SAP for Utilities -
Beyond Smart Meters

Al Khoobar, 31 May 2015
Slawomir Klimowicz, SAP MENA
Agenda

1. SAP solutions for Smart Metering
   A bit of history, solution portfolio, future outlook

2. Beyond software solutions
   SAP leading and contributing to programs, projects and associations
To support top performance SAP offers a comprehensive and industry-specific solution portfolio

**Energy supply chain optimization**
- Fuel supply chain management
- Energy portfolio management
- Corporate sustainability

**Operational efficiency for plants and grids**
- Project and portfolio management
- Asset operations and maintenance
- Asset network
- Environment, health, and safety

**The intelligent grid**
- Meter data management and operations
- Grid data processing and analysis
- Demand side management
- Customer education

**Customer experience**
- Multi-channel marketing
- Sales and customer service for residential customers
- Sales and customer service for commercial and industrial customers
- Bill to cash

Corporate functions > Human resources | Finance | Procurement

Platform and technology > Enterprise technology | Analytics | Mobile | In-memory platform
Market relevancy through extended collaboration
The SAP AMI Eco-System

The AMI@SAP Lighthouse Council

Extended ACCU AMI Workgroup

Exchange of information on technology, market trends and strategies for AMI and Smart Grids
Composition and discussion of architectures and use cases
Definition and prioritization of common software requirements
Timely feedback from SAP on new product developments (system demos)
Early customer engagement in the software-development-process (specs, etc.)
Principles to Follow while engaging in AMI

- Simplicity of architecture
- Definition of standards for regulated as well as for deregulated markets
- The Commercial System sets the MDM/MDUS as gateway to the AMI Systems
- Independence of technical AMI environment from Business Process Execution Applications
- Strict differentiation of Meter Reading and Device Management Processes in MDM/MDUS
- Scalability of architecture with respect to high meter volumes
- Applying Enterprise SOA for the integration of MDM/MDUS and Business Applications
- Utilization or (if not available) creation of Industry Standards
The SAP Approach to AMI Projects

AMI  MDM  CIS (ERP & EAM)

Technical Processes  Business Processes

(*) Leveraging Partnerships
System architecture – Regulated market

Smart Meters → AMI → MDUS → Technical Infrastructure

AMI

Smart Meters

Customers

Technical Infrastructure

Business Process Execution

Smart Meter Analytics

→

Master Data

→

Meter Reading

Interval Data

TOU Blocks

Process Data

Event Data

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System architecture – Meter readings/Master data

Device Management
- Enhancement Device Category and Device
- Enhancement Installation/Change of Meters
- Automatic Master Data Exchange to MDUS
- Enhancement BW Content, BOR Objects etc.
- Regional structure and Grid: Assignment of AMI Systems

Meter Reading
- Enhancement Meter Reading Order
- Flexible Sending of Meter Reading Requests (PI)
- Receiving of Meter Readings (triggered by SAP/AMI)
- On-Demand Meter Reading
- Enhancement Monitoring of Meter Reading Results
- Cancellation of Meter Reading Requests
- Adjustment of all Entry-Screens for Meter Readings
System architecture – Handling of interval data/TOU blocks

**Commercial & Industrial Customers**

- Upload of profile values on a regular basis (e.g. daily)
- Complete EDM features (VEE, etc.)
- Billing through RTP-Interface

**Residential Customers**

- Fast upload of profile values on a regular basis (e.g. daily)
- Basic EDM features (limited status conversion, etc.)
- TOU-Billing (new variants)

- Aggregation request to MDUS
- Upload of aggregated TOU blocks
- TOU-Billing (new variants)
System architecture – Process and event data

Disconnection/Reconnection
- Integration in Dunning Process
- Notification Process
- Scheduling of Disc./Rec. Orders
- Mass Activity for Sending Disc./Rec. Orders
- Cancellation of Disc./Rec.
- Monitoring of Disc./Rec. Orders

Sending of Text Messages
- Sending of text messages from CRM or ERP (free editable text or templates)
- Integration in dunning process
- Report to send out messages
- Automatically check each message before sending (e.g. offensive language)
- Prevent message sending in a short notice

Event Management
- Receiving and prioritization of event data from the MDUS-System
- Triggering of follow-up activities based on utility-specific rules
- Monitoring of event processing

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# Strategic solutions – Participation by invitation

Qualified Business Solutions (QBS)

## Selection Criteria
- Specific business or technology focus ("White Space")
- Alignment with SAP product & technology roadmap
- Limited overlap with the SAP solution
- Highly differentiated and integrated solution
- Proven track record and customer references
- Company maturity and financial viability
- Global engagement

## Relationship Benefits
- Solution Certification
- Technical Enablement
- Marketing Enablement
- Echo Hub Storefront
- Online Marketing Campaigns
- Solution Endorsement by SAP
- Joint Marketing campaigns

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[MDUS]  
[SAP]

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[emeter]  
[Itron]  
[Landis+Gyr]  
[OSTsoft]
The Intelligent Grid: The SAP experience

- **2007**
  - Concept
  - Customer Groups (Lighthouse Council & ACCU AMI Working Group)
  - Architecture

- **2008**
  - AMI Foundation
  - Master Data Sync
  - Meter Reading
  - CRM Enhancements

- **2010**
  - Processes
  - Enhanced Billing
  - Disconnection / Reconnection
  - Event Handling
  - Etc.

- **2011**
  - Deregulation
  - SOA enablement for sending and receiving SAP EDM profiles

- **2013**
  - Continuous Innovation
  - Conditional Billing
  - Others (Activation Handling, Device Management, etc.)

- **2014**
  - Project Feedback
  - Register Group, Time Stamp, etc.

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### SAP AMI Integration for Utilities

#### Business Suite 7
- **Meter Reading**
  - Support of regular and on-demand reading
  - Monitoring
  - Status Administration
- **Device Management**
  - Exchange of Master Data
  - Business Warehouse Content
  - Integration to all Data Objects (e.g., Grid)
- **Customer Service**
  - Disconnection / Reconnection (also ERP)
  - AMI Capabilities for Product Value Help
  - Device Information in the Interaction Center
- **Broad Number of Enterprise Services**

#### Business Suite 7 Innovation 2010
- **Joint Energy Data Management (MDUS Integration)**
  - Tight integration of MDUS with SAP for Utilities
  - Transfer aggregation rules dynamically to the MDUS
  - Support of the various billing scenarios
- **Monitoring**
- **Disconnection / Reconnection**
  - Scheduling, Monitoring of entire Process
  - Support of Approval and Reversal Process
- **Device Management**
  - On-Demand Request for AMI-Meter/Device status
  - Master Data Exchange

#### Business Suite 7 Innovation 2010
- **Sending of Text Messages to the Meter**
  - Possibility to send text message from CRM or ERP to specific meter
- **Event Management**
  - Receiving and prioritization of event data from the MDUS-System
  - Triggering of follow-up activities based on utility-specific rules
  - Monitoring of event processing
- **P2P Communication for all enterprise services**
- **Miscellaneous**:
  - Performance Improvements
  - Support Meter Mass Rollout

#### Business Suite 7 Innovation 2011
- **Market Communication**
  - Mass processing and infrastructure adjustments
  - SOA enablement for sending and receiving of profiles stored in SAP EDM
- **Bulk-Services**
  - Asynchronous services for profile import
- **Enhancement of TOU-Billing-Features**
  - Simulation
- **Demand Side Mgmt.**
  - Program support
  - Monitoring & Reporting

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…and what customers have told us

Continuous innovation / Country-specific enhancements

Partnering concept

Mass deployments of smart meters

Operational reporting / analytics

Simplicity / flexibility of architecture
Key Features of an MDM System (Gartner Based)

Data collection

Command management (such as remote connect/disconnect)

Validating, editing and estimating (VEE) meter reads

Exception management

Electricity and Gas

Event management (such as "last gasp" outage notification)

Estimating invalid or missing reads

Profiling scalar meter reads

Bill determinant calculation

Aggregating meter reads

Tracking meter inventory

Business Process Execution

Providing data to downstream systems, such as customer information systems (CISs)

Providing information directly to end users (utility personnel and end customers alike)

Supporting additional functions, such as revenue protection analysis, distribution planning support and prepayment
# SAP Approach to the AMI Projects

## Traditional Approach

- MDM perceived as a system with a very strong technical focus
- Support to multiple AMI protocols and strong in interoperability.
- Handling large data volumes at low TCO.
- MDM would not focus on Business Process Execution (MDUS concept)
- MDUS Certification and partnerships secured end to end interoperability.

## Alternative Approach

- Customers are asking for TCO reduction and simplification of system architecture / landscape
- SAP HANA offers real time capabilities and Critical insights on data w/o need for replication
- SAP EDM handles large volumes of data with low TCO (already productive customers)
- MDM implementations have limited capabilities to take care of business process execution aspects (e.g. market communication)
- Customers ask SAP to offer end to end solutions given the it’s extensive solution capabilities
- Multiple AMI protocols are already being on a project basis effort.
- MDUS protocol is a key enabler of AMI integration simplifying the integration work. A standard easily adopted by multiple AMI players.
The Alternative SAP Approach to AMI Projects

Technical Processes

(*) Leveraging Partnerships

Business Processes
The New Partner Model

SAP Enterprise Service Bundle Certification:
- Enterprise services (ES) bundles group enterprise services according to an end-to-end business scenario
- SAP certifies the implementation of one or more use cases outlined within the AMI ES Bundle
- Validation/certification of partner’s ability to consume AMI ES via SAP PI
- Process to be completed within a limited time frame
- Access to shared and exclusive-use hosted test systems
- No restriction/limitation to any partners
- Link to ES Bundle Certification page:

- Supported to foster co-innovation and product development
- More flexible, less cost-intensive and time-consuming collaboration agreement
Simplicity / flexibility of architecture

- Customers ask for simplification and cost reduction: license, implementation and maintenance → two-tier architecture
- Processes do not need a three-tier architecture and act sometimes obstructive; some processes need the data in the SAP-system anyway
- Significant overlap between solution providers
- SAP AMI Integration for Utilities solution and new SAP ES Bundle Certification supports different architectures and multiple vendors (no changes to the MDUS-interfaces)
- Customers are already deploying SAP Energy Data Management as the central meter data repository (AGL, etc.)
- SAP Consulting by this time offers a reduced system architecture in certain tenders due to customer requirements

SAP Business Assessment for individual customer landscape / architecture
SAP AMI Integration for Utilities - Roadmap

AMI 1.0
ECC 6.0 EHP4/CRM 7.0
- Meter Reading
- Device Management
- Customer Service
- Broad Number of Enterprise Services

AMI 2.0
ECC 6.0 EHP5/CRM 7.0 EHP 1
- TOU Aggregation
- AMI Monitoring
- Disconnection / Reconnection
- Device Mgmt
- Sending of Text Messages
- Event Mgmt
- P2P Comm. for all enterprise services
- Performance Improvements
- Smart Meter Rollout

AMI 3.0
ECC 6.0 EHP6/CRM 7.0 EHP 2
- Market Communication
- Bulk-Services
- Enhancement of TOU-Billing-Features
- Demand Side Mgmt.

AMI 4.0
ECC 6.0 EHP7/CRM 7.0 EHP 3
- Device Mgmt (flexible handling of remote capabilities) *
- Meter Reading (Push of meter readings to the MDUS) *
- Provision of VEE relevant information to the MDUS *
- New billing concept: Conditional Billing (CPP, PTR tariffs)
  * Functionality will be also provided on ECC 6.0 EHP6 / EHP5
Smart Metering / Smart Grids architecture by SAP

**Business Intelligence Suite**
- Device Mgt.
- EDM
- Billing
- Prepayment
- Contract Accounting

**Utilities**
- Sales
- Service
- Demand Side Mgmt.
- CRM

**Multichannel Foundation for Utilities**
- NetWeaver Gateway

**ERP + add-on's**
- Multiresource Scheduling
- Work Manager (Mobile app)
- C4C

**Process Orchestration or WSRM**
- AMI Integration

**Middleware**
- Non-SAP
- SAP
- Either

**Web / Mobile**
- SMP
- MultiChannel Foundation for Utilities

**2-Tier**
- HES

**3-Tier**
- MDUS

**HES: Head-End System**
**MDUS: Meter Data Unification and Synchronization**
**WSRM: Web Services Reliable Messaging**
**EDM: Energy Data Management**
**SMP: SAP Mobility Platform**
**C4C: SAP Cloud for Customer**

Smart meter roll-out through external and/or internal service providers.

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Customer’s experience

**Lessons learnt led to a market driven rollout policy reforms ...**

- Rollout of smart meters is commercially driven rather than mandated or regulated
- Ensures that the meter specifications are based on the smart metering services that customers want
- Provides the flexibility for retailers & 3rd parties to develop new products and services to customers.

...focused on empowering customers to make choices

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**Active Stream Breaking New Ground**

Active Stream is on the cutting edge of technology – to provide the best customer experience at the lowest cost.

- Implement SAP Energy Data Management (EDM) integrated with smart meters (SAP’s new “2-tier AMI architecture”).
- 100% cloud based solution at AGL – access (RemoteApp), email (Office 365) and systems (Storm, SAP, Brave) are cloud based.
- Host enterprise systems on Microsoft Australia Azure cloud platform.
- Implement high availability SAP on Azure (using SISO/SQ2012 solution).
The Implementation of Smart Metering starts with the Business Assessment

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**Business Strategy**

- Creation of business model
- Review of the past growth
- Business model simulation
- Evaluation of the business strategy

**Process Architecture**

- Define process and IT requirements
- Adjust process model
- Development and evaluation of IT scenarios

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**IT Strategy + BPM**

- Define requirements
- Provide and appraise solution options
- Roadmap
- Test critical processes and IT performance

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**Implementation**

- Translate strategy concepts into IT concepts
- Implementation of processes and IT scenarios
- Go live

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Business Assessment
Smart Metering
SAP Smart Meter Roll Out

SAP Solution

- District Planning and Resource Assignment
- Order Creation and Customer Information
- Issue Tracking and Replanning
- SAP Smart Meter Rollout

- Provide **all relevant information** in a unified environment
- Provide **sophisticated planning tools** and workflows to reduce resource effort and improve planning reliability
- Allow complex planning activities in **GIS** environment

SAP Differentiators

**Integration:** Seamlessly integrate all relevant data and processes across functional boundaries on a single platform

**The right information:** Flexible toolset for execution and verification of smart meter mass rollout

**Always up-to-date:** Real-time data availability in online and offline scenarios
## Smart meter rollout – a holistic view

<table>
<thead>
<tr>
<th></th>
<th>Preparation</th>
<th>Rough planning</th>
<th>Fine planning</th>
<th>Job-/ order-submission</th>
<th>Job-/ order-execution</th>
<th>Confirmation of job / order</th>
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</thead>
<tbody>
<tr>
<td><strong>SAP for Utilities</strong></td>
<td>Data analysis</td>
<td>Data analysis</td>
<td>Data source and order generation</td>
<td>Mobile-workforce interface</td>
<td>Confirmation of device information</td>
<td></td>
</tr>
<tr>
<td><strong>SAP Smart Meter Roll-Out by Prologa</strong></td>
<td>Def. of planning scenario Selection of devices Generation of job plans for order generation</td>
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<tr>
<td><strong>SAP MRS</strong></td>
<td>Definition of responsibilities and capacities per area</td>
<td>Planning of orders and scheduling Resource allocation Route optimization</td>
<td>Status-update and conflict-handling</td>
<td>Monitoring, status</td>
<td>Monitoring, status Reporting, costs and resources</td>
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<td><strong>SAP Controlling</strong></td>
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<tr>
<td><strong>SAP Work Manager Mobile</strong></td>
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<td>Confirmation of activities and status information</td>
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<tr>
<td><strong>SAP AMI</strong></td>
<td>Device attributes and data synchronization</td>
<td></td>
<td></td>
<td></td>
<td>Data synchronization</td>
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</tbody>
</table>
SAP Cloud for Customer (C4C)
Smart meter roll-out through internal and external service providers

External service employees (w/o SAP ERP)
- Overview of tickets
- Employee details
- Ticket information (e.g. customer data)

- Optimization of employees (internal & external)
- Analysis (e.g. work duration)
- Assignment details (internal & external)
- Travel information
- Transfer of service orders:
  - Internally: Work Manager Mobile
  - externally: C4C

System demo
SAP HANA Live architecture
Foundation for new class of applications

Zero latency!

SAP ECC Applications

Operational Reporting

Atomic data set for detailed drill-down information

Pre-defined models across entire suite

Operational data available instantaneously

SAP HANA PLATFORM

Database Layer

Physical Tables

HANA Views
SAP Hana Live for Utilities, edition for SAP ERP

**Target Roles**
- Business Users
- Divisional Managers

**Analysis Report Areas**
- Device Management
- Meter Reading
- Billing
- Invoicing

**Business Questions**
- What is the status of the device roll-out and device inspection process?
  - How many and what type of devices are installed?
  - How many, which and when devices are due for a periodic replacement – and where?
- What is the status of the meter reading process with regard to consistency and completeness?
  - How many plausible/implausible meter reading results exist?
  - Is the meter reading order creation process complete? How many meter reading orders are missing?
  - How many meter readings are scheduled to be read?
- What is the status of the billing process with regard to consistency and completeness?
  - Are the billing orders complete? How many billing orders are missing?
  - How many billing documents have been outsourced during billing?
  - How many billing documents were reversed?
  - How many contracts are blocked for billing?
  - How many contracts have been scheduled for billing?
- And many more…

**Key Metrics**
- Device Management:
  - Devices
  - Device info records
  - Periodic Replacement
- Meter Reading:
  - Meter reading orders
  - Plausible meter reading results
  - Implausible meter reading results
  - Meter reading documents
  - Missing meter reading orders
  - Scheduled meter readings
- Billing:
  - Contracts scheduled for billing
  - Billing documents
  - Reversed billing documents
  - Outsourced billing documents
  - Missing billing orders
  - Billable billing orders
  - Non-billable billing orders
  - Contracts blocked for billing
- Invoicing:
  - Contracts scheduled for billing
  - Billing documents
  - Reversed billing documents
  - Outsourced billing documents
  - Missing billing orders
  - Billable billing orders
  - Non-billable billing orders
  - Contracts blocked for billing

**Dimensions**
- SAP Client
- Contract
- Installation
- Equipment
- Device category
- Year of construction
- Register
- Meter reading date/time/status
- Meter reading type/category
- Meter reading unit
- Portion
- Scheduled billing date
- And many more…

Demo
Agenda

1. SAP solutions for Smart Metering
   A bit of history, solution portfolio, future outlook

2. Beyond software solutions
   SAP leading and contributing to programs, projects and associations
Beyond software development

EU SmartGrids horizons 2020 and 2035
ESMIG: Working groups’ Studies and reports – SAP Chairing

KEY MESSAGE

- Support of EU standardization mandates (e.g. M441 & M490)
- Support of standards, interoperability and privacy by design (TF SmartGrids, EG2)
- Support of the 3rd Energy package (EBSII uses cases, “Empower” report)

EBSII working group is chaired by SAP
# 17 Smart Metering Use Cases in focus at ESMIG

## ESMIG-EBSII Use Cases

<table>
<thead>
<tr>
<th>Use Case Description</th>
<th>ebIX UseCases-ID</th>
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</thead>
<tbody>
<tr>
<td>1 Obtain Meter Reading Data</td>
<td>1</td>
</tr>
<tr>
<td>2 Install, Configure and Maintain the Metering System</td>
<td>2 - 3 - 4 - 5 - 6 - 7</td>
</tr>
<tr>
<td>3 Support Prepayment Functionality</td>
<td>1 - 7</td>
</tr>
<tr>
<td>4 Manage Power Quality Data</td>
<td>-</td>
</tr>
<tr>
<td>5 Manage Outage Data</td>
<td>1 - 7</td>
</tr>
<tr>
<td>6 Facilitate Demand Response Actions</td>
<td>-</td>
</tr>
<tr>
<td>7 Facilitate DER for Network Operation</td>
<td>-</td>
</tr>
<tr>
<td>8 Manage the Network using Metering System Data</td>
<td>1 - 7</td>
</tr>
<tr>
<td>9 Manage Interference to Metering System</td>
<td>-</td>
</tr>
<tr>
<td>10 Manage Tariff Settings on the Metering System</td>
<td>5</td>
</tr>
<tr>
<td>11 Enable and Disable the Metering System</td>
<td>-</td>
</tr>
<tr>
<td>12 Interact with Devices at the Premise</td>
<td>-</td>
</tr>
<tr>
<td>13 Manage Efficiency Measures at the Premise using Metering System metering system data Data</td>
<td>-</td>
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<tr>
<td>14 Display Messages</td>
<td>-</td>
</tr>
<tr>
<td>15 Consumer Move-in/move-out</td>
<td>3 - 5 - 6 - 7</td>
</tr>
<tr>
<td>16 Supplier Change</td>
<td>4 - 5 - 6 - 7</td>
</tr>
<tr>
<td>17 Demand Side Management</td>
<td>-</td>
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</tbody>
</table>
ESMIG - European Smart Metering Industry Group Architecture

Scope of the Use Cases in this document

Technical Systems

Business Systems

Use cases related to this system (actor)

Technical asset management
Real-time applications
Distribution Grid Management System
Outage Management
Workforce Management
Consumer Relationship & Billing (CIS & CIP)
Energy Capital Management
Enterprise Asset Management
Intercompany Data Exchange
Geographic Information System
Customer Communications Management

Other Industry Players

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Customer 33
<table>
<thead>
<tr>
<th>Initiatives</th>
<th>Participants</th>
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<tr>
<td>ETP Smart Grids: Energy Retailers Perspective on Deployment of Smart Grids in Europe (07/2010)</td>
<td><img src="image" alt="Participants" /></td>
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<tr>
<td>ETP Smart Grids Demand and Metering and Retail Group chaired by SAP</td>
<td>Top 7 DSO</td>
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<tr>
<td>European Electricity Grid Initiative (EEGI) white paper (Top 7 TSO &amp; Top 7 DSO)</td>
<td>Top 7 TSO</td>
</tr>
<tr>
<td>Member of Executive Committee</td>
<td>EEGI Committee</td>
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<tr>
<td>ESMIG – EBSII working group on MDM/ERP System Interoperability (09/10)</td>
<td><img src="image" alt="Participants" /></td>
</tr>
<tr>
<td>European Smart Industry Group – WG EBSII chaired by SAP</td>
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Thank You!