SAP Smart Meter Analytics Powered by SAP HANA

Solution Overview

Agenda

- **Key Trends and Issues**
- Solution Overview
- Why SAP?

- *Appendix*

External Pressures

Major changes are elevating the strategic importance of data

Government Regulations

- Unbundling of energy markets
- Promotion of renewable energy and energy efficiency
- Enhanced regulatory reporting and rules

Market Environment

- Increasing competition
- New service business revenue opportunities
- More demanding customers

Technical Innovation

- AMI / Sensing & Measurement Technology
- Distributed generation
- Electric Vehicles

Smart Metering is a Disruptive Change

Massive volumes of data expected from this source

Classic Meter

- 1 reading per customer/**year**
- 1KB per reading

= ~ 1 GB raw data per year

Vs.

Smart Meter

- 15-min (96 values) per customer/**day**
- 1KB per reading

= **~ 400GB raw data per year**

Example: Utility with 1.2 MM meters in Germany

Is it an Opportunity or a Problem?

Imagine if you could…

Increase adoption rates for demand-side management programs

Increase revenue from new energy services

Reduce direct energy costs via more accurate load forecasting

Reduce revenue loss from theft

Achieve energy savings and emissions targets

Boost customer satisfaction and retention

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SAP Smart Meter Analytics
Powered by SAP HANA

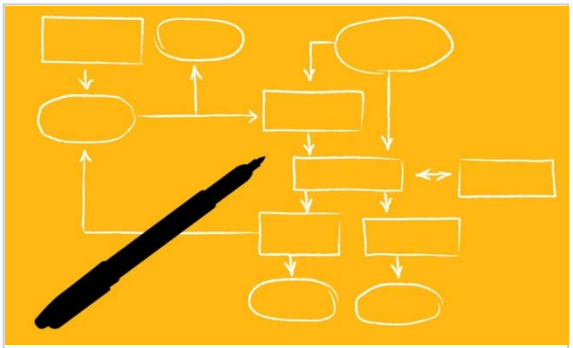
Powerful Customer Insights & Segmentation

Instant analysis of customers' energy consumption and advanced segmentation based on smart meter data

Energy Efficiency Benchmarking

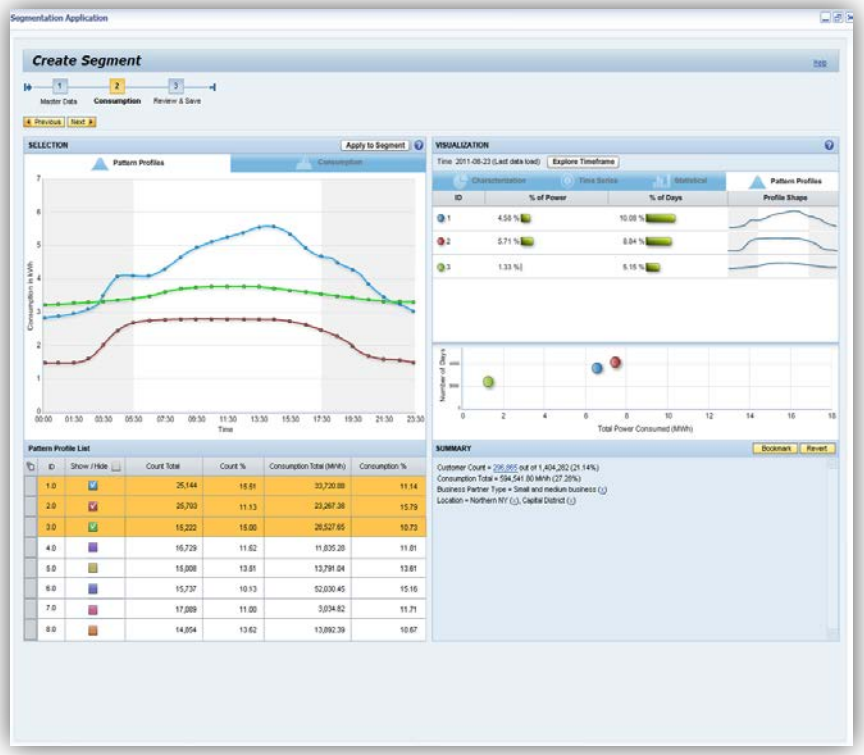
Energy efficiency benchmarking based on statistical analysis of consumption data and root cause analysis

Platform for Consumption-driven Processes



Pre-packaged, web service-enabled In-memory platform to enable consumption-driven business processes throughout the company

Powerful Customer Insights and Segmentation



Capabilities:

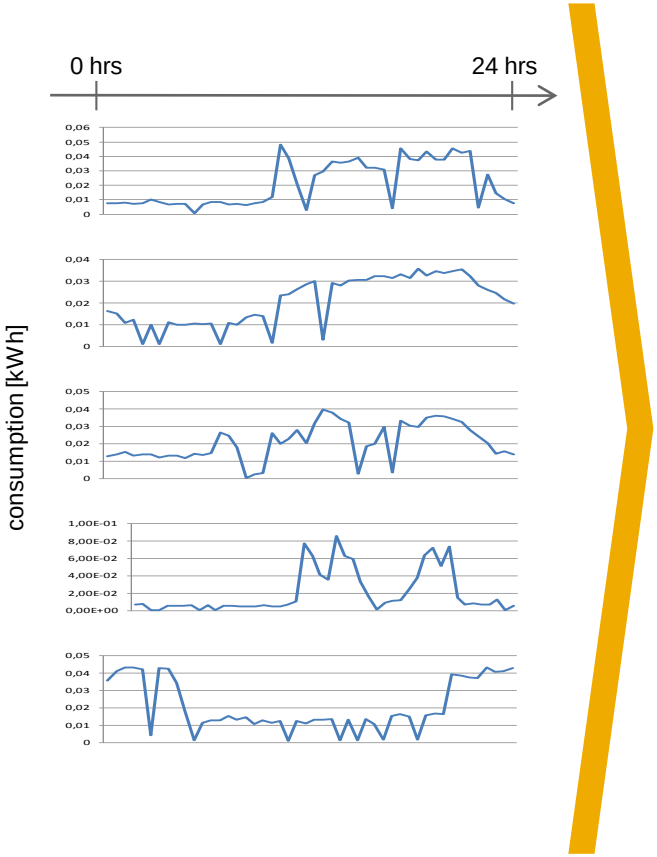
- Instant analysis of massive volumes of smart meter data at any level of granularity, aggregation, and dimension
- Customer segmentation based on consumption pattern profiles, customer attributes, and consumption metrics

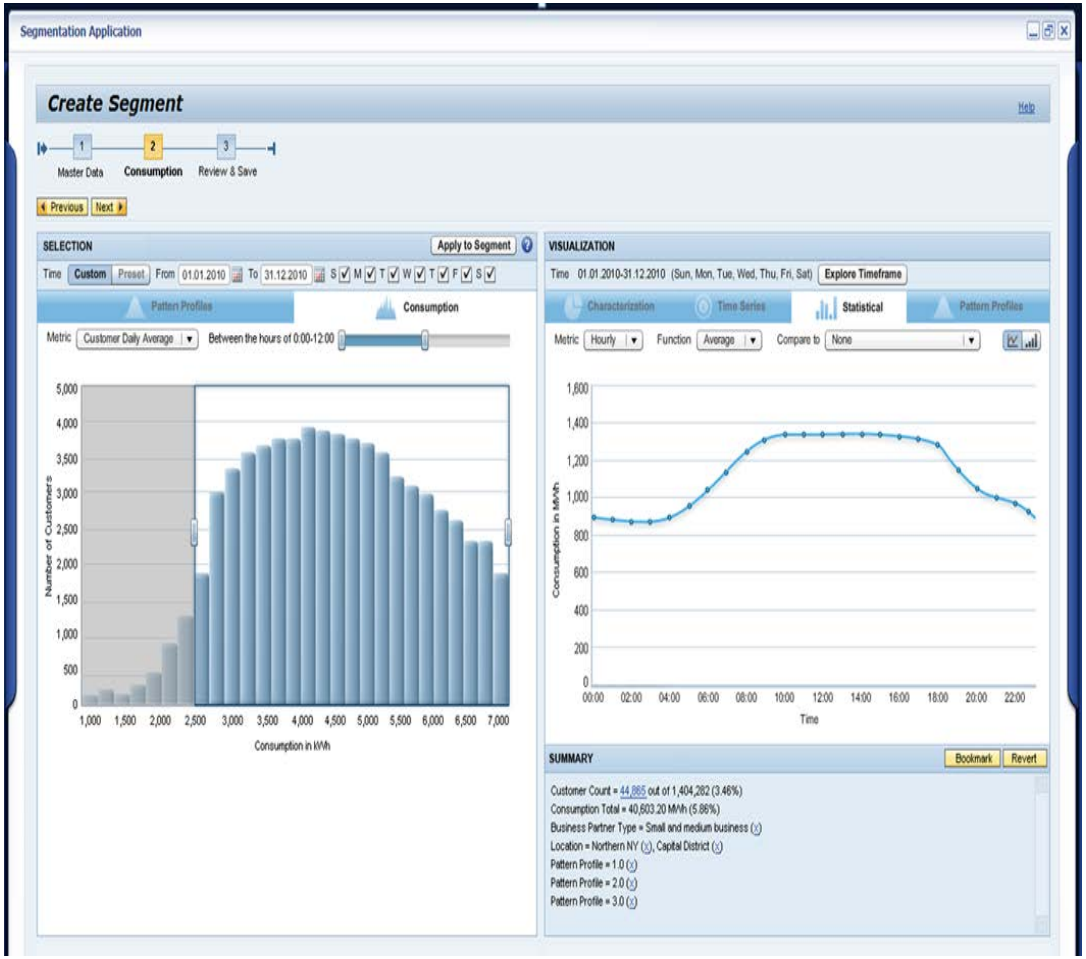
Benefits:

- Deliver targeted demand-side mgmt programs and communications
- Increase load forecast accuracy and savings in direct energy costs
- Manage customer relationships based on customer value attributes, e.g. predictability

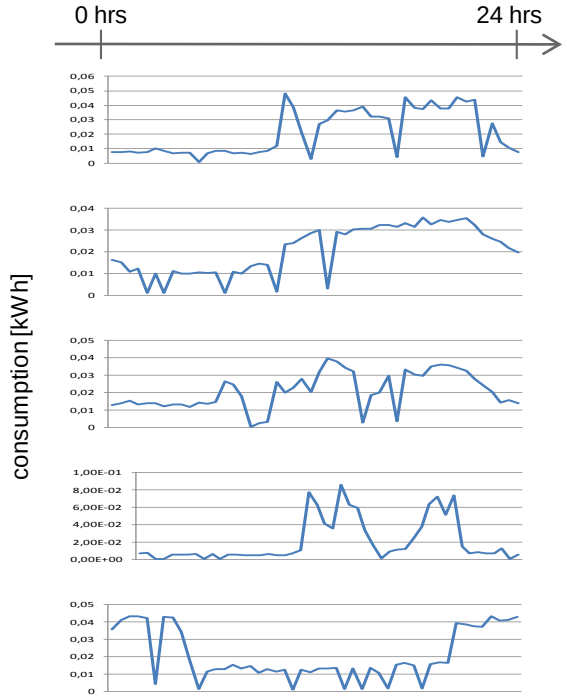
Instant aggregation at any level against the raw data set

At the finger tips of the business users





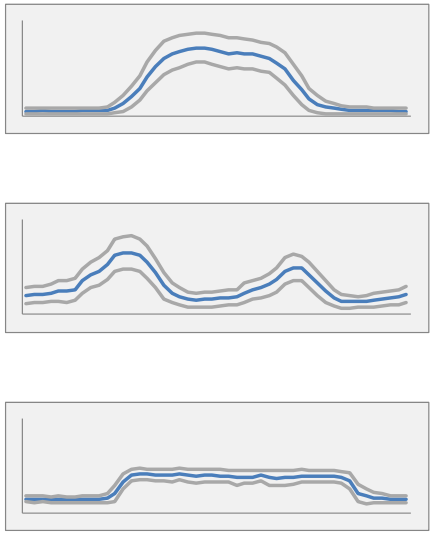
Pattern Profiles – Understanding Customer Usage



1 typical size: millions of daily profiles

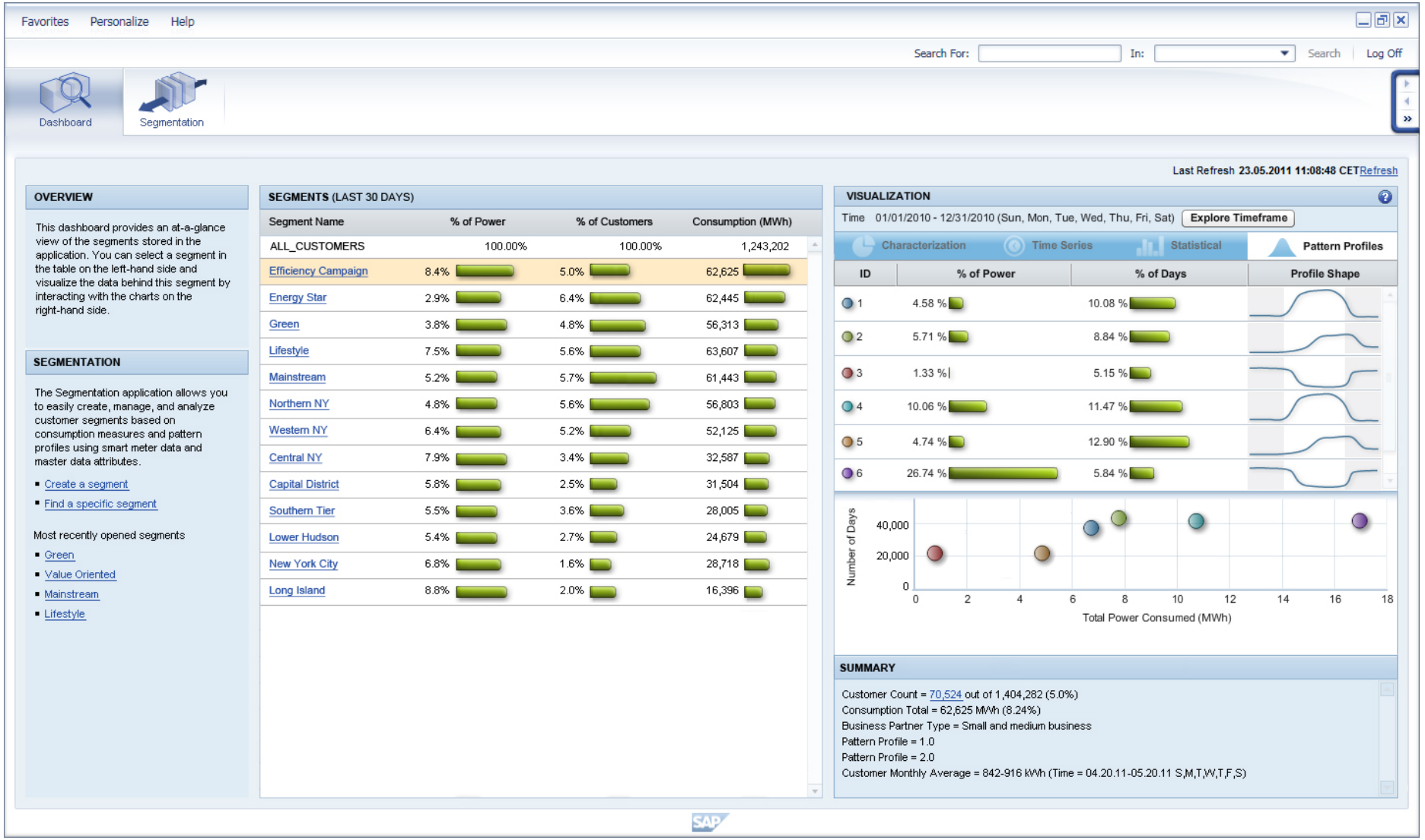
Millions of daily consumption profiles contain valuable information about customer behavior for a better energy management

2 In-memory pattern recognition algorithm crunches typical load profiles out of those huge amount of data to “summarize” those data and categorize user behavior.



3 Instead of exploring millions of individual profiles it is sufficient to take a look at the typical pattern in the data to understand user behavior. Those pattern are the basis for other follow-up processes

Compelling User Interface enables business users



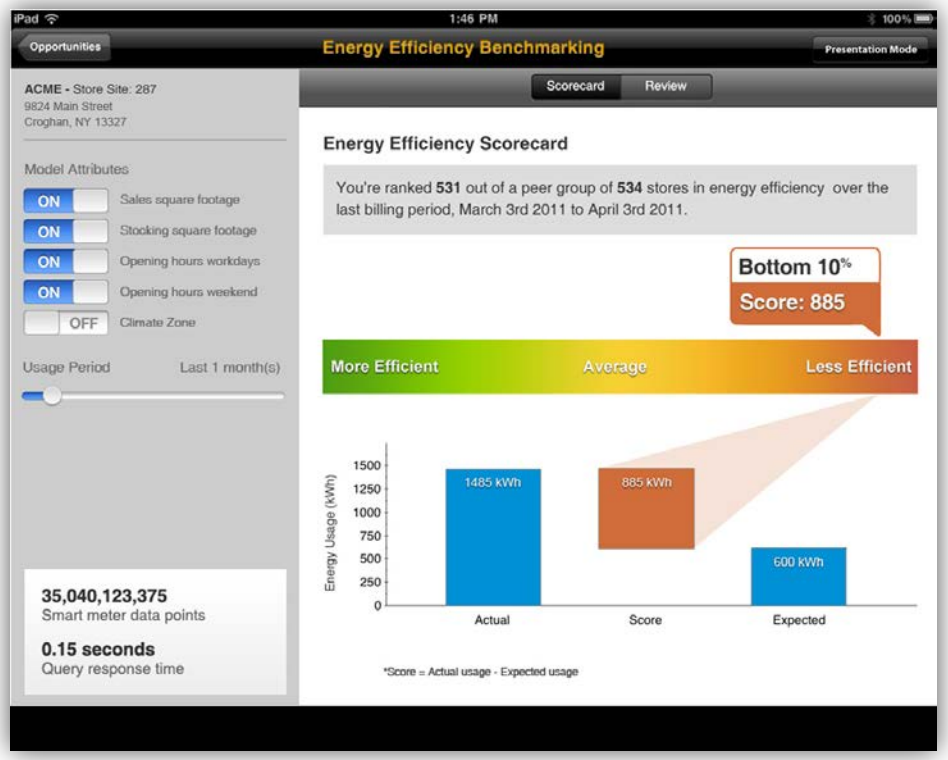
Energy Efficiency Benchmarking

Capabilities:

- Energy efficiency benchmarking that compares customers against peer group based on statistical predictions
- On-the-fly update of benchmarking attributes (e.g., square footage, location)
- Root cause analysis of energy usage variance based on automated heuristics

Benefits:

- Improve energy efficiency of end customers
- Increase revenues by up-selling and cross-selling new energy services
- Help reach energy saving targets

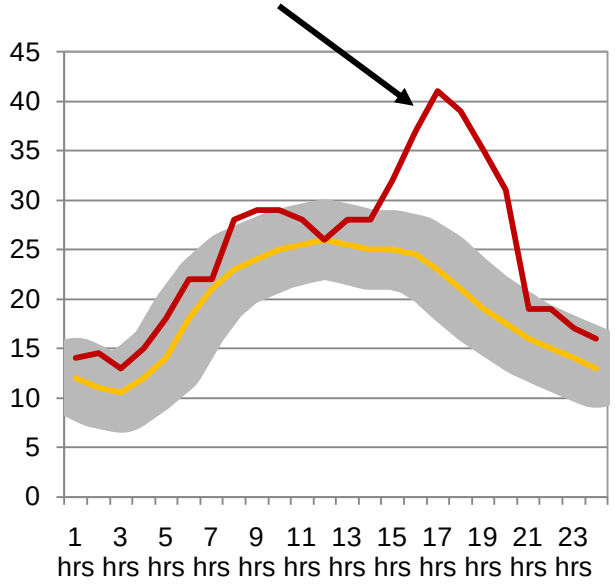


How Energy Efficiency Benchmarking works in SAP Smart Meter Analytics

- Customer type
- Type of building
- Electrical devices
- Historic behavior of "**similar**" customers
- Temperature dependency
- …

range of expected
prediction
actual

This customer is consuming more energy than predicted and deviates from the expected consumption pattern in particular in the late afternoon!



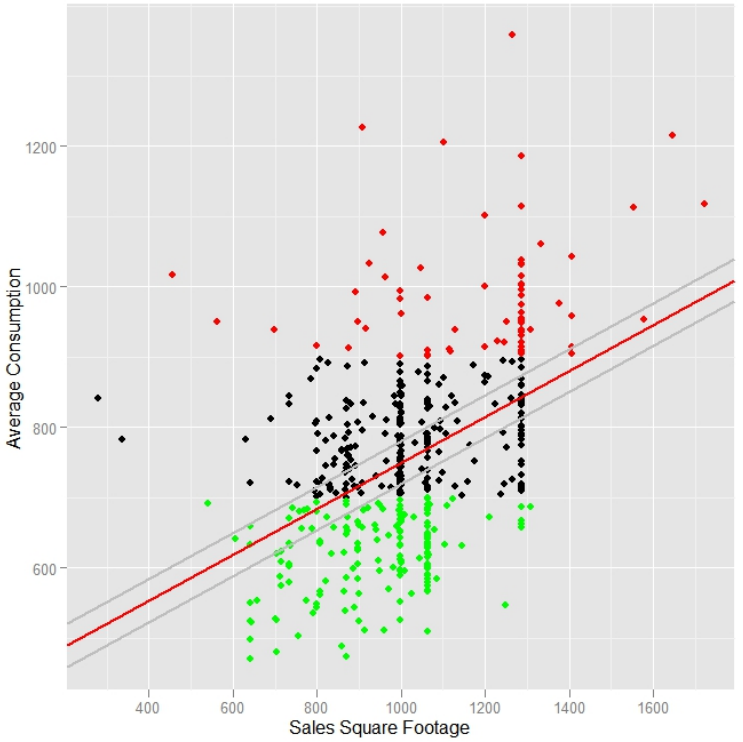
Compute benchmark for peer group and identify outliers
A benchmarking example

Business Objective

- From a retailer chain with ~ 500 stores find those stores which are least energy efficient and would profit from energy management services.

Available Data:

- Half hourly Smart Meter Data
- Climatic region
- Sales square footage
- Number of opening hours
- …



Energy Benchmarking:

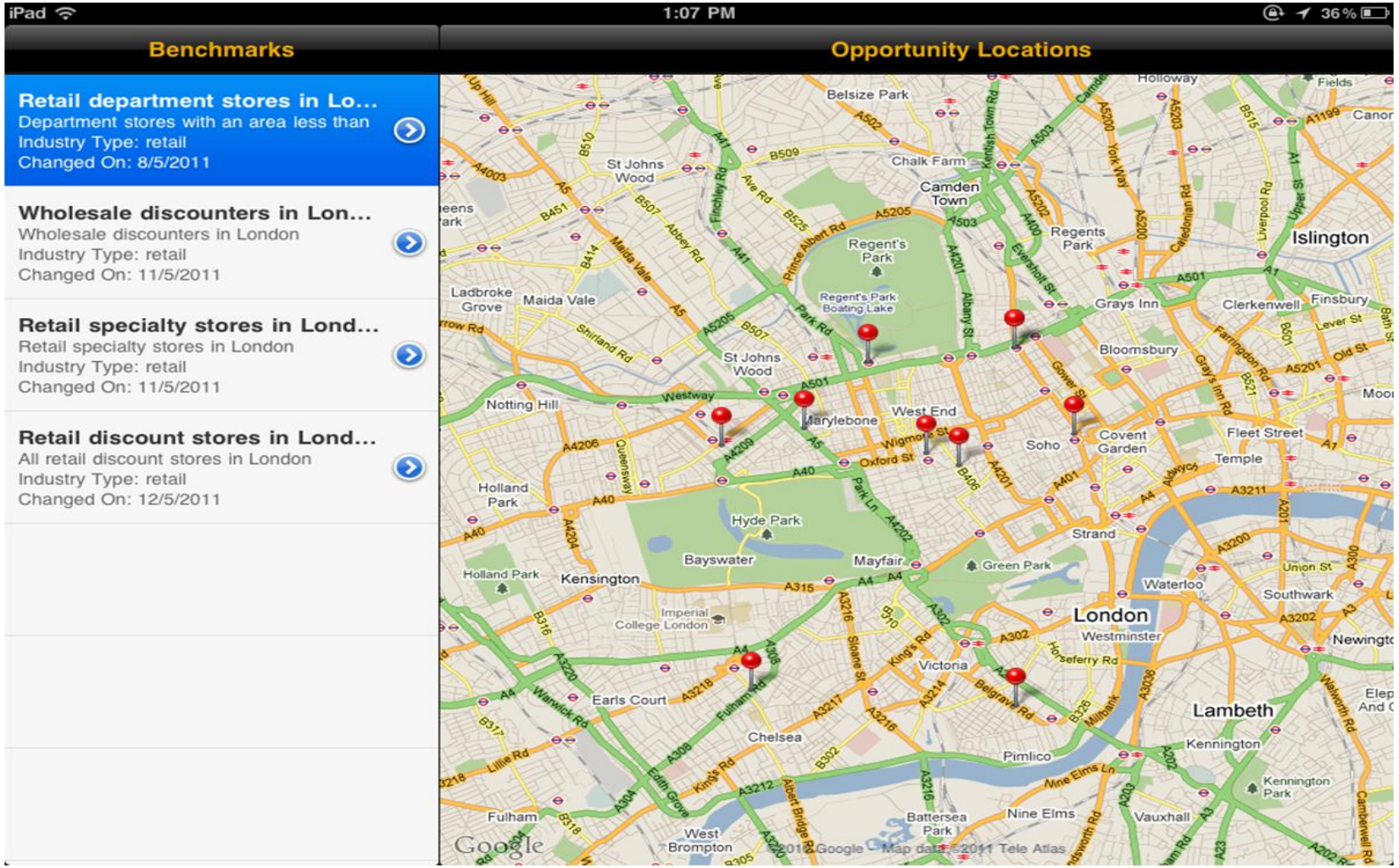
Compute a regression model from the data of all stores, which estimates the dependency of consumption on facility configuration.

Relative Store-level Energy Efficiency

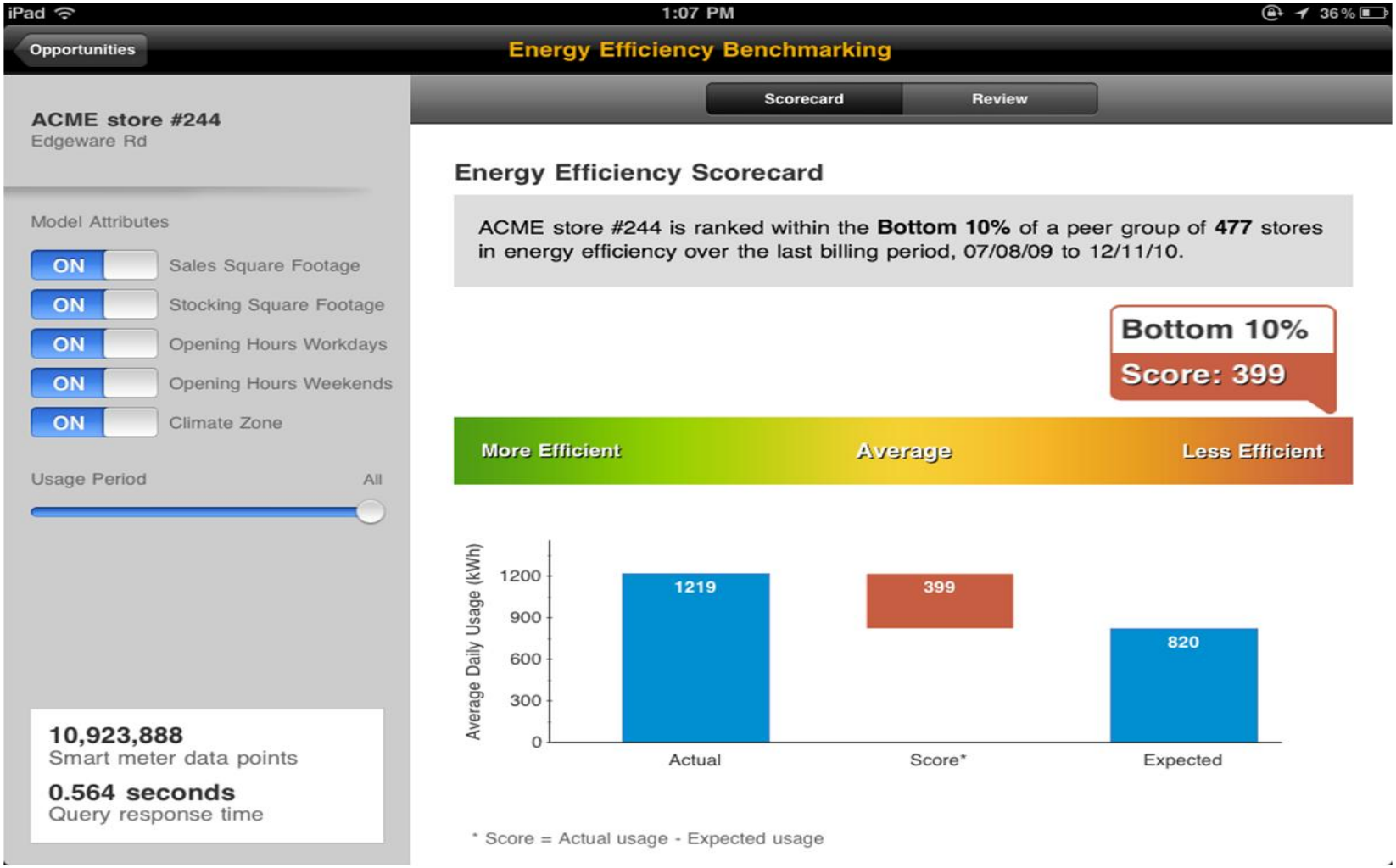
Any surplus consumption which cannot be justified from what we know about the store is an energy services opportunity.

Actionable insight readily available on mobile devices

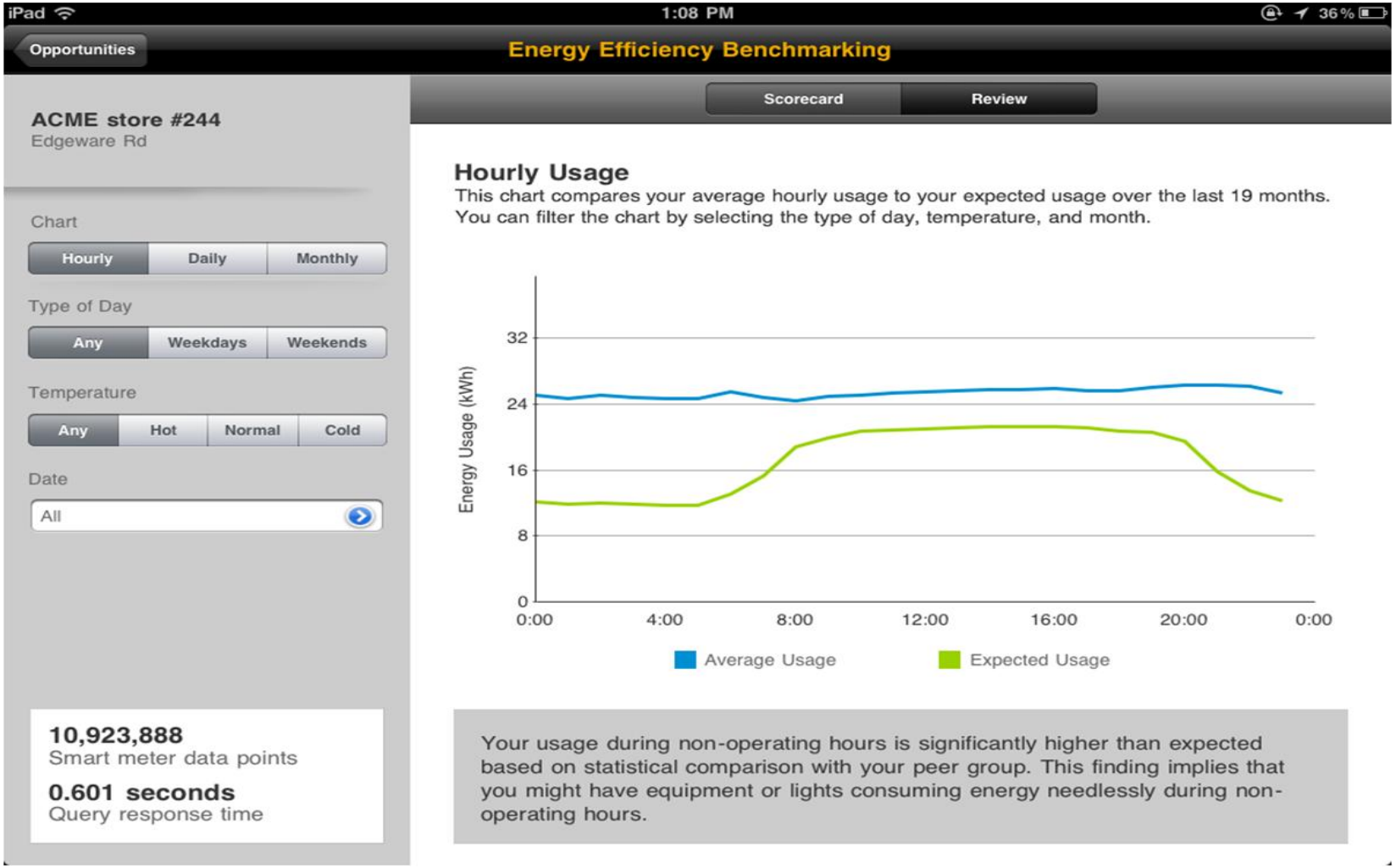
A benchmarking example



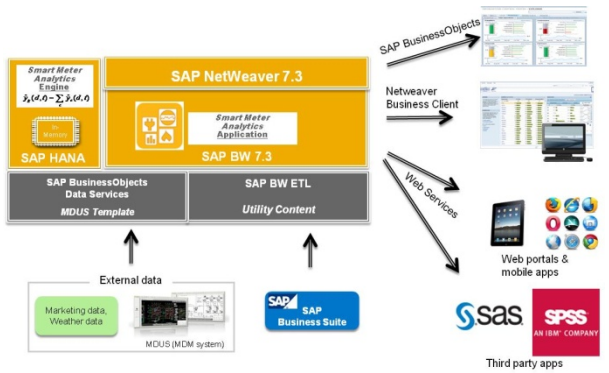
Flexible and dynamic scorecard reporting
A benchmarking example



Drill-down capability for on-the-spot root cause analysis
A benchmarking example



Platform for Consumption-Driven Processes
SAP Smart Meter Analytics



SAP Smart Meter Analytics

Core Capabilities

- Aggregation
- Pattern Recognition
- Benchmarking
- Exploration

Churn Management

Tariff Development

Fraud Detection

Customer Service

Energy Services

Energy Settlement

Energy Portfolio Management

Balance and Demand Forecasting

Grid Management

Online Portal

DSM Activities

Architecture Overview
SAP Smart Meter Analytics

SAP Smart Meter Analytics Engine

$$\hat{y}_g(d,t) = \sum_c \hat{y}_c(d,t)$$

In-Memory

SAP HANA

SAP NetWeaver 7.3

Smart Meter Analytics Application

SAP NetWeaver BW 7.3

SAP BusinessObjects Data Services

Meter Data Unification System (MDUS) Template

SAP BW ETL

Utility Content

External data

Marketing data, Weather data

MDUS (MDM system)

SAP Business Suite

SAP BusinessObjects

SAP Netweaver Business Client

Web Services

Web portals & mobile apps

sas

SPSS AN IBM® COMPANY

Third party apps

SAP HANA and in-memory computing technology impacts velocity, volume and value

3600x

Faster reporting speed

460B

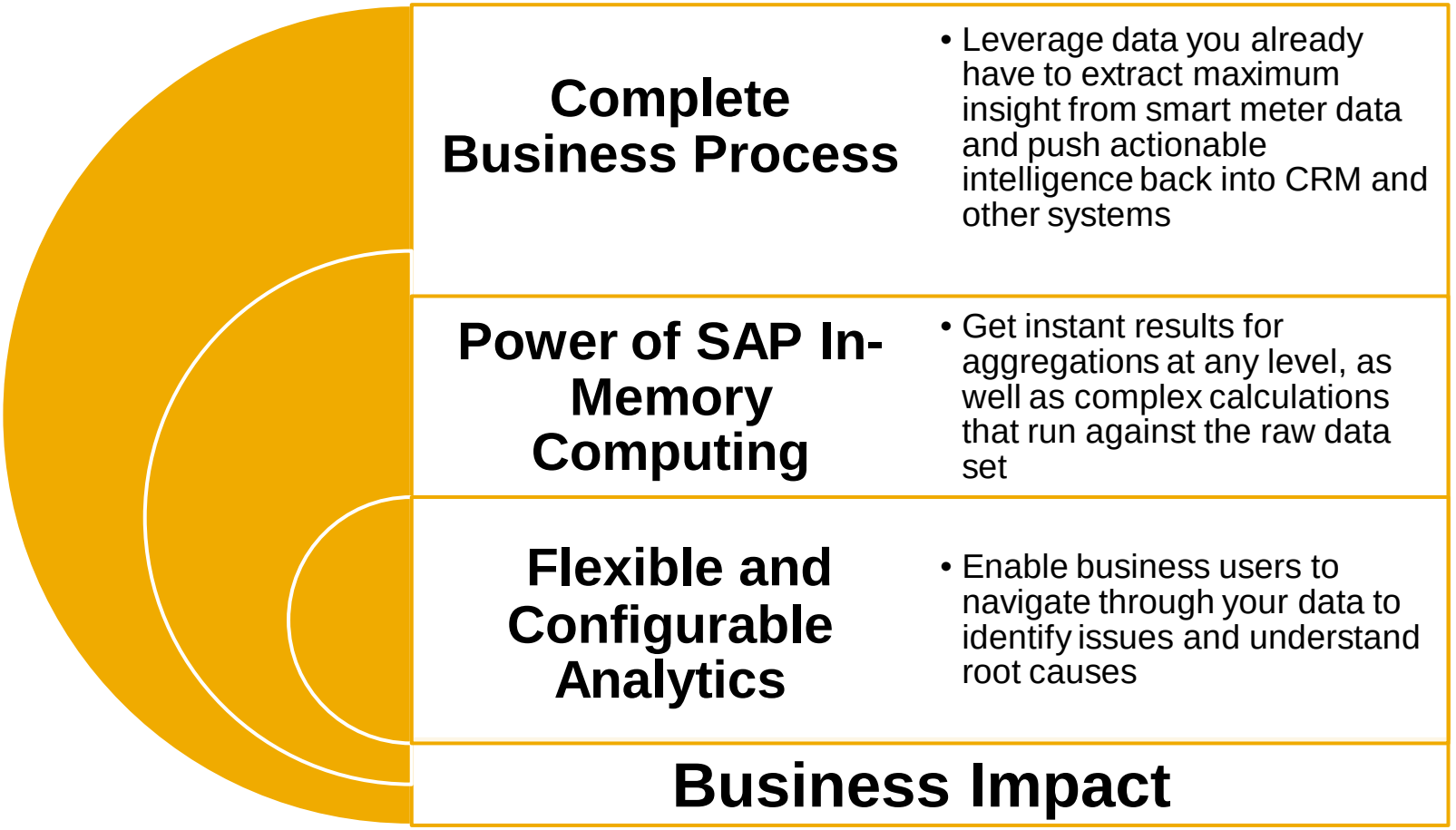
Data records analyzed in less than a second

21%*

Average increase in revenue

* Source: Oxford Economics

Why SAP Smart Meter Analytics, powered by SAP HANA?



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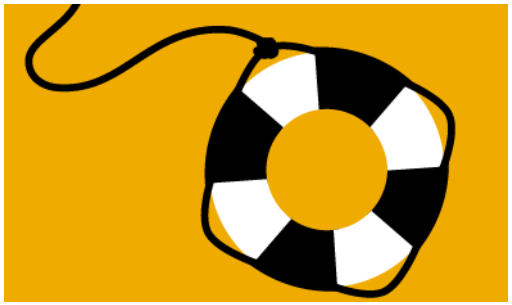
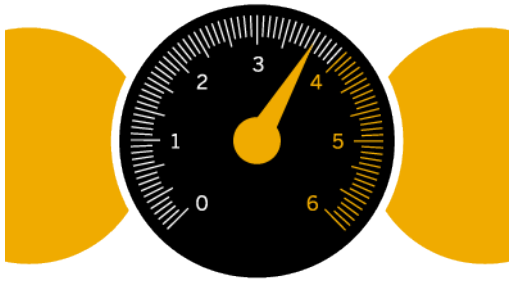
The SAP difference

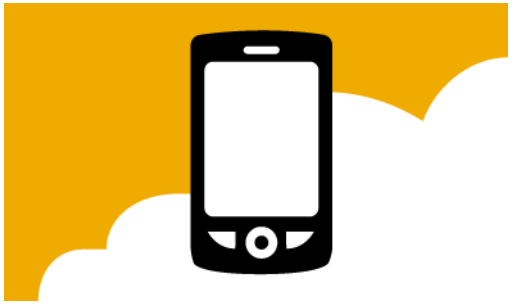


Trusted



Lightning Fast

Easy



Anytime

Industry/LoB Expertise

Collaborative

Thank You!

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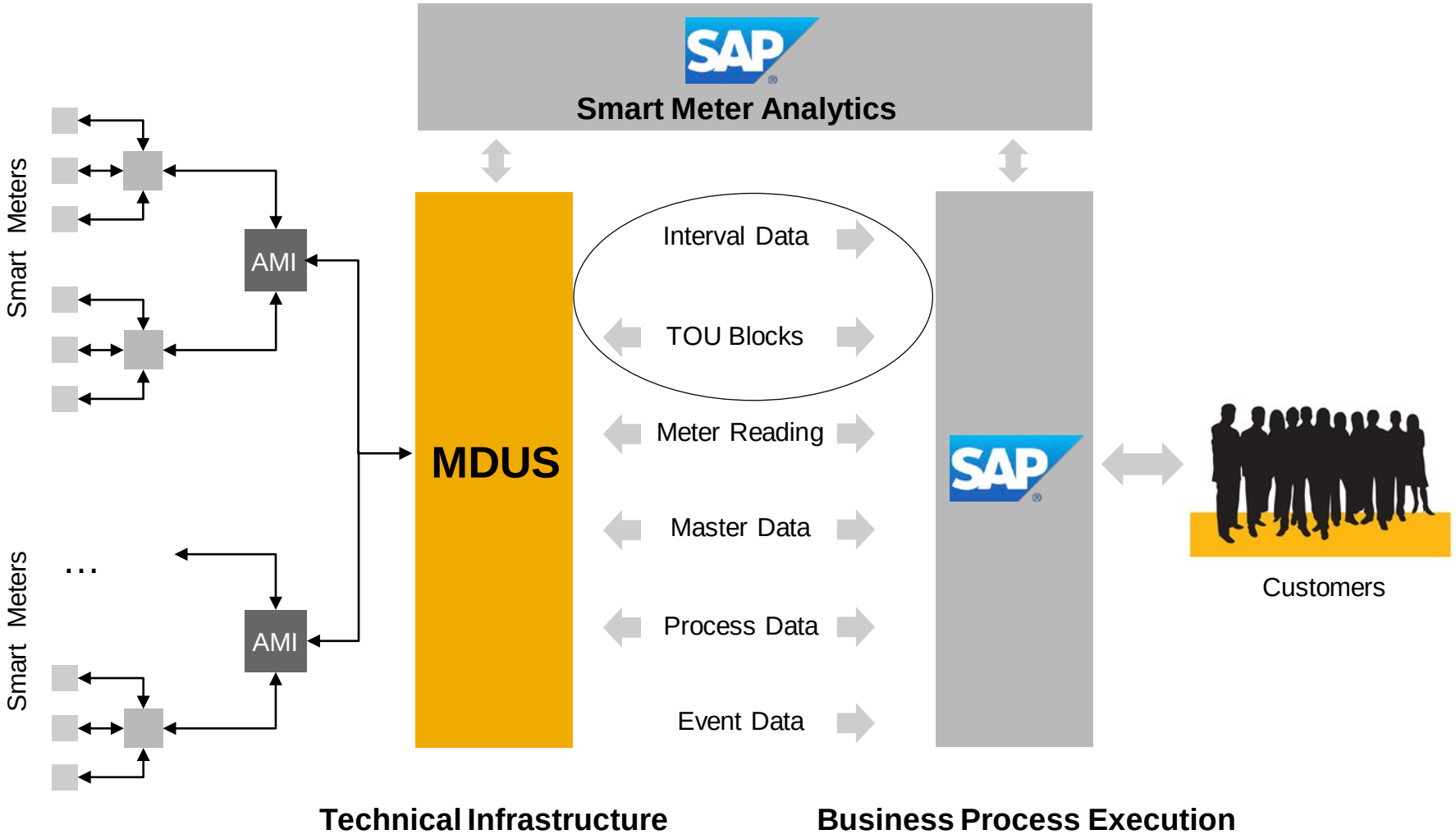
Appendix

Sample AMI system architecture with SAP Smart Meter Analytics



Another sample AMI system architecture with SAP Smart Meter Analytics