Predictive Analytics Meets IoT
Harnessing the opportunity, overcoming the challenges

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Fern Halper

**TDWI Director of Research,
Advanced Analytics**

@fhalper
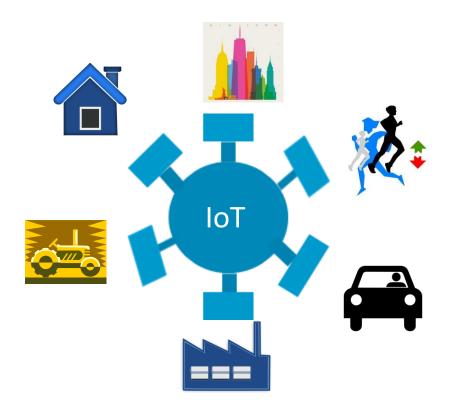
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Speakers

Fern Halper
Research Director for
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TDWI

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Sr. Director of
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SAP

A network of connected devices that can send and receive data over the Internet

IoT

Why now?

- Cost for computers, storage, and bandwidth
- High speed networks
- Low power semi-conductors
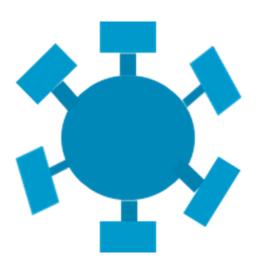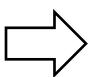- Low cost devices
- Wifi and Internet access

Agenda

- IoT overview and status
- Opportunities – Analytics and IoT
- Overcoming IoT challenges
- SAP offerings

Sensors, RFID,
Smart meters,
scanners, video, etc.
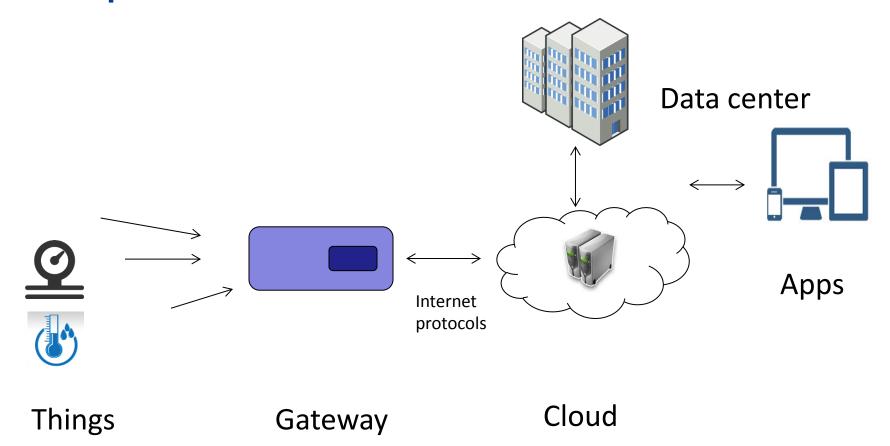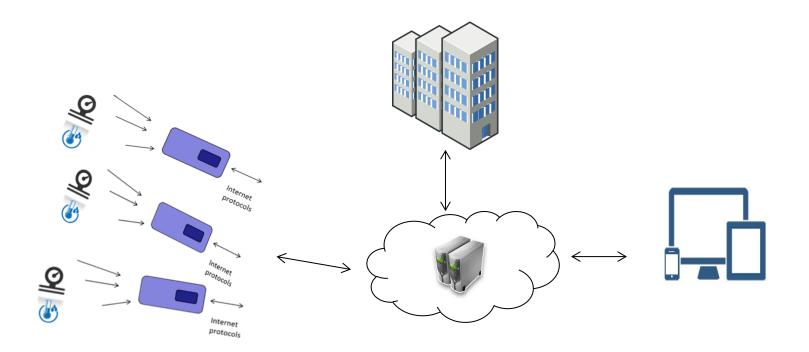
- Intermittent data
- Streaming data
- Structured/unstructured

Analytics
provides value

Simple illustration

Data center

Apps

Internet
protocols

Things   Gateway   Cloud
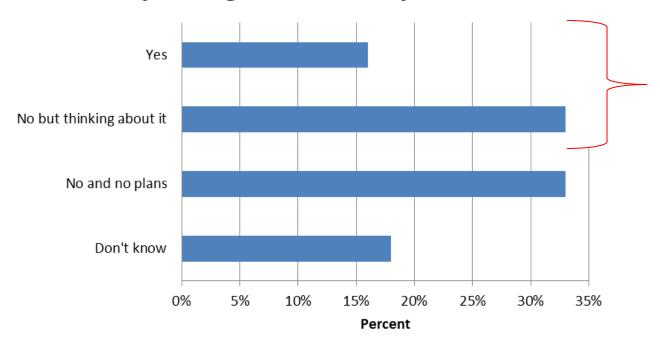
Analytics can occur at multiple points

Again:

The value lies in analytics
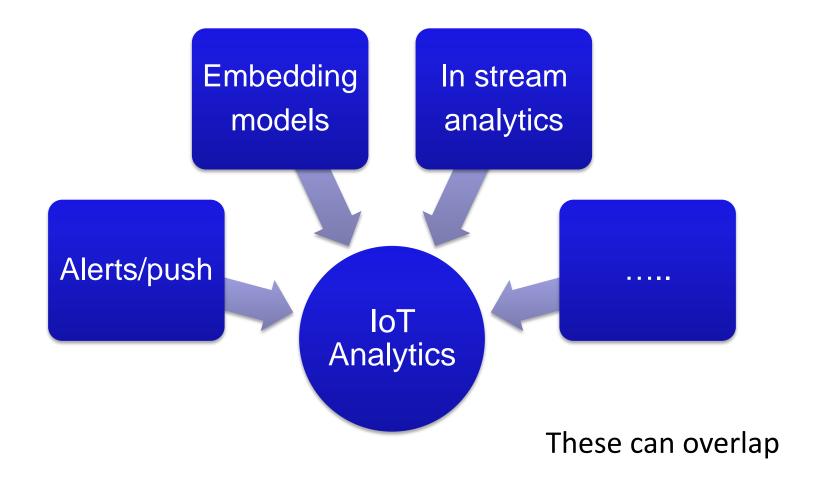
Interest is growing

Does your organization analyze IoT data?

(source: TDWI BPR Emerging Technologies and Methods, 2015, n=303)

Example of IoT Analytics

Embedding models

In stream analytics

Alerts/push

…..

IoT Analytics

These can overlap

Alerts/Push
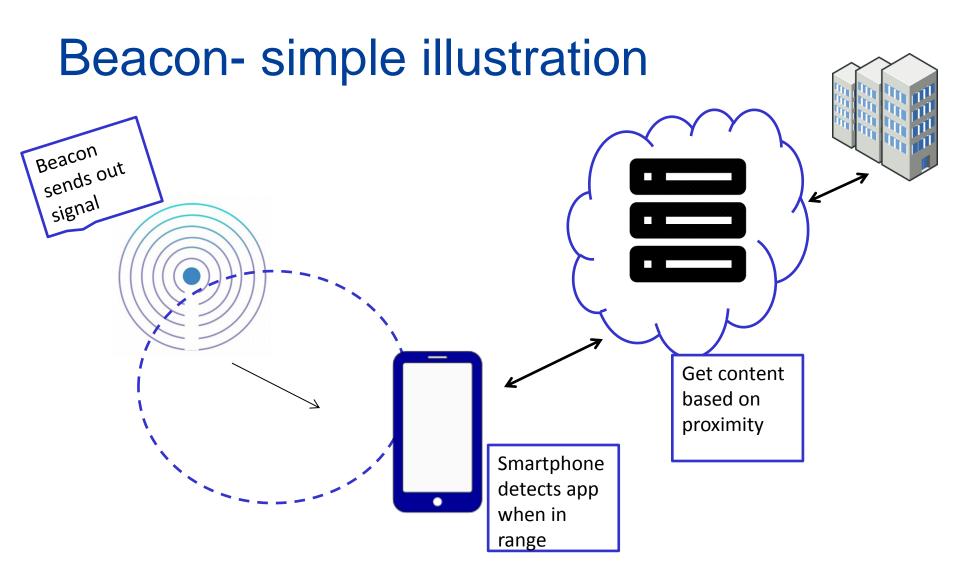
An example- Retail

- Beacon technology
- Push coupons or personalized content
- Uses hyper local geospatial analytics too

Beacon- simple illustration

Beacon sends out signal

Smartphone detects app when in range

Get content based on proximity

Other "thing" alert examples

- Manufacturing
- Medical
- Automotive
- Agriculture

In stream

Analytics

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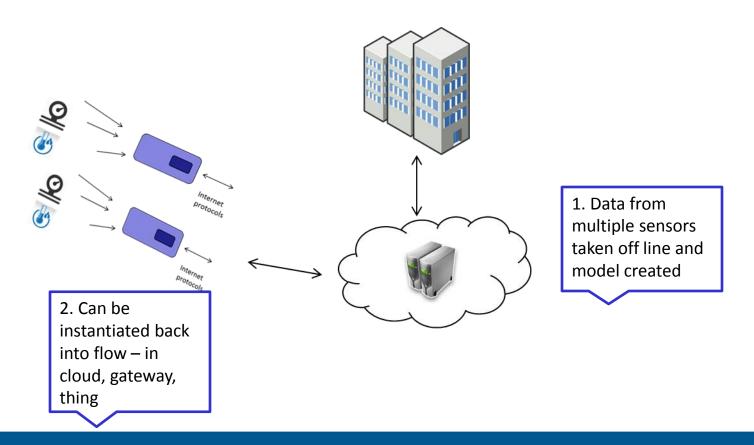
window

Events can be aggregated to form an event window

As each window expires, it is closed and replaced by a new window

In-stream models

1. Data from multiple sensors taken off line and model created

2. Can be instantiated back into flow – in cloud, gateway, thing

Examples - predictive maintenance

- Collects data from multiple sensors
- Can put data in cloud/on-premises
- Some use dashboards/intelligent monitoring
- Some use models built and then deployed

Real-time analysis inside the stream
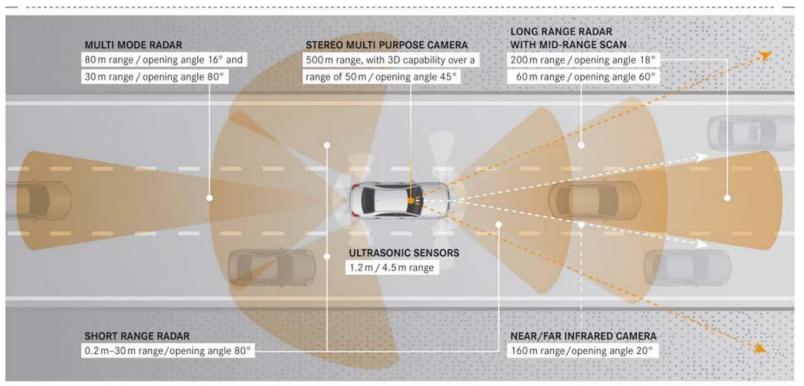
- CEP
- Stream analytics
  - *An evolving area*
  - *Analyzing data before it is stored*
  - *More sophisticated analytics*

Analytics

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Automatic changes in behavior

◢ Radar, stereo camera and ultrasonic systems
More sensors – more protection
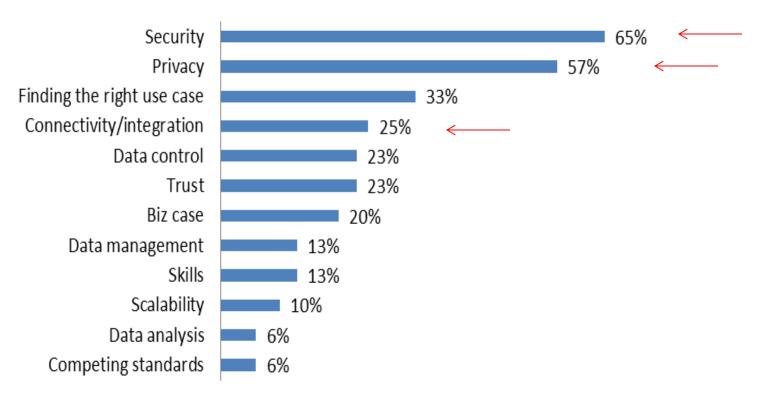
(Mercedes S550 radar coverage.)

Challenges

Top 3 challenges associated with IoT

Challenge	Percentage
Security	65%
Privacy	57%
Finding the right use case	33%
Connectivity/integration	25%
Data control	23%
Trust	23%
Biz case	20%
Data management	13%
Skills	13%
Scalability	10%
Data analysis	6%
Competing standards	6%

(source TDWI quick survey, 161 respondents, 2015)

Security

- IoT is a system of systems; threat grid increased
- Organizations working to provide guidance and tooling (e.g. cloud security alliance, IoTSF, IIC, others)

Internet protocols

Things   Gateway   Cloud

All attack points

Some recommendations

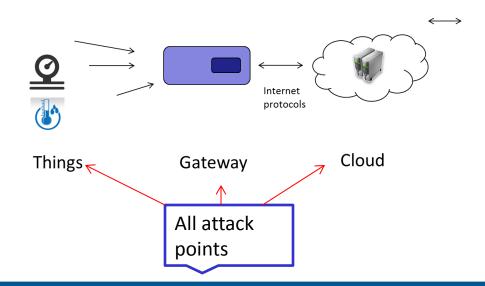- Maintain the confidentiality and integrity of both business and personal data collected within the IoT through the provisioning of <u>encryption</u>, <u>authentication</u> and <u>integrity</u> protections throughout the IoT infrastructure

- Understand and address stakeholder privacy concerns prior to the implementation of the IoT capabilities by performing a <u>privacy impact assessment</u>

- Safeguard the infrastructure from attacks that target the IoT as a vector into an organization's assets, through the use of IoT device life cycle <u>controls</u> and a <u>layered security approach</u>

- Initiate a global approach to combat security threats by sharing threat information with security vendors, industry peers and Cloud Security Alliance

(source: Cloud Security Alliance, 2015)

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Standards

- Fragmented standards; hard for things to talk to each other
- IEEE, IIC, OIC, and others working to develop interoperable standards
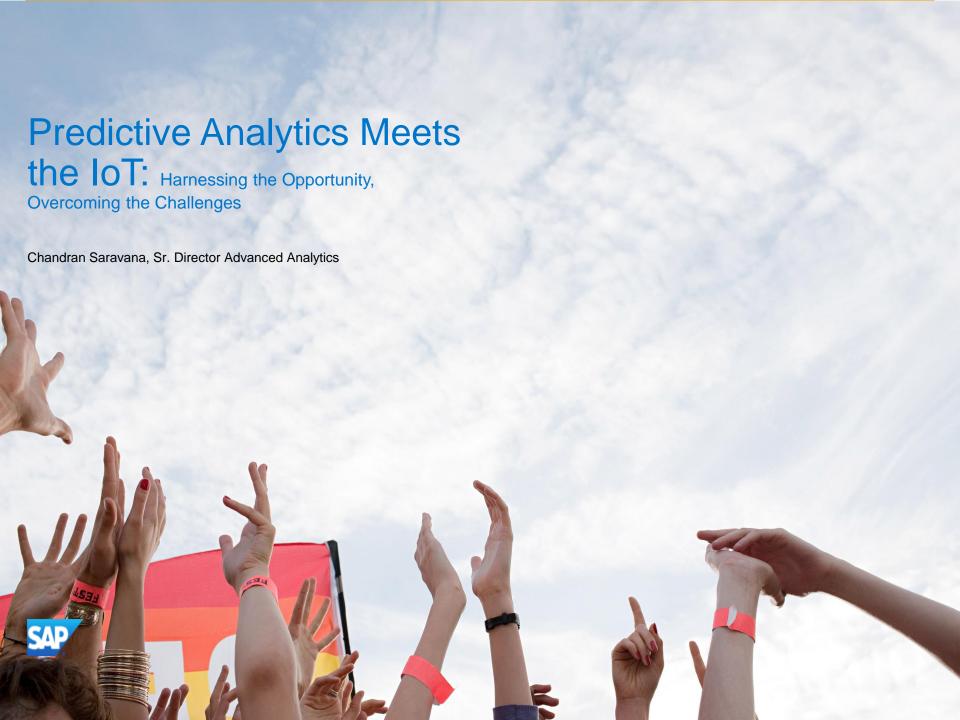
Wrap-up

- Excitement is growing around IoT
- Analytics are critical for IoT value
- IoT is a rapidly evolving area
  - *Security*
  - *Standards*
  - *Etc.*
- Start considering whether it is useful for your organization!

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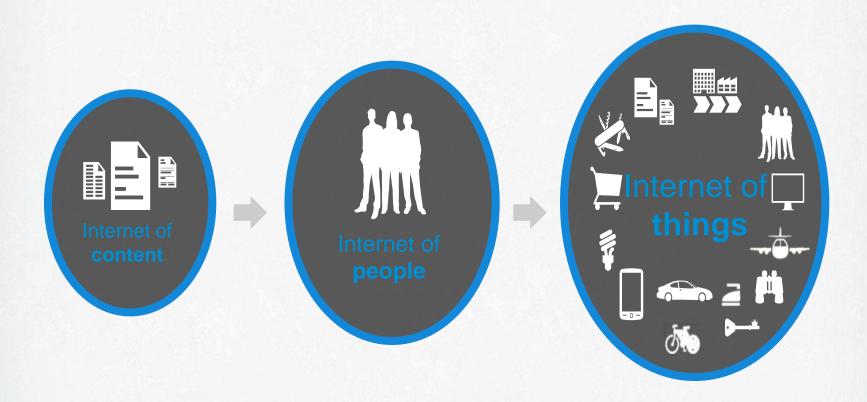
Poll Question

- Are you analyzing IoT data today in your company?

  – *Yes we are collecting and analyzing IoT data*

  – *Yes we are collecting it, but not analyzing it*

  – *No, but we are planning to start a project in the next 6 months*

  – *No, and we have no plans to do so*

Predictive Analytics Meets the IoT: Harnessing the Opportunity, Overcoming the Challenges

Chandran Saravana, Sr. Director Advanced Analytics

IoT is connecting information, people, and things

Internet of **content**

Internet of **people**

Internet of **things**

IoT is connecting information, people, and things

IoT is about…

reimagining
business processes
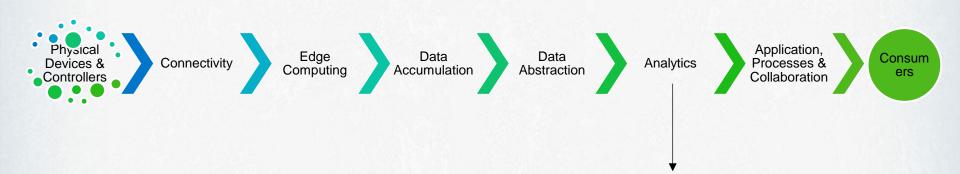
reimagining
customer experience

reimaging
human behavior

SAP
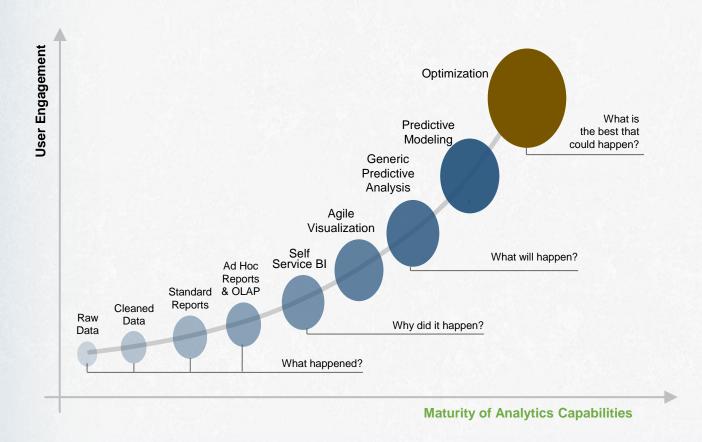
The Internet of Things - Value Chain Reference Model

Physical Devices & Controllers → Connectivity → Edge Computing → Data Accumulation → Data Abstraction → Analytics → Application, Processes & Collaboration → Consumers

Analysis Type	Real Time	Near Real Time	Batch
Processing	Predictive Analytics	Data Discovery	Query & Reporting
Frequency	Continuous	Real Time	On Demand
Format	Structured	Unstructured	Semi-structured

SAP

How Analytics Need to Evolve

- End-to-end
- Easy adoption
- Fast implementation
- Business focused
- Enables storytelling

SAP

SAP Predictive Analytics

Spot opportunities in real-time
Real-time predictive on big data & IoT

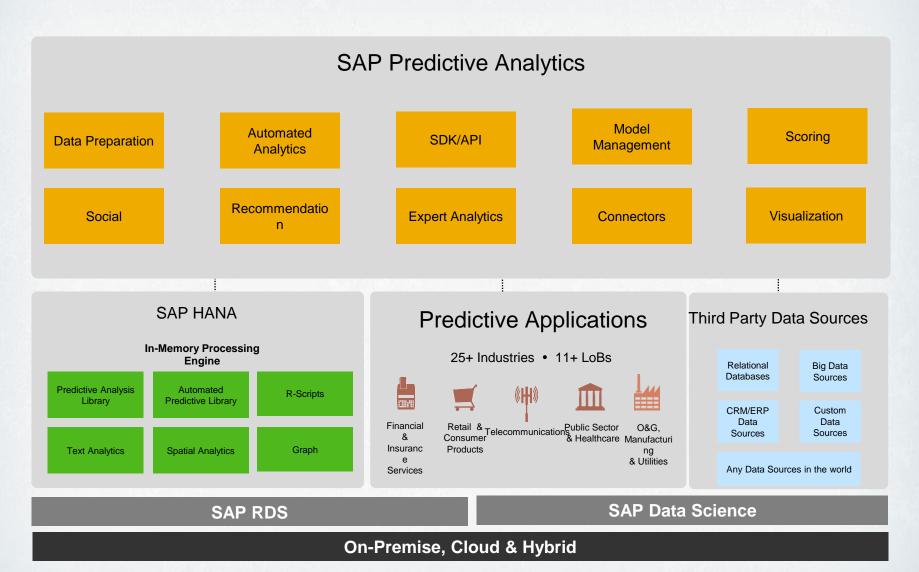## Make predictions simple, fast and accurate
Automated predictive workflow

Act with confidence at the point of decision
Embedded predictive analytics in business processes and apps

SAP Predictive Analytics

SAP Predictive Analytics

- Data Preparation
- Automated Analytics
- SDK/API
- Model Management
- Scoring
- Social
- Recommendation
- Expert Analytics
- Connectors
- Visualization

SAP HANA

In-Memory Processing Engine

- Predictive Analysis Library
- Automated Predictive Library
- R-Scripts
- Text Analytics
- Spatial Analytics
- Graph

Predictive Applications

25+ Industries • 11+ LoBs

- Financial & Insurance Services
- Retail & Consumer Products
- Telecommunications
- Public Sector & Healthcare
- O&G, Manufacturing & Utilities

Third Party Data Sources

- Relational Databases
- Big Data Sources
- CRM/ERP Data Sources
- Custom Data Sources
- Any Data Sources in the world

SAP RDS

SAP Data Science

On-Premise, Cloud & Hybrid

SAP

Alliander: Rapidly Improving Asset Data Quality with Data Science Expertise from SAP

Company
Alliander N.V.

Headquarters
Arnhem, The Netherlands

Industry
Utilities

Products and Services
Private energy grids and installations

Employees
6,700

Web Site
www.alliander.com

Objectives
- Improve data quality in the asset register, a central repository for all assets – such as gas pipes and electrical cables – used across the grid
- Reduce maintenance costs and regulatory risks by completing missing technical data, such as material or construction year, for all assets with high accuracy
- Move away from purely rule-based solutions for managing the quality of asset data that are time-consuming, unable to detect unknown patterns, and require tremendous expert involvement

Why SAP
- Combination of internal business knowledge with unparalleled data mining expertise from SAP to rapidly improve data quality
- SAP's Data Science organization uses data mining and R programming techniques – a language for statistical analysis – to identify patterns, extract regularities from the data itself, and complete missing asset data automatically

Benefits
- Faster improvement in data quality
- Lower project costs as well as significantly less effort and fewer resources for data quality management
- No penalties by satisfying regulatory requirements
- Better, more efficient planning for asset investments

"Ever since we learned about the data mining approach to improve master-data quality proposed by SAP's Data Science organization, it has become a substantial component of all our data quality projects."

Rob Jansen, Manager of Grid Information, Alliander N.V.

Lower
Annual spend for asset maintenance by approximately 1% to 2%

Better
Planning of future workloads

Higher
Data quality for accurate and 100% complete technical data

Thank you

@chandransar

Audience Questions?

Contact Information

If you have further questions or comments:

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