

BPM and Cloud Integration

A New Driver for Research in Security in Business Processes

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Guest Lecture: Konzepte und Anwendung von Workflowsystemen
Karlsruhe Institute of Technology (KIT)

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Agenda

- 1 SAP and SAP P&I ACES
- 2 Process-aware Information Systems
- 3 Security, Trust, and Compliance of Business Processes
- 4 Research Directions and Challenges
- 5 Conclusion

Abstract

Enterprise systems in general and process aware systems in particular are storing and processing the most critical assets of a company. To protect these assets, such systems need to implement a multitude of security properties. Moreover, such systems need often to comply to various compliance regulations.

In this talk, we briefly discuss challenges of implementing large-scale systems based on workflow-management in general and, in particular, the in the context of cloud based systems. We will put a particular focus on security requirements and discuss the gap between the ideal world of process-aware information systems and the real world. We conclude our presentation by discussing several research challenges in the area of verifiable secure process aware information systems.

Agenda

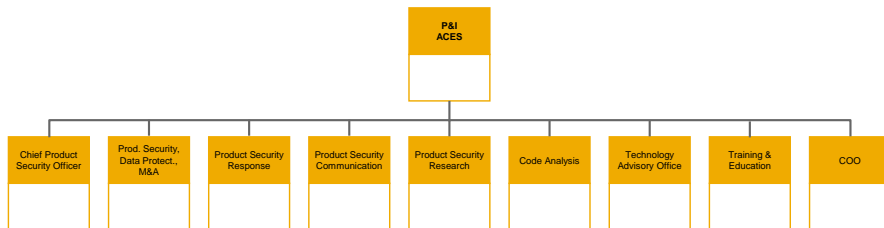
- 1 SAP and SAP P&I ACES
- 2 Process-aware Information Systems
 - The Ideal World
 - The Real World
 - Cloud Integration
 - System Complexity and Adoption Rate
- 3 Security, Trust, and Compliance of Business Processes
- 4 Research Directions and Challenges
- 5 Conclusion

Die SAP AG

- Leader in Business Software
- Vendor process-aware systems
- More than 25 industries
- 63% of the world's transaction revenue touches an SAP system
- 64 422 employees worldwide
- Headquarters: Walldorf (and St. Leon-Rot)
- Location in Karlsruhe: ca. 500m from here



SAP P&I ACES: Organizational Structure



SAP P&I ACES: Mission

Mission

- Orchestrating the architecture definition and communicating the results consistently
- Building the best educated development organization in- and outside the company
- Making Security a key differentiator for choosing SAP

Goals

Architecture	Lead the way we jointly create and manage the architecture of our products
Communication	Roll-out this architecture consistently to our field colleagues, customers and partners.
Education	Drive education for developers internally & externally - ensure that it is fun to learn SAP, renew education concepts and technology.
Security	Drive Product Security, transform it to become a differentiator for SAP.

My Background

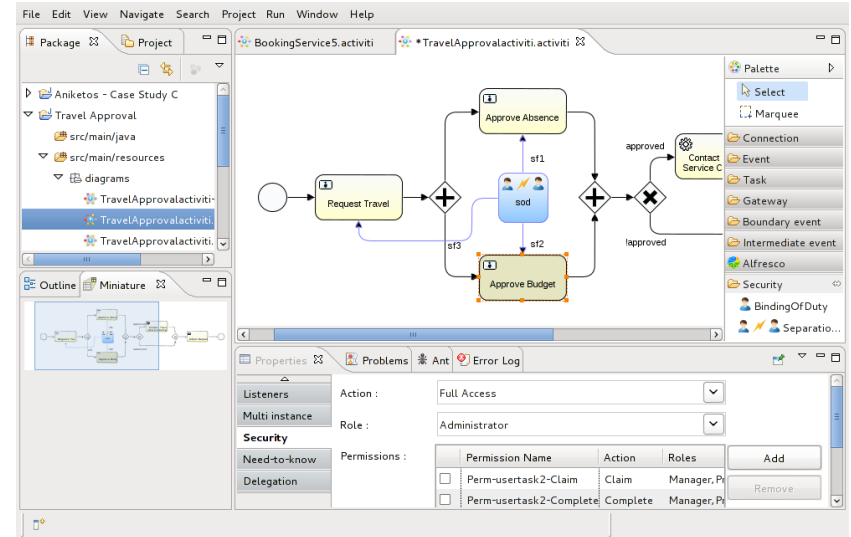
- Senior Researcher at SAP AG
 - Product Security Research
 - Code Analysis
- Background: Security, Formal Methods, Software Engineering
- Current work areas:
 - Security in business processes
 - Static code analysis (u.a. für JavaScript)
 - Security Testing



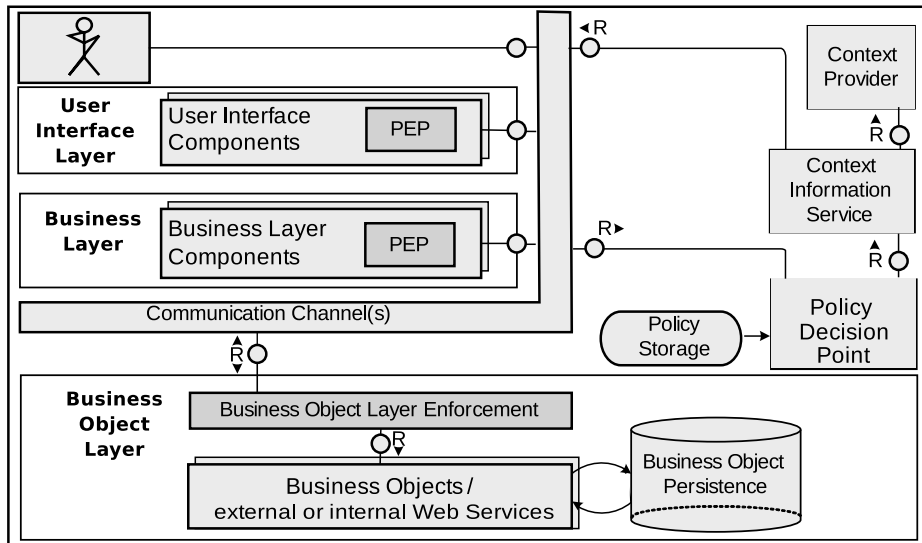
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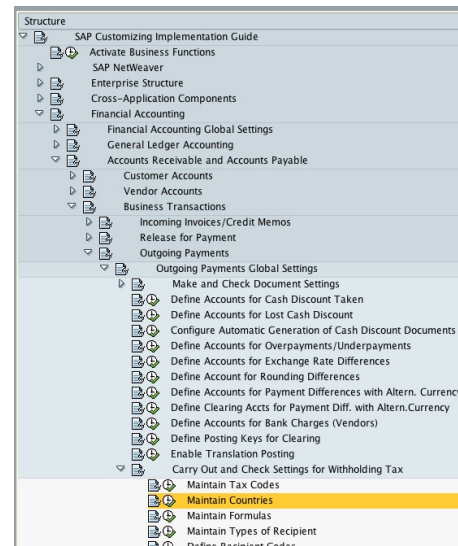
Ideal World: Modeling



Ideal World: Deployment and Execution



Real World: Modeling



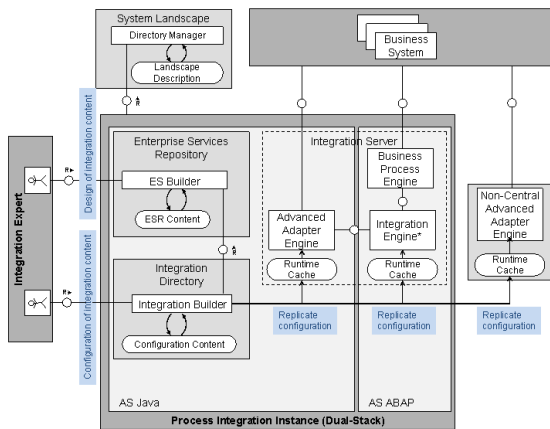
Process Models:

- BPMN/BPEL
- Configurable transactions
- Custom Coding
- Legacy Systems
- External services

Security:

- Each system (OS, DB, IS)
 - own security infrastructure
 - own logging infrastructure
- Management solutions try to bridge this gap

Real World: Deployment and Execution



Backend:

- AS Java, AS ABAP
- Business Process Engine
- Legacy Systems
- External services
- Sensors and product lines

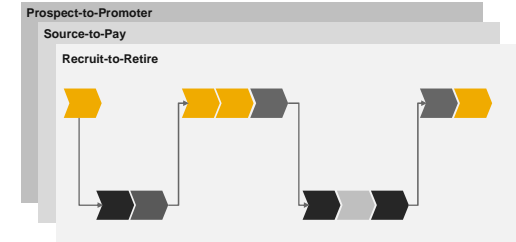
Frontend:

- Desktop clients
- Web-based clients
- Mobile clients
- Client side compositions (e.g., mash-ups)

End-to-End Business Process Integration

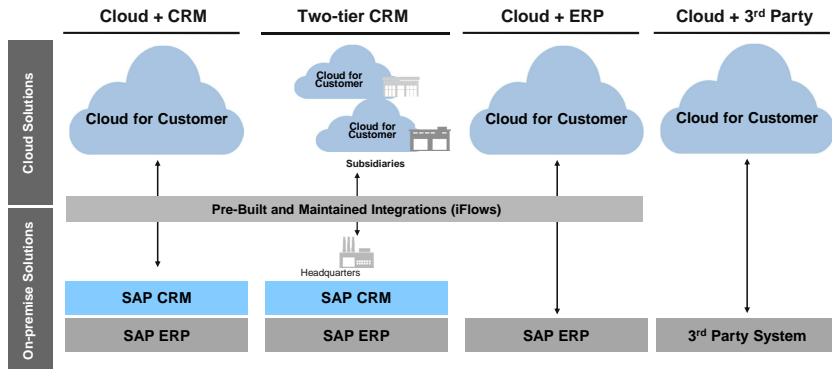
- Customers have complex on-premise landscapes
- As customers adopt cloud solutions, hybrid landscapes will become a norm
- Integration across the boundaries of cloud and on-premise is a must to prevent application silos

End-to-End Business Processes

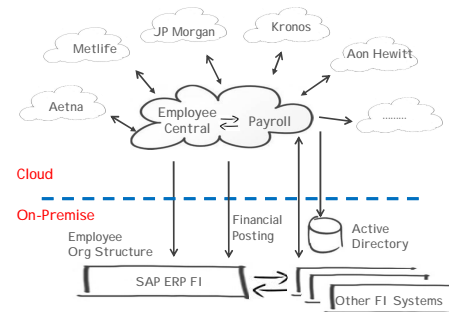


As companies adopt cloud, real-time end-to-end business process integration is critical

How the Future Might Look Like

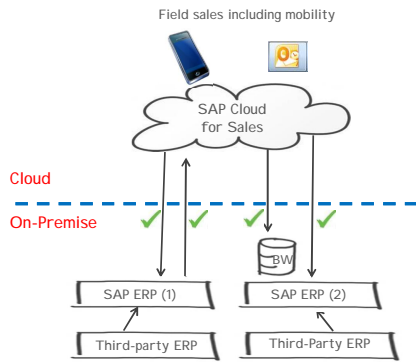


Customer Example (1/2)



- Large manufacturing company with SAP ERP, multiple legacy HR and other financial applications worldwide
- Migration from legacy HR system
- >120 third-party interfaces – Integration of third-party cloud solutions to Employee Central (EC) and EC Payroll
- 100% of SAP-to-SAP integrations and 30% of all integrations covered by prepackaged integration flows (iFlows)

Customer Example (2/2)

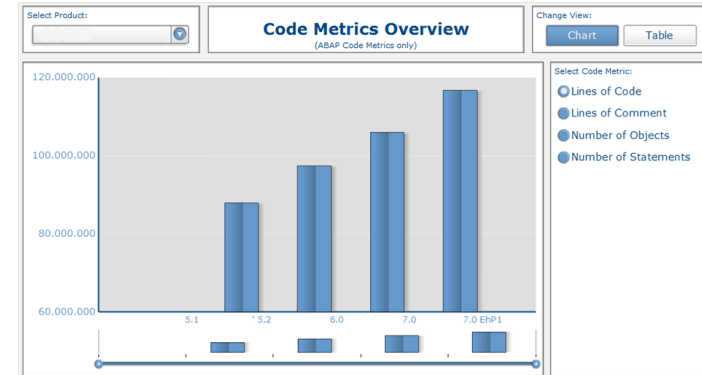


- Industrial manufacturer with multiple subsidiaries on different SAP ERP clients as well as third-party ERP systems
- Rapid implementation with small IT team
- Delivered improved usability for field sales and collaboration between field sales and back office
- Integration of accounts, materials, sales quotes and sales orders

Support Lifecycle (Maintenance)

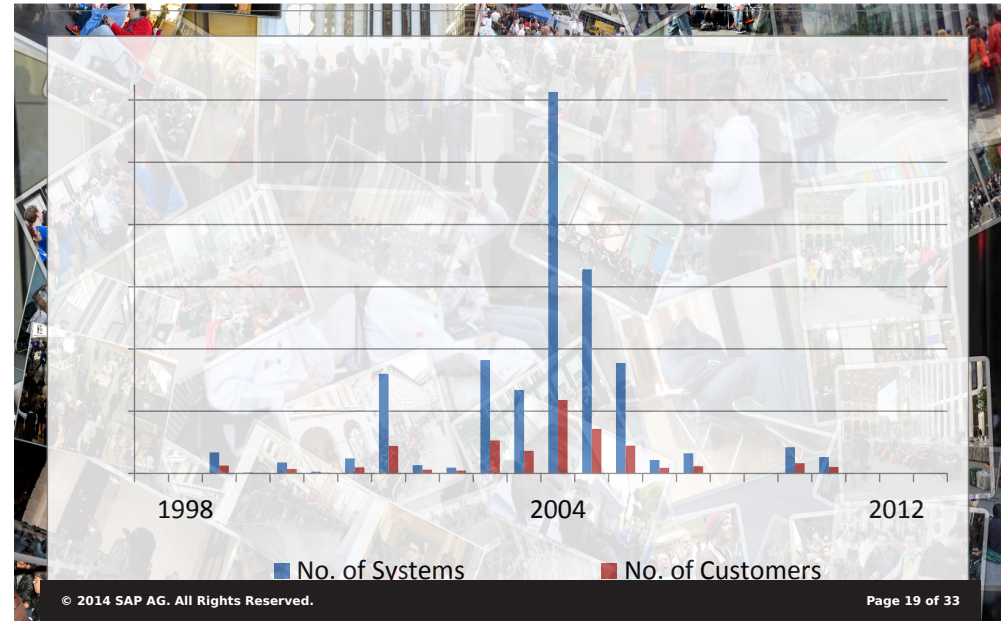


Evolution of Source Code

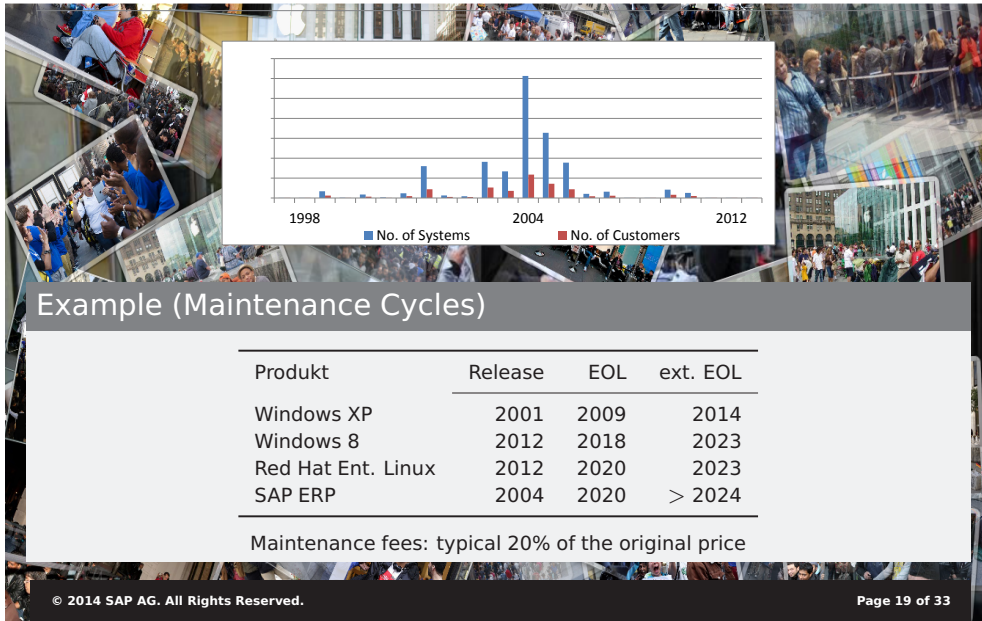


- Increase in
 - code size
 - code complexity
 - number of products
 - product versions

Support Lifecycle (Maintenance)



Support Lifecycle (Maintenance)







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Customer Requirements

LOB*

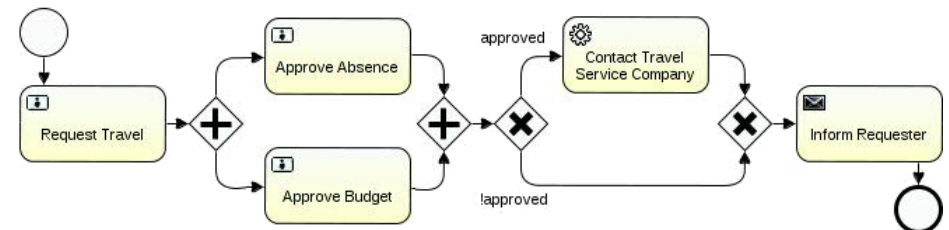
-  Single source of truth and master data synchronization
-  Real-time business process integration
-  Integrated user experience
-  Rapid deployment

*Line of business

IT

-  Data security and compliance
-  Support for complex landscapes
-  Choice of integration technology
-  End-to-end monitoring and support

Security in Business Processes: An Example



Access Control



Goal:

- Control access to Tasks, Resources (Data), ...

The core:

- Usually: Users, Roles, Access Rights, ...
- In special cases: Data labeling

On top:

- Separation of Duty
- Binding of Duty
- Delegation

Protecting Data (and Goods)



Goal:

- Ensure
 - confidentiality
 - integrity (safety)of data (and goods)

The core:

- Need-to-Know
- Fingerprints
- Encryption
- Sensors

Compliance and Additional Requirements



Many regulated markets

- Basel II/III, SoX, PCI
- HIPAA

Many customer-specific regulations

- Own governance to mitigate risks
- Own business code of conduct
- Fraud detection/prevention
- Non-observability

Customers are individually audited

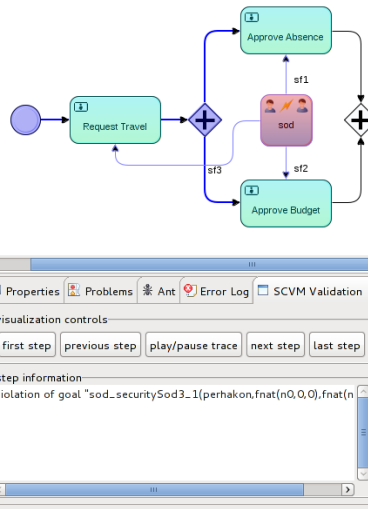
- No "one certificate fits all" solution

Security should not hinder business

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Our Research Over the Last Decade



Access Control for Processes

- RBAC-like models
- Delegation models
- Break-(the)-glass models

Model-driven Security

- Modeling of Security
- Generation of implementation, configuration
- Monitoring based on models

Process-level Verification

- Compliance to security spec.
- Consistency of security configurations

Implementation-level Verification

- Compliance of implementation to process level security req.

Research Challenges



Adaptability:

- How to extend systems safely
- Integration of legacy systems

Auditability:

- Coherent audit across providers/systems
- Reduction of audit costs

Cloud (SaaS):

- How to manage decentralized systems
- How to capture behavior of the composition
- Who is the attacker

Process level vs. technical levels:

- Security is more than CIA
- Ensuring secure implementation

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Conclusion

“ The most interesting challenges are still ahead of us!

- Real systems are large and complex:
 - many programming languages or frameworks
 - many security technologies
 - highly distributed
 - implement business processes in many different ways
- Many research is done on the process level
- We now need to bring the
 - process level
 - implementation levelcloser together to provide **end-to-end security**
- Cloud solutions create new challenges:
 - data protection across different providers
 - new attacker models

Thank you!

Interested in an Internship/Thesis at SAP:

- achim.brucker@sap.com
- www.sap.com/jobs/ and search for location “Karlsruhe” or “student”



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