Modeling and Analyzing Demand Response Systems

www.wattalyst.org

WATTALYST

- Wattalyst is short for WATT anALYST. Wattalyst aims to understand in what context and how would consumers reduce electricity demand. It is funded by the FP7 program of the European Commission. The consortium consists of seven partners from different geographies
- Project Start Date : 01/10/2011
- Duration: 3 years
- Grant Agreement No: 28322

ILLUSTRATION DIAGRAM

- **OBSERVE** - Readings from networked smart meters, appliance monitoring devices and context sensors
- **INFER** - By Data Mining and Analytics on observation data
- **INFORM** - The consumer about peak load, high market price, system instability etc. through SMS, in-house displays
- **INFLUENCE** - The consumers with incentives for reducing consumption

WHAT IS DEMAND RESPONSE?

- Changes in electricity usage by consumers from their normal consumption patterns in response
  - to changes in the price of electricity over time
  - to incentive payments designed to induce lower electricity use at times of peak load

SCOPE

- Investigation of how consumers react to demand response signals.
- Understanding how consumers reduce demand by identifying the loads (e.g. washing machines, electric vehicles) that can be shifted / reduced (e.g. cooling, heating).
- Understanding effective methods of conveying the DR signals to the users.

OBJECTIVES

- Provide an understanding of the factors that drive energy consumption and demand side participation.
- Investigate influential mechanisms for multiplexing consumption schedules and smoothening / lowering energy demand peaks.
- Analyze the components of a DR system towards a sustainable and scalable energy monitoring infrastructure
- Conduct field trials to validate the viability and effectiveness of the proposed solutions
- Create design recommendations for DR system designers

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WATTALYST

SEVENTH FRAMEWORK PROGRAMME

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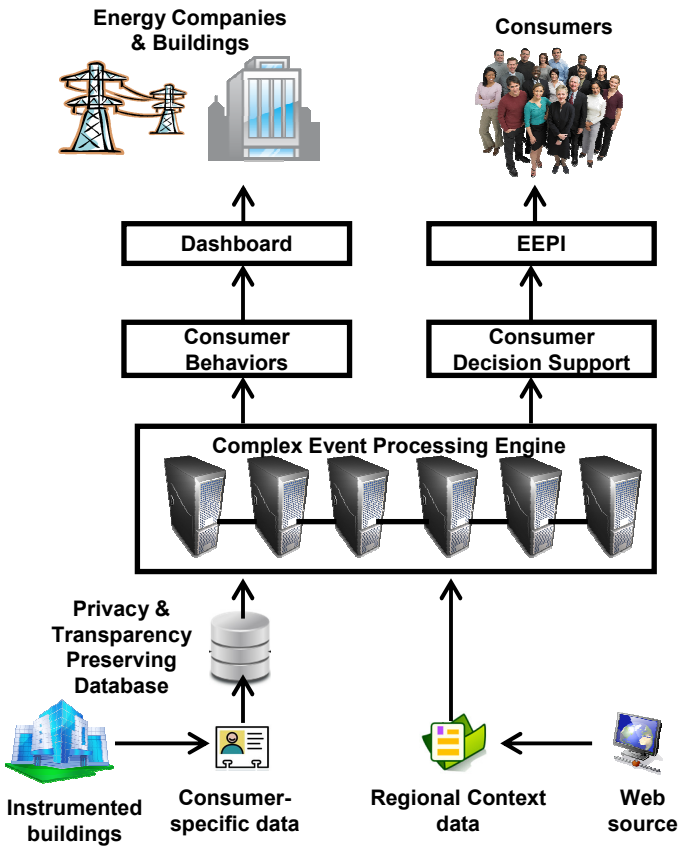
SYSTEM ARCHITECTURE



MOTIVATION

- During the past five years overall EU energy consumption has increased an average of 0.9% per year.
- Electricity generation accounts today for a sizeable portion of the European Union's CO2 emissions.
- If Europe continues to follow this present trend not only will it fail to meet its own climate change objectives of 20% reductions by 2020, but electricity consumption will actually have risen 18%.
- Demand Response programs in conjunction with the emergence of technology to support DR are known to be effective for reducing energy consumption.
- The process of designing effective DR programs is not well understood.
- WATTALYST will address this need by establishing correlations between electricity consumption and the factors that influence demand side participation.

KEY CONTRIBUTIONS

- Provide sustainable monitoring, inference and observation framework to understand fine-grained consumption and generate patterns, relationships of consumption with user's context.
- Conduct research to evaluate economically sustainable incentive schemes that are far more dynamic and sensitive to user's needs.
- Offer tools to help DR designers to
  - Visualize fine-grained generic energy consumption profiles.
  - Identify root causes of changes in demand and determine the effectiveness of various incentives and pricing schemes.

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