

Organizing and Managing Grassroots Enterprise Mashup Environments

Doctorial Thesis, 24th June, 2010

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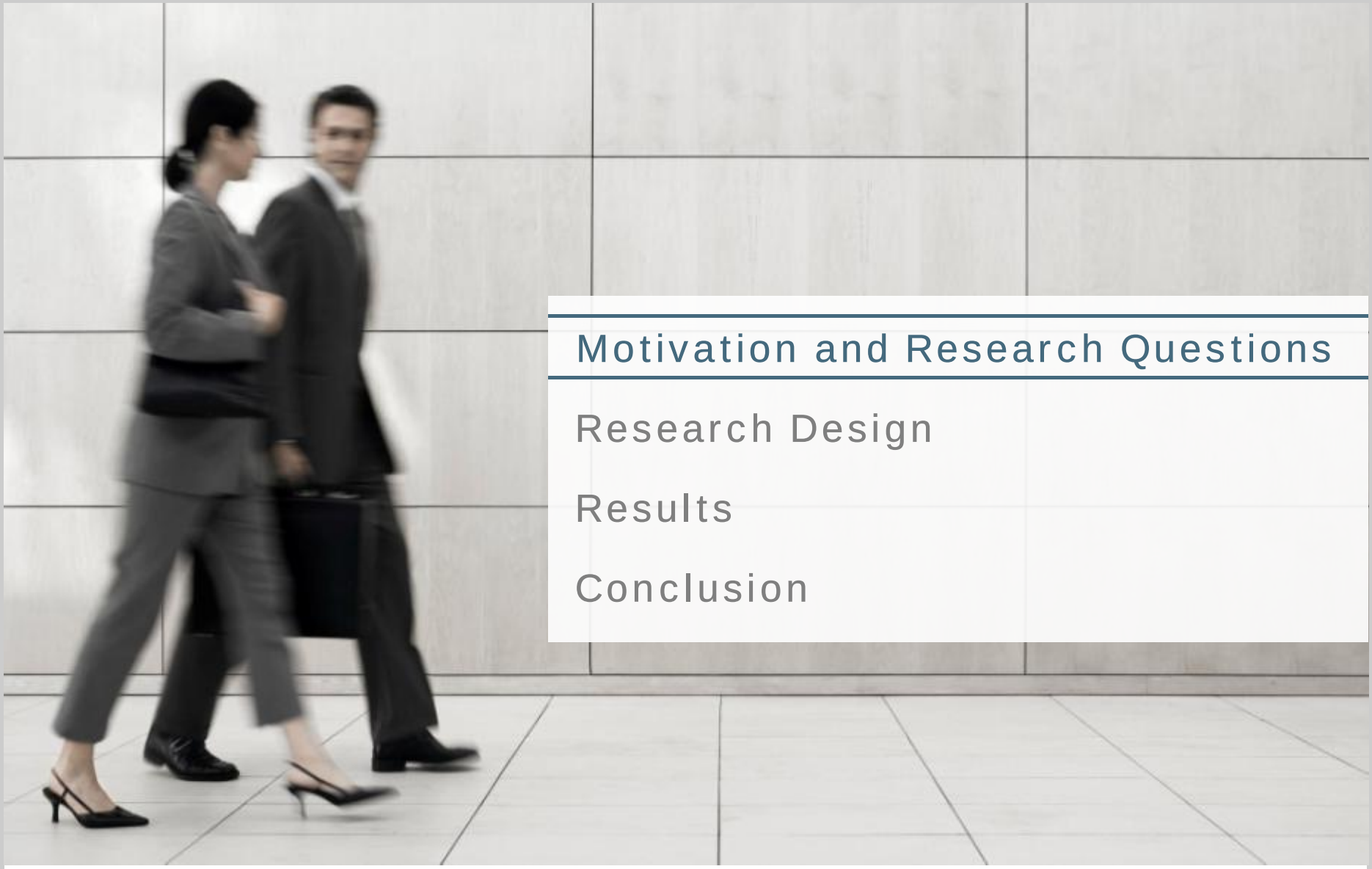


Motivation and Research Questions

Research Design

Results

Conclusion



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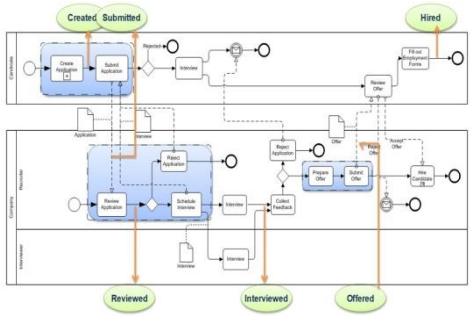
Motivation

From Automating Transactions …

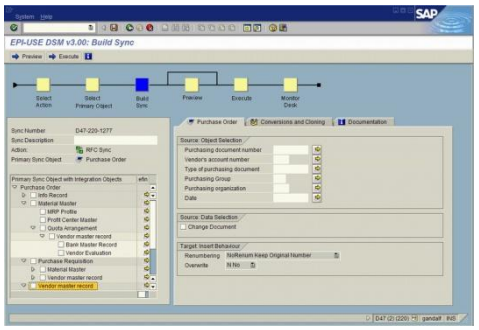




Service-Oriented Architecture



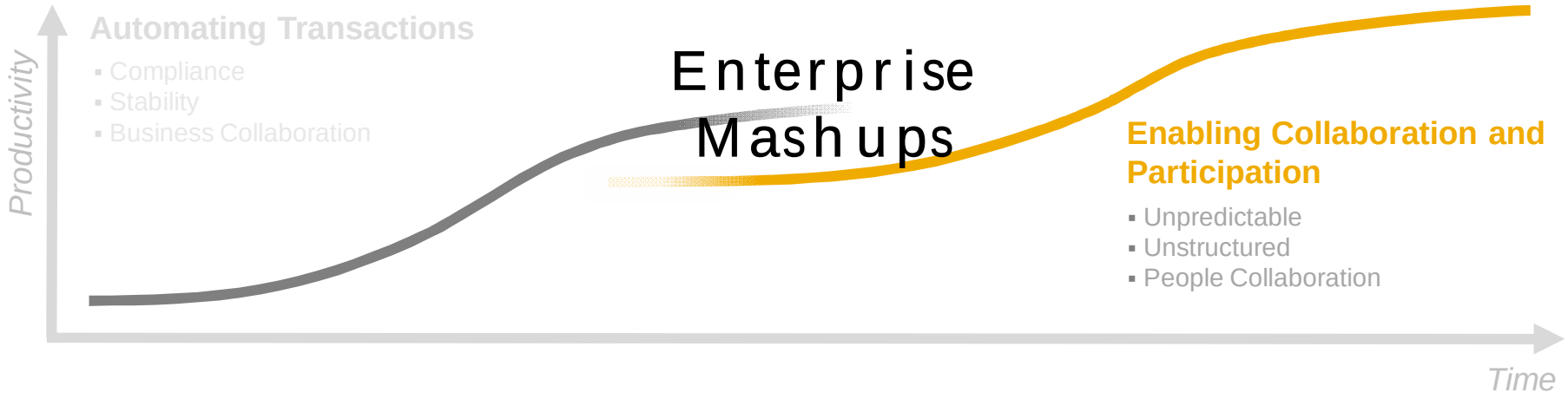
Business Process Management



Business Software (ERP, CRM, …)

Motivation

… to Peer Production





Cloud Computing



(Mobile) Apps



Mashup

Motivation

Enterprise Mashup Vision



Yes, we can!

An enterprise mashup is a Web-based resource that combines existing resources, be they content, data or application functionality, from more than one resource by empowering the actual end users to create individual information centric and situational applications.

Motivation

Research Questions and Contributions

How to organize and manage grassroots enterprise mashup environments in order to transfer the consumer-driven mashup paradigm into corporate environments?

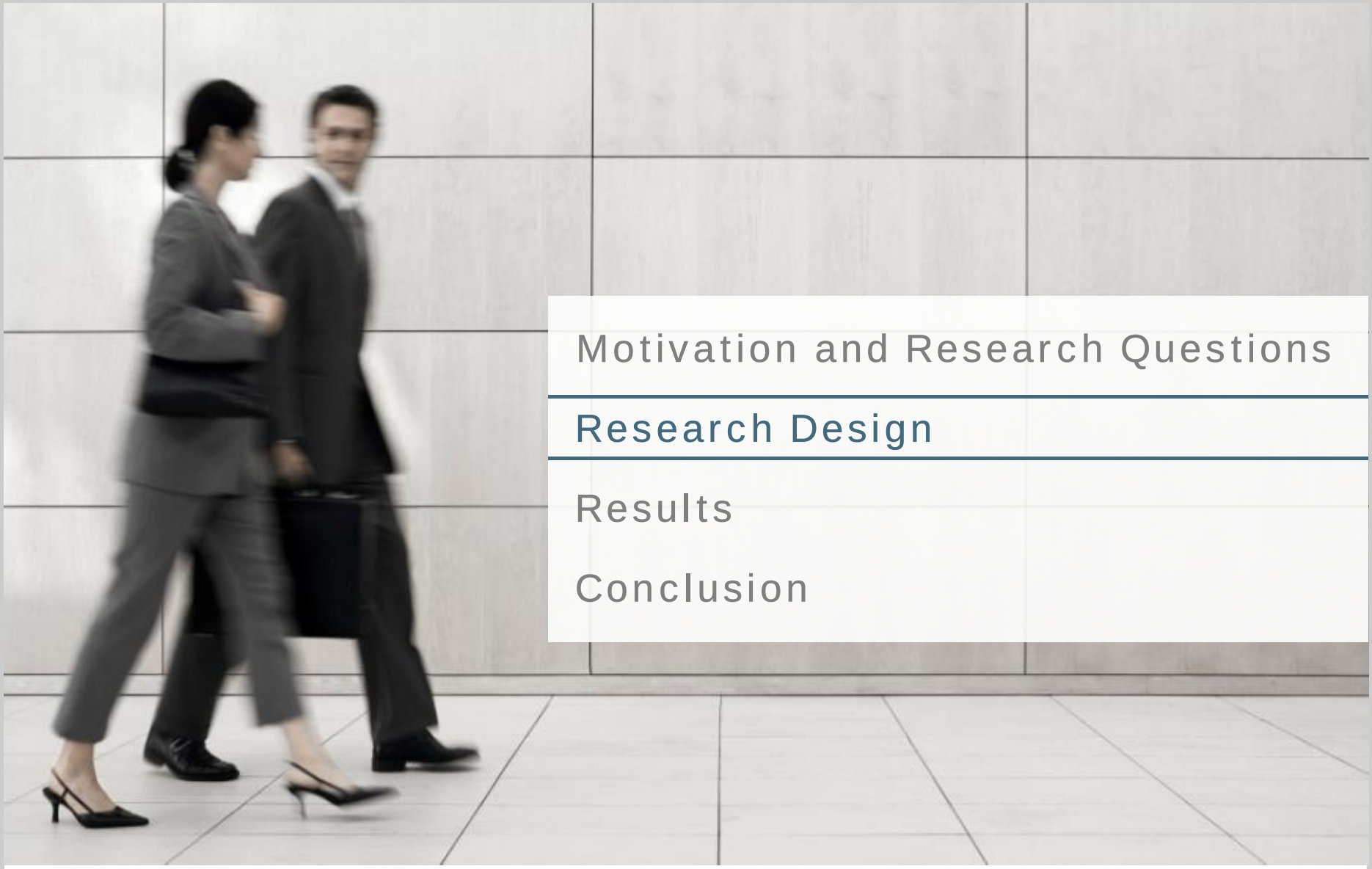
- **Q1** How can enterprises structure and design grassroots enterprise mashup environments?
- **Q2** How to guide enterprises with a governance model for balancing between organization concerns such as manageability and fostering user involvement?
- **Q3** How can enterprises integrate and leverage existing IT-enabled functionalities in mashup environments?
- **Q4** What are the business values for introducing the mashup paradigm in corporate environments?

Research Contributions

- Multi-view scientific reference model
- Governance model
- Application of design science research methodology

Practical Contributions

- Practical guidelines for future mashup platforms
- Scenarios demonstrating the business value
- Business case



Motivation and Research Questions

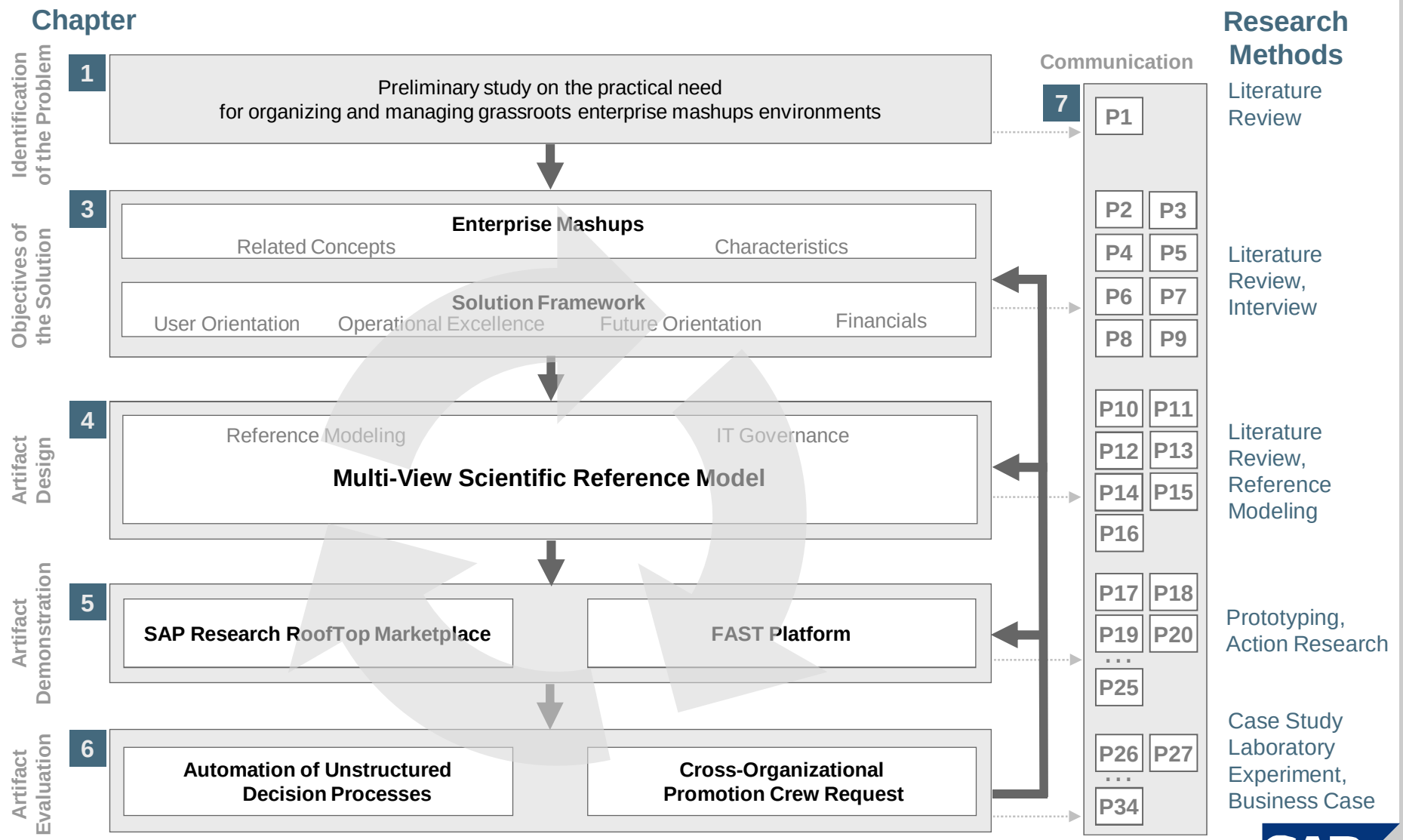
Research Design

Results

Conclusion

Research Approach

Design Science Applied* & Structure of the Thesis



* Peffers, K., Tuunanen, T., Rothenberger, M., & Chatterjee, S.: A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems, 24(3), pp. 45-77, 2008



Motivation and Research Questions

Research Design

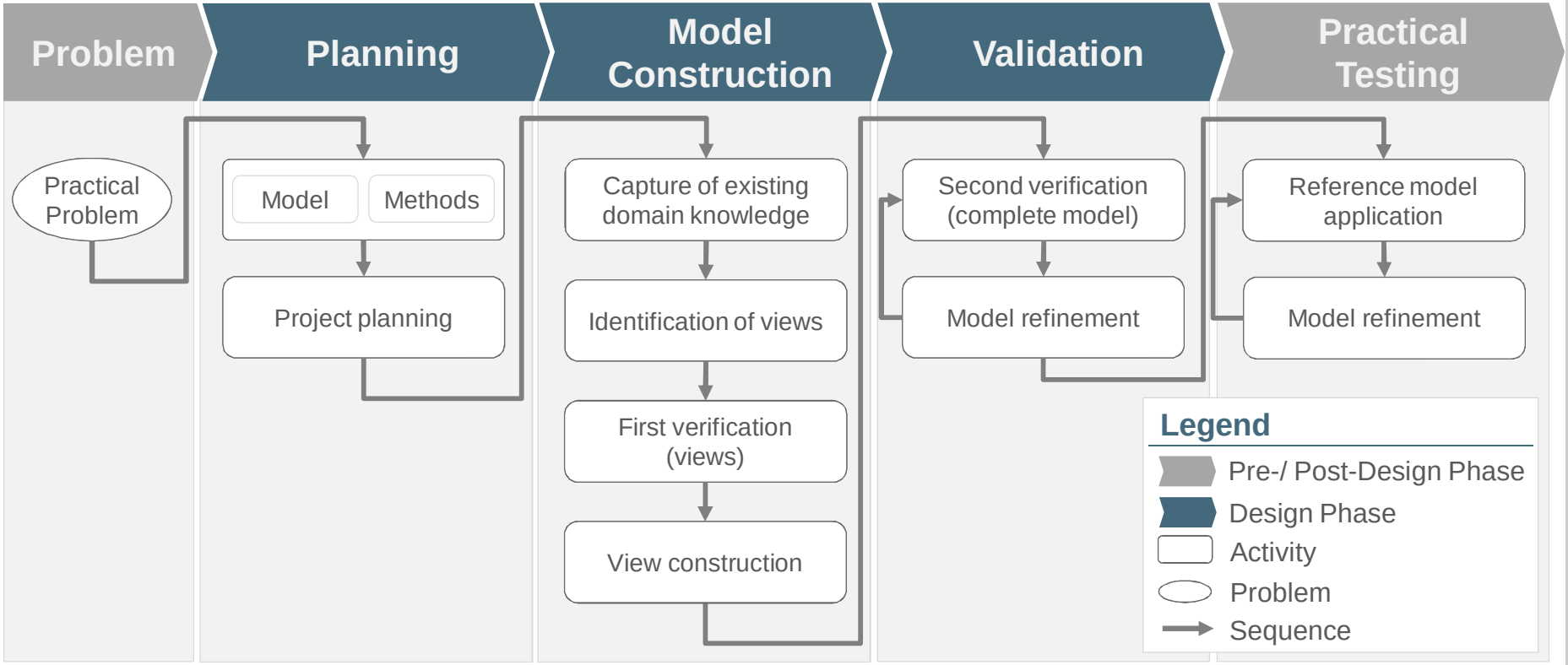
Results

- **Design (Multi-View Reference Model)**
- **Demonstration**
- **Evaluation**

Conclusion

Design: Multi-View Scientific Reference Model

Research Process*

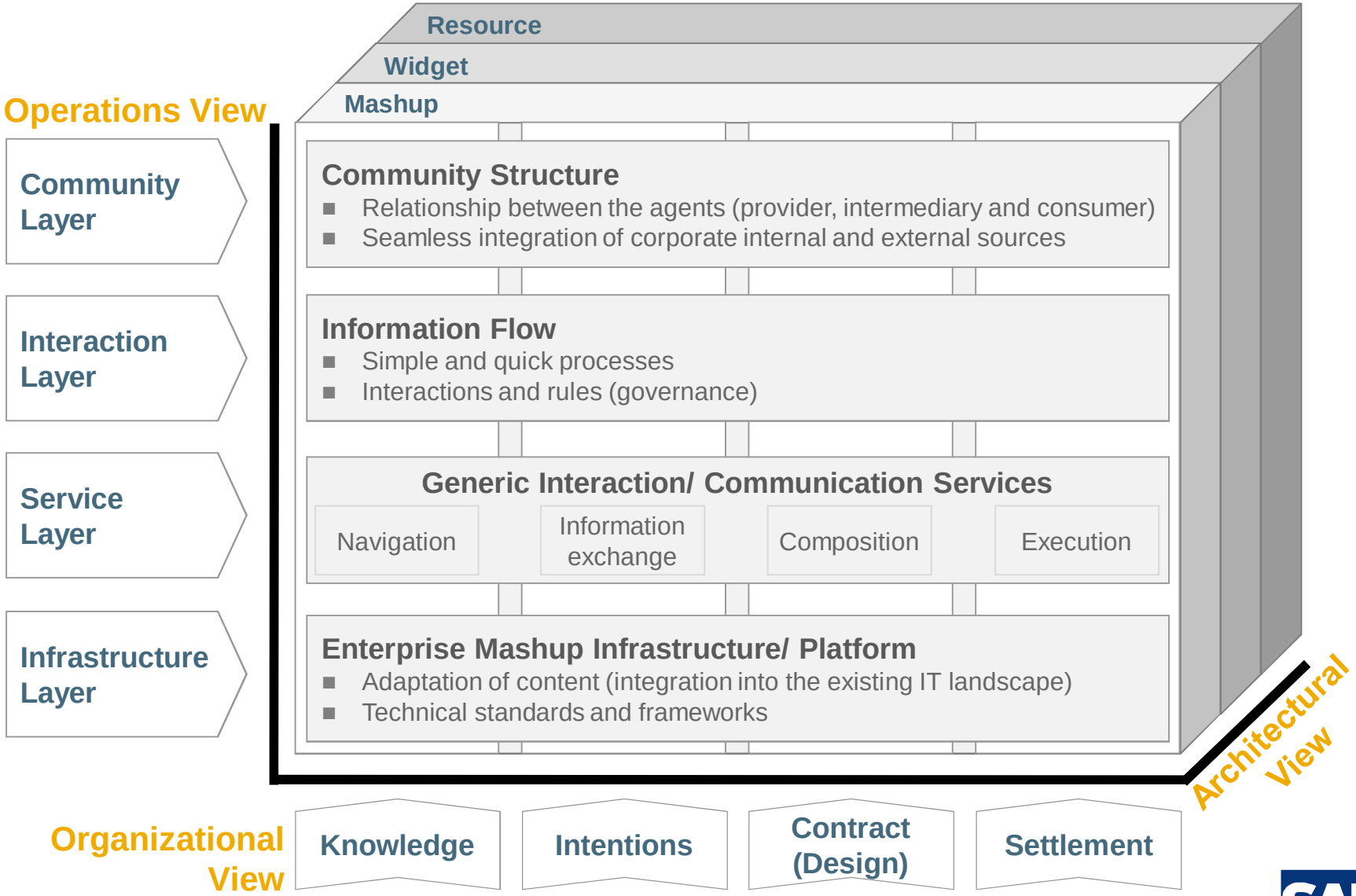


- Reference model for fostering understanding and communications
- Leveraging similarities to communities and electronic markets

* Ahlemann, F., & Gastl, H. (2007). Process Model for an Empirically Grounded Reference Model Construction. In P. Fettke & P. Loos (Eds.), Reference Modeling for Business Systems Analysis (pp. 77-97). Hershey PA, USA: Idea Group.

Design: Multi-View Scientific Reference Model

Overview (Views)

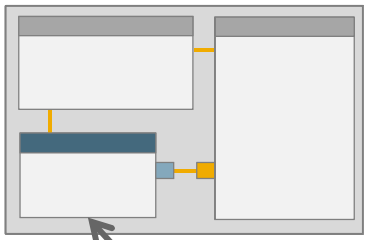


Design: Multi-View Scientific Reference Model

Architectural View: Enterprise Mashup Stack

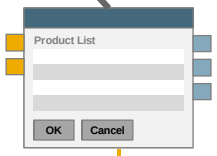
Mashup

- Compostion of Widgets (Wiring) to enterprise-class applications



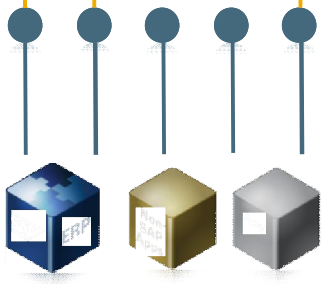
Widget

- User-friendly Building Blocks
- Provide graphical and simple user interaction mechanism
- Abstracting from the complexity of the underlying resources



Resource

- Core Building Blocks
- Respresent actual content, data or application functionality
- Encapsulated via well-defined interfaces (APIs)



Organizational User Roles

End users run mashups
- Consume mashup
- Personalize mashup (e.g., change background color)

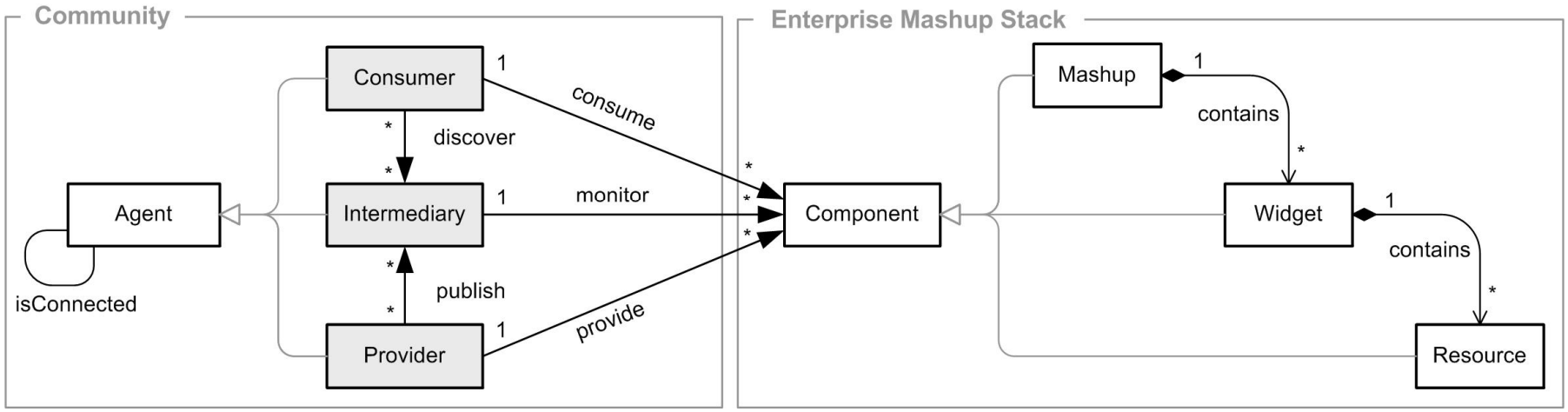
Key users create mashups
- Add pre-build widgets (from the catalogue)
- Connecting widgets by wiring their in-/out- ports

Consultants create widgets
- Binding generic user interfaces to resources
- Transforming and aggregating data (piping)

Developers implement the services
- Create and deploy services
- Make resources available (e.g., RSS Feeds, SAP Enterprise Services)

Design: Multi-View Scientific Reference Model

Operations View: Community Layer



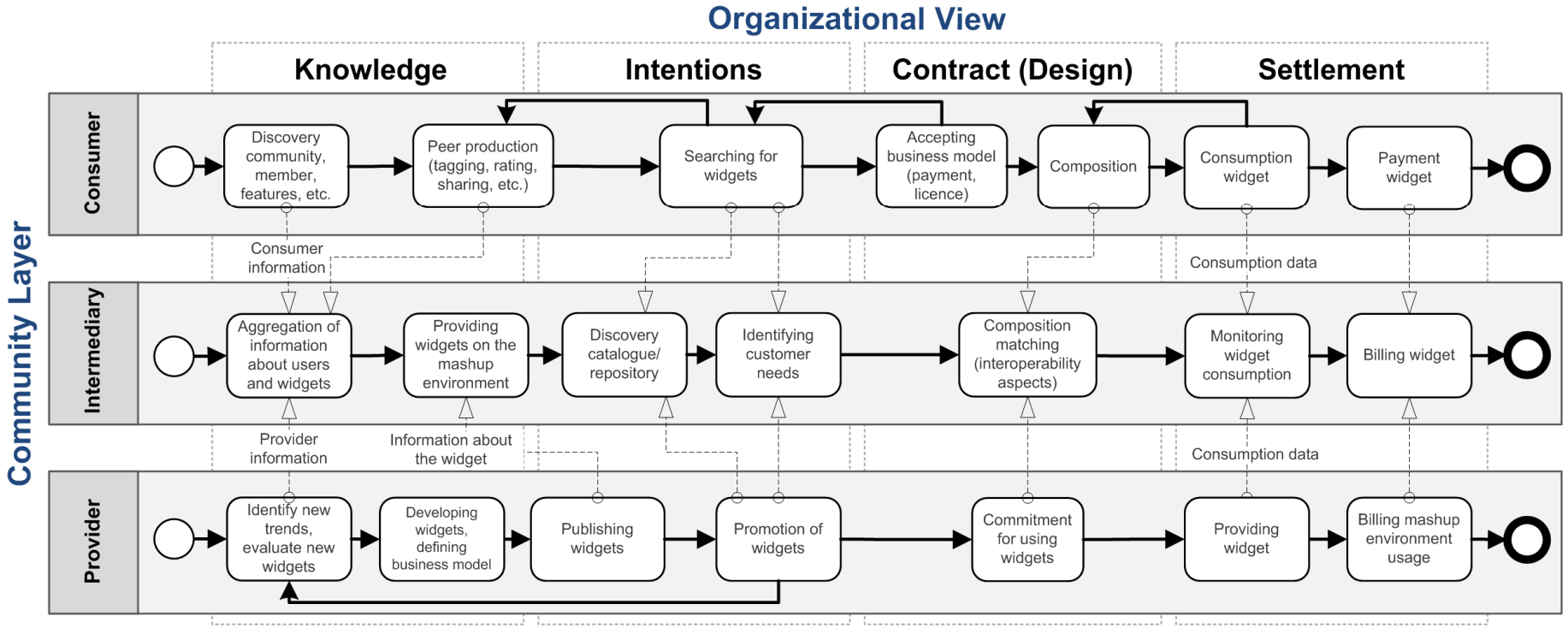
Agent Roles well known from Electronic Markets and SOAs



- **Provider** implements and hosts a mashable component (mashup, widget, resource)
- **Intermediary** mediates between providers and consumers (improving navigation, transparency and governance)
- **Consumer** is able to retrieve and compose mashup components according to his individual needs

Design: Multi-View Scientific Reference Model

Operations View: Interaction Layer



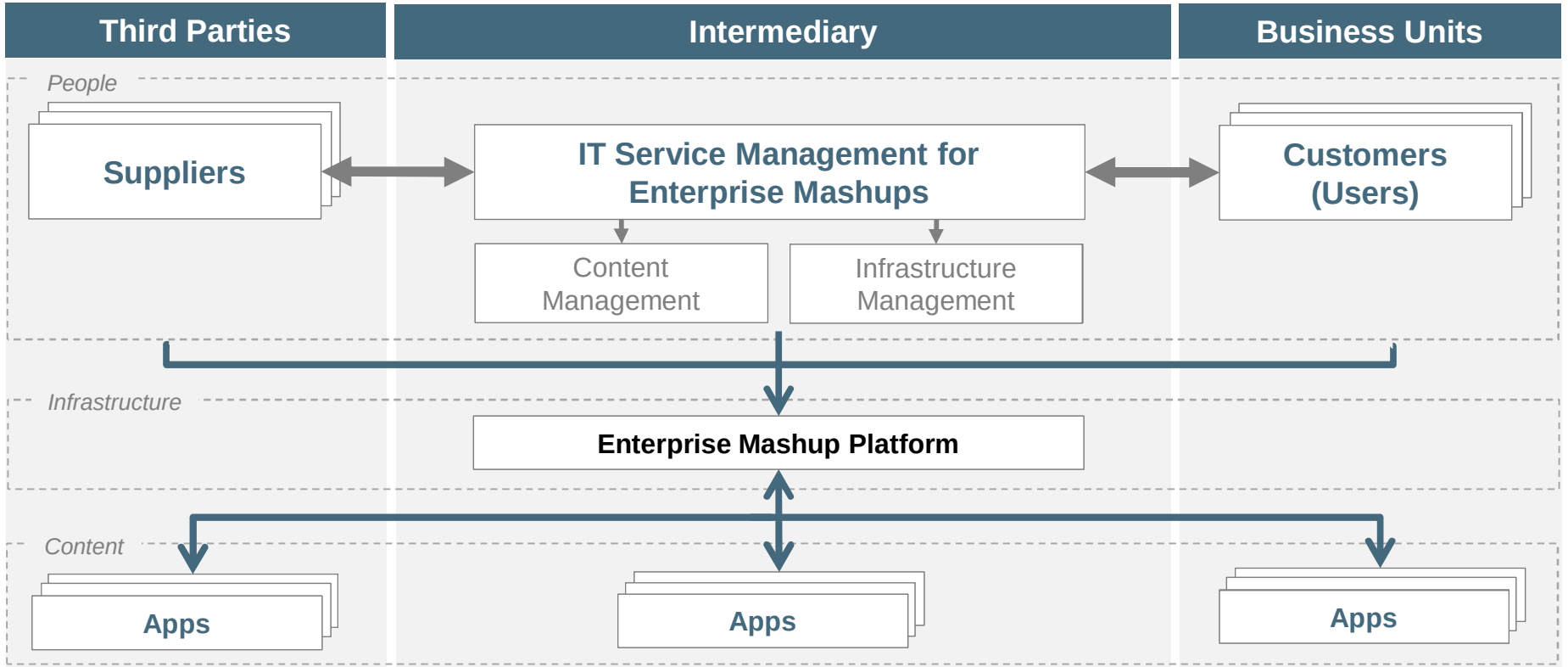
Characteristics of the interactions between the three agent roles

- Market transaction phases
- Permament loops between the converging design and run time phases
- Real data sources

Agent Interaction Phase Model

Design: Multi-View Scientific Reference Model

Enterprise Mashup Governance (Organization Structure)



- External providers of mashable components
- SAP, Google, Amazon, etc.

- Provide central channel to the internal customers and external suppliers
- Align and control IT governance
- Hide complexity from the users for the composition of mashable components

- Users in the business units
- Marketing, sales, product development, accounting, etc.

Processes and Reponsibilities



Motivation and Research Questions

Research Design

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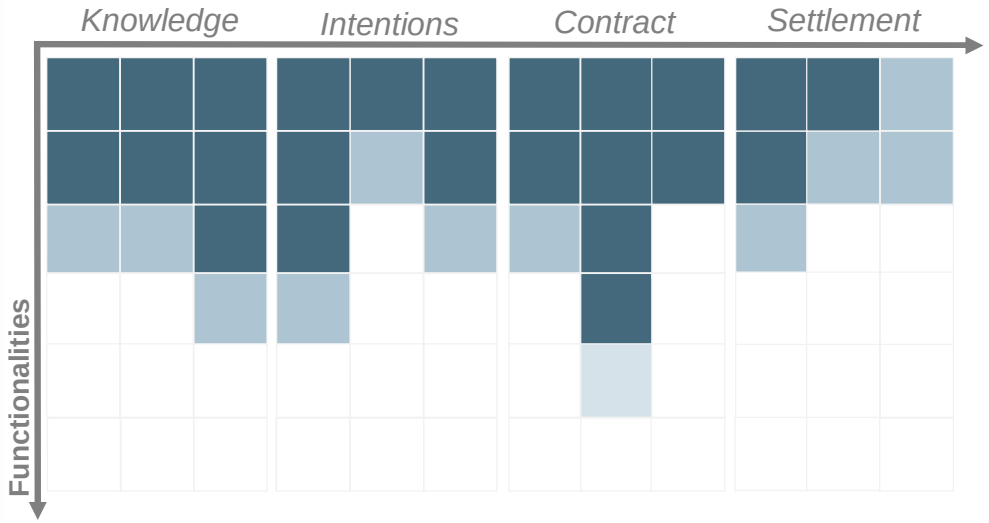
- **Design (Multi-View Reference Model)**
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Demonstration

Research Process

SAP Research RoofTop Marketplace



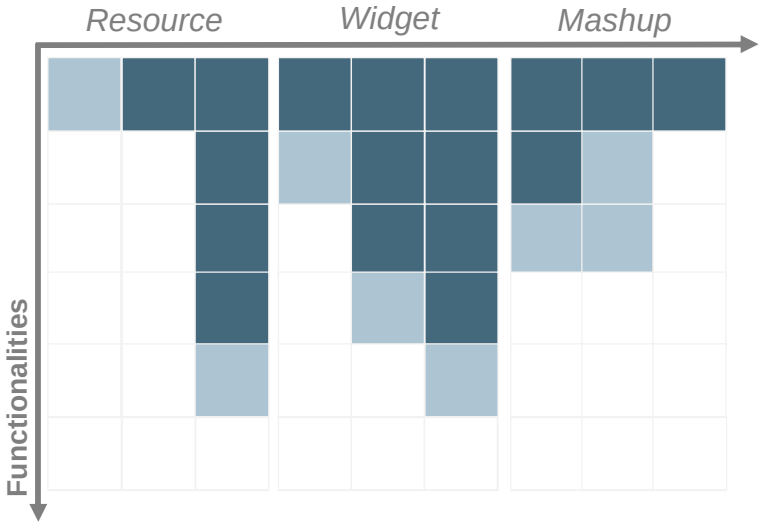
Horizontal Prototype

- Features: Organizational view of the multi-view scientifc reference model [...]
- Enterprise mashup ontology [...]

Vertical Prototype

- Context-aware enterprise mashups supporting the ad-hoc composition of enterprise-class applications [...]

FAST Platform



Horizontal Prototype

- Features: Architectural view of the multi-view scientific reference model [...]
- Enterprise mashup life cycle [...]

Vertical Prototype

- Enterprise mashup composition patterns [...]



Motivation and Research Questions

Research Design

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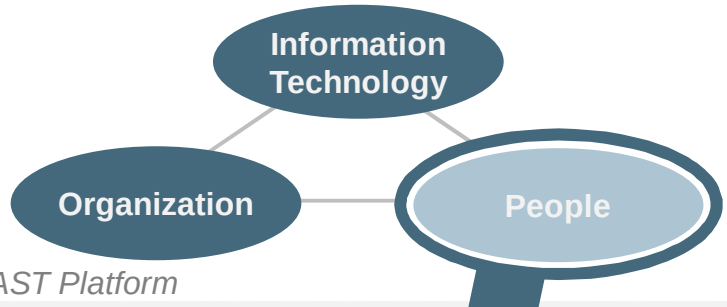
Evaluation

Research Process

Multi-Case (embedded) Studies

Context: Promotion Industry

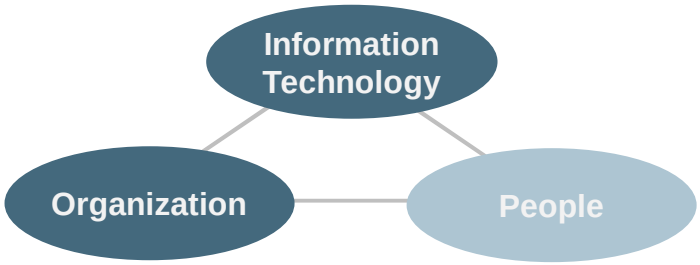
Case: Cross-Organizational Promotion Crew Request



FAST Platform

Context: Aerospace and Defense Industry

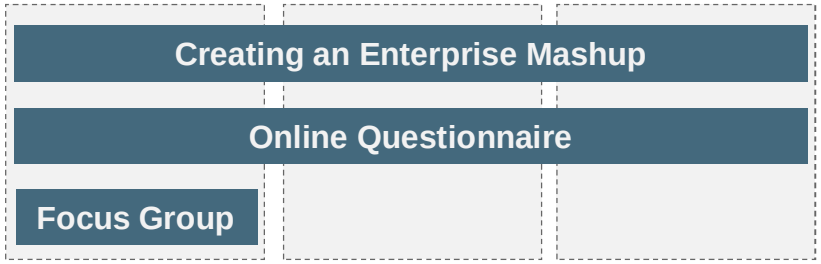
Case: Automation of Unstructured Decision Processes



SAP Research RoofTop Marketplace

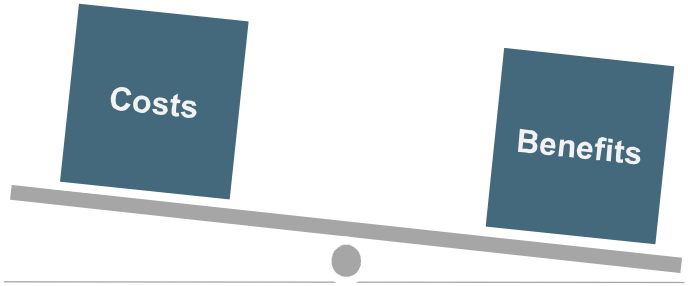
Laboratory Experiment

Management Students | *Technical Students* | *Open for all*



Business Case

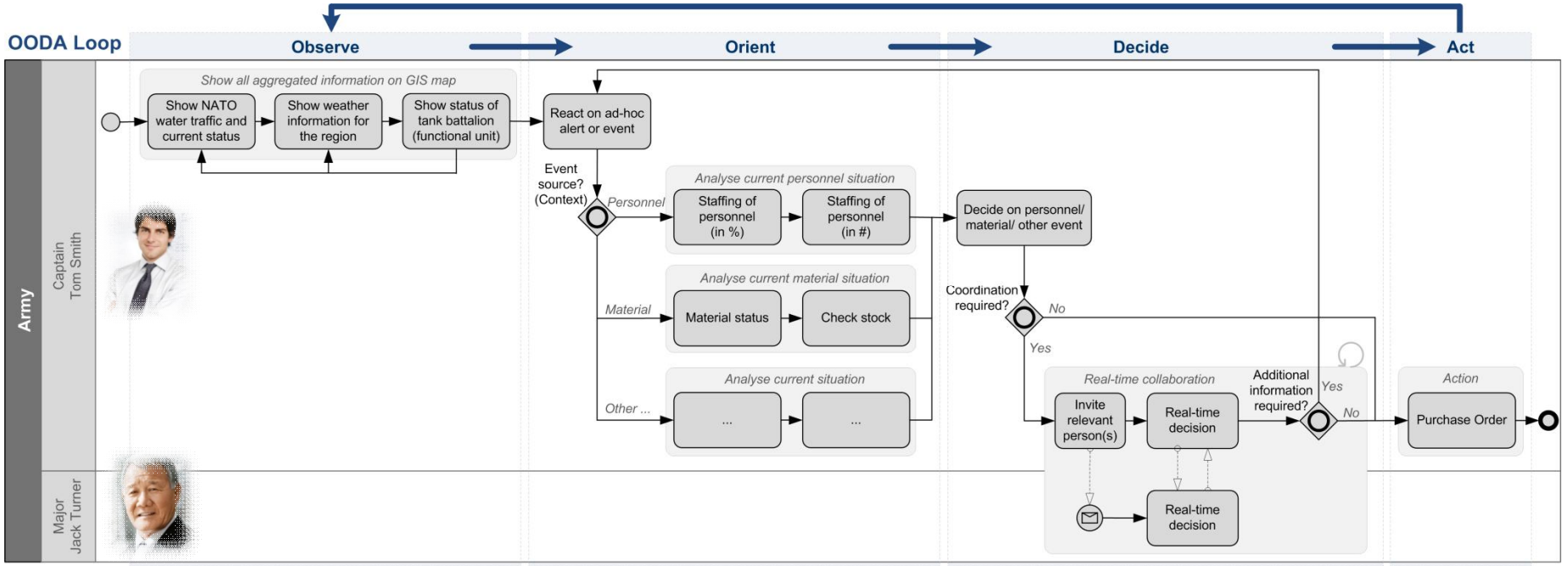
Investment Decision



Configuration

Evaluation: Unstructured Decision Processes

Scenario Background



- Observe your environment
- Seamless composition of company internal and external resources
- Combine structured (table) and unstructured content (e.g., map)

- Orientation
- Guide the user to identify the source of an unexpected event/ alert
- Providing information related to the individual context of the knowledge worker

- Real-time decision
- Development and evaluation of decision alternatives
- Real-time collaboration across different (external) organizational roles

- Action
- Perform the action based on the made decision

Evaluation: Unstructured Decision Processes

Enterprise Mashup Solution



Evaluation: Unstructured Decision Processes

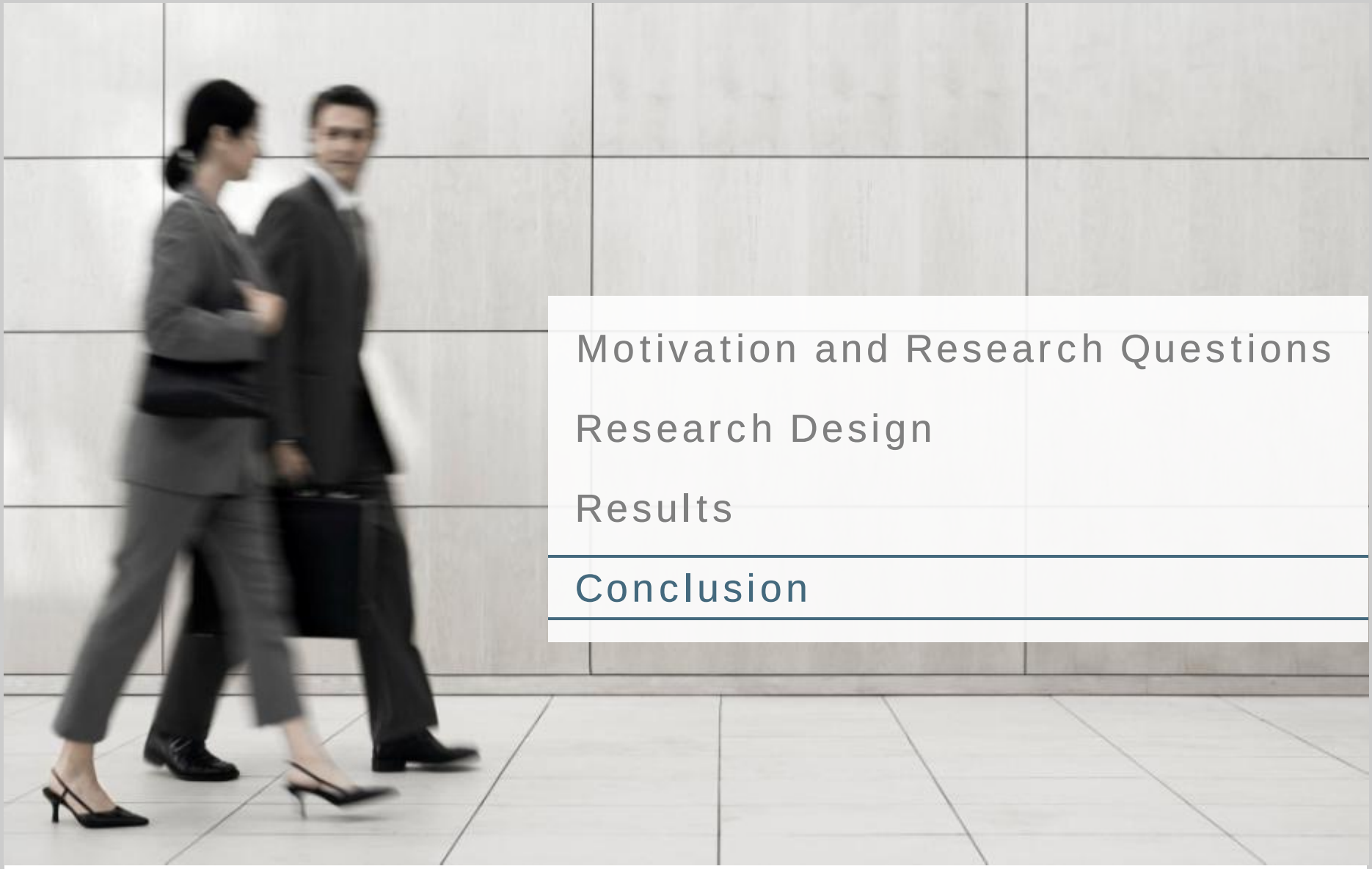
Business Values*

Effect Type	Observe	Orient	Decide	Act
Automational				
Processing time	6 → 1 min (-83%)	12 → 3 min (-75%)	6 → 4 min (-33%)	2 → 1:20 min (-38%)
Collaboration & sharing	++	+++	+	+
Informational				
Process breaks	5 → 0	3 → 0	3 → 0	1 → 0
Decision quality	++	+++	++	o
Transformational				
Competiveness	++	+++	+	+

Results

- Automation of unstructured decision processes
- Speeding up the observe and orient phase
- Improve decision quality by providing real-time and aggregated information from various sources
- Structuring along the OODA loop allows generalizing of the results (defense processes)

* Mooney, J. G., Gurbaxani, V., & Kraemer, K. L. (1996). A Process-Oriented Framework for Assessing the Business Value of Information Technology. ACM SIGMIS Database, 27(2), 68-81.



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Key Findings

How can enterprises structure and design grassroots enterprise mashup environments?



- Complementary to service-oriented architectures ("Putting a face on SOA")
- Determined by user-oriented objectives
- Sharing of knowledge and solutions within the community
- Multi-view scientific reference model
  - Three disjointed and comprehensive views (Architectural, organizational and operations)
  - Organization along market transaction phases (knowledge, intentions, contract/ design and settlement)
  - Agent interaction phase model links between the three views

Conclusion

Key Findings

How to guide enterprises with a governance model for balancing between organization concerns such as manageability and fostering user involvement?



- Hybrid governance models defines boundaries of user freedom
  - IT department (intermediary) maintains the infrastructure
  - Content and people are organized in a decentral manner
- Governance services are aligned with the four organizational phases
  - Possibility of reuse existing ITIL and CobIT processes
  - High degree of automation
- New role of the IT department as a moderator and mediator of organic growing mashup platforms

Conclusion

Key Findings

How can enterprises integrate and leverage existing IT-enabled functionalities in mashup environments?



- Content is the driving factor and represents the greatest risk factor (business case)
- Gentle slope of complexity
  - Balance between adaptation power and complexity
  - Enterprise mashup composition patterns demonstrate integration roadmap
- Missing APIs (smallest building blocks of enterprise mashups)
  - Web-based resources are missing
  - Integration challenges are related to semantic issues (expert knowledge is required; e.g., for SAP enterprise services)
  - New service design of legacy systems is needed

Conclusion

Key Findings

What are the business values for introducing the mashup paradigm in corporate environments?



- User benefits (financial and non-financial benefits)
  - Aggregation of various sources
  - Improved decision quality
  - Community involvement
  - Customization of individual environment
- Business people are more enthusiastic than technical people
- Support of unstructured business processes (ad hoc processes)
  - Automation of unexpected situations in all decision phases
  - “Crisis situations”

Conclusion

Limitations of the Research



- Design Science
  - Method mix in design and evaluation activity
  - “Design as a search process”
- Contribution to (scientific) knowledge base
  - 30+ publications
  - 3 Best Paper Awards, IEEE 2nd Place

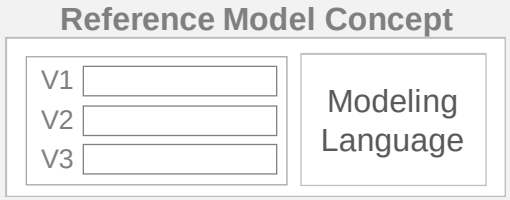


- Evaluation of the artifact in an indirect manner
  - Measurement against the objectives
  - Understanding and communications focus
- Application and evaluation of the governance aspects
  - Productive systems not available at this stage
- Limited number of cases
  - Early stage of technology adoption
  - Collected data build foundation of the business case

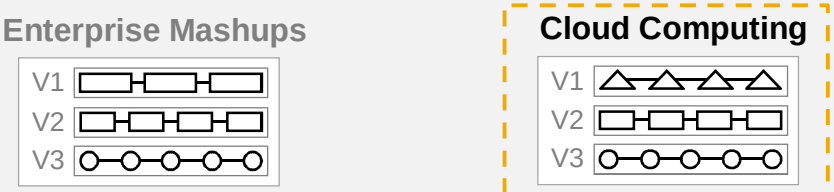
Conclusion

Generalization of the Reference Model

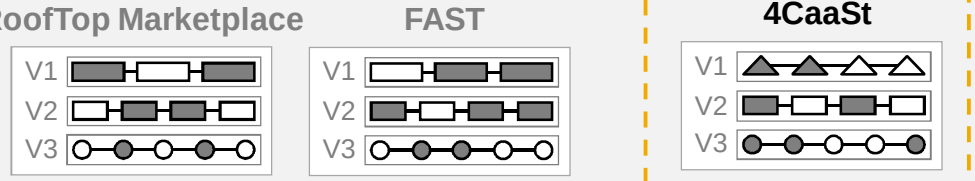
1 Reference Model Concept



2 Reference Model Types (Reference Model)



3 Specific Model



Areospace & Defense | **Cross-Org Processes** | **Unbundled Business Software**

Conceptual Level

Definition
- What is a reference model?

Model
- What are the general views (V)?
- Which modeling language is applied?
- Who are the target audiences?

Taxonomy of reference model types
- Different domains
- Refinement of the views

Instance Level

Instances

Modeled instances
- Concrete representation
- Integration of required details

Real world environment



Discussion