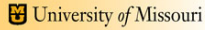# In-the-know: Recommendation Framework for City-supported Hybrid Cloud Services

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Overview

- Need for transformation of user 'App' provisioning from the *PC-era Local Apps* to the *Post PC-era Cloud Apps* using hybrid cloud services within cities
    - Can leverage a city's local ICT investments for building private clouds
    - Can extend them 'on-demand' to utilize the benefits of public clouds
- Goal is to mediate hybrid cloud services for highly bandwidth-intensive and latency-sensitive Apps
   - Based on context of "Mobility", "Performance" and "Cost" factors
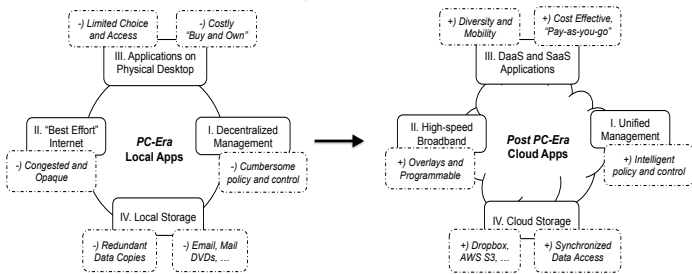
"In-the-know" Architecture

- For context-aware mediation, our architecture has three types of agents:
    - Consumer Agent – collects user's preferences like cost, performance
    - Recommender Agent – defines rules to perform context-aware mediation
    - Provider Agent – provisions resources using 'on-demand' contracts

The recommendations help dynamically configure service alternatives to ensure:

  a) Optimal user QoE in service delivery, and
 b) Effective utilization of hybrid cloud resources
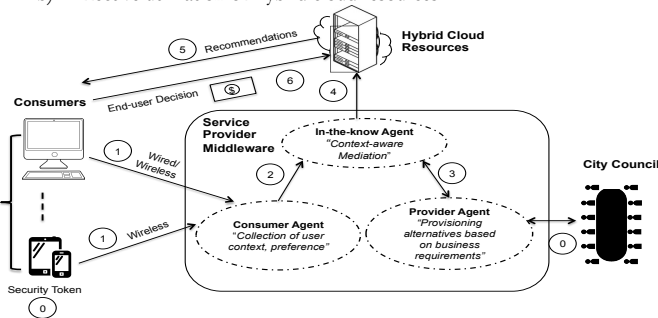
"In-the-know" Ecosystem

- City-supported services based on socio-economic considerations at the macro-scale (*city-level*) can be translated into service pricing within on-demand contracts at the micro-scale (*citizen-level*), through the use of "In-the-know" recommendations at the meso-scale (*provider-level*)
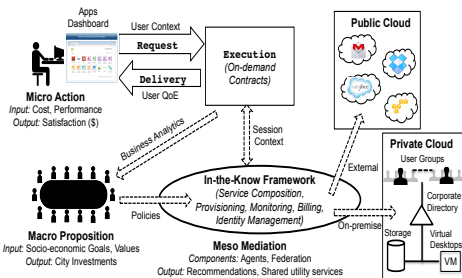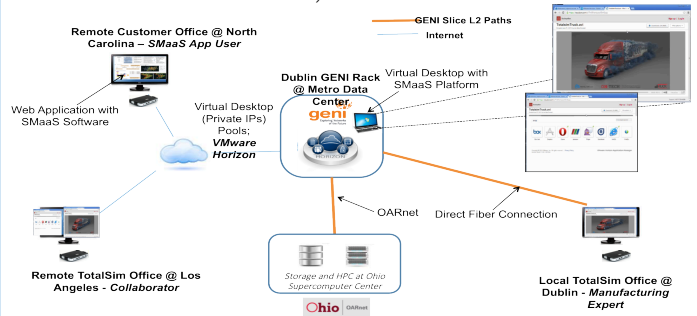

Case Study I: Eldercare-as-a-Service (ECaaS) App

- *Purpose:* Serves as a "Residential" App provisioning study within a city
- *Objective:* To mediate provisioning of a high-definition videoconferencing Cloud App that uses thin-clients and Kinect sensors in Google Fiberhoods for connecting Patients (@Kansas City) and Medical Expert (@MU)
- *Metrics:* Mobility Score (M_i) - calculated based on available bandwidth for thin-client encoding rate selection; Performance Score (P_i) - calculated based on video quality and interaction responsiveness perceived by users; Cost Score (C_i) - calculated based on price of the service provisioning
- *GENI Relevance*: GENI Rack and OpenFlow use for App orchestration
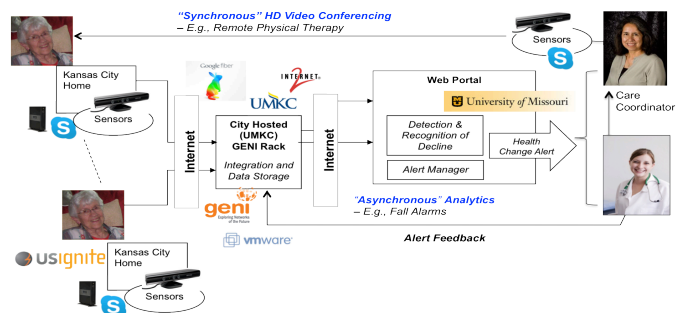
Case Study II: Simulation-as-a-Service (SMaaS) App

- *Purpose:* Serves as a "Small-business" App provisioning study within a city
- *Objective:* To mediate provisioning of a modeling and simulation related Cloud Apps that use thin-client connections to customized virtual desktops with elastic HPC-backends (leveraging storage and computation resources at OSC and City of Dublin, OH) for advanced manufacturing companies such as TotalSim to provide affordable HPC Apps to customers
- *GENI Relevance*: TotalSim using GENI for PaaS experiments, which will enable them to deliver their App (that has data-intensive computation and data movement workflows) in SaaS form to their customers