Smart Meter Data Analytics

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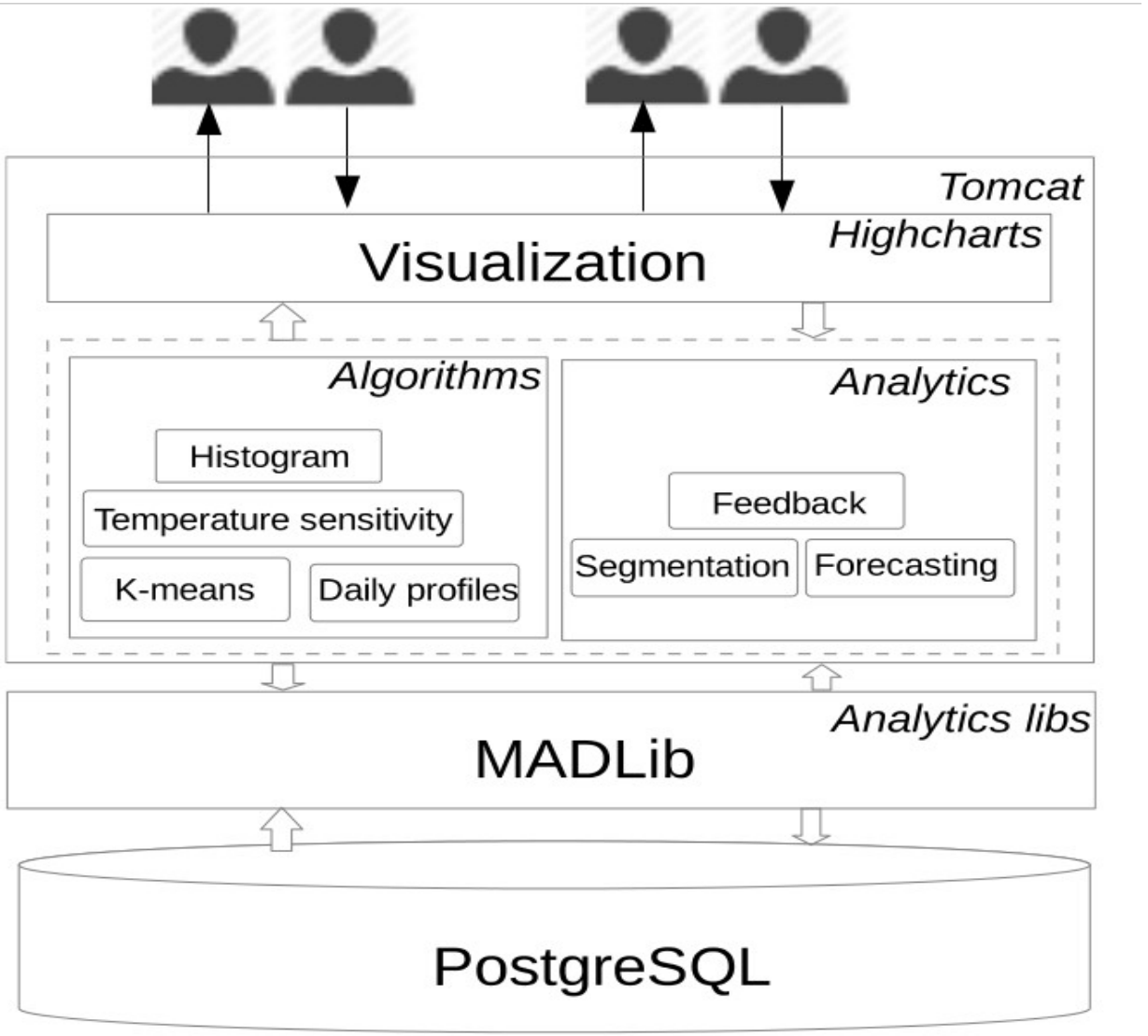
The Smart Meter Data Analytics Project

System Architecture



Roles of the use

1. Utilities
2. Energy consultant
3. Energy consumers

Functionalities

- Energy consumption time series analytics
  - Time and location dimensions
  - Different angularities
- Segmentation analytics
  - Cluster customers with similar consumption patters
  - Show on Google map

Functionalities

- Energy demand forcasting
- Pattern discovery
  - Load profiling
  - Load distribution
  - Load disaggregation
- Customer feedback
- Consumption comparison

Build Smart Meter Data Analytics System

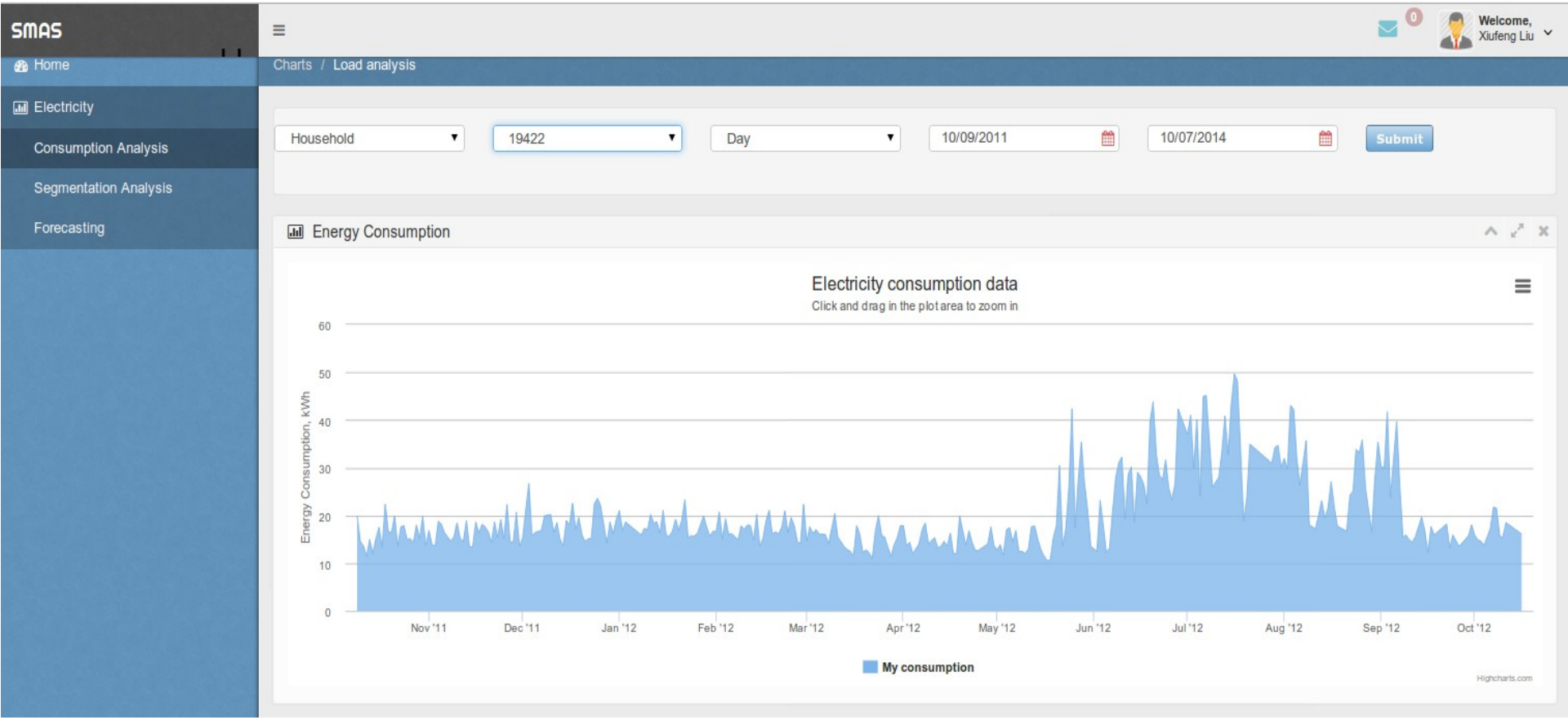
- The Prototype System – SMAS:
  - Roles of users: Utilities, energy consultants, and energy consumers
  - Integration with different analytic models
  - Functionalities: consumption time-series analysis, pattern discovery, customer segmentation, forecasting and customer feedback
  - Open source

Uses the System to Solve Real Problems

- Have 27,000 electricity time series from Essex Energy
- Have 25,000 water time series from Abbotsford, BC
- Have fine-grained data from 12 buildings on Waterloo University campus
- Refine the system based on real-life case studies

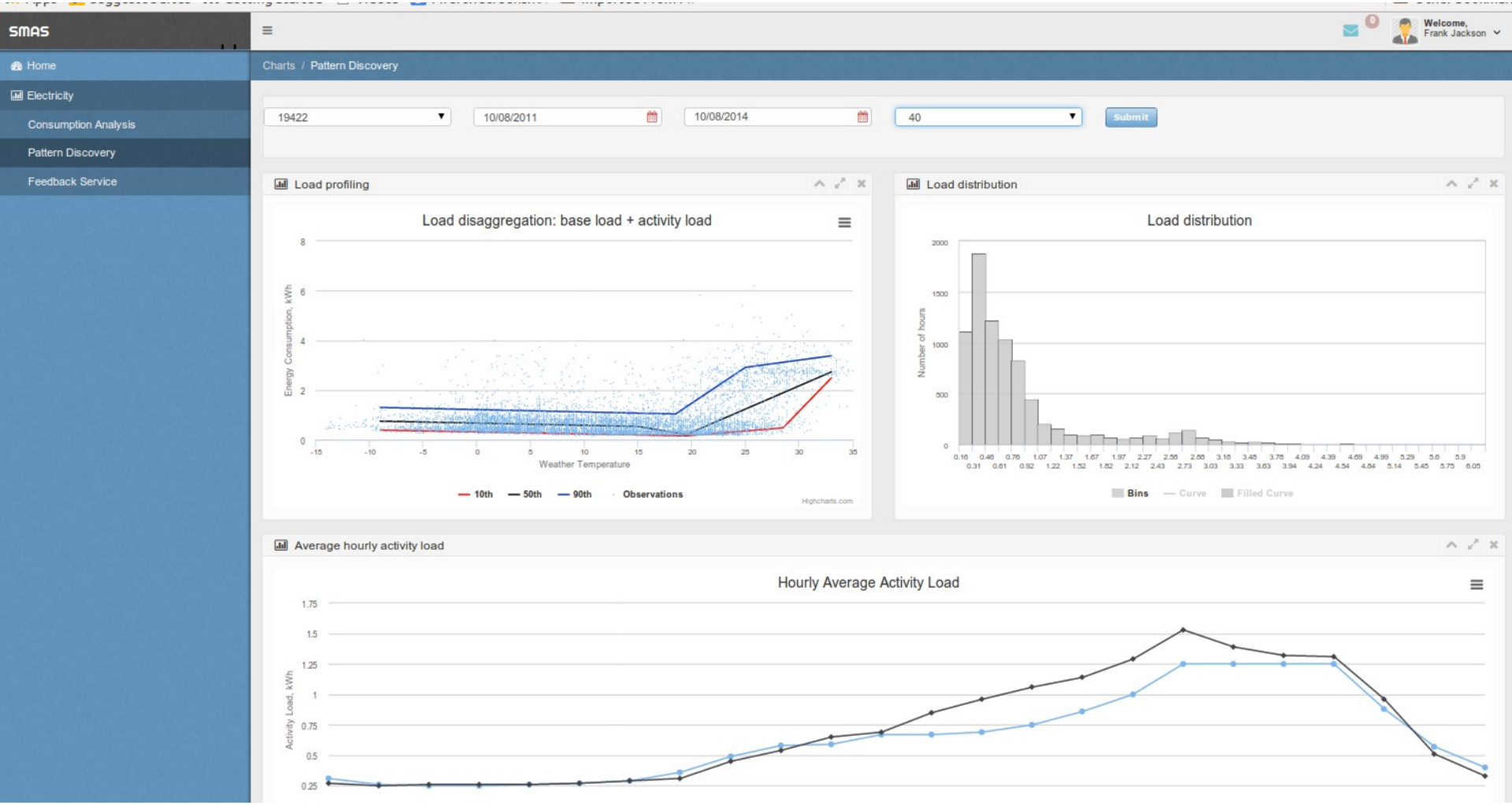
Smart Meter Data Analysis System (SMAS)

Consumption time-series analysis



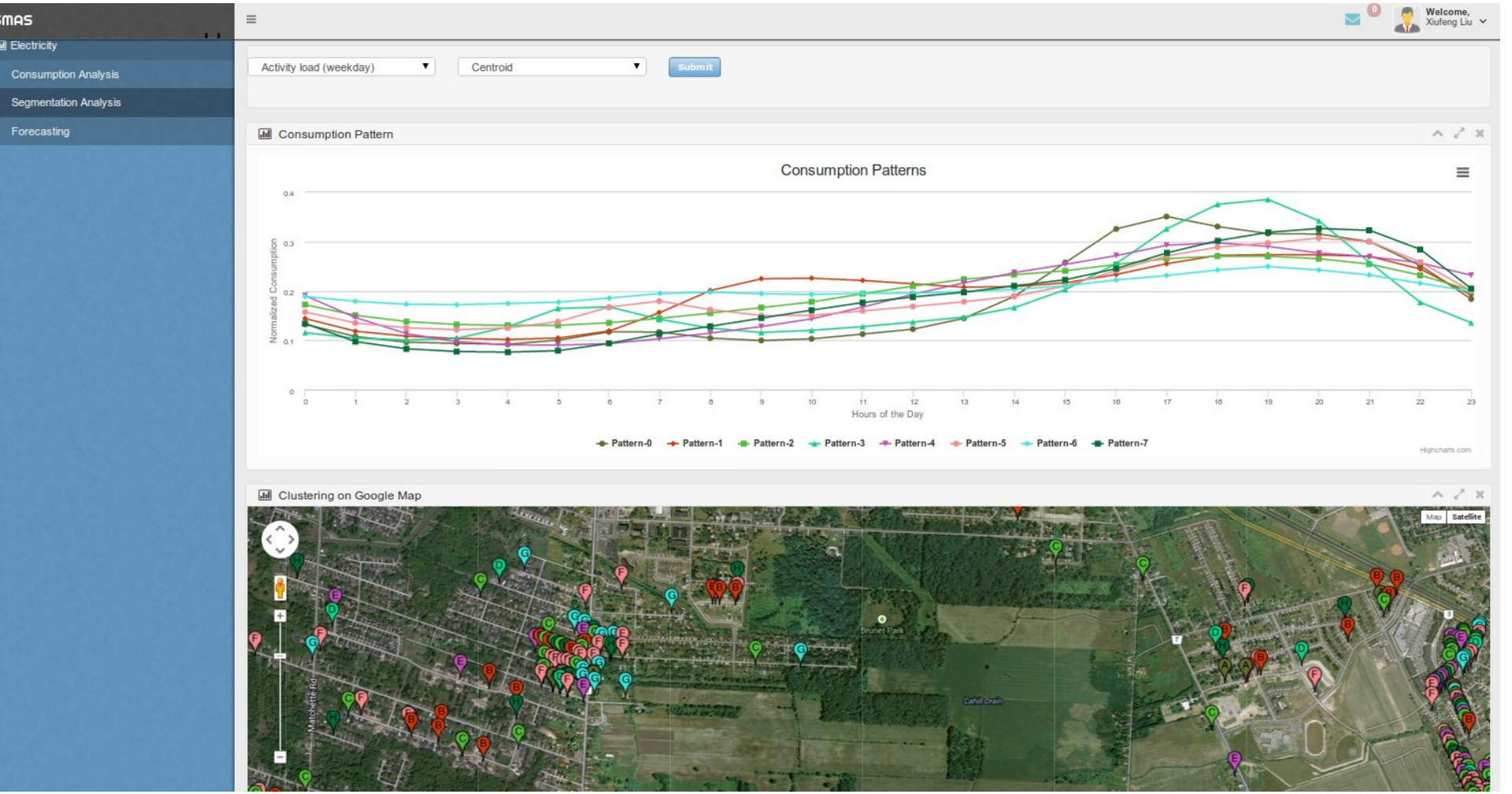
Smart Meter Data Analysis System (SMAS)

Consumption profiling



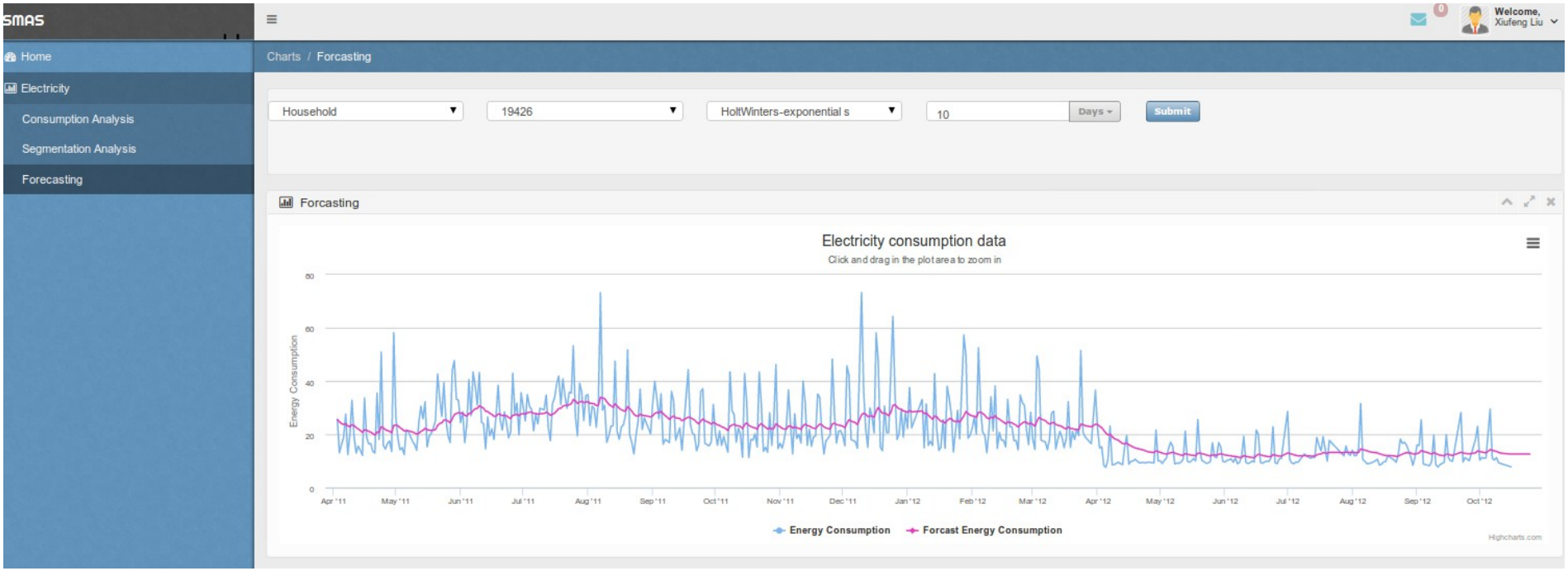
Smart Meter Data Analysis System (SMAS)

Consumption pattern discovery and customer segmentation



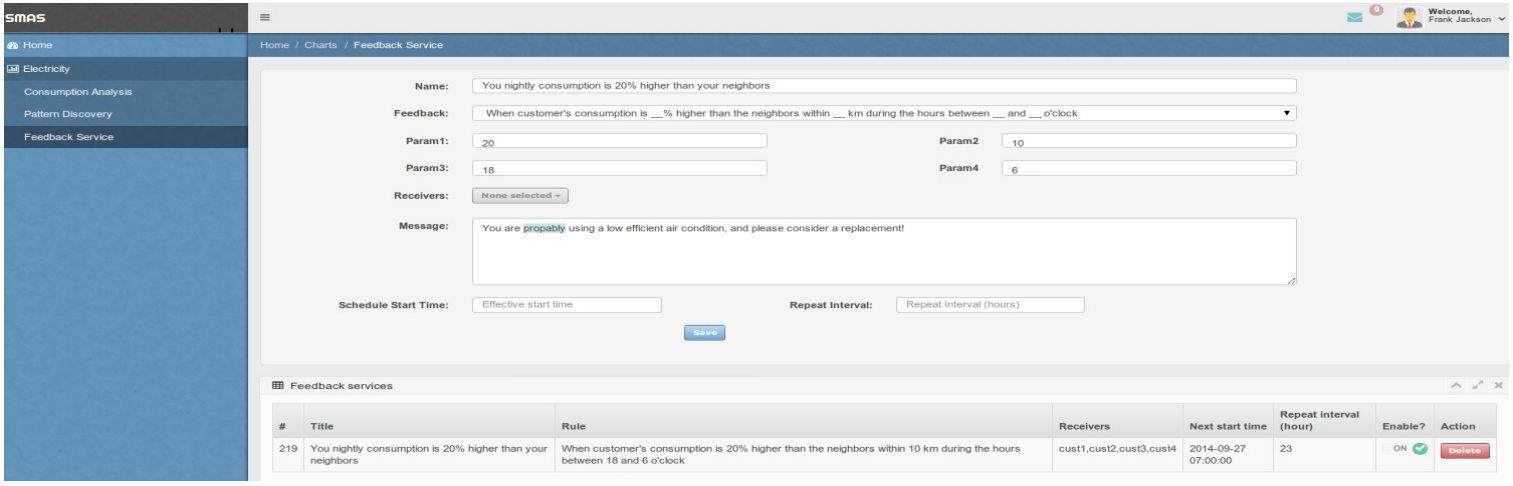
Smart Meter Data Analysis System (SMAS)

Demand forecasting



Smart Meter Data Analysis System (SMAS)

Customer feedback

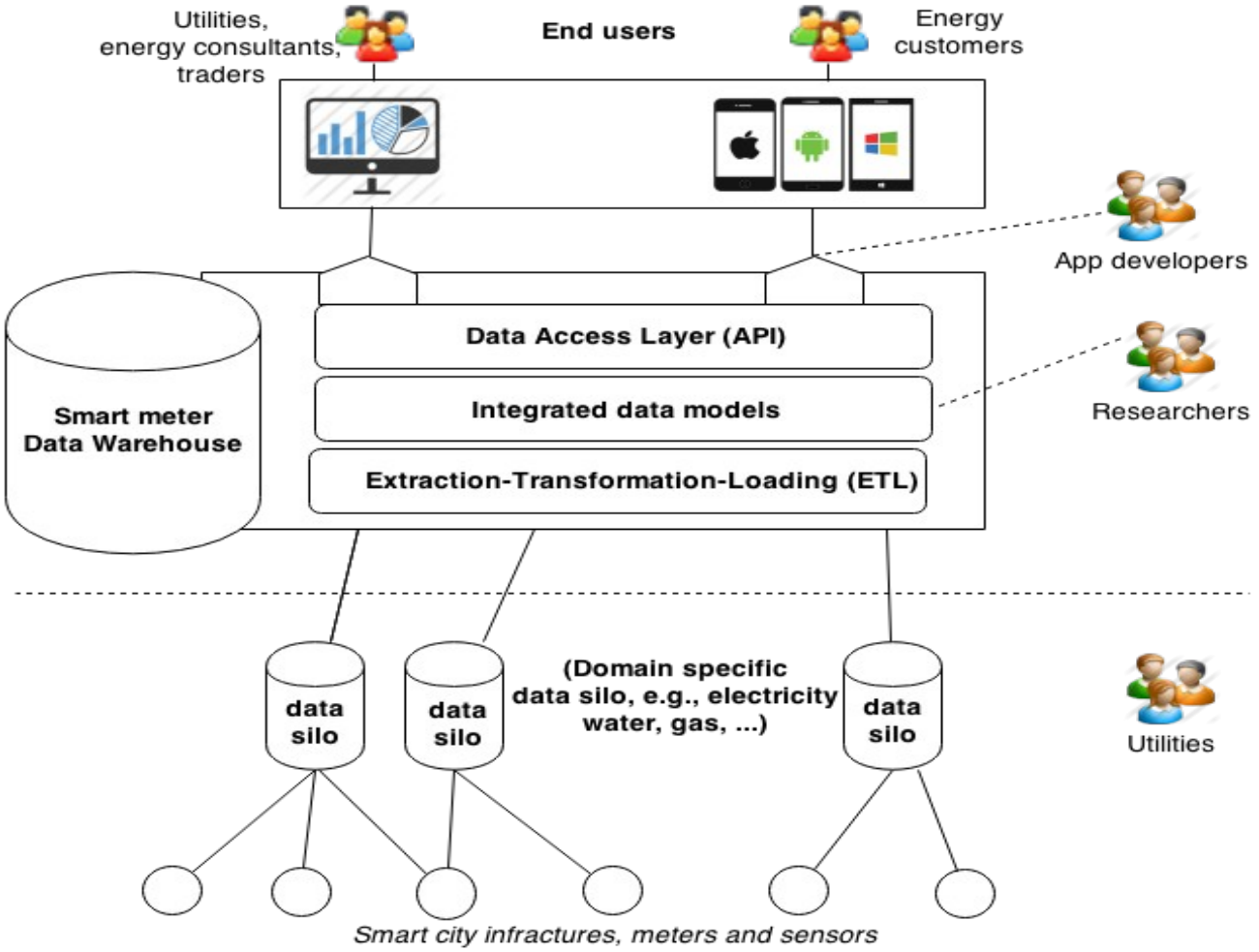


Big Data Platforms

- Use Canada cloud computing platform: *Sharcnet,* for performance experiments
- Run MapReduce jobs in cloud environment to update the analytics views

What I can contribute

- Build an ambitious smart energy system for production and research



What I can contribute

- Data Modeling for the energy prosumption:
  - Districts
  - Cities
  - Buildings
- With the metrics, such as:
  - Climate
  - Building-related characteristics
  - Building occupants’ behavior and activities,
  - User-related characteristics
  - Social and economic factors (e.g., degree of education, energy cost, etc.)
  - Indoor environmental quality required.
  - ...

What I can contribute

- Big data integration and analysis
  - Big data ecosystem for analytics
  - Near real-time analytic results
- Data quality issue & data cleansing:
  - Missing data
  - Erroneous data
- Research management activities

Questions?