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Sebastian Fromme, SAP SE

SAP on VMware - A Customer Story
How EVONIK Is Managing Its SAP Workload While Utilizing Market-Leading SAP and VMware Technology

Sascha Minnert, Evonik Industries AG
Sebastian Fromme, SAP SE
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Agenda

Introduction
▪ Evonik
▪ SAP

Evonik Overview
▪ Datacenter & SAP Project
▪ Technology & Tools

Concepts, Principles & Operations
▪ KISS – Keep It Simple Stupid
▪ Tool Integration
▪ Monitoring

Summary
▪ Key Takeaways
▪ Resources
▪ Q & A
Introduction

Evonik
SAP
What we don't do

- CAR TIRES
- TOWELS
- MATTRESSES
- NUTRITION
- TABLETS
What we do
Living better with Evonik

more fuel saving    fluffier    more elastic    healthier    more effective

CAR TIRES       TOWELS       MATTRESSES       NUTRITION       TABLETS

Countless products gain their special attributes through our creative power.
Who gives adhesives their sticking power?
Evonik TV Spot
Who we are
Evonik at a glance

~13 Billion Euro turnover in 2016
80% Of turnover gained from leading market positions
172 Sites

>35,000 Employees in over 100 countries
2.165 billion Euro EBITDA 2016
~500 R&D projects
Where we can be found
Evonik operates worldwide

North America
2,699 M€ turnover
4,660 employees
39 sites

Central & South America
563 M turnover
793 employees
15 sites

Western Europe (incl. Germany)
5,534 M€ turnover
23,919 employees
42 sites

Eastern Europe
767 M€ turnover
639 employees
11 sites

Asia-Pacific North
1,947 M€ turnover
3,688 employees
30 sites

Middle East & Africa
403 M€ turnover
194 employees
12 sites

Asia-Pacific South
818 M€ turnover
1,616 employees
23 sites

Turnover in 2016
Our aspiration

We want to be the best company for specialty chemicals in the world
SAP: The World’s Largest Provider of Enterprise Application Software

- 355,000+ Customers in more than 180 countries
- 87,100+ Employees in 130+ countries
- €22.06bn Total Revenue (IFRS) in FY2016 (preliminary)
- 87% Of Forbes Global 2000 are SAP customers
- 45 yrs. Of history and innovation
- 100+ Innovation and development centers
- 15,000+ SAP partner companies globally
- 125 mil. Subscribers in our cloud user base

• SAP itself is one of the biggest customers of VMware
• Many SAP customers worldwide use VMware virtualization for their business critical workloads

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Evonik Overview

Datacenter & SAP Project
Technology & Tools
Data Center Setup EMEA
DC Relocation Program

DC 1

DC 2

10 GbE

10 GbE
Network Security Design

- **Separation of Office LAN and Server LAN** by firewall with IPS
- **Jump servers** for administration
- **2 Security levels possible**
  - L1: Client Separated
  - L2: DC Separated (optional)
- **Reasons**
  - Improved security
  - Reliable environment for system management
  - Less influence between LAN segments
Hardware Overview of One Site

VxBlock

- Cisco UCS
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host

SAP Bare-Metal

- Cisco UCS
- Server
- Server
- Server
- Server
- Server

VxBlock Technology Extension

- Cisco UCS
- VMware
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host

Windows / Linux

- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host
- ESXi-Host

Backup

- VxRail (SAN)
- ISILON (NFS)

Basic Infrastructure (DC Management Tools)

- VxRail Storage

DMZ

- VxRail Storage

SAP file systems

- NetApp (NFS)

Linux Boot (Bare-Metal)

- Linux Boot (vmware)

ESXi-Host Boot file systems

- Windows / Linux file systems
DC Workload Distribution Principle
All workload types (simplified)

DC 1

DC 2
DC Workload Distribution Principle
Example: SAP (VMware)
DC Workload Distribution Principle
Example: SAP (Bare-Metal)

DC 1

DC 2

SAP (Bare-Metal)  SAP (VMware)
Important Management Tools

- VMware vCenter Server
- vRealize Operations with Blue Medora SAP Management Pack
- SAP Landscape Management (SAP LaMa)
- Vendor Tools
  - Dell EMC (VCE) Vision
  - VxRail Manager
  - Cisco UCS Manager
  - Netapp WFA
  - …
SAP Landscape Management
Making SAP landscape management easier

SAP Landscape Management is an automation and orchestration solution to simplify • automate • centralize the management of your SAP landscapes

➢ Increase Operational Efficiency
➢ Accelerate Cloud Transformation
➢ Boost Business Agility

* Formerly SAP Landscape Virtualization Management (LVM)
Layer Model
Adding Other Perspectives

Technical Perspective
- Application
- OS
- VM
- Hypervisor
- Compute
- Network
- Storage

Operations Perspective
- Business
- Application Architecture
- OS
- VM
- Hypervisor
- Compute
- Network
- Storage

Integration & Functions Perspective

Global IT
(strategy & standards)
Layer Model
The art of creating a strong “net”
The “SAP Basis Team of Tomorrow”
Example: SAP Basis – leading digital transformation

- DSAG (German SAP User Group) members questioned the self-conception of the classic “SAP Basis Team” in the light of digitalization.

- This attracted a lot of interest and finally DSAG recommendations were published by the “SAP Basis Team of Tomorrow” project group.
  - new roles / future roles
  - positioning & communication
  - cross-function team

- How about your SAP Basis – or more general: application architecture – teams?
Global EVONIK SAP Basis Team
“Follow the Sun”
SAP System Landscapes @ Evonik

~ 30 Landscapes

- 130+ Systems
- 900+ Instances
- 200+ Hosts

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# The “Language” Problem

<table>
<thead>
<tr>
<th>System</th>
<th>Host</th>
</tr>
</thead>
<tbody>
<tr>
<td>erp.evonik.corp</td>
<td>e.g. <code>prderpasc</code> for ASCS</td>
</tr>
<tr>
<td>SID: ASCS/PAS/2xAAS/DB/DB’</td>
<td>MSCS cluster with ASCS, node <code>saphostn1</code></td>
</tr>
<tr>
<td>One Linux host</td>
<td>ESX Host <code>dc1esx1234</code></td>
</tr>
<tr>
<td>ESX Cluster or vCenter</td>
<td></td>
</tr>
<tr>
<td>CISCO UCS Manager</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business</th>
<th>Host</th>
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<tbody>
<tr>
<td>OS</td>
<td></td>
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<table>
<thead>
<tr>
<th>Application Architecture</th>
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<tbody>
<tr>
<td>OS</td>
<td></td>
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</table>

<table>
<thead>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Hypervisor</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Compute</th>
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<table>
<thead>
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</table>

<table>
<thead>
<tr>
<th>Storage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage</td>
<td></td>
</tr>
</tbody>
</table>

~ 30 Landscapes
Prod
QA
DEV
(Sandbox)

130+ Systems
900+ Instances
200+ Hosts

Finally it is not important that you use the “right” term – the key is to have a common understanding.
What is the problem?
Let us have a look to a practical question …

Is built-in VMware HA sufficient for my business needs? OR Do I need to setup a InGuest-Clustering or other solutions?

Do I really know my business needs & can I translate it to IT – and finally – architecture requirements?

HA in application (Enqueue Replication, HANA System Replication, SQL Server AlwaysOn…), HA in OS, HA for VM and all potential dependencies…

Corporate IT Strategy (e.g. HA/DR) - Software Maintenance - Security - Operations Concept - Internal Billing - …

➢ Probably you will not find an optimal solution if you do not bring the right people together that have the same attitude of collaboration.

➢ Finally it is not a matter of technology – it is a matter of people and organization. Successful digitalization requires organizational transformation.
KISS  Keep It Simple Stupid
Data Center Relocation Program and SAP Application Cloud

- DC relocation program provided a unique chance to create a new SAP application architecture and operations concept
- Teamwork, tight collaboration and partner involvement was (and is) key for success!
- Key thoughts for “SAP Application Cloud”
  - Keep it as simple as possible
  - Efficient use of hardware resources
  - Expect that current limits today may not be relevant in near future
    - E.g. VMware memory limits and SAP restrictions (scale out, multi-VM, one server)
  - Separate SAP systems in dedicated VMs
  - Enable High Availability (HA) via VMware
- …and thorough usage of SAP Landscape Management
Target Environment for SAP Application Cloud

- Uniform layout for all SLA’s
- Alternatives in case of limit exceeding
- vSphere 6, HANA and E7v4 allow systems up to 4 TB RAM
- Thanks to adaptive installation prepared alternatives are easy to realize
- All HANA databases with Scale Up (Single Node)

**ONE Platform:**
- Database: SAP HANA
- Operating System: SLES (for SAP applications)
- Hypervisor: VMware
- Hardware Architecture: x86 (Cisco/VCE*)
- Storage: NetApp

* Dell EMC

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SAP Application Cloud
Storage & SAP LaMa

- Unified storage connector – independent from system layout / deployment
SAP Application Cloud
SLA Definition – Critical System Class – Example

- **SAP Instances + HANA**
  - Separate VMs
  - HANA in separate VM or native
  - At least two application servers

- **HA**
  - VMware HA
  - VMware FT (SCS)
  - Synchronous HANA Replication
  - Synchronous Storage Replication

- **DR**
  - Asynchronous HANA Replication
  - Mirrored Snapshots
  - Asynchronous file system mirroring
  - …

**Operations Team**
Mo – Fr: 00:00 – 24:00

**HA**
- RPO: 0+ (last written transaction)
- RTO: some 20 min. per system

**DR**
- RPO: some 15 min.
- RTO: some hours or days
SAP Application Cloud
Deployment Option – Critical System Class – Example

DC 1

VMware
HA
VMware
FT
VMware
HA
VMware
HA
VMware
HA

App. Server
SUSE
Central Services
SUSE
App. Server
SUSE
HANA
SUSE
HANA Sys.Repl.
SUSE

VMware – vSphere

DC 2

VMware
HA

HANA
SUSE
HANA Sys.Repl.
SUSE

VMware – vSphere

VMworld 2017 Content: Not for publication or distribution
SAP Application Cloud
Deployment Option – Critical System Class – Example
Tool Integration
SAP Application Cloud
Virtualization Perspective and SAP LaMa

- Application Virtualization through SAP LaMa
- Hardware Virtualization through VMware
- Server Virtualization through Cisco UCS
- Storage Virtualization through NetApp

VMware - vSphere
SAP Server

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SAP Landscape Management - Overview of components

Management Server

SAP NetWeaver Java 7.50

- SAP LaMa
  - Virtualization API
  - Central Storage API

Virtualization Adapter

Central Storage Adapter

LAN

Managed Node

- SAP Host Agent
  - sapacosprep

Database Library

Custom Exit

- Storage Library
- Platform Library

SAN

NAS/NFS

vm_host (hypervisor)

= SAP

= SAP Partner

= SAP / SAP-Partner Integration
SAP Application Cloud
Development System – D60

Business
Application Architecture
OS
VM
Hypervisor
Compute
Network
Storage

Web-dispatcher
App. Server
Central Services
HANA
SUSE

VMware HA
vSphere

VM name: sl5022
Virtual CPUs: 6
Memory (MB): 187780

OS: SLES4SAP 12 SP1
Host: sl5022

VMware Tools (OVT)
OS: 10.1.0.57774

ESX Host: es1-bi08,...
ESXi: 6.0.0.5224934
Model: Cisco UCS-EK-M4-2
Processor: 2 x 8880 @ 2.30GHz
Memory: 1569905 MB

Datacenter: XXX
Resource Pool: XXX
CPU
Reservation: XX
Limit: XX
Shares: XX
Memory
Reservation: XX
Limit: XX
Shares: XX

ESX Cluster:
XXX
vSphere HA: XX / XXX Cores
CPU Resources: XXX GHz
Mem. Resources: XX GB
EVC Mode: XXX

HANA Instance
XXX

SHAHDA
WD (for D60)
AS ABAP (PAS)
d60acsXX
AsCS
31
f60hdbXXXX
d60hdbXX
HANA Appl.
Server
SUSE
VMware
HA
Web-dispatcher
App. Server
Central Services
HANA
SUSE

ESX Host:
es1-bi08,...
ESXi: 6.0.0.5224934
Model: Cisco UCS-EK-M4-2
Processor: 2 x 8880 @ 2.30GHz
Memory: 1569905 MB

Resource Pool: XXX
CPU
Reservation: XX
Limit: XX
Shares: XX
Memory
Reservation: XX
Limit: XX
Shares: XX

Datacenter: XXX
SAP Application Cloud – Central Tool Integration
Development System – D60

- SAP Landscape Management (SAP LaMa)
  - SAP Management, Orchestration, vCenter + NetApp Integration
- VMware vCenter Server
  - vSphere Management / Monitoring
- vRealize Operations with Blue Medora SAP Management Pack
  - Central Monitoring, Capacity Management, E2E Visibility
Monitoring
Technical Monitoring Infrastructure – VMware & SAP

Inside-Out
- Part of Basic Monitoring
- No additional authorization
- Included in SAP certification process for hypervisor solutions

Outside-In
- Product Management Tools
- Customers can and must use it for detailed analysis
- Entry point for “vertical” integration

Application (SAP)

Operating System (Guest)

SAP NetWeaver

SAP HANA

Solution Manager

VMware Tools Guest SDK (read-only)

SAP Host Agent

Virtualization & Cloud Infrastructure

Compute

Network

Storage

vSphere API

SAP Landscape Management (SAP LaMa)

Management & Monitoring (vRealize Operations, vCenter, …)
SAP Basic Monitoring - Tools, Processes and Use Cases

- **Inside-Out Approach**
- Read-Only
- Control Switches
  - `VM tools.guestlib.enableHostInfo = "TRUE"`
  - `ESX Misc.GuestLibAllowHostInfo = 1`
  - SAP Note **2266266**

**VMware Tools**
- Guest SDK (read-only)
- Guest Lib

**SAP Host Agent**

---

**SAP NetWeaver**
- Local Monitoring (e.g. ST06)
- System Analysis

**Solution Manager**
- Central Monitoring
- SAP Support Platform

**SAP HANA**
- Pre-flight Check
- Performance Optimization

---

**SAP Support**
- Incident Processing
  - Performance Issue
  - Support Statement Question
  - ...

**SAP Support**
- Service Delivery
  - EarlyWatch Alert
  - Capacity Management Services
  - ....
Monitoring: Showcases

• Big topic, many perspectives

• Limitation to some practical examples:
  • SAP NetWeaver ABAP: ST06
  • SAP Services: EarlyWatch Alert
  • vRealize Operations Integration:
    • Application Server ABAP
    • SAP HANA
    • Relationships / Mapping (incl. SAP + Cisco UCS)
# Use Case Example: ST06

## ESXi, VM Tools

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Linux s5022 3.12.74-60.64.40-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostname</td>
<td>s5022</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Cisco Systems Inc</td>
</tr>
<tr>
<td>Model</td>
<td>UCSB-EX-M4-2</td>
</tr>
</tbody>
</table>

## ESX Host Hardware

<table>
<thead>
<tr>
<th>Memory</th>
<th>Physical memory</th>
<th>187.780 MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free memory</td>
<td>121.181 MB</td>
<td></td>
</tr>
<tr>
<td>Free swap size</td>
<td>39.710 MB</td>
<td></td>
</tr>
<tr>
<td>Configured swap size</td>
<td>39.710 MB</td>
<td></td>
</tr>
</tbody>
</table>

## OS Memory metrics

- Free memory incl. FS cache: 131.621 MB
- Free memory percentage: 64.98%
- Pages In: 0 P/s
- Pages Out: 0 P/s
- Page In: 0 K/s
- Page Out: 0 K/s
- Page In of RAM: 0 %
- Page Out of RAM: 0 %

## OS CPU metrics

- System: 0 /s
- Intervals: 1.824 /s
- Average processes waiting (1 min): 0.25
- Average processes waiting (5 min): 0.27
- Average processes waiting (15 min): 0.40
- Context switches: 3.360 /s
- Number of CPUs: 6
- Utilization: 7.34%

## ESX Host CPU Cores, HT

- CPU Virtualization Host: Intel(R) Xeon(R) CPU E7-8880 V3 @ 2.30GHz
- Maximum Processor Frequency: 2.294 GHz
- Number of Threads per Core: 2
- Physical CPUs: 12
- Physical CPUs Consumed: 9.4
- Virtual CPUs: 6
- Ready Time: 6.00%
- Capacity Limit: 6.00 CPUs
- Available Capacity: 6.00 CPUs
- Additional Capacity Available: 5.44 CPUs
- Guaranteed Capacity: 0.00 CPUs
- Capacity Maximum: 6.00 CPUs
- CPU Contention Time: 0.1
- Starvation: 0.1
- Capacity Consumed: 0.56 CPUs
- Available Capacity Consumed: 9.3

## Virtualization Configuration

- Enhanced Monitoring Access: TRUE
- Enhanced Monitoring Details: ACTIVE
- Solution: VIRT_METHOD_VMWARE_ESX
- Solution Version: VMware ESX 6.5.0 build-5224934
- Data Provider Version: VMware Tools 10.1.0.57774
- Last Hardware Change: Wed Aug 2 09:16:50 2017
Use Case Example: EarlyWatch Alert

Performance Indicators for D60

<table>
<thead>
<tr>
<th>Area</th>
<th>Indicators</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Performance</td>
<td>Active Users (&gt;400 steps)</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Avg. Availability per Week</td>
<td>100 %</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time in Dialog Task</td>
<td>1162 ms</td>
</tr>
<tr>
<td></td>
<td>Max. Dialog Steps per Hour</td>
<td>118</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time at Peak Dialog/Hour</td>
<td>177 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. Response Time in RFC Task</td>
<td>377 ms</td>
</tr>
<tr>
<td></td>
<td>Max. Number of RFCs per Hour</td>
<td>1266</td>
</tr>
<tr>
<td></td>
<td>Avg. RFC Response Time at Peak Hour</td>
<td>413 ms</td>
</tr>
<tr>
<td>Hardware Capacity</td>
<td>Max. CPU Utilization on DB Server</td>
<td>16 %</td>
</tr>
<tr>
<td>Database Performance</td>
<td>Avg. DB Request Time in Dialog Task</td>
<td>91 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. DB Request Time for RFC</td>
<td>39 ms</td>
</tr>
<tr>
<td></td>
<td>Avg. DB Request Time in Update Task</td>
<td>488 ms</td>
</tr>
<tr>
<td>Database Space Management</td>
<td>Data Space</td>
<td>45.07 GB</td>
</tr>
<tr>
<td></td>
<td>DB Growth Last Month</td>
<td>0 GB</td>
</tr>
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</table>

2. Landscape

2.1 Products and Components in current Landscape

<table>
<thead>
<tr>
<th>System</th>
<th>SAP Product</th>
<th>Product Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60</td>
<td>SAP NetWeaver</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Main Instances (ABAP or JAVA based)

<table>
<thead>
<tr>
<th>Related System</th>
<th>Main Instance</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60</td>
<td>Application Server ABAP</td>
</tr>
</tbody>
</table>

Databases

<table>
<thead>
<tr>
<th>Related System</th>
<th>Database System</th>
<th>Database Version</th>
<th>DB ID</th>
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<tbody>
<tr>
<td>D60</td>
<td>SAP HANA Database</td>
<td>1.00.122.09</td>
<td>F60</td>
</tr>
</tbody>
</table>

2.2 Servers in current Landscape

SAP Application Servers

<table>
<thead>
<tr>
<th>System</th>
<th>Host</th>
<th>Instance Name</th>
<th>Logical Host</th>
<th>ABAP</th>
<th>JAVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>D60</td>
<td>s65022</td>
<td>d65a0a32_D60_32</td>
<td>d65a0a32</td>
<td>☑</td>
<td></td>
</tr>
</tbody>
</table>

DB Servers

<table>
<thead>
<tr>
<th>Related System</th>
<th>Host</th>
<th>Logical Host (SAPDBHOST)</th>
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<tbody>
<tr>
<td>D60</td>
<td>s65022</td>
<td>d60hd000</td>
</tr>
</tbody>
</table>

Components

<table>
<thead>
<tr>
<th>Related System</th>
<th>Component</th>
<th>Host</th>
<th>Instance Name</th>
<th>Logical Host</th>
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</thead>
<tbody>
<tr>
<td>D60</td>
<td>ABAP SCS</td>
<td>s65022</td>
<td>d60acs31_D60_31</td>
<td>d60acs31</td>
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</tbody>
</table>

2.3 Hardware Configuration

Host Overview

<table>
<thead>
<tr>
<th>Host</th>
<th>Hardware Manufacturer</th>
<th>Model</th>
<th>CPU Type</th>
<th>CPU Mhz</th>
<th>Virtualization</th>
<th>Operating System</th>
<th>CPUs</th>
<th>Cores</th>
<th>Memory in MB</th>
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</thead>
<tbody>
<tr>
<td>s65022</td>
<td>VMware, Inc.</td>
<td>VMware Virtual Platform</td>
<td>Xeon E7- 8880 v3</td>
<td>2300</td>
<td>VMware</td>
<td>SUSE Linux Enterprise Server 12 (x86_64)</td>
<td>6</td>
<td>6</td>
<td>187780</td>
</tr>
</tbody>
</table>

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### SAP Adapter – vROPs – ABAP (Metrics, Properties)

#### Environment Overview

<table>
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<tr>
<th>Custom Groups</th>
<th>Custom Datacenters</th>
<th>Applications</th>
<th>Inventory</th>
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<td>vSphere Environment</td>
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### vROPs – Adapter Integration (Map / Relationships)

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#### Detailed Groups

- **vSphere World**
- **vSAN Datastores**
- **Universe**
- **vSAN World**
- **Non vSAN Datastores**
- **Objects Monitored Remotely**
- **Remote Checks World**
- **Unsynchronized Agents**
- **Objects with Missing Configuration (EP Ops)**
- **Agents Running Remote Checks**
- **vRealize Operations Manager Self Monitoring**
- **Operating Systems World**
Key Takeaways

• **Technology**
  - Trustful partnership with a vendor who knows your demands
  - Simplified stack

• **Concepts, Principles & Operations**
  - KISS – challenging but key for efficient operations
  - Think and work vertical – built a strong net
  - Simplify your infrastructure – simplify your operations – run simple
  - Not “one-size-fits-all” but “one-model-fits-all-requirements”

• **Tools**
  - SAP LaMa with an adaptive and standardized infrastructure – an ideal combination for automation and SAP management
  - Real E2E visibility – vROPs provides excellent features

• **Monitoring**
  - Know your workload - Tools on one hand, but people drive the business

• **Collaboration is Key**
  - Technology is there - people matter
  - Collaboration & partnership with all vendors & stakeholders
  - Success in digitalization comes from success in organizational transformation
Key Takeaways – People Matter

“Coming together is a beginning. Keeping together is progress. Working together is success.”

Henry Ford
Resources

- LaMa: [www.sap.com/lama](http://www.sap.com/lama) → Special Evonik video (“See what our customers are saying”)
- Blue Medora SAP Adapters: [www.bluemedora.com/products/sap](http://www.bluemedora.com/products/sap)
- DSAG Project Group “The SAP Basis Team of Tomorrow”: [www.dsag.de/ak-infrastruktur](http://www.dsag.de/ak-infrastruktur)
- … and your partners
  - SAP Digital Business Services [www.sap.com/services](http://www.sap.com/services)
  - VMware Professional Services [www.vmware.com/services](http://www.vmware.com/services)
Please fill out your survey.

Take a survey and enter a draw for a VMware company store gift card.
Thank you.

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SAP Related Sessions @ vmworld 2017 Europe

- **VIRT2389BE** 14th September 12:00 – 13:00, Hall 8.0, Room 30
SAP on VMware - Customer Group Discussion with EVONIK and SAP on how to run SAP on top of SDDC

- **VIRT1138BE**
Unleash the power of your virtual SAP HANA deployment

- **VIRT1385BE**
How Accenture helps their customers to virtualize SAP workloads with VMware solutions to optimize costs and business outcome

- **VIRT3014PE**
SAP Virtualization Experts Panel

- **MTE4787E**
SAP in the SDDC including Virtual Hana with Arne Arnold
Thank You