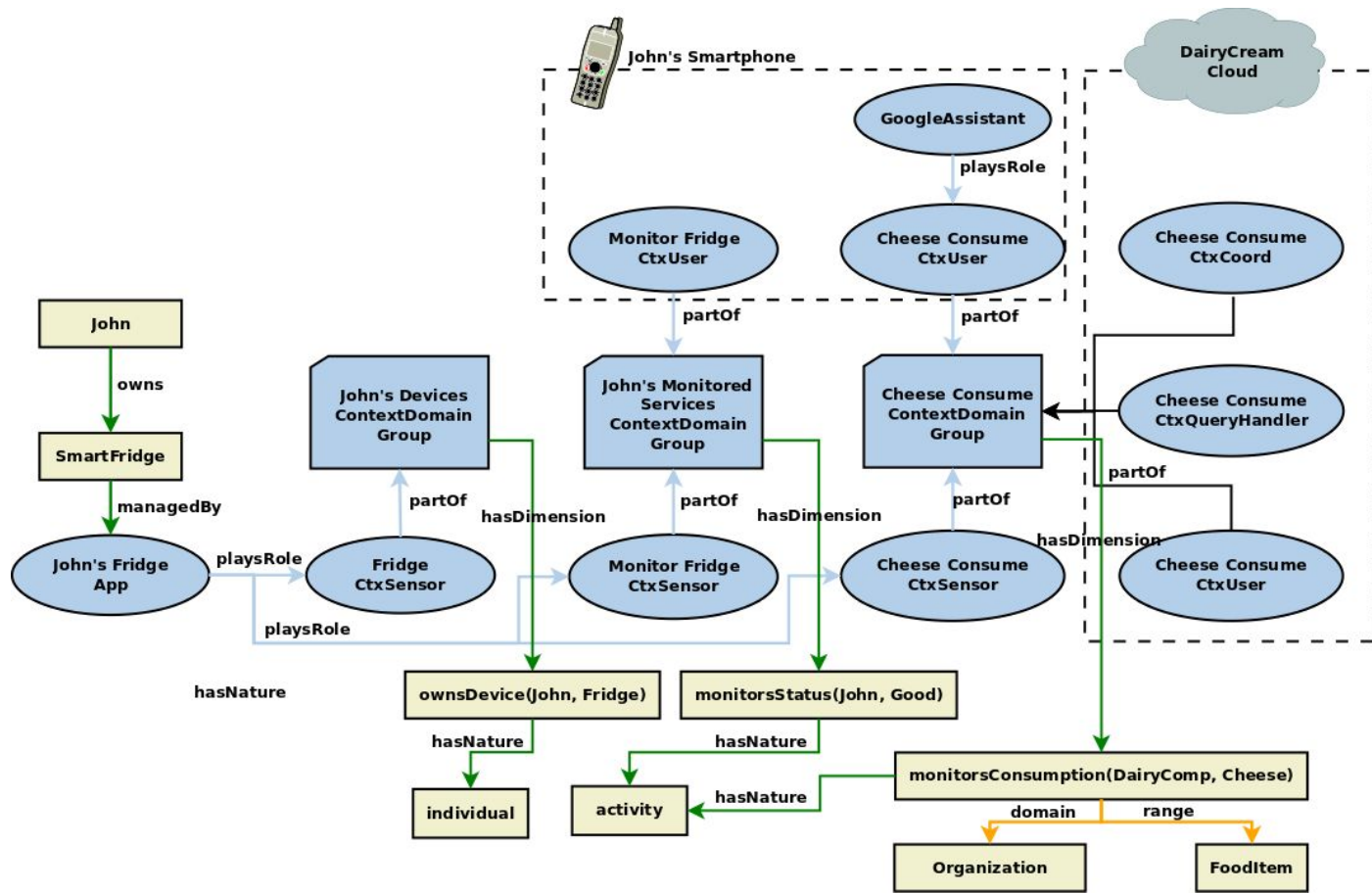
We want to exploit the **typed relations** and **normative-dimension** of **Socio-Technical Networks**

The **structure** has to help determine:

- A logical, distributed partitioning for managing context information (*localize* as much as possible) which can be actively *joined, quitted, traversed*
- The normative/authorization dimension - how/when are applications allowed/obligated to interconnect to share context information



Structuring context info: ContextDimensions and ContextDomains



Sensing as a service: modeled

Conclusion

Position: large-scale context-as-a-service stands on **augmenting** models for representing context (e.g. ThingDescription) with **structure** of information organization which brings:

- Facilitated search/indexing
- Decentralized management and query routing
- Exploit the agent-based view to add normative dimension to context sharing