Process Mining: Data Science in Action

Business Process Model and Notation (BPMN)

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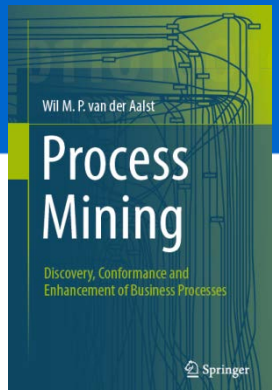
www.processmining.org



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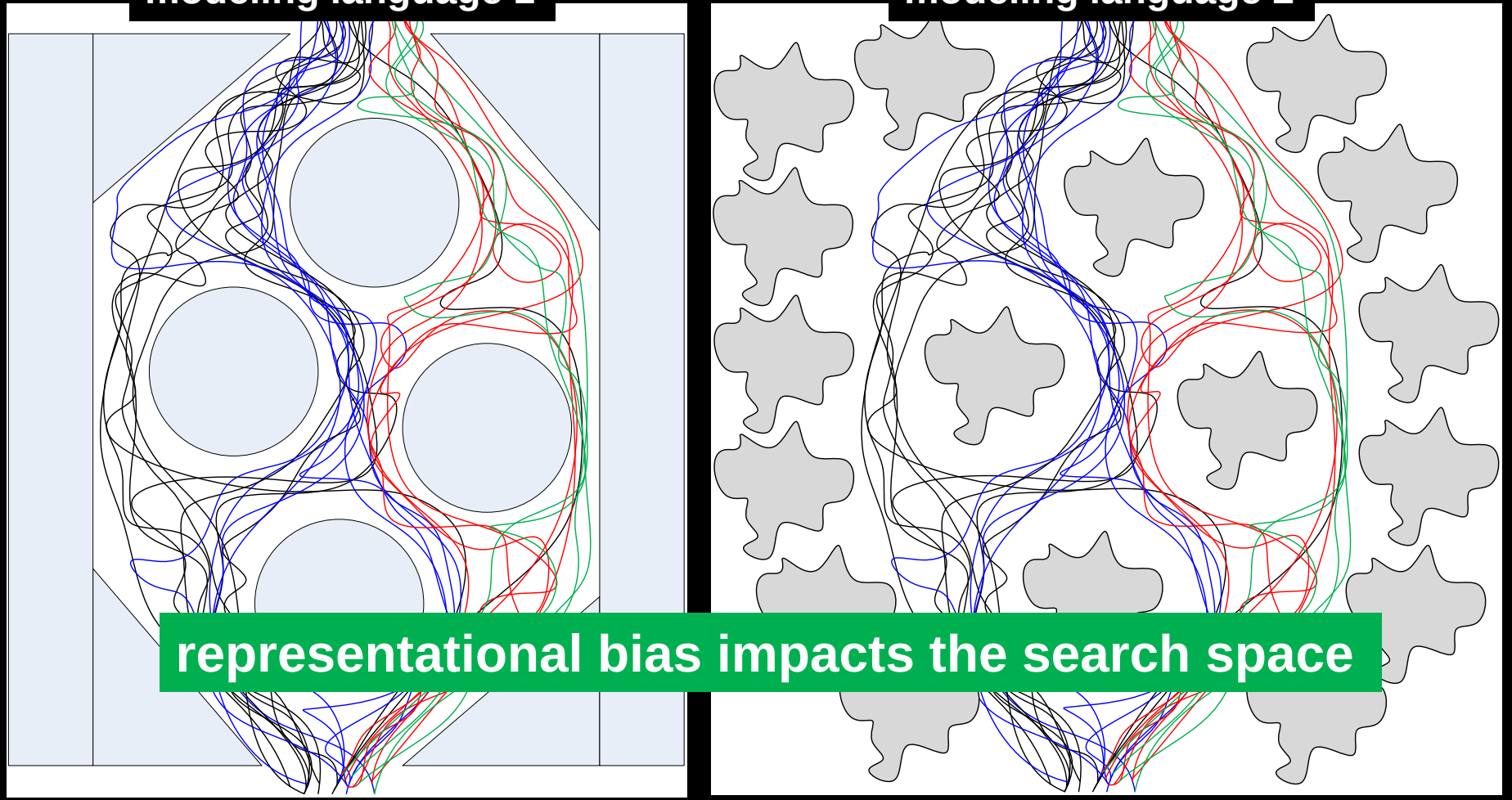
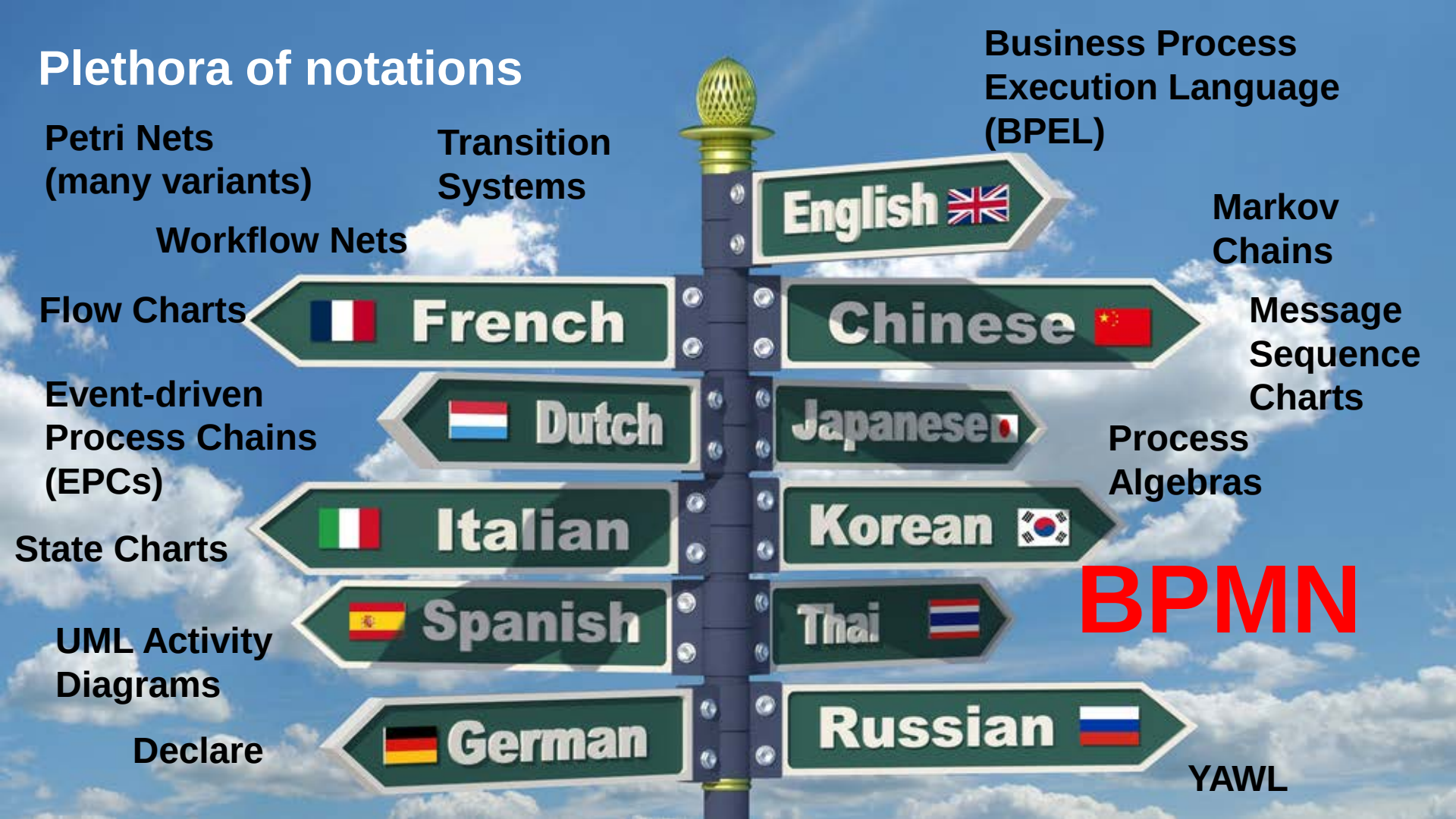
Where innovation starts


modeling language 1
modeling language 2
representational bias impacts the search space


Plethora of notations
Petri Nets (many variants)
Transition Systems
Business Process Execution Language (BPEL)
Workflow Nets
Markov Chains
Flow Charts
Message Sequence Charts
Event-driven Process Chains (EPCs)
Process Algebras
State Charts
BPMN
UML Activity Diagrams
Declare
YAWL
English
French
Chinese
Dutch
Japanese
Italian
Korean
Spanish
Thai
German
Russian

Business Process Model and Notation

- **BPMN is also known as the Business Process Modeling Notation.**
- **Emerged in 2004.**
- **OMG standard (www.bpmn.org, www.omg.org/spec/BPMN/).**
- **Supported by many vendors.**
- **Similar to UML activity diagrams and Event-driven process chains (EPCs).**
- **Typically, only a small subset is considered.**

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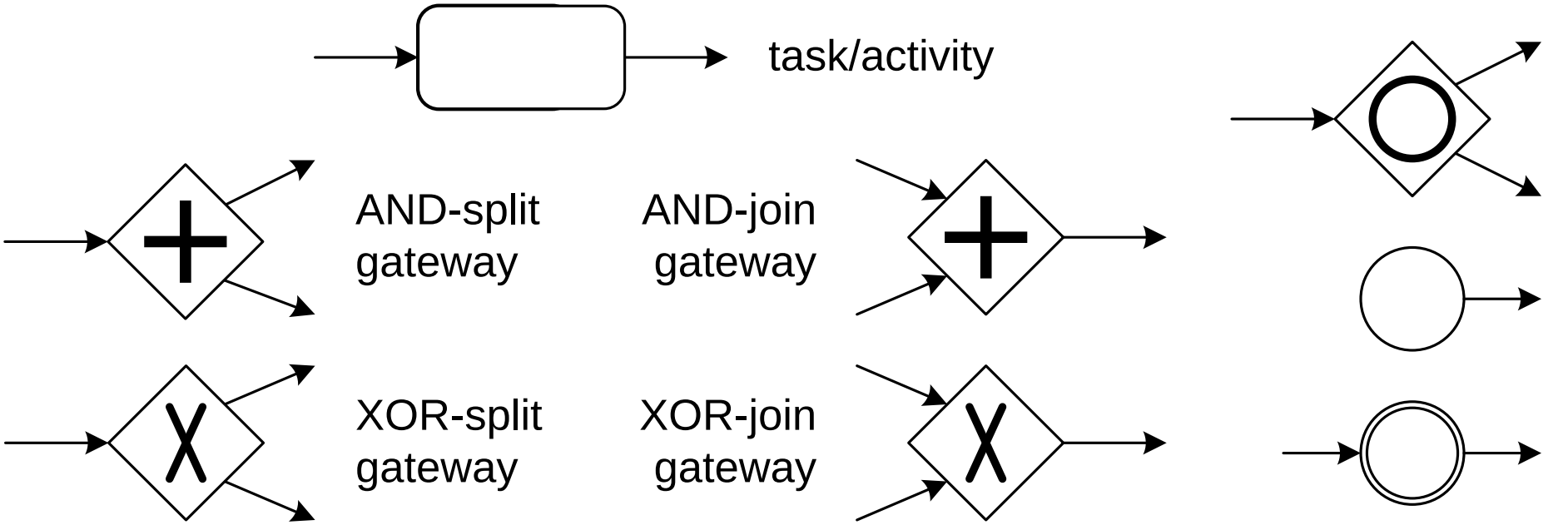
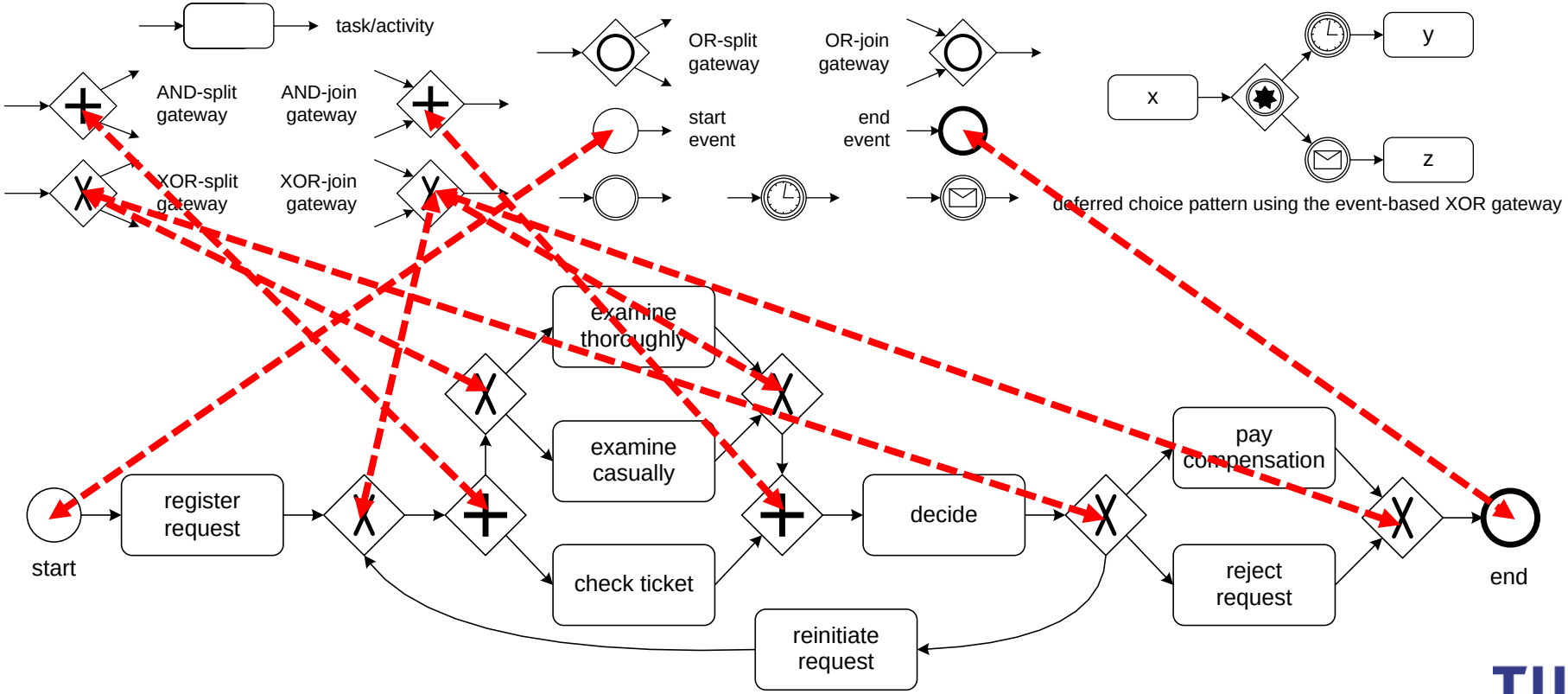
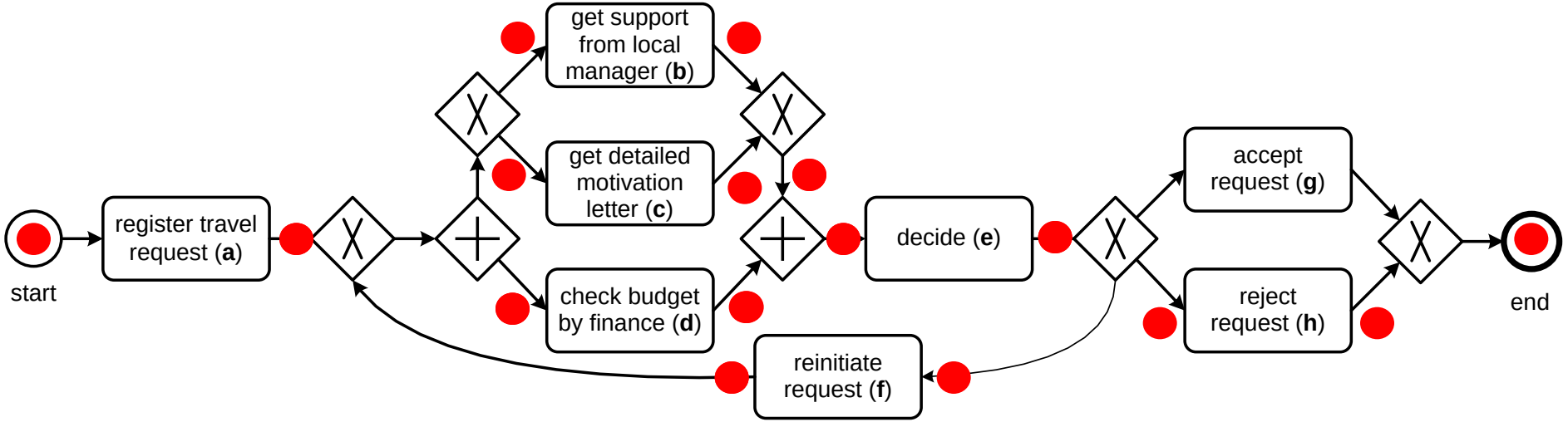
BPMN notational elements



BPMN example



Playing Out A BPMN model
(token based semantics)



a d c e f b d e h

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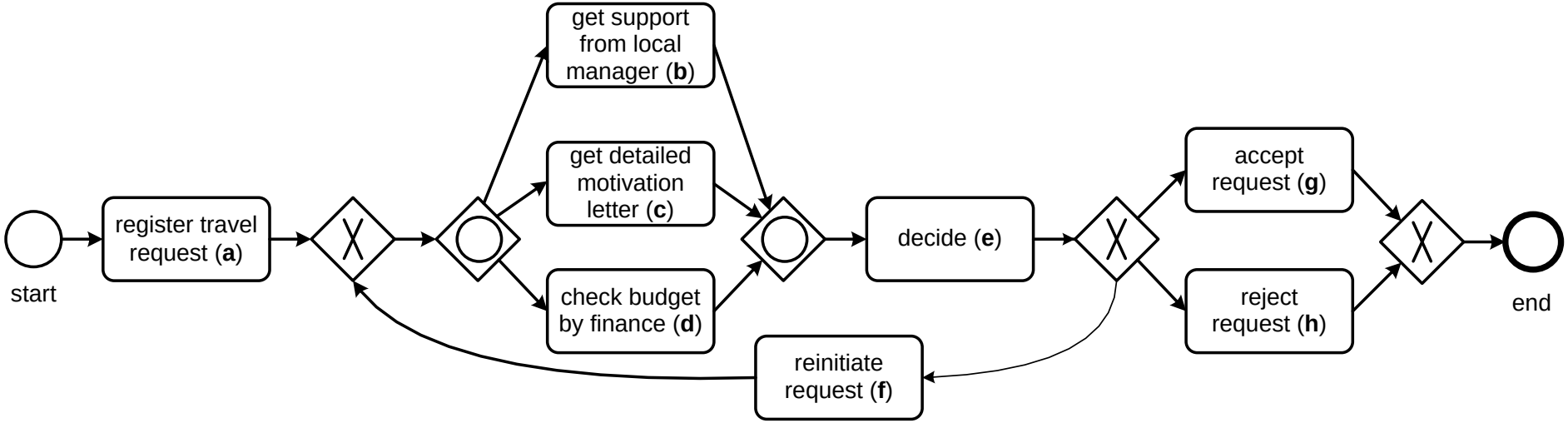
OR-join



Informally:
wait until all work is done (no synchronization is needed) …

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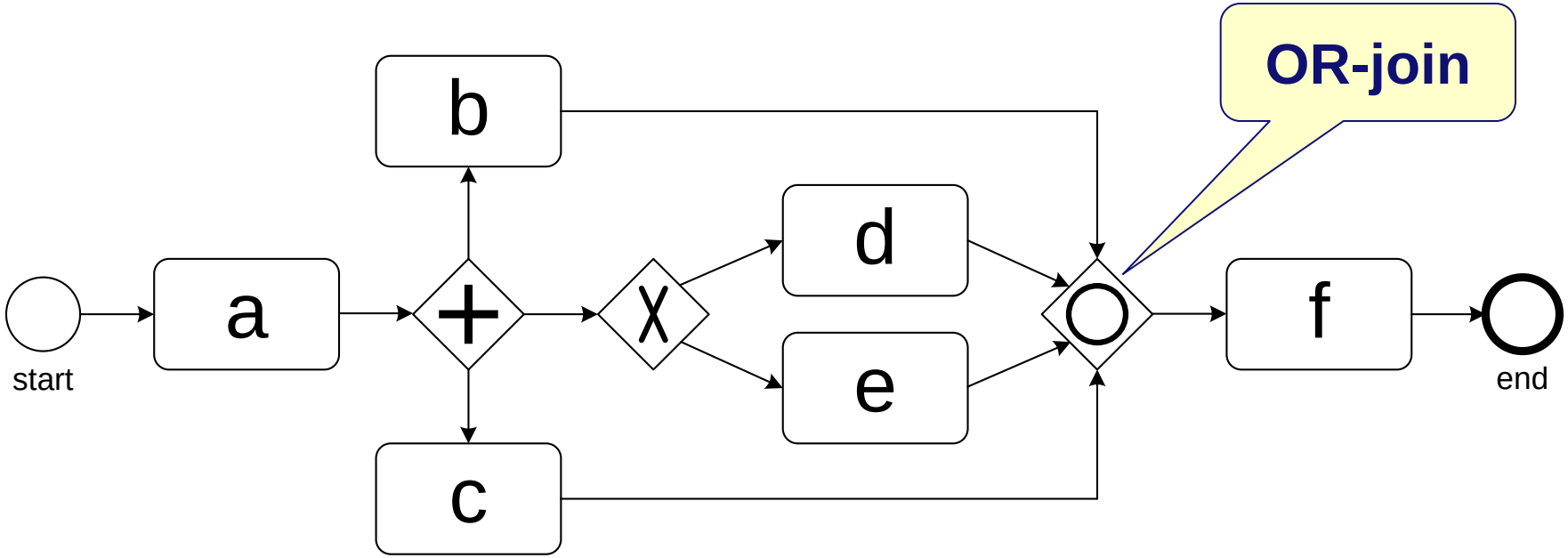
Question: How many traces are possible



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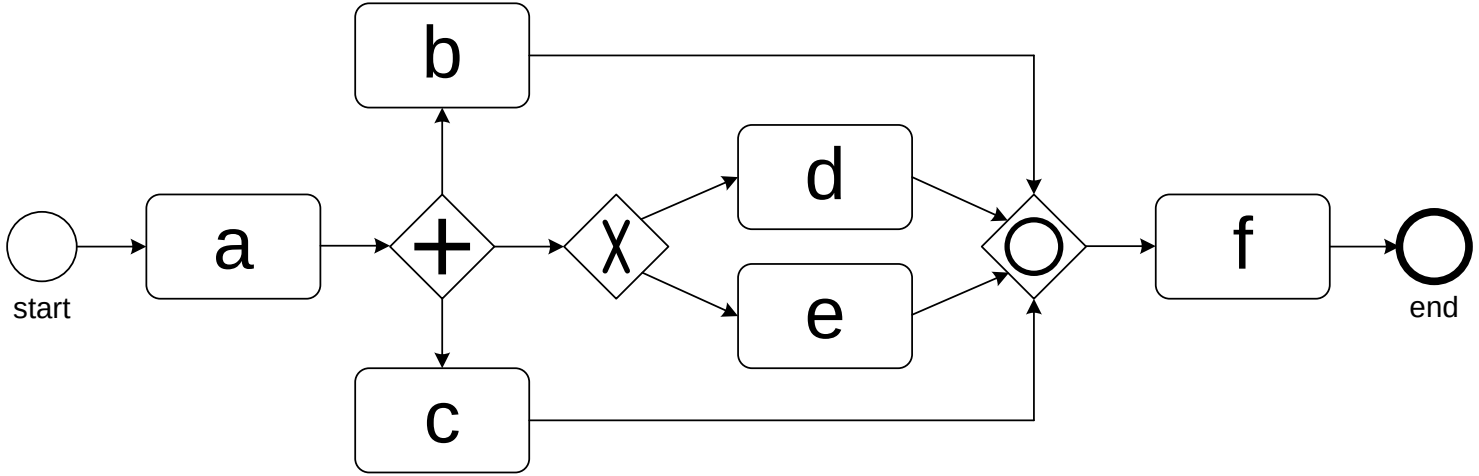
Answer



2 x 3! = 12 traces

- **"2 x" for choice between d and e**
- **"3!" = 6 ways of ordering three concurrent activities**

abcdf
abcef
abdcf
abecf
acbdf
acbef
acdbf
acebf
adbcf
adcbf
aebcf
aecbf

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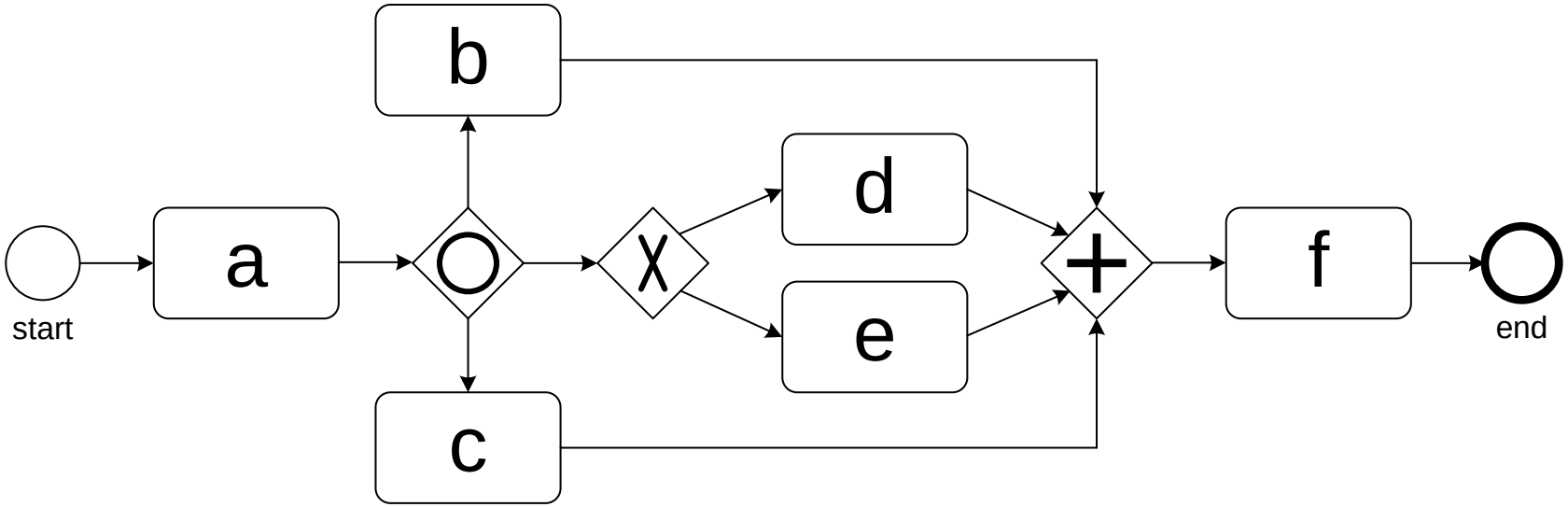
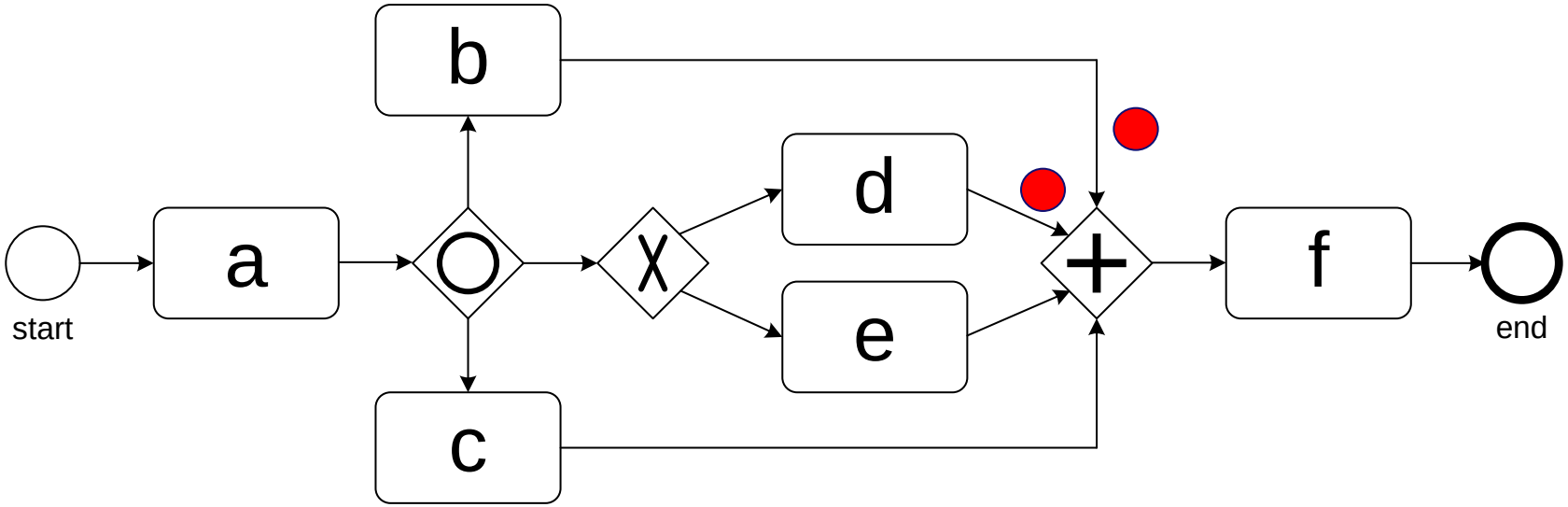
Question: Sound?



Answer: No



Many potential deadlocks

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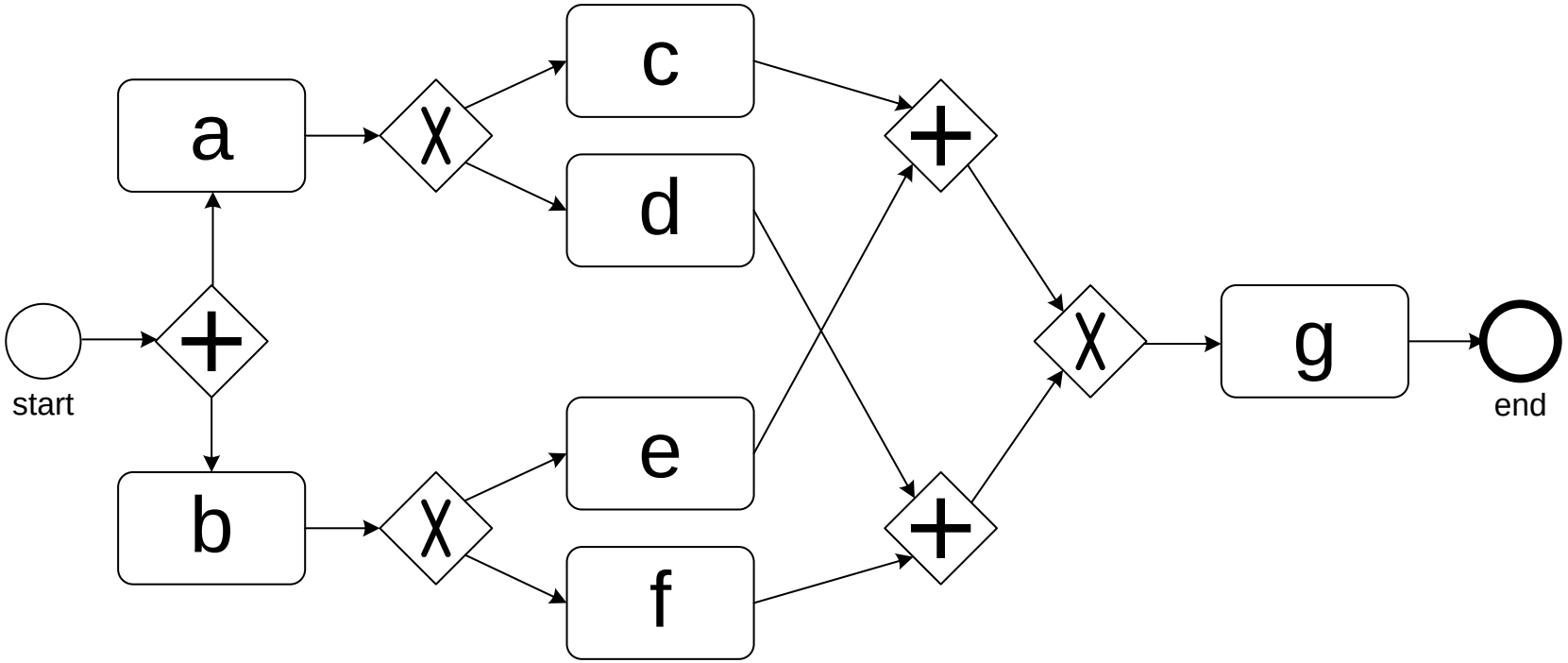
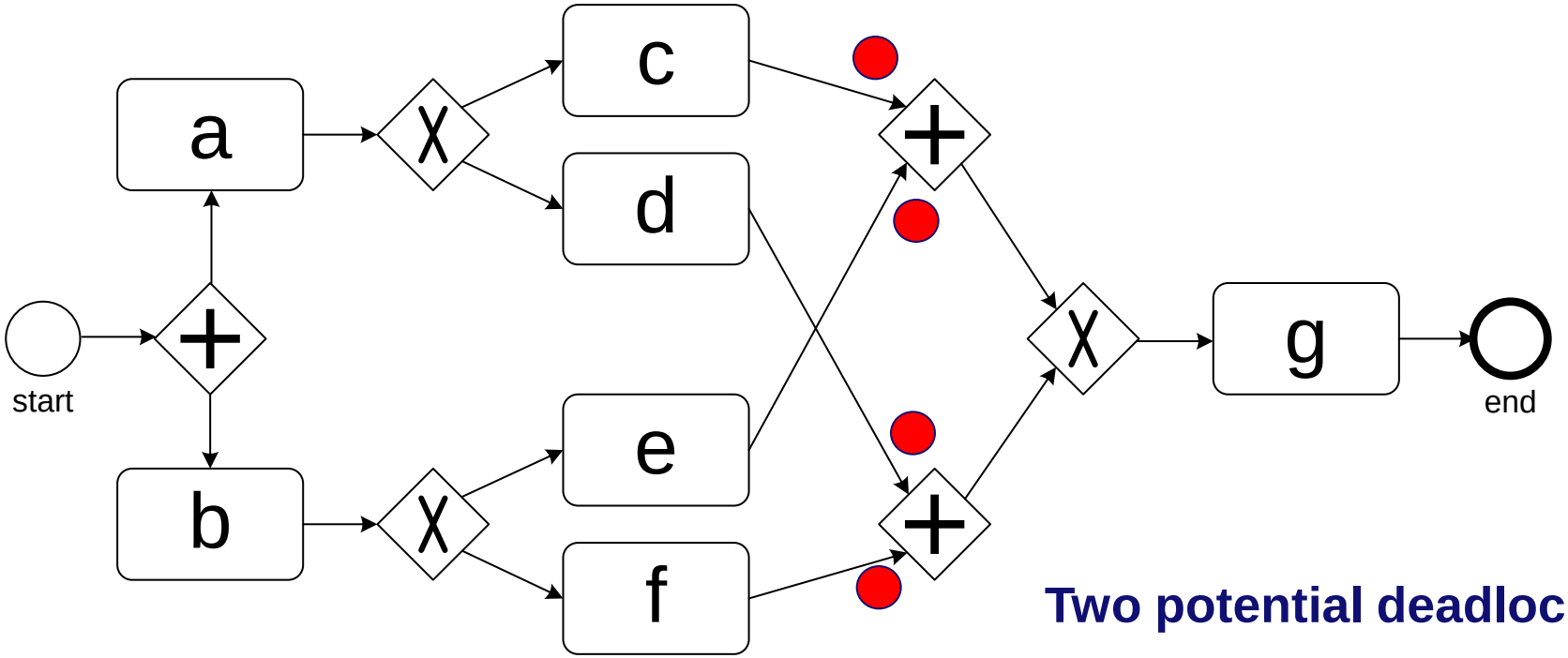
Question: Sound?



Answer: No!



Two potential deadlocks

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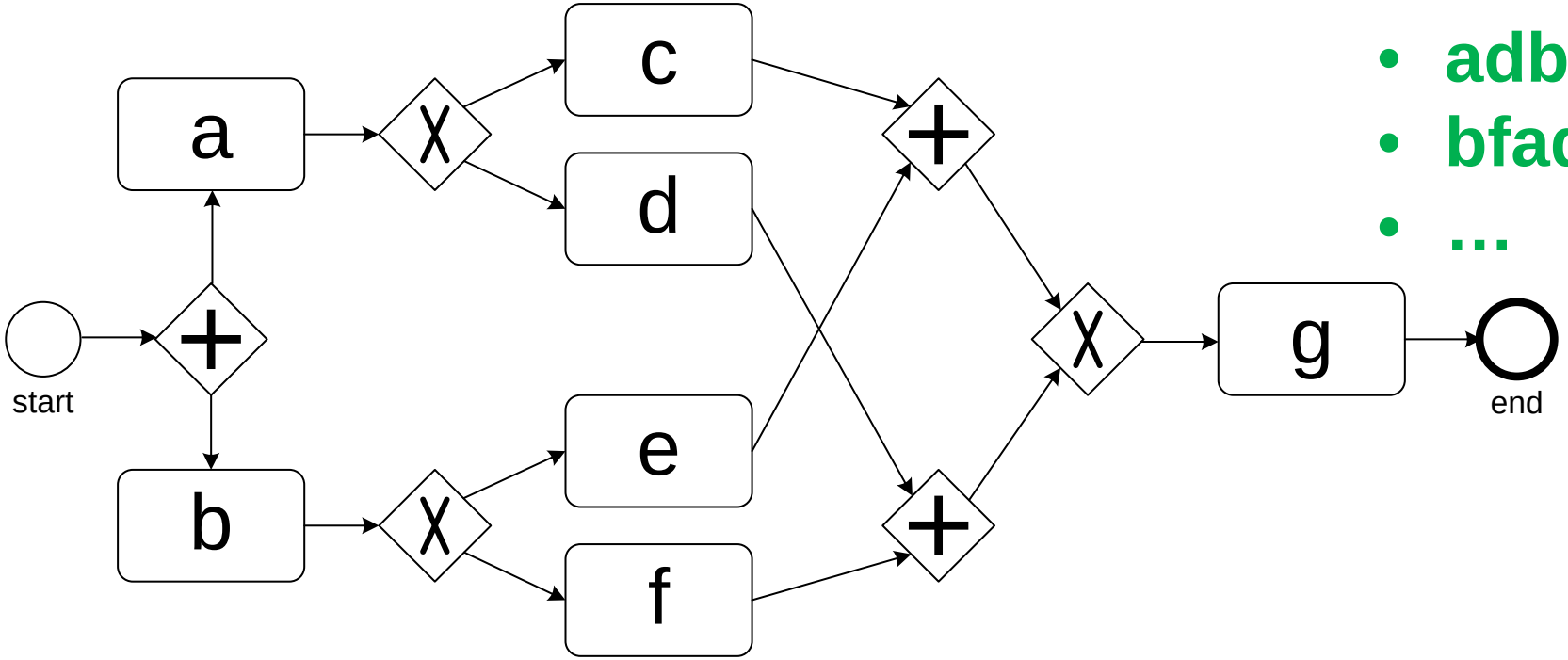
Also "good" traces

- acbe
- abce
- beac
- adbf
- bfad
- ...



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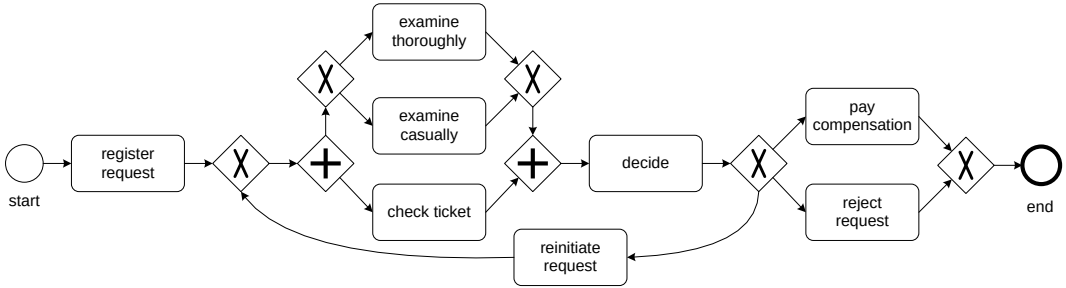
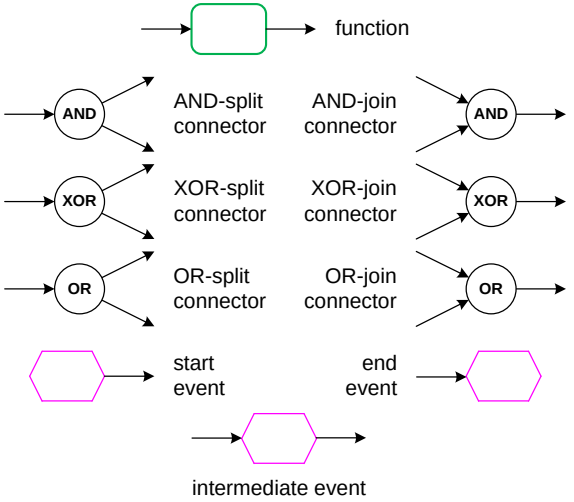
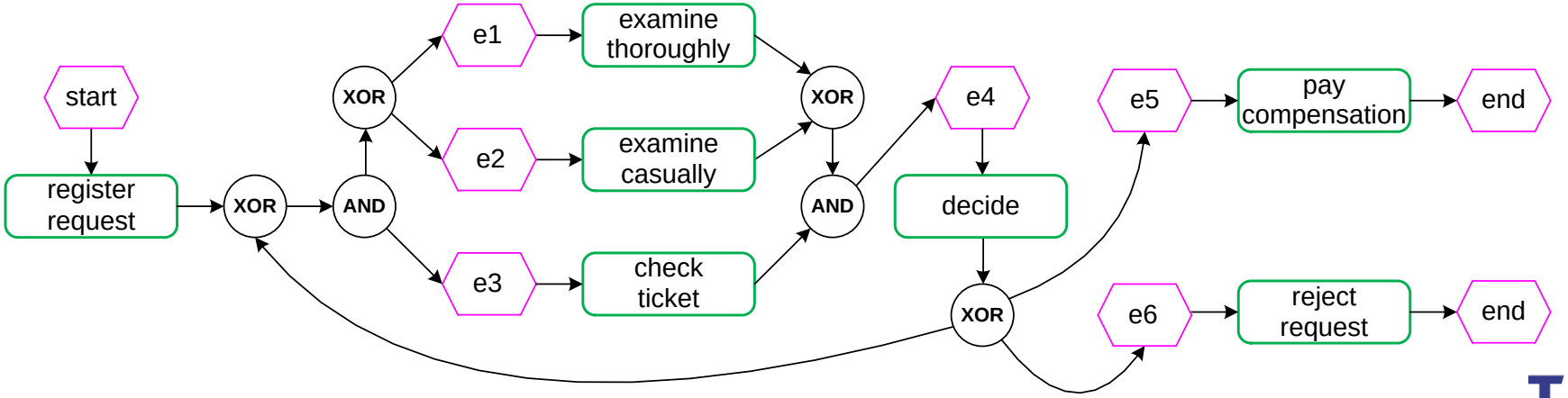
Event-Driven Process Chains

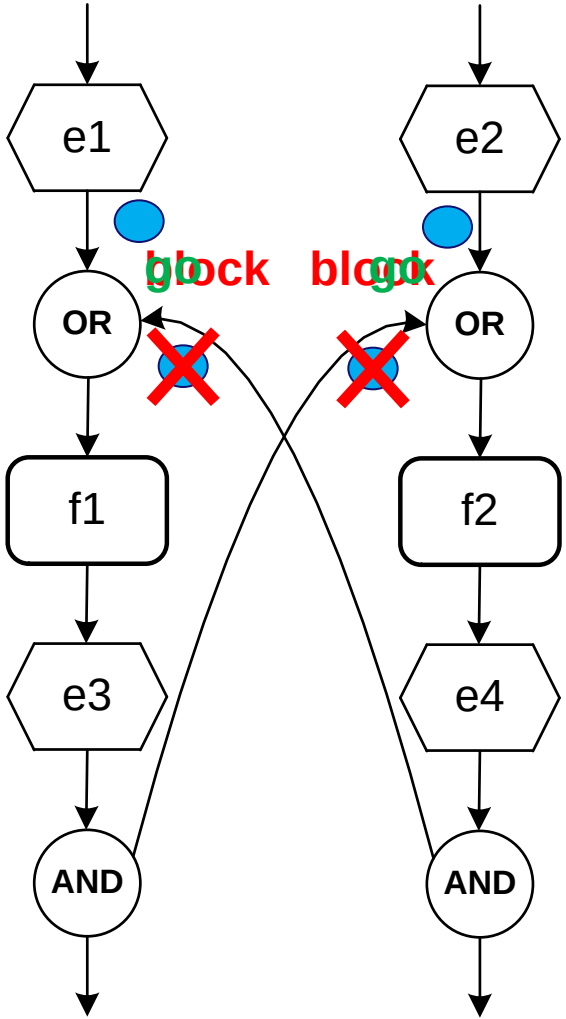


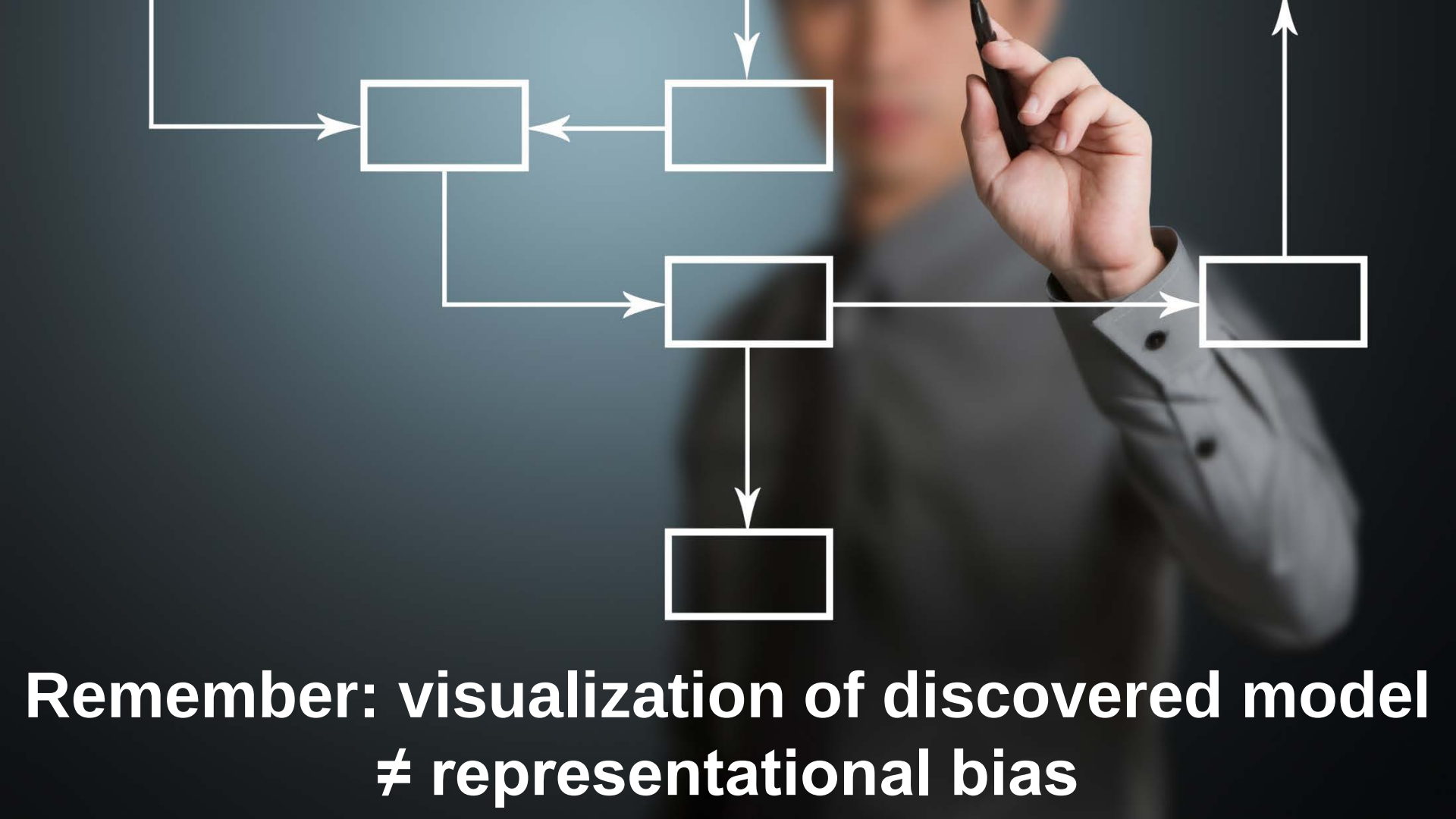




Vicious cycle paradox

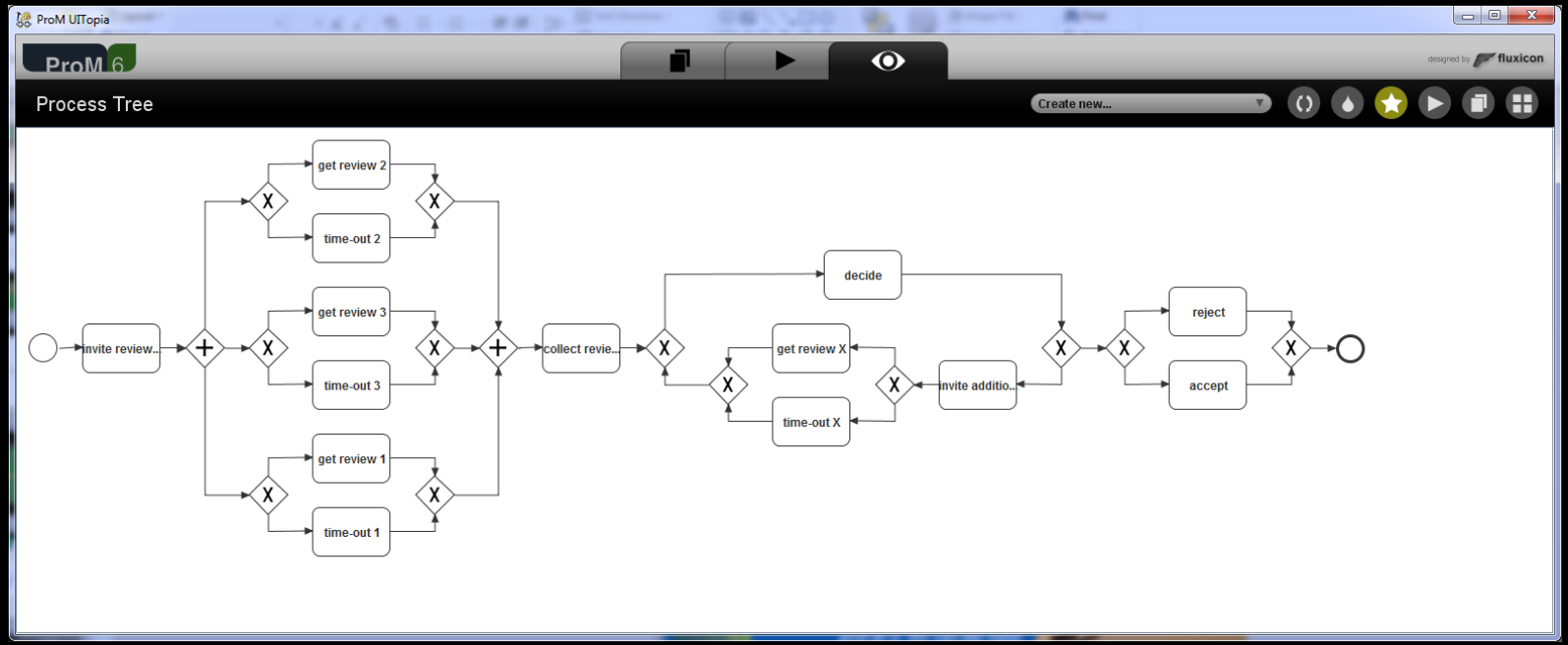
- If one blocks, both should block (due to symmetry).
- If both block, there will never be a second token. Hence, the choice to block was wrong.
- If one is not blocked, both can potentially progress (due to symmetry).
- If both progress, there will be a second token. Hence, the choice to progress was wrong.
- Paradox: all choices are wrong.





Remember: visualization of discovered model ≠ representational bias

Few miners working directly on BPMN, but Petri nets, causal nets, process trees, etc. can be converted to and from BPMN (sometimes "lossy").



inductive miner

Part I: Preliminaries

- Chapter 1: Introduction
- Chapter 2: Process Modeling and Analysis
- Chapter 3: Data Mining

Part II: From Event Logs to Process Models

- Chapter 4: Getting the Data
- Chapter 5: Process Discovery: An Introduction
- Chapter 6: Advanced Process Discovery Techniques

Part III: Beyond Process Discovery

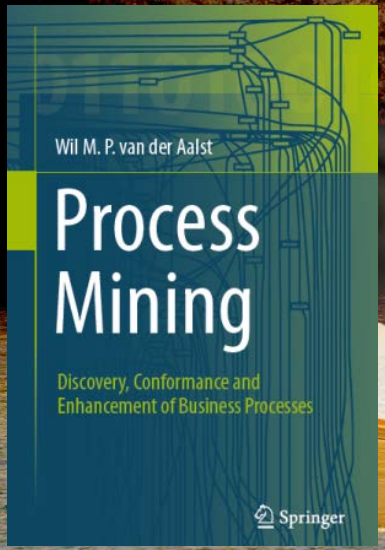
- Chapter 7: Conformance Checking
- Chapter 8: Mining Additional Perspectives
- Chapter 9: Operational Support

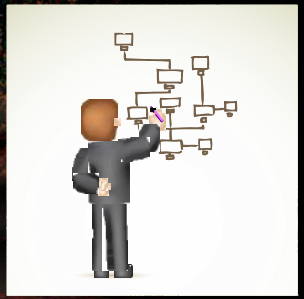
Part IV: Putting Process Mining to Work

- Chapter 10: Tool Support
- Chapter 11: Analyzing "Lasagna Processes"
- Chapter 12: Analyzing "Spaghetti Processes"

Part V: Reflection

- Chapter 13: Cartography and Navigation
- Chapter 14: Epilogue





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