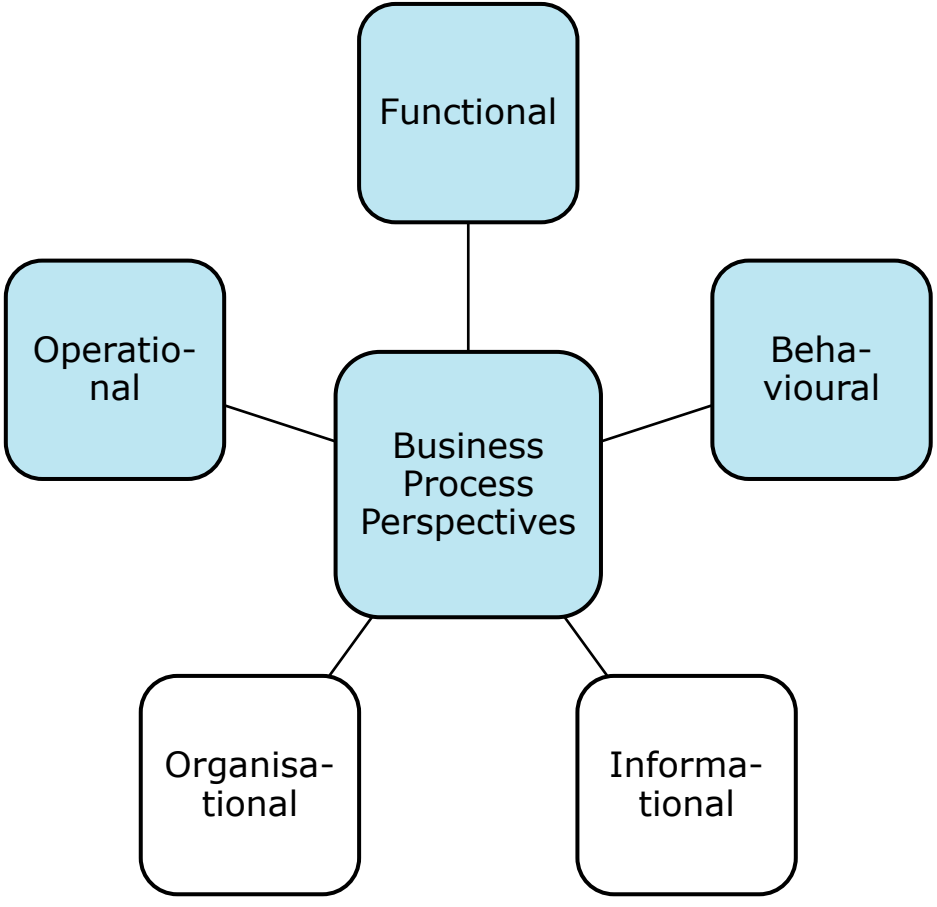
Process- and Resource-Aware Information Systems

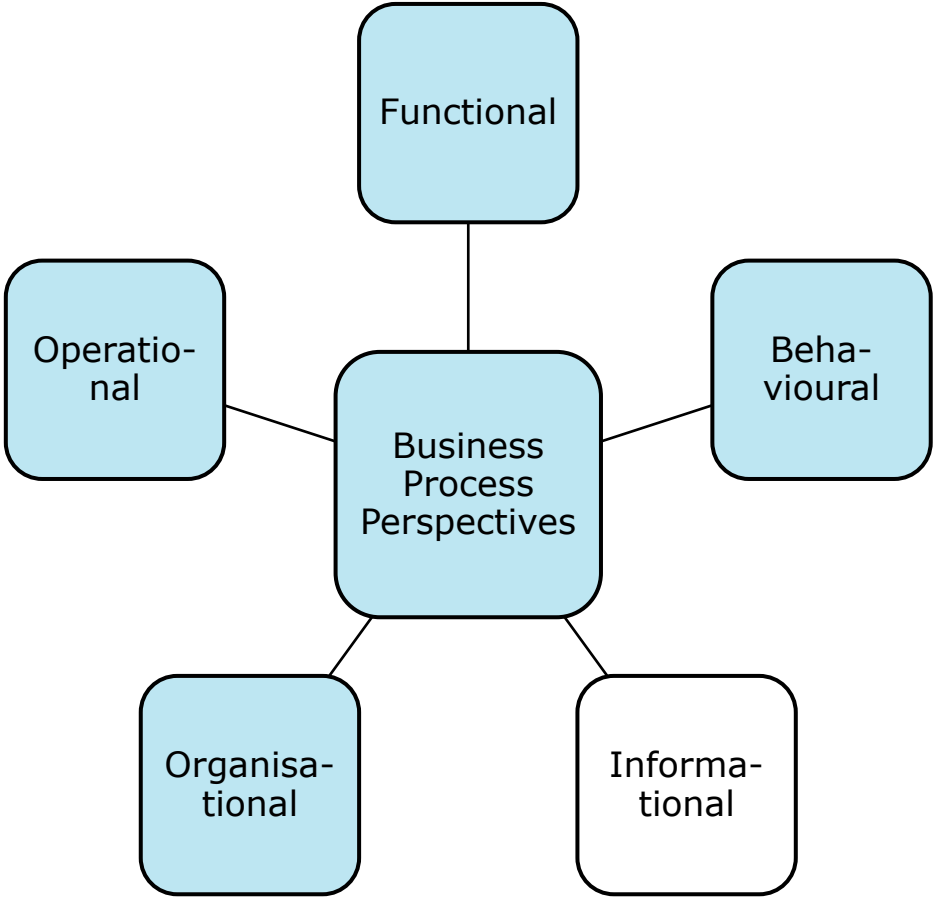
Cristina Cabanillas
Vienna University of Economics and Business, Austria

EMISA 2017, @ESSEN, GERMANY

Motivation – PAIS: Process-Aware Information System



Motivation – PRAIS: Process- and Resource-Aware Information System



Research Questions

Which are the operations involved in human resource management in business processes?

RQ1

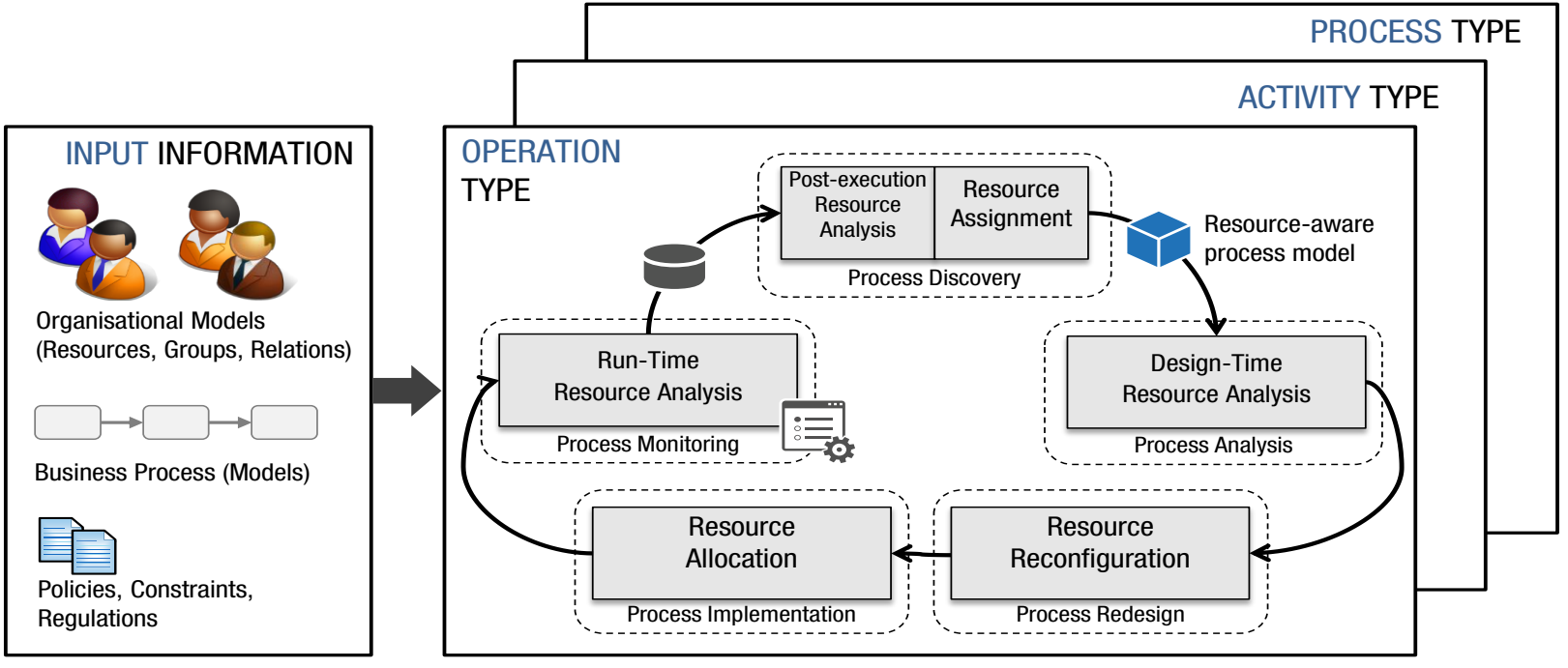
Are there other factors that affect the way in which the operations are addressed?

RQ2

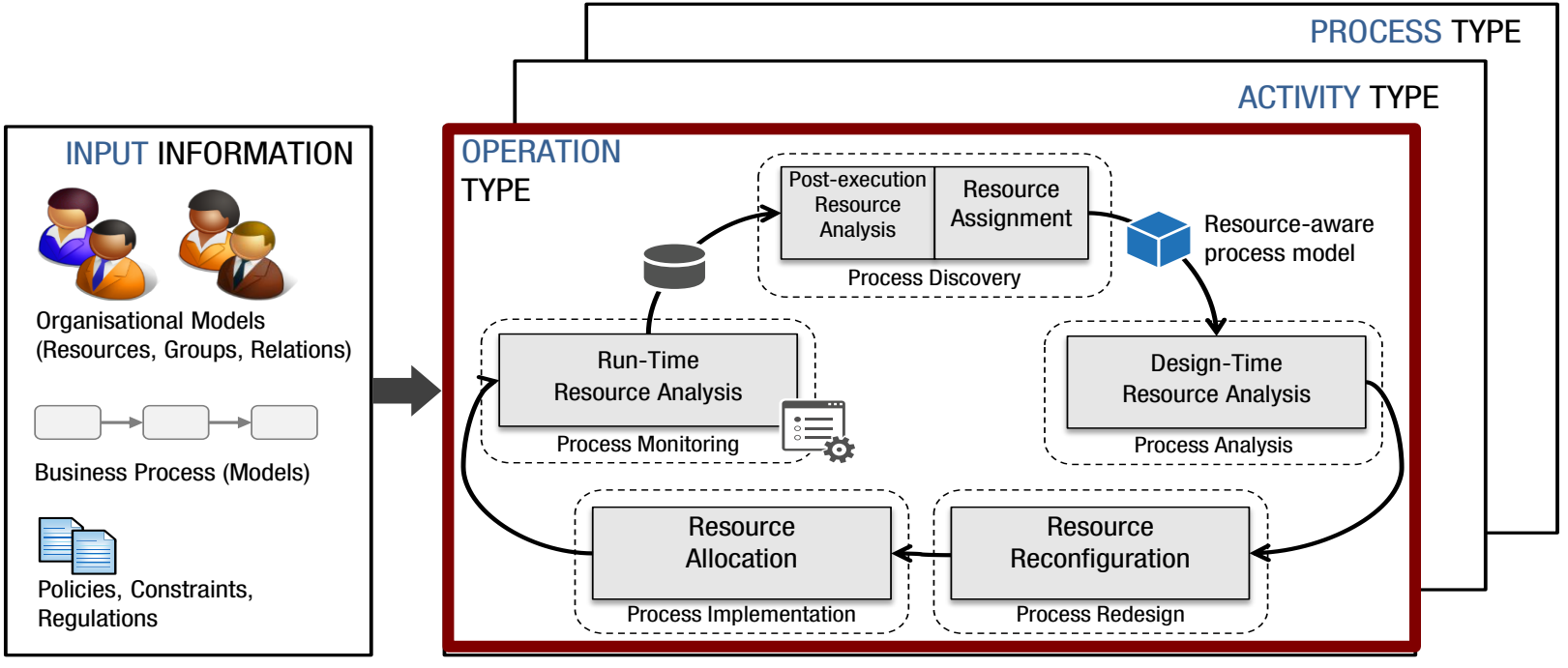
Which is the existing support on the theoretical and practical sides?

RQ3

Framework

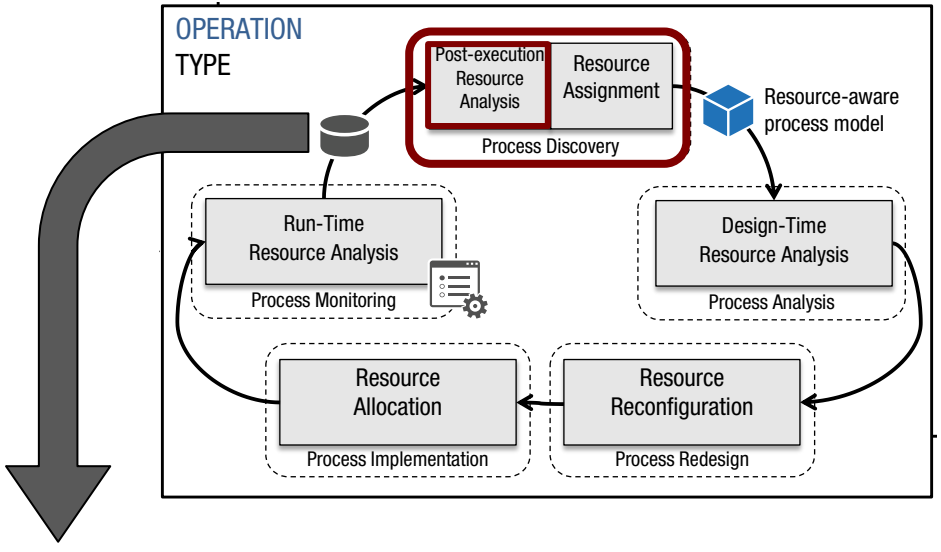

PROCESS TYPE
ACTIVITY TYPE
INPUT INFORMATION
Organisational Models
(Resources, Groups, Relations)
Business Process (Models)
Policies, Constraints,
Regulations
OPERATION
TYPE
Post-execution
Resource
Analysis
Resource
Assignment
Process Discovery
Resource-aware
process model
Run-Time
Resource Analysis
Process Monitoring
Design-Time
Resource Analysis
Process Analysis
Resource
Allocation
Process Implementation
Resource
Reconfiguration
Process Redesign

Framework



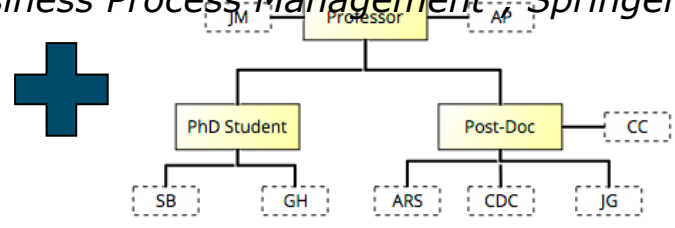
RQ1

Framework – Operation types

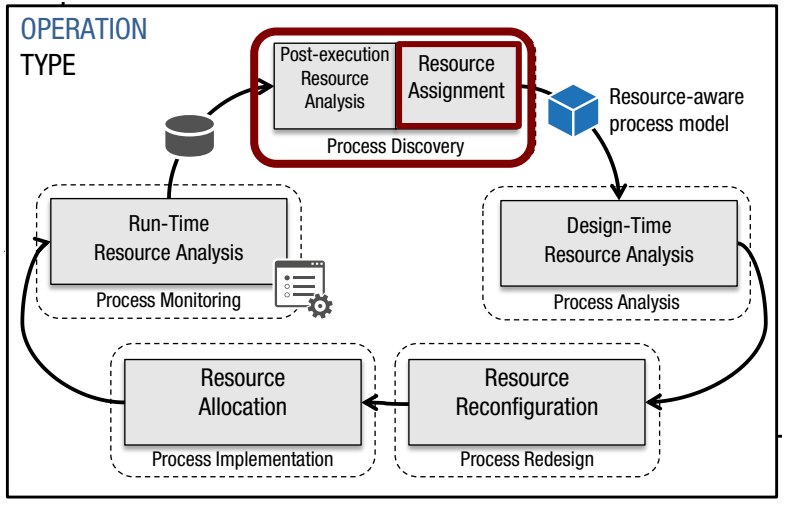


Dumas et al., "Fundamentals of Business Process Management", Springer, 2013

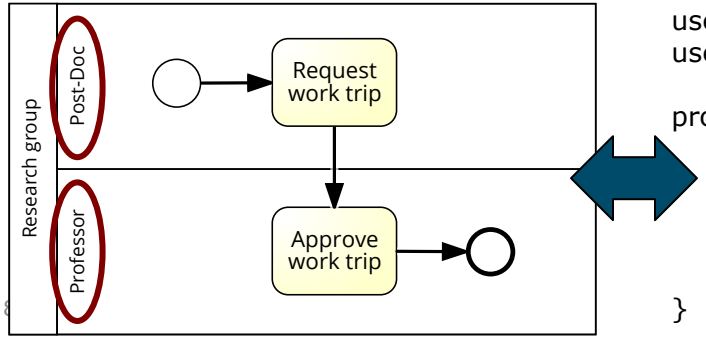
```
<trace>
  <event>
    <string key="org:resource" value="CC"/>
    <date key="time:timestamp" value="2013-08-06T14:..."/>
    <string key="concept:name" value="Request work trip"/>
    <string key="lifecycle:transition" value="start"/>
  </event>
...
```



Framework – Operation types



Imperative process model

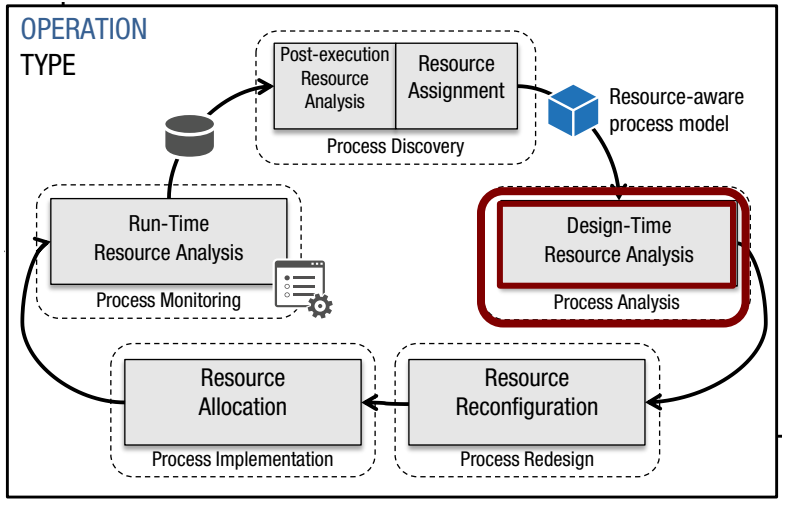


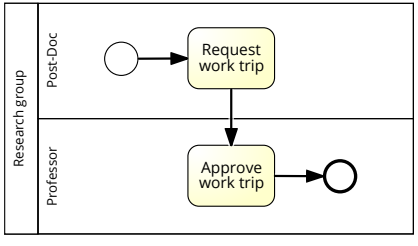
Declarative process model

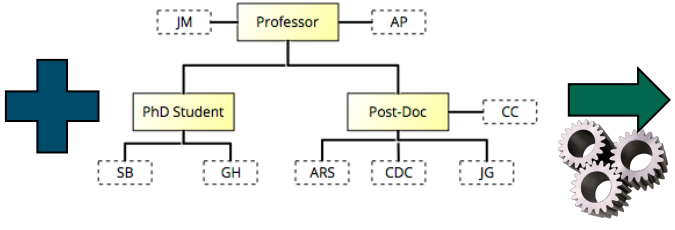
```
use group Post-Doc
use group Professor

process WorkTrip {
        task Request work trip
        task Approve work trip
        ensure role(Request work trip, Post-Doc)
        ensure role(Approve work trip, Professor)
        ensure sequence(Request work trip, Approve work trip)
}
```

Framework – Operation types





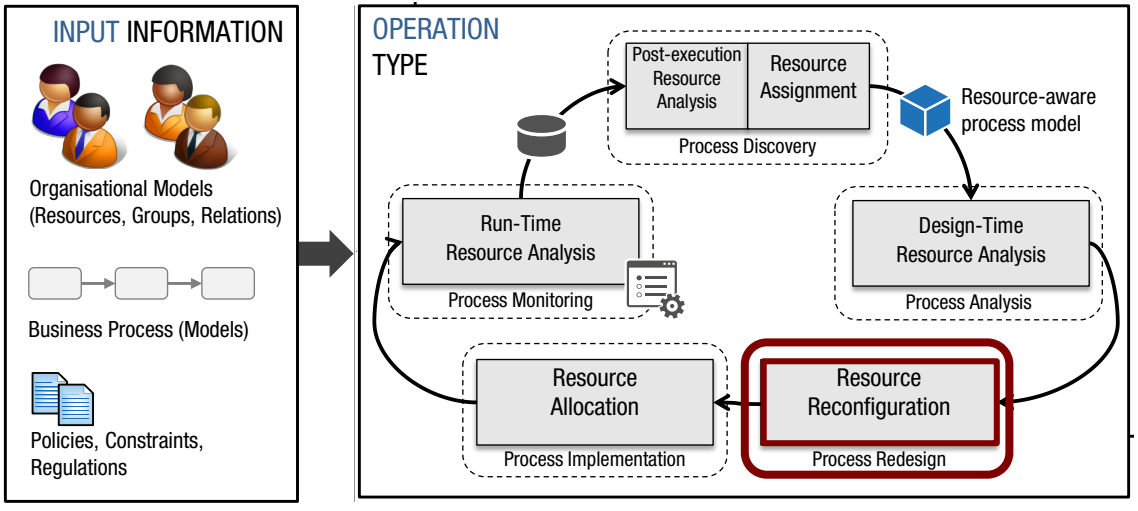


A1. ARS, CDC, JG, CC
A2. No
…

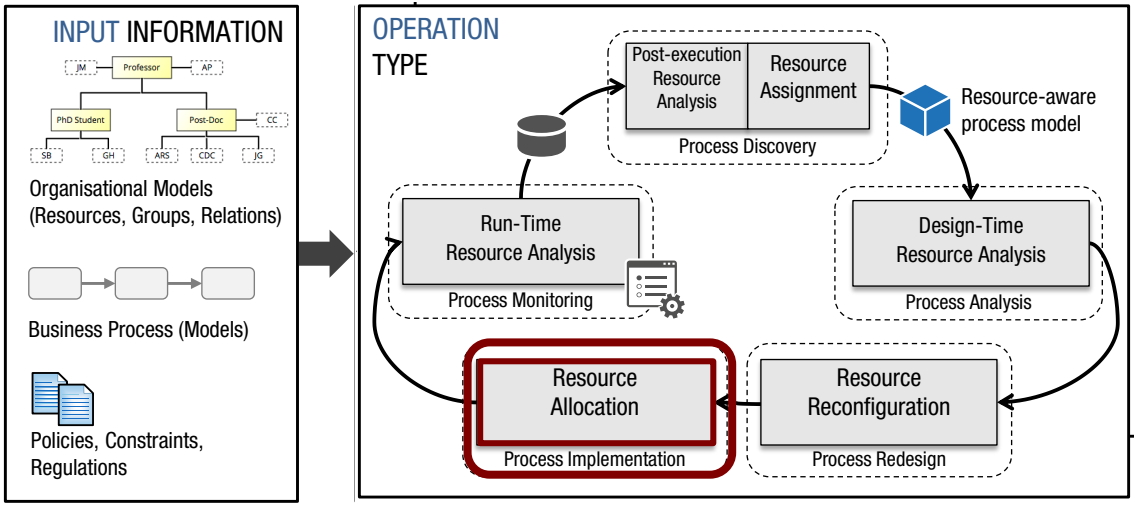
Analysis Operations

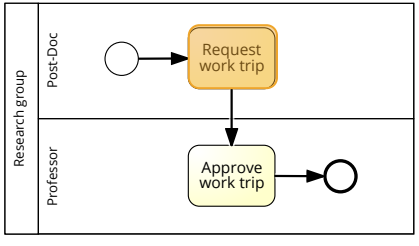
Q1. Who can request a work trip?
Q2. Is SB involved in this process?
…

Framework – Operation types



Framework – Operation types





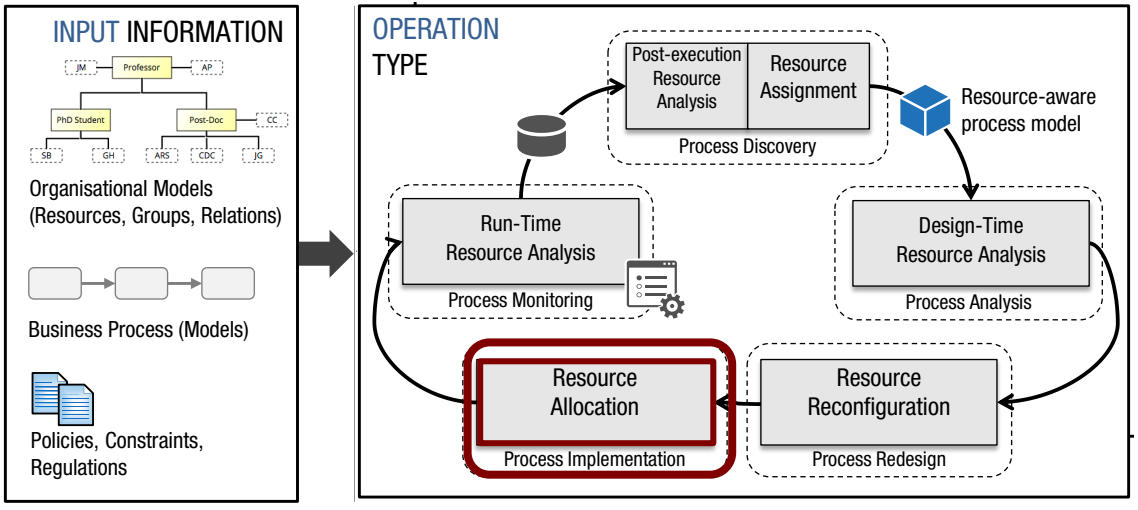
Potential performers:
ARS, CDC, JG, CC

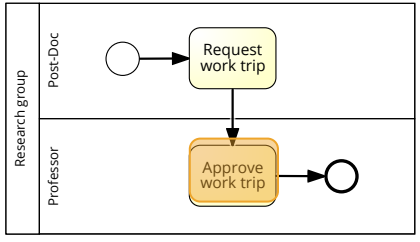
Optimization criteria

Actual performer:
CDC

Who should perform this instance?

Framework – Operation types





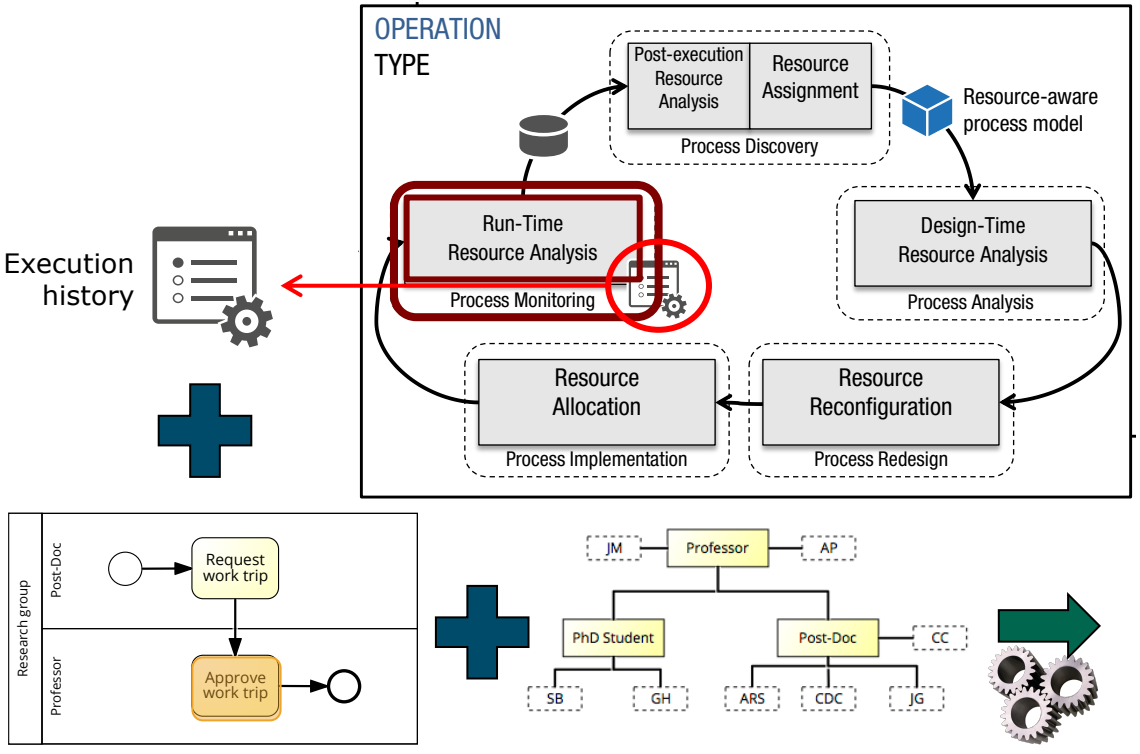
Potential performers:
JM, AP

Optimization criteria

Actual performer:
AP

Who should perform this instance?

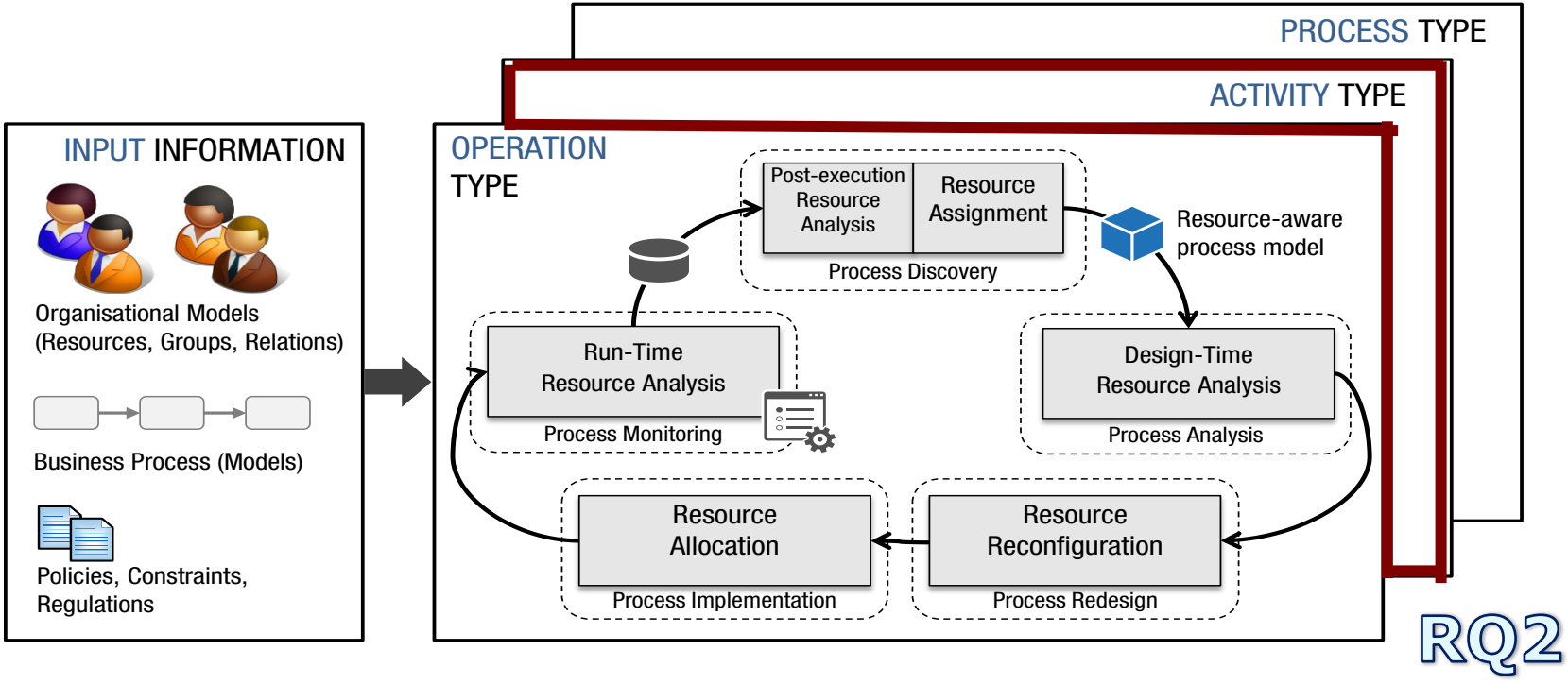
Framework – Operation types



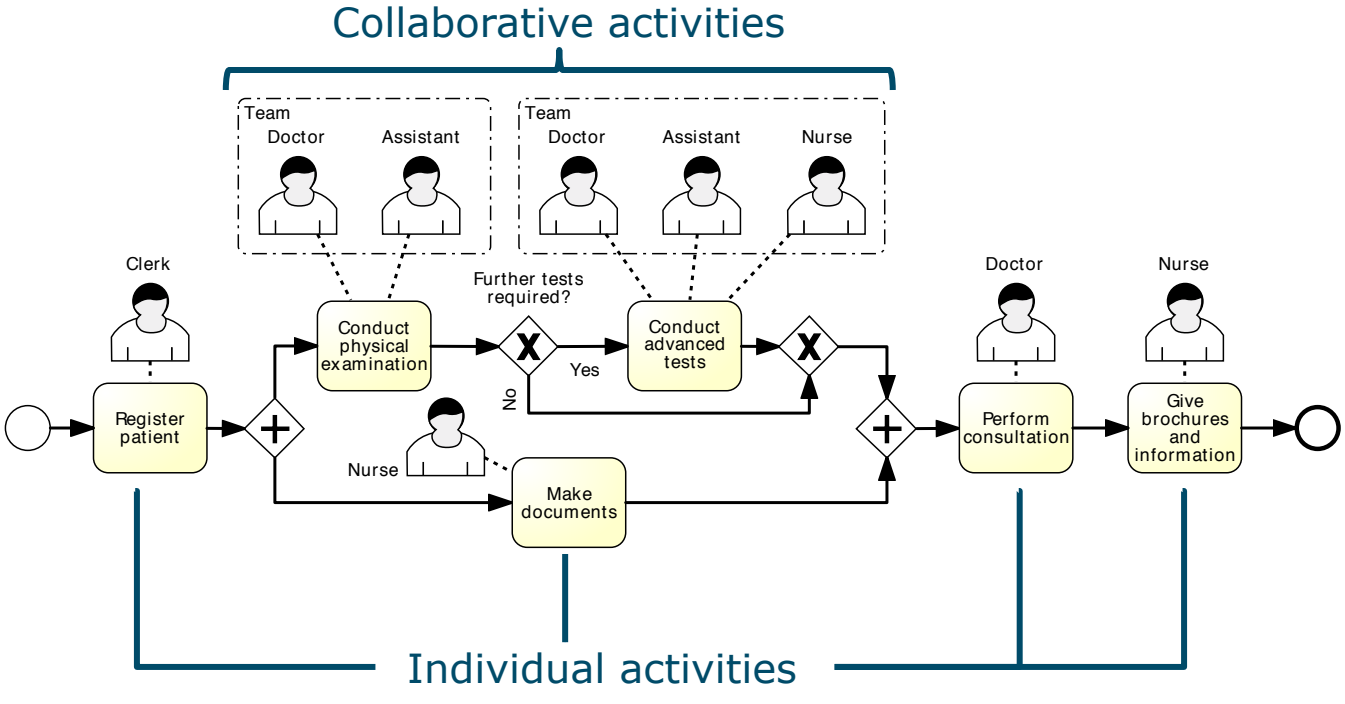
Analysis Operations

- Q1. Who can approve a work trip?
- Q2. Who can **still** be involved in this process?
- …

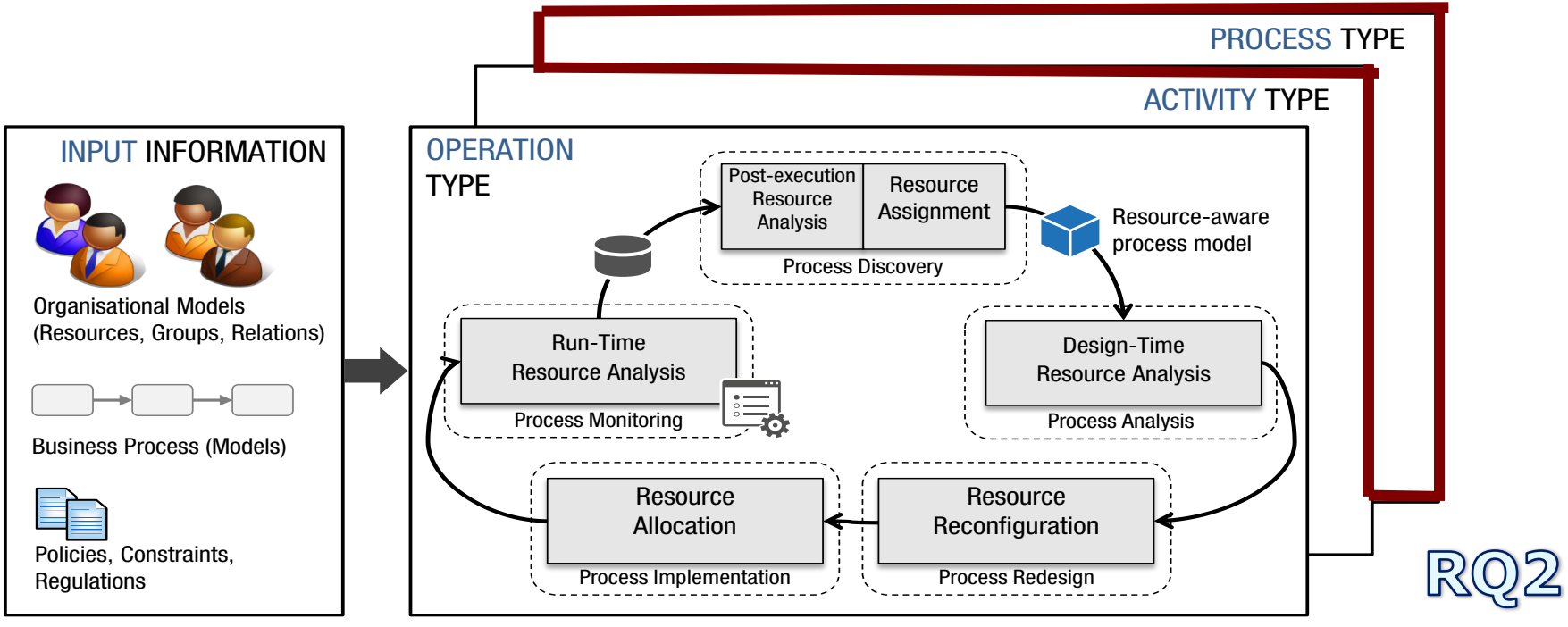
Framework


PROCESS TYPE
ACTIVITY TYPE
INPUT INFORMATION
Organisational Models
(Resources, Groups, Relations)
Business Process (Models)
Policies, Constraints,
Regulations
OPERATION
TYPE
Post-execution
Resource
Analysis
Resource
Assignment
Process Discovery
Resource-aware
process model
Run-Time
Resource Analysis
Process Monitoring
Design-Time
Resource Analysis
Process Analysis
Resource
Allocation
Process Implementation
Resource
Reconfiguration
Process Redesign
RQ2

Framework – Activity types

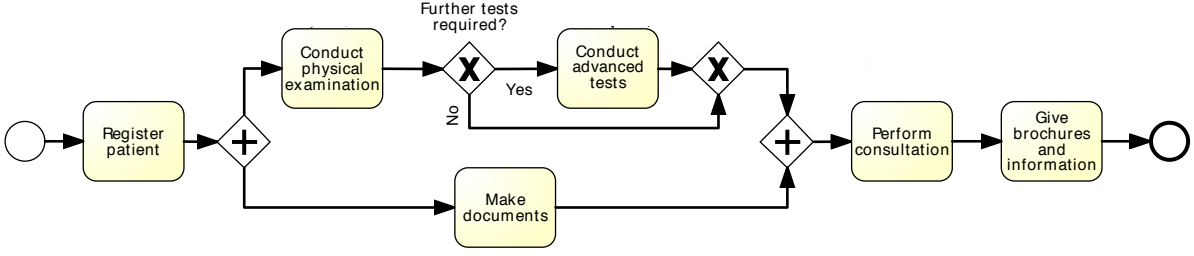


Framework

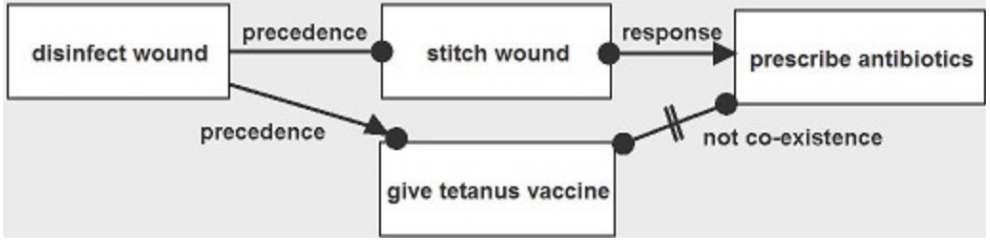

PROCESS TYPE
ACTIVITY TYPE
INPUT INFORMATION
Organisational Models
(Resources, Groups, Relations)
Business Process (Models)
Policies, Constraints,
Regulations
OPERATION
TYPE
Post-execution
Resource
Analysis
Resource
Assignment
Process Discovery
Resource-aware
process model
Run-Time
Resource Analysis
Process Monitoring
Design-Time
Resource Analysis
Process Analysis
Resource
Allocation
Process Implementation
Resource
Reconfiguration
Process Redesign
RQ2

Framework – Process types

Routine processes



Flexible processes



Support RQ3

Operation type →		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
Process type →		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Individual	Concept	√	√	√	≈	≈	-	≈	≈	≈	-
	Tool	√	√	√	≈	≈	-	≈	≈	≈	-
Collaborative	Concept	-	≈	≈	-	-	-	-	-	-	-
	Tool	-	≈	≈	-	-	-	-	-	-	-

Activity type ↑

- Creation patterns
- Role mining
- Staff mining
- DPILMiner

Support RQ3

Operation type →		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
Process type →		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Indi-vidual	Concept	√	√	√	≈	≈	-	≈	≈	≈	-
	Tool	√	√	√	≈	≈	-	≈	≈	≈	-
Colla-bora-tive	Concept	-	≈	≈	-	-	-	-	-	-	-
	Tool	-	≈	≈	-	-	-	-	-	-	-

Activity type ↑

- Creation patterns
- Role mining
- Staff mining
- DPILMiner

- Modelling
- Expressive p.
- Textual vs. graphical
- RAL/RALph
- DPIL
- RALTeam

Support RQ3

		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
Operation type →											
Process type →		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Indi-vidual	Concept	√	√	√	≈	≈	-	≈	≈	≈	-
	Tool	√	√	√	≈	≈	-	≈	≈	≈	-
Colla-bora-tive	Concept	-	≈	≈	-	-	-	-	-	-	-
	Tool	-	≈	≈	-	-	-	-	-	-	-

Activity type ↑

- Creation patterns
- Role mining
- Staff mining
- DPILMiner

- Modelling
- Expressive p.
- Textual vs. graphical
- RAL/RALph
- DPIL
- RALTeam

- Analysis operations

Support RQ3

		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
Operation type →											
Process type →		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Indi-vidual	Concept	√	√	√	≈	≈	-	≈	≈	≈	-
	Tool	√	√	√	≈	≈	-	≈	≈	≈	-
Colla-bora-tive	Concept	-	≈	≈	-	-	-	-	-	-	-
	Tool	-	≈	≈	-	-	-	-	-	-	-
Activity type ↑		- Creation patterns - Role mining - Staff mining - DPILMiner		- Modelling - Expressive p. - Textual vs. graphical - RAL/RALph - DPIL - RALTeam		- Analysis operations		- Push&Pull patterns - Petri nets - Greedy - Simple processes - ASP			

Support RQ3

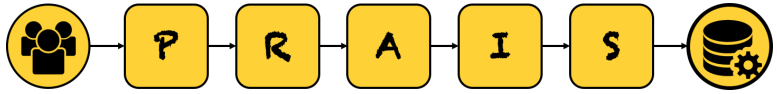
Operation type →		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
Process type →		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Indi-vidual	Concept	√	√	√	≈	≈	-	≈	≈	≈	-
	Tool	√	√	√	≈	≈	-	≈	≈	≈	-
Colla-bora-tive	Concept	-	≈	≈	-	-	-	-	-	-	-
	Tool	-	≈	≈	-	-	-	-	-	-	-
Activity type ↑		- Creation patterns - Role mining - Staff mining - DPILMiner		- Modelling - Expressive p. - Textual vs. graphical - RAL/RALph - DPIL - RALTeam		- Analysis operations		- Push&Pull patterns - Petri nets - Greedy - Simple processes - ASP		- Analysis operations	

Conclusions

- Framework for moving from PAIS to PRAIS
- 3 aspects affecting resource management: operations, activity types, process types
- Current situation:
  - Most developed operations: resource mining and resource assignment
  - Optimizations in resource allocation convenient in current BPMS
  - Resource analysis hardly supported
  - Conceptual support better than tooling support

- Limitations of this work:
  - No exhaustive systematic literature review
  - Scope of research: BPM

PRAIS Project



WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

UNIVERSIDAD DE SEVILLA

TU/e

UNIVERSITÄT BAYREUTH

Project kickoff (01/04/2017)

Individual resource assignment supported (30/06/2017)

Allocation integrated with individual assignments (30/11/2017)

Teamwork assignment supported (31/03/2018)

Resource assignment techniques validated (31/05/2018)

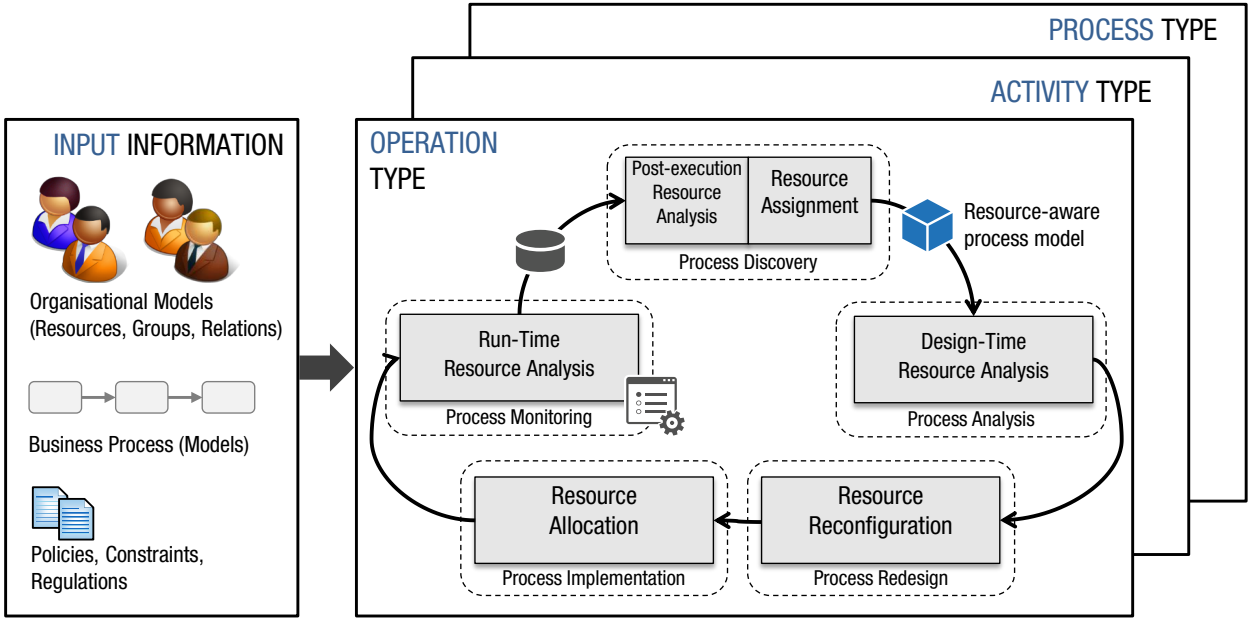
Teamwork allocation supported (31/07/2018)

Resource mining for discovery & improvement supported (31/12/2018)

Continuous (re)planning supported - Project completed (31/03/2019)

http://ai.wu.ac.at/prais-project

EFMD EQUIS ACCREDITED AACSB ACCREDITED ASSOCIATION AMBA ACCREDITED



		Resource Mining		Resource Assignment		Design-Time Analysis		Resource Allocation		Run-Time Analysis	
		Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible	Routine	Flexible
Indi-vidual	Concept	√	√	√	~	~	-	~	~	~	-
	Tool	√	√	√	~	~	-	~	~	~	-
Colla-bora-tive	Concept	-	~	~	-	-	-	-	-	-	-
	Tool	-	~	~	-	-	-	-	-	-	-

cristina.cabanillas@wu.ac.at