BPM and Cloud Integration

A New Driver for Research in Security in Business Processes

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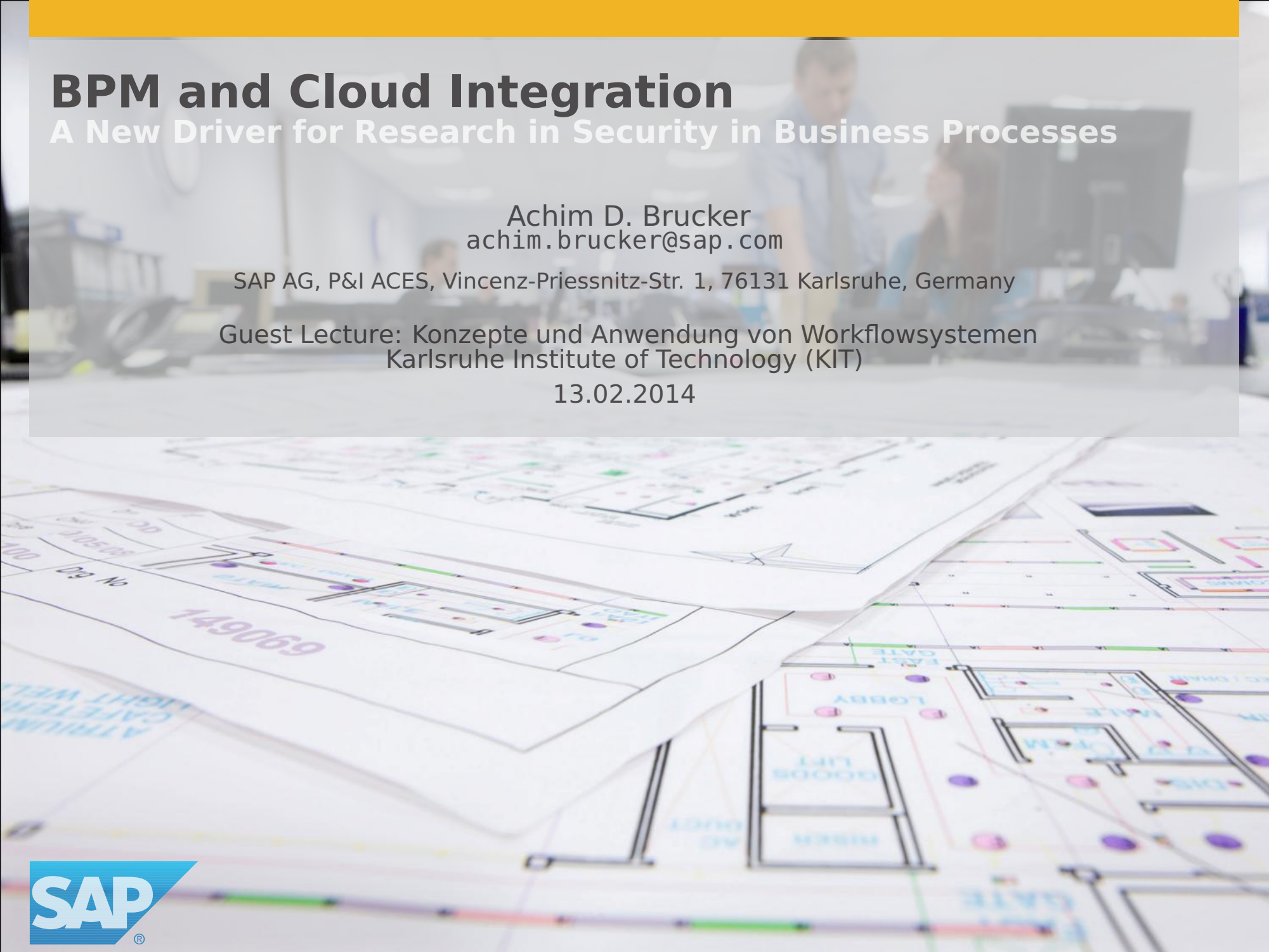
Guest Lecture: Konzepte und Anwendung von Workflowsystemen
Karlsruhe Institute of Technology (KIT)

13.02.2014



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 gab 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

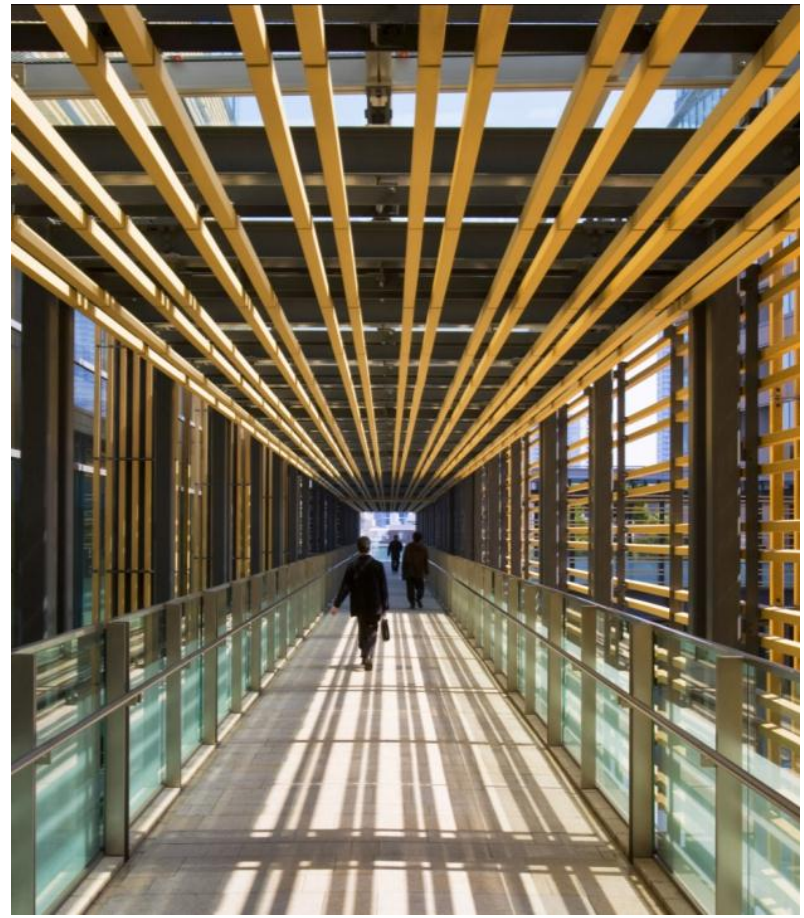
1. SAP and SAP P&I ACES
2. Process-aware Information Systems
3. Security, Trust, and Compliance of Business Processes
4. Research Directions and Challenges
5. Conclusion

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: Mission

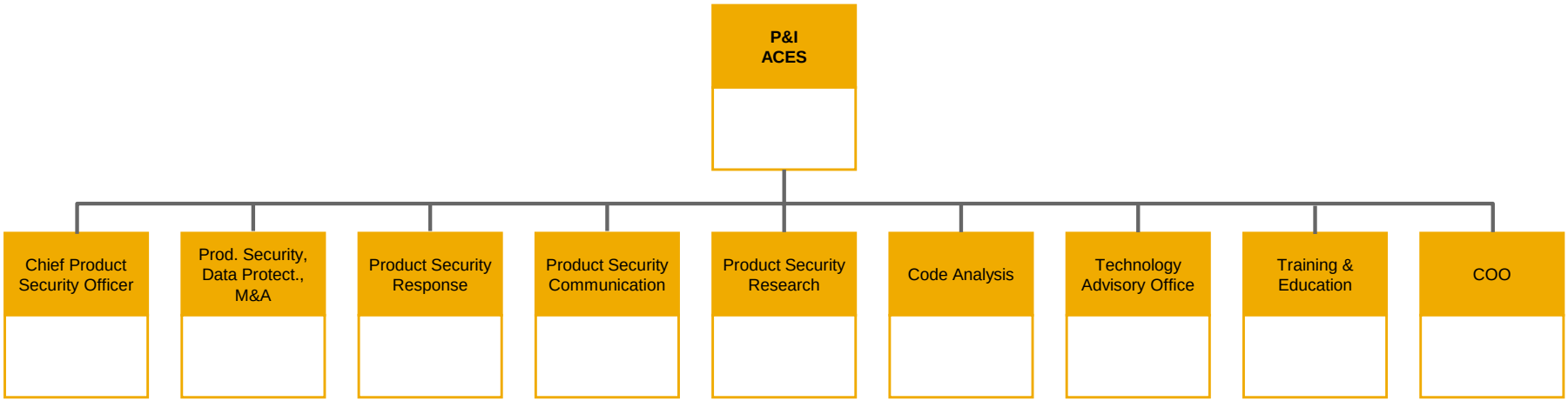
Mission

- 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.

SAP P&I ACES: Organizational Structure



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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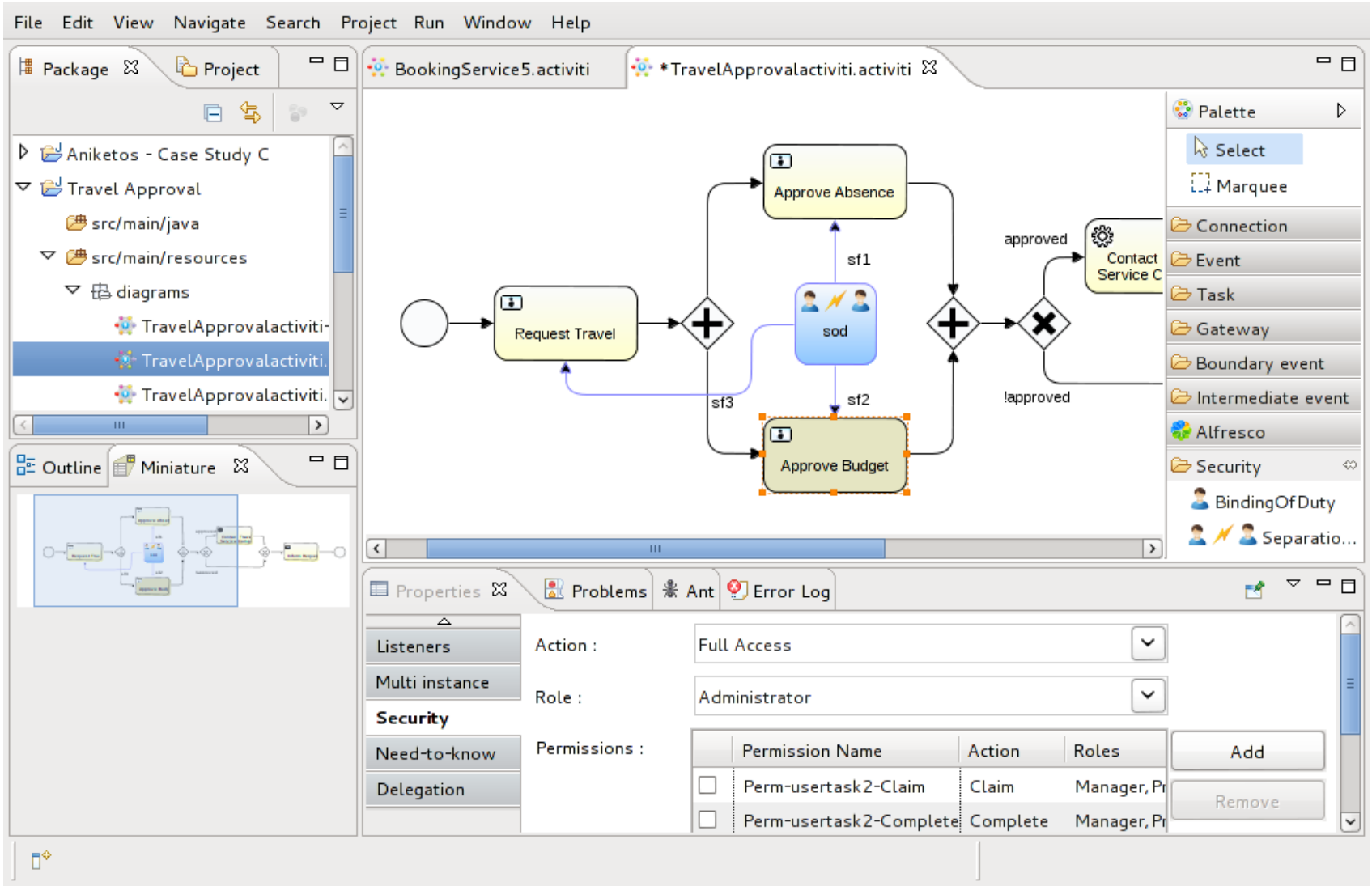
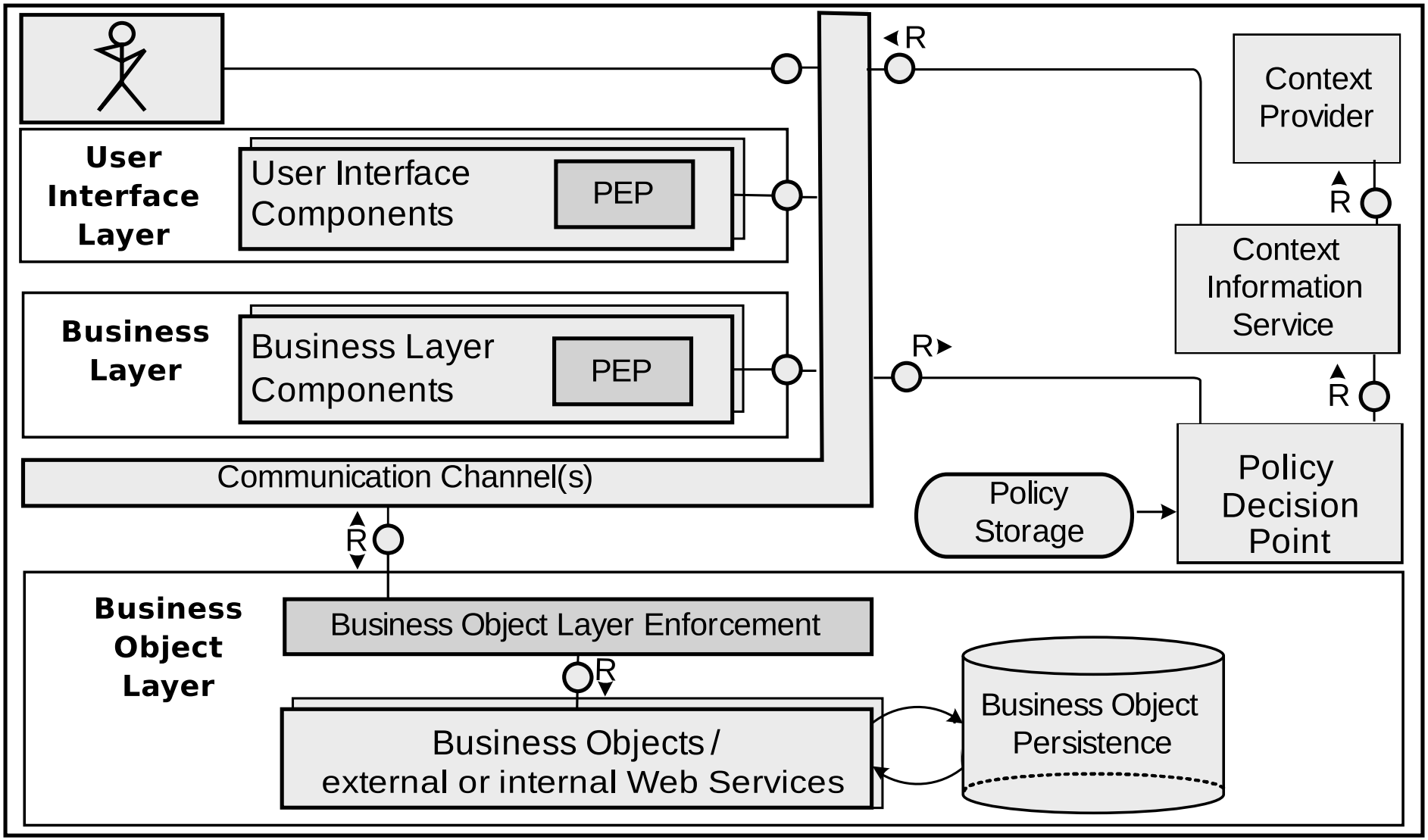
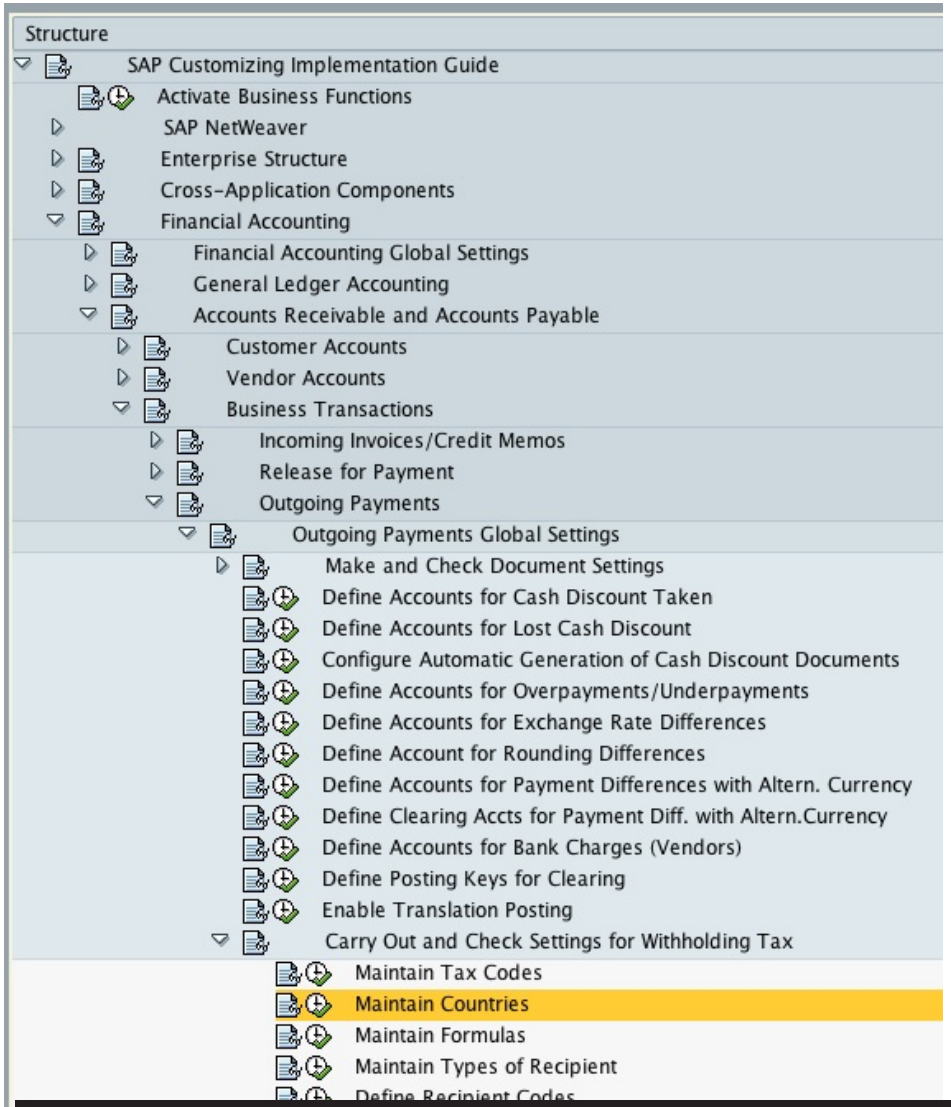
Ideal World: Modeling



Ideal World: Deployment and Execution



Real World: Modeling



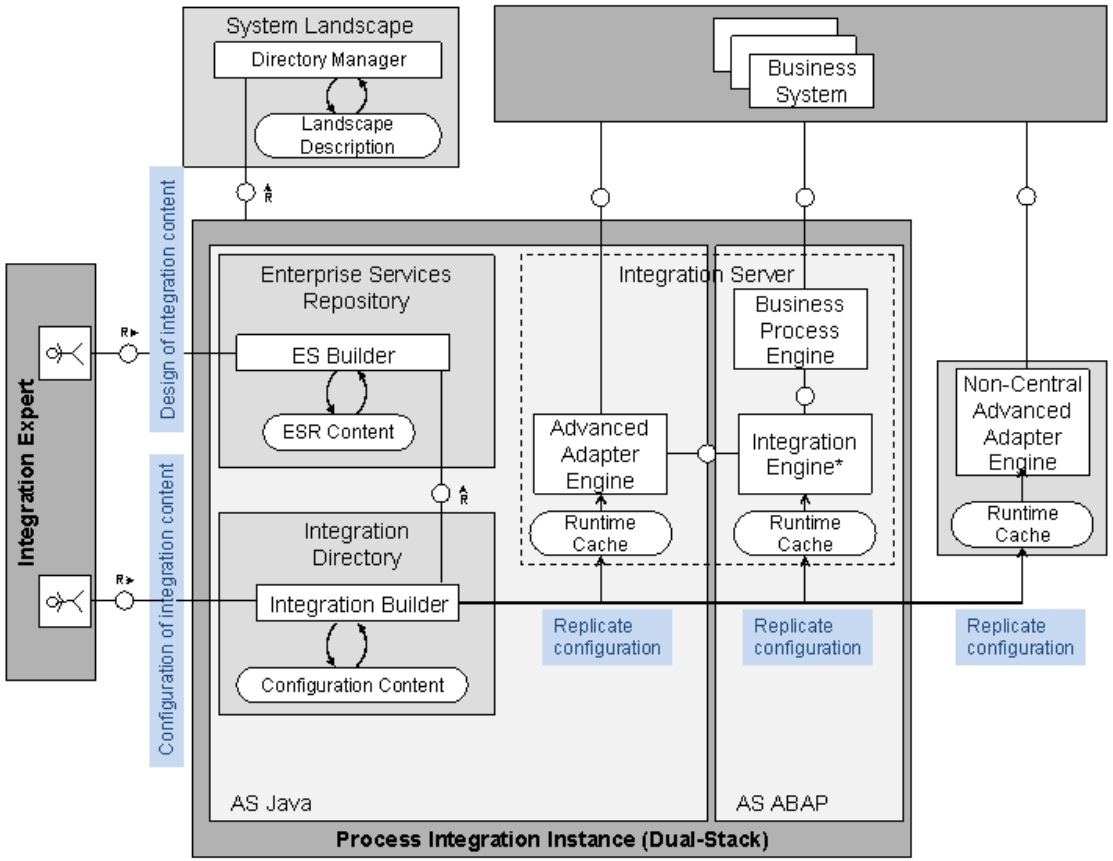
Process Models:

- 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:

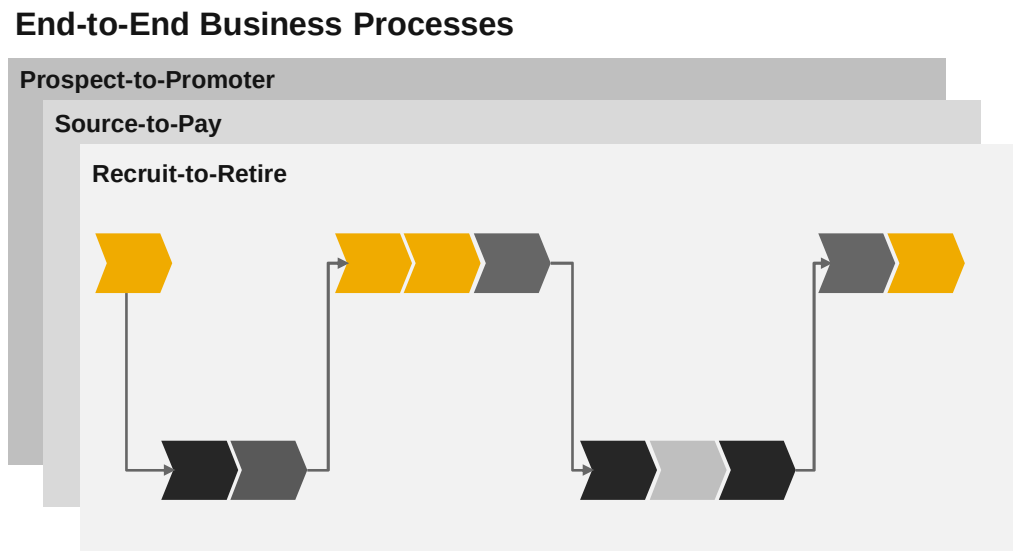
- AS Java, AS ABAP
- Business Process Engine
- Legacy Systems
- External services
- Sensors and product lines

Frontend:

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

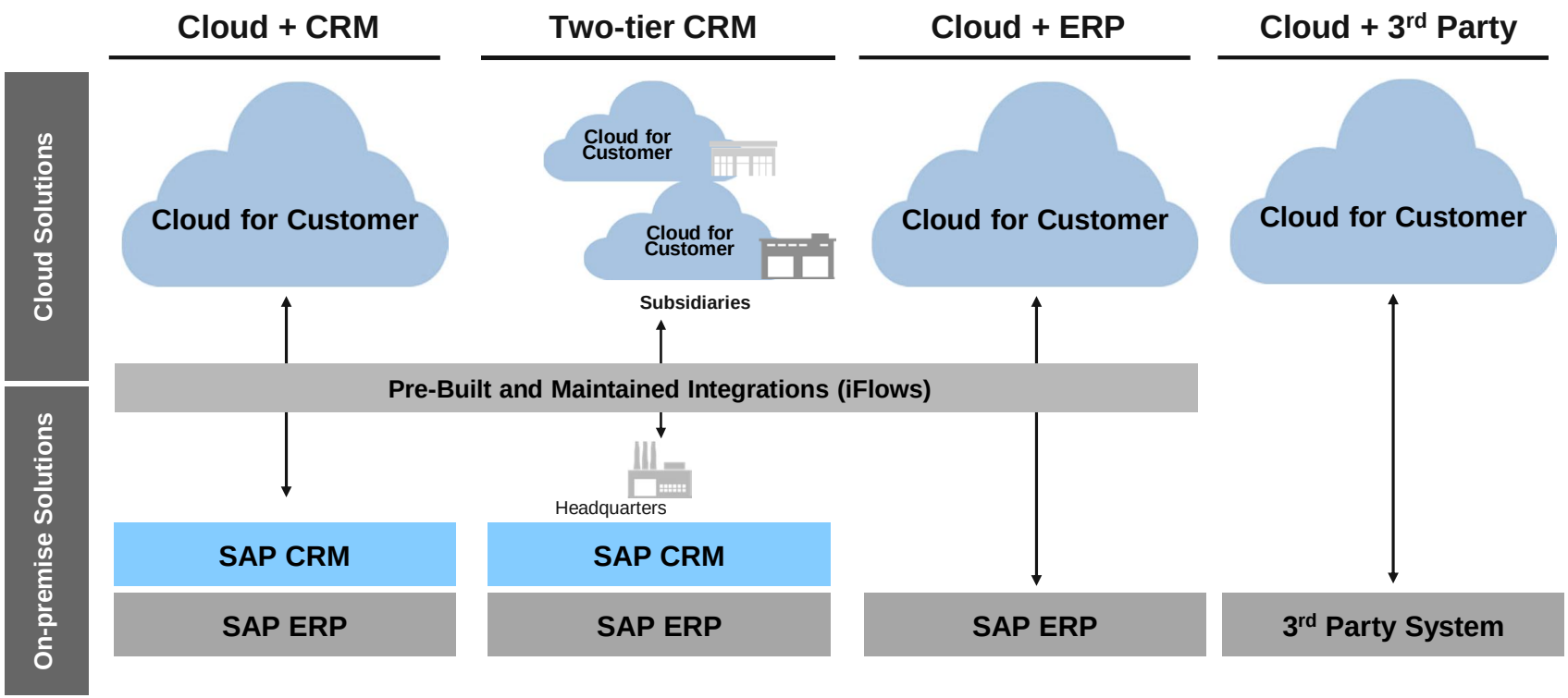
End-to-End Business Process Integration

- 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

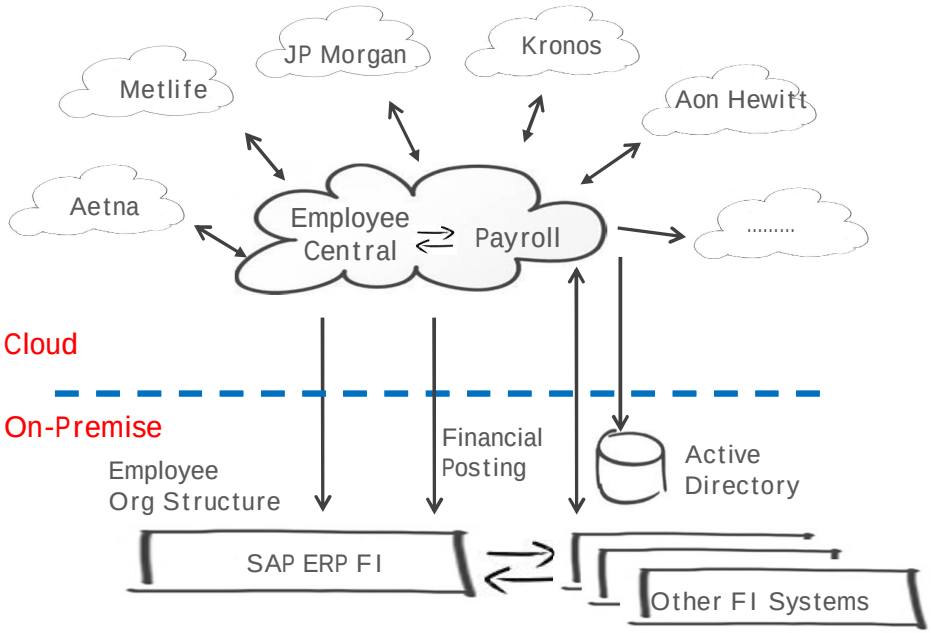


As companies adopt cloud, real-time end-to-end business process integration is critical

How the Future Might Look Like

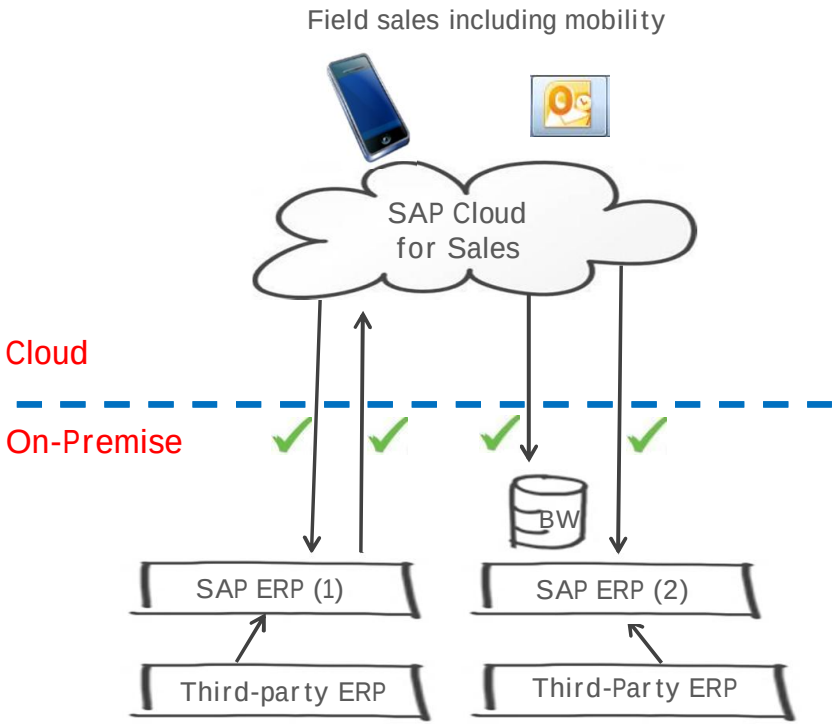


Customer Example (1/2)



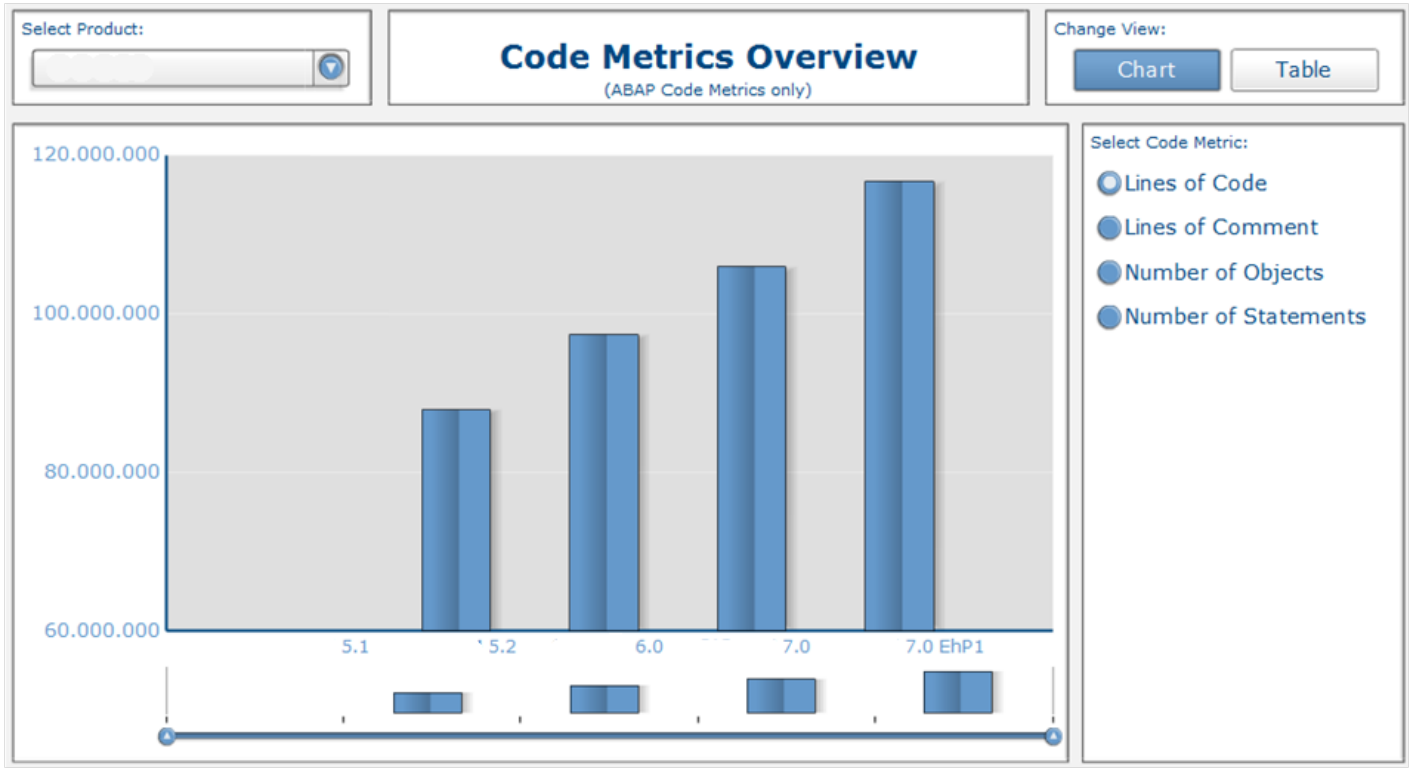
- Large manufacturing company with SAP ERP, multiple legacy HR and other financial applications worldwide
- Migration from legacy HR system
- >120 third-party interfaces – Integration of third-party cloud solutions to Employee Central (EC) and EC Payroll
- 100% of SAP-to-SAP integrations and 30% of all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

Evolution of Source Code



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

Support Lifecycle (Maintenance)

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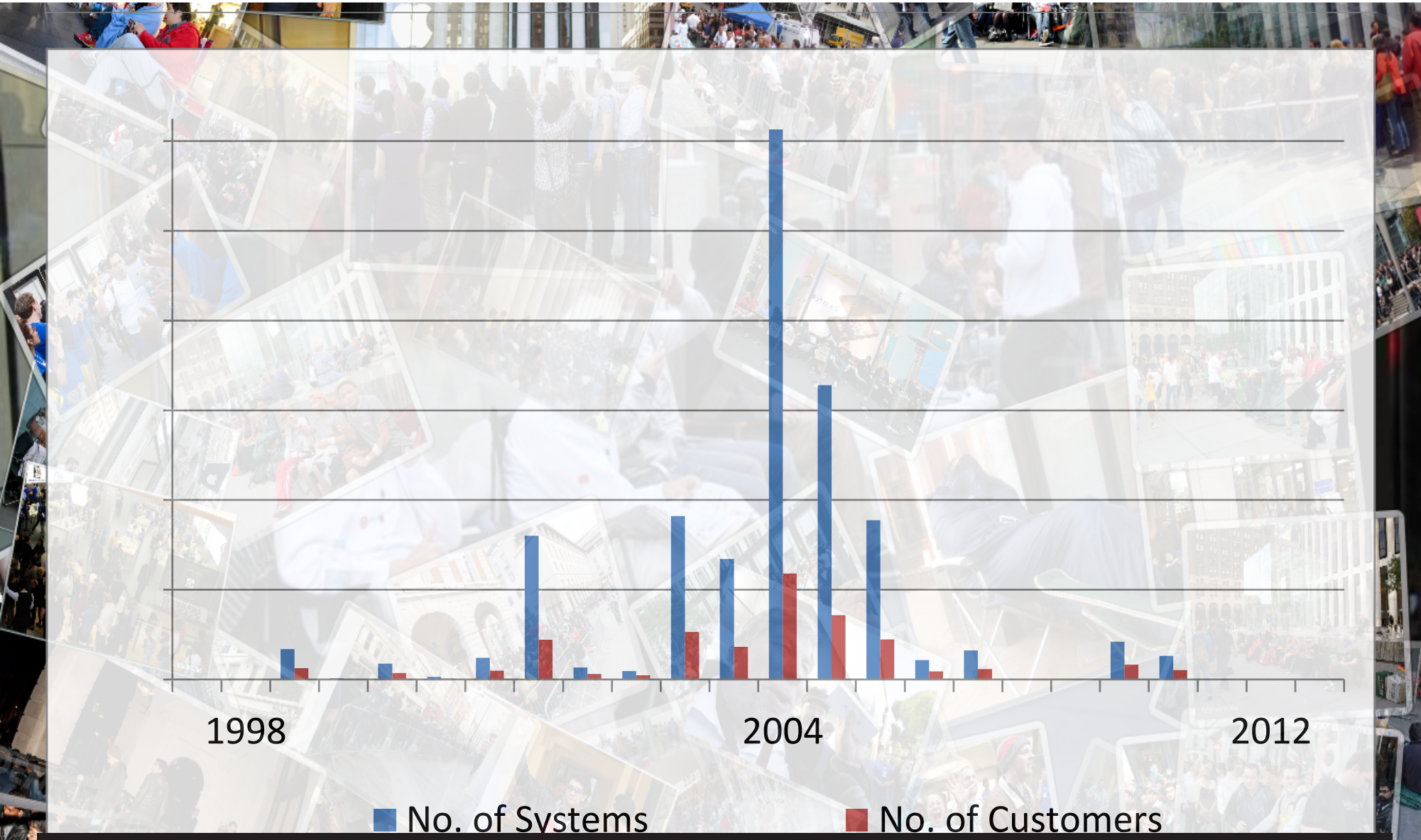
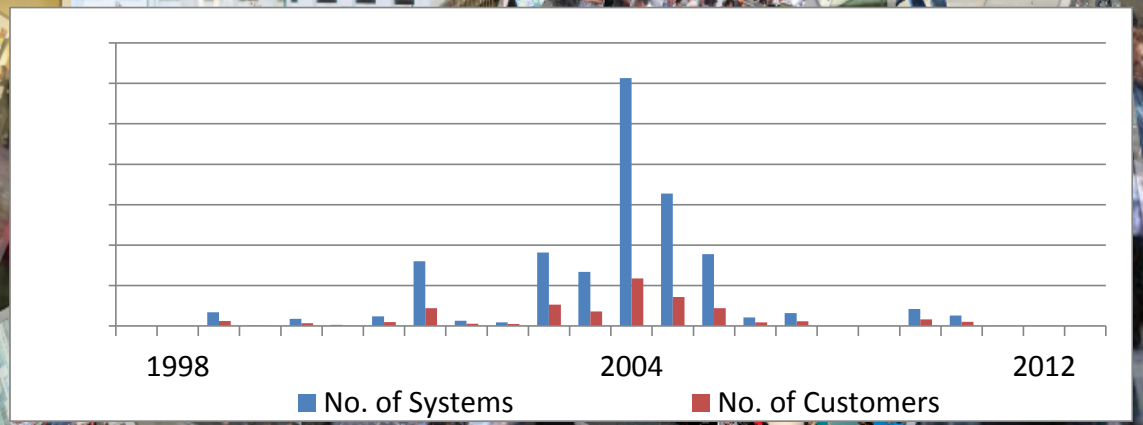


Support Lifecycle (Maintenance)



Example (Maintenance Cycles)

Produkt	Release	EOL	ext. EOL
Windows XP	2001	2009	2014
Windows 8	2012	2018	2023
Red Hat Ent. Linux	2012	2020	2023
SAP ERP	2004	2020	> 2024

Maintenance fees: typical 20% of the original price

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

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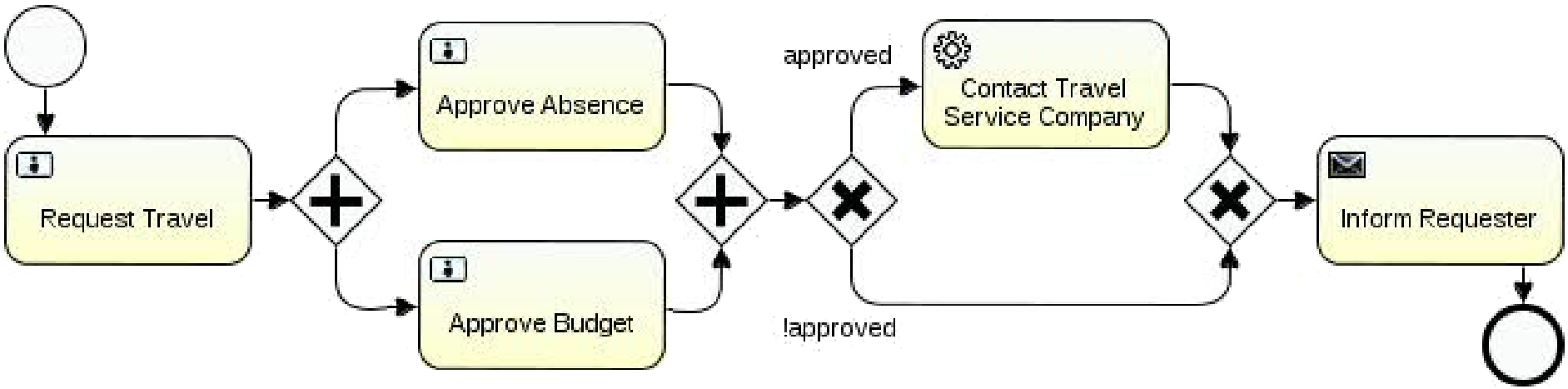
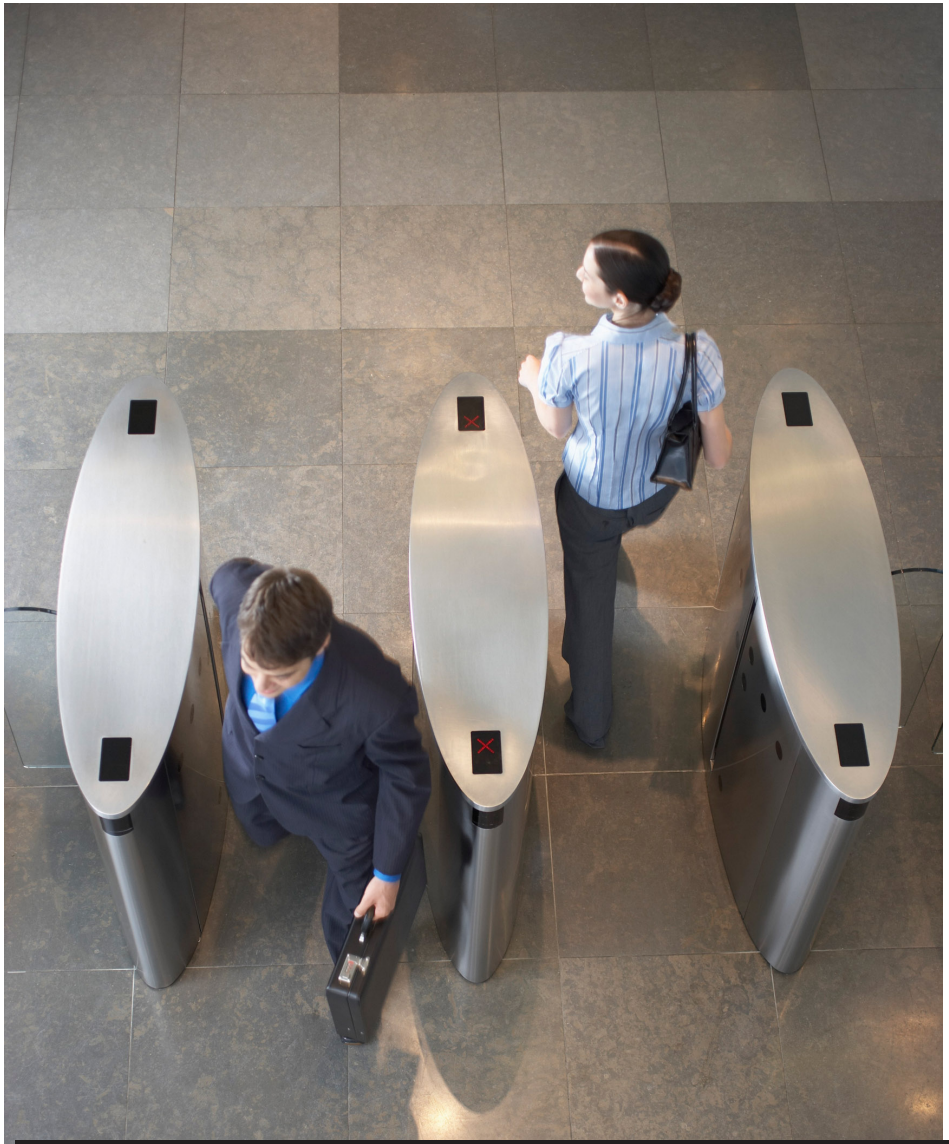
Security in Business Processes: An Example



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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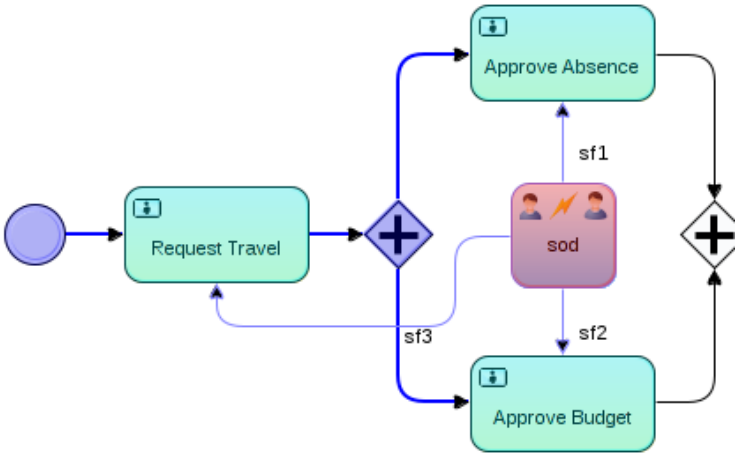
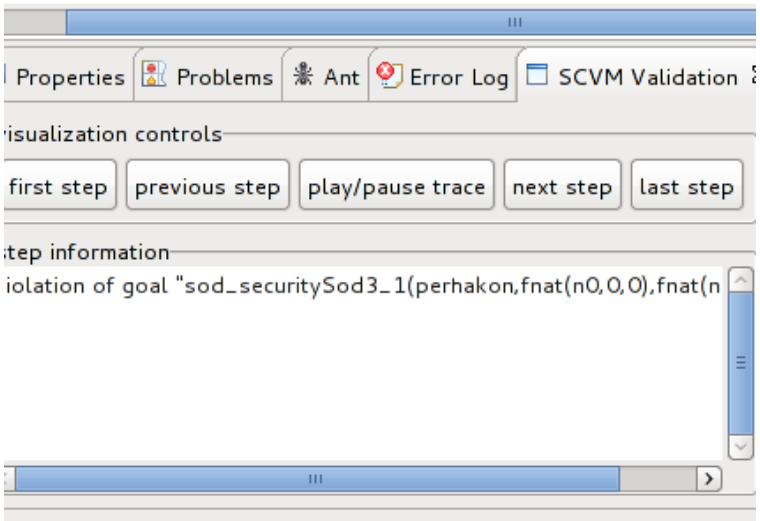
Our Research Over the Last Decade





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 level

  closer 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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