DISTRIBUTED ARCHITECTURE OF MULTISCALE CONTEXT MANAGEMENT FOR THE IoT

**Motivations**

- **IoT context-aware applications**
  - Smart cities, intelligent transport, leisure and entertainment
- **Infrastructure for the IoT**
  - Large and heterogeneous system distributed over several levels of ICT

**Challenges: Context management for the IoT Applications**

- Context management: data delivery, processing, and situation identification and presentation
- Context data perceived from not only ambient but also the remote spaces
- Large amounts of heterogeneous data from different sources
- Taking quality of context and privacy protection into account

**Innovation: Distributed Event-based System with Multiscoping for Multiscability, QoC and Privacy**

- **Multiscale Distributed Systems (MDS)**
  - Multiscalability (dealing with heterogeneity) ≠ scalability
  - Multisystem characterisation (framework MuScA)
  - Model-driven process to define viewpoints, dimensions, scales
  - To express constraints for context data delivery
    - E.g., limit the car park information delivery to those at foot distance
    - E.g., limit the delivery of GPS position to friends in the same city

- **Distributed Event-Based System (DEBS) with multiscoping**
  - Concept of scale (of MDS) ⇒ concept of scope (of DEBS)
  - Application designers and system administrators "partition" the system into scopes by tagging architecture elements
  - Advertisements, subscriptions, and publications are scoped
  - Notifications are only delivered to visible scopes

**Results**

- **Functionalities**
  - Context data distribution (framework MuDEBS)
    - Expressive content-based filtering, and with push and pull modes
    - Multiscalable filtering of context data with multiscoping
    - Data-model agnostic (data models are manipulated in context managers)
  - Context management (framework MuCONTEXT)
    - Combining approaches: process oriented, ontology oriented and agent-based

- **Extra-functionalities**
  - Quality of context and privacy protection (framework QoCIM)
    - Realised using rule-based filtering for controlling the distribution of context data

**Architecture of INCOME**

**Publications**

- Lim, L. and Conan, D. Distributed Event-Based System with Multiscoping for Multiscalability. 9th MW4NG Workshop of the 15th Inter. Middleware Conf. 2014.

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http://anr-income.fr/
https://fusionforge.int-evry.fr/www/mudebs/