Motivating Example: Smart City Ambient Assisted Living (SCAAL)

- Scenario
  - Smart cities dissolve computational infrastructure, create ubiquitous context-aware services in metropolitan area
  - Ambiant assisted living aids in prolonging and enhancing independent living for the elderly
  - SCAAL applications empower independent navigation of senior citizens in large cities
- Personal data center (PDC) manages multiple sensor & data streams
  - 3-dimensional high-resolution health data
  - Priorities, update rates change based on patient’s health
- Dynamic environment

SCAAL Applications Require QoS; Inherently Involve Very Dynamic Environments

Solution Approach: ADAPtive Middleware & Network Transports (ADAMANT)

- Timely adaptation to dynamic environments
  - Supervised machine learning
  - Accurately handle known environments
  - Support unknown environments

Managing interacting QoS

- Composite metrics evaluate multiple QoS concerns
- Adaptive Network Transport (ANT) framework has composable modules
- Protocols balance QoS (e.g., reliability & latency)

ADAMANT addresses the challenges of bounded, timely, scalable adaptation to manage QoS

FUTURE WORK

1. Specifying contentious requirements via DSML profiles for application types, DDS patterns
2. Supporting EIBs, Web Services, ESBs
3. Prioritizing QoS aspects within composite metrics

Further Research:

Incorporation of standards

- Data Distribution Service (DDS) = OMG pub/sub standard
- 22 QoS policies
- Platform-agnostic IDL

QoS-enabled Pub/Sub Systems in Dynamic Environments Are Challenging to Manage

Scalability

- Data Distribution Service: decouples senders, receivers
- Transport protocol agnostic (e.g., IP multicast)

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