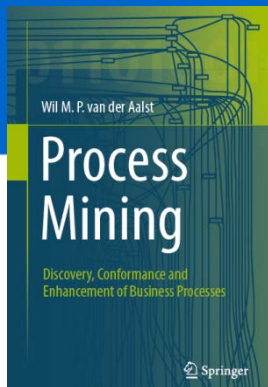


Process Mining: Data Science in Action

Introduction to Conformance Checking

prof.dr.ir. Wil van der Aalst
www.processmining.org

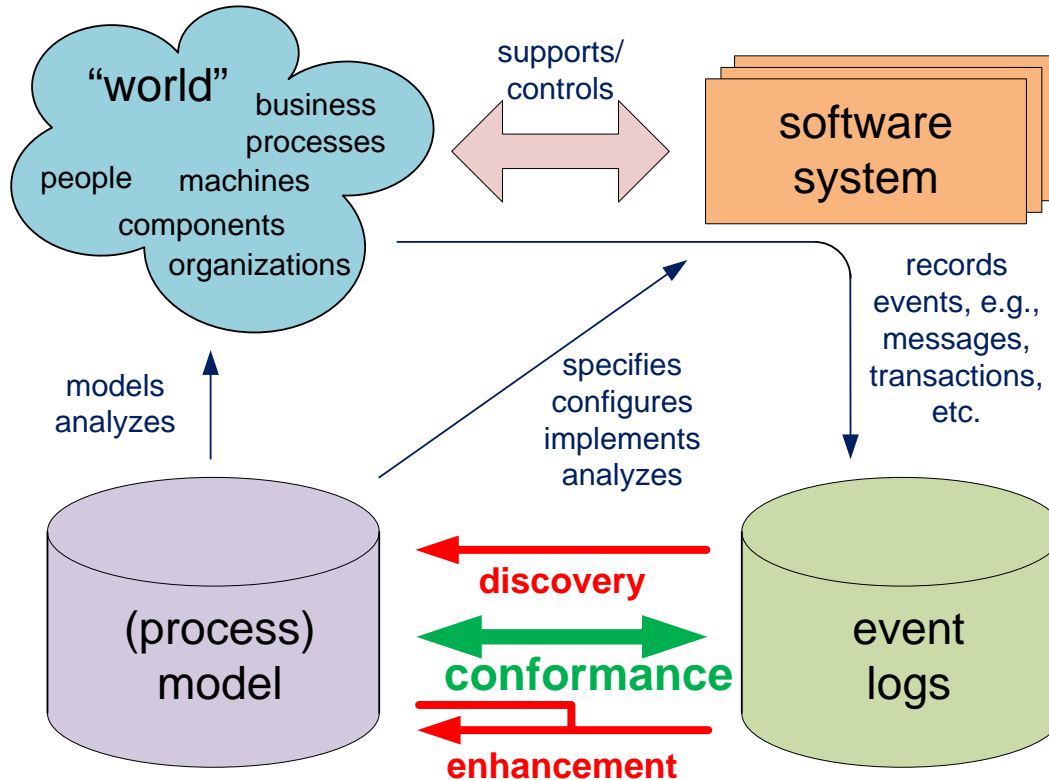


TU/e

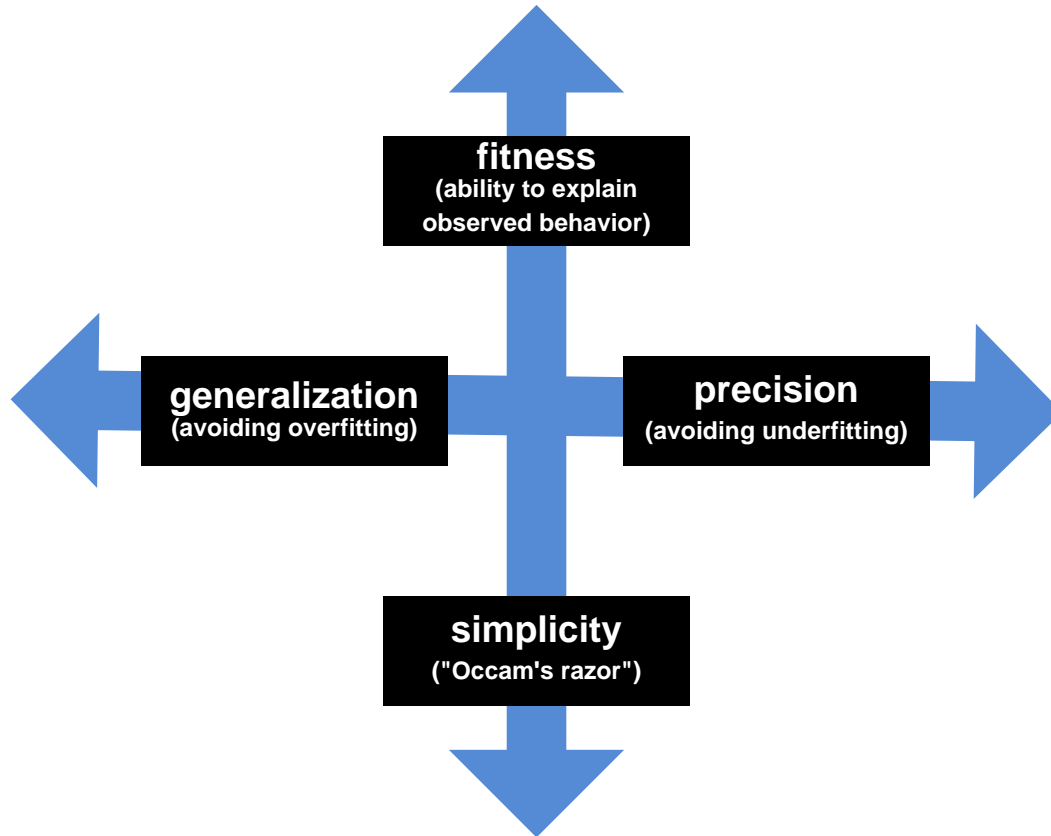
Technische Universiteit
Eindhoven
University of Technology

Where innovation starts

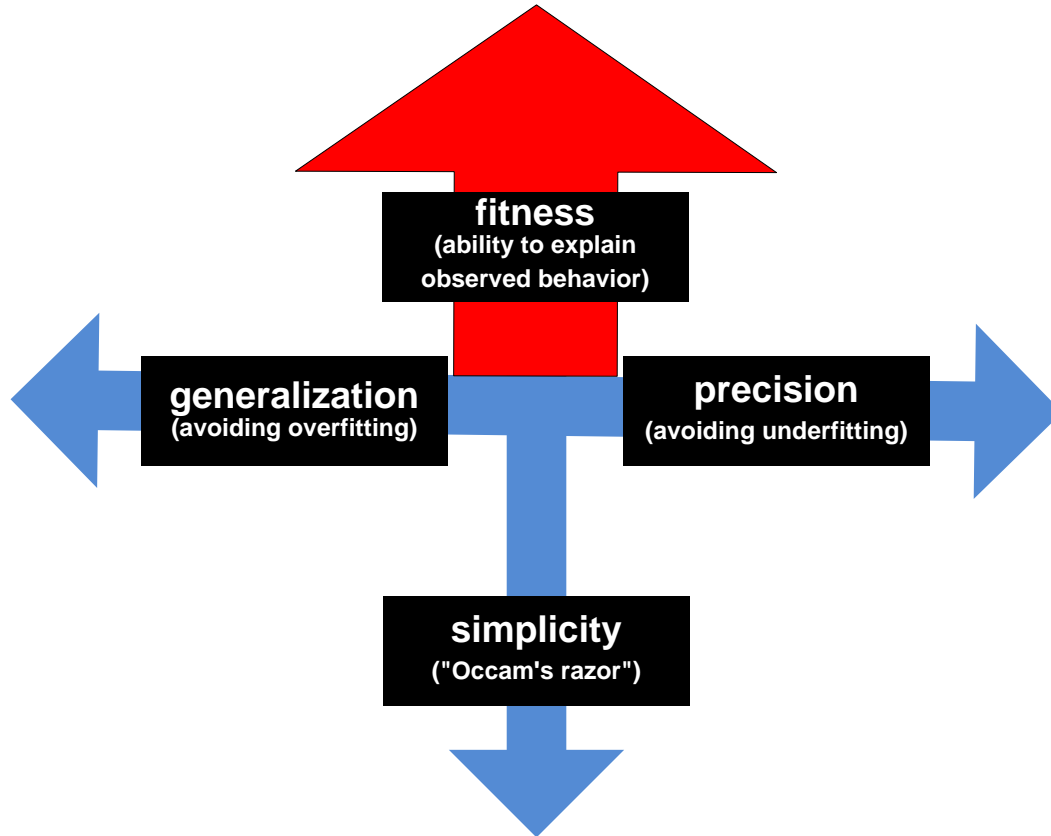
Conformance checking



Four dimensions to compare log and model



Replay fitness is dominant



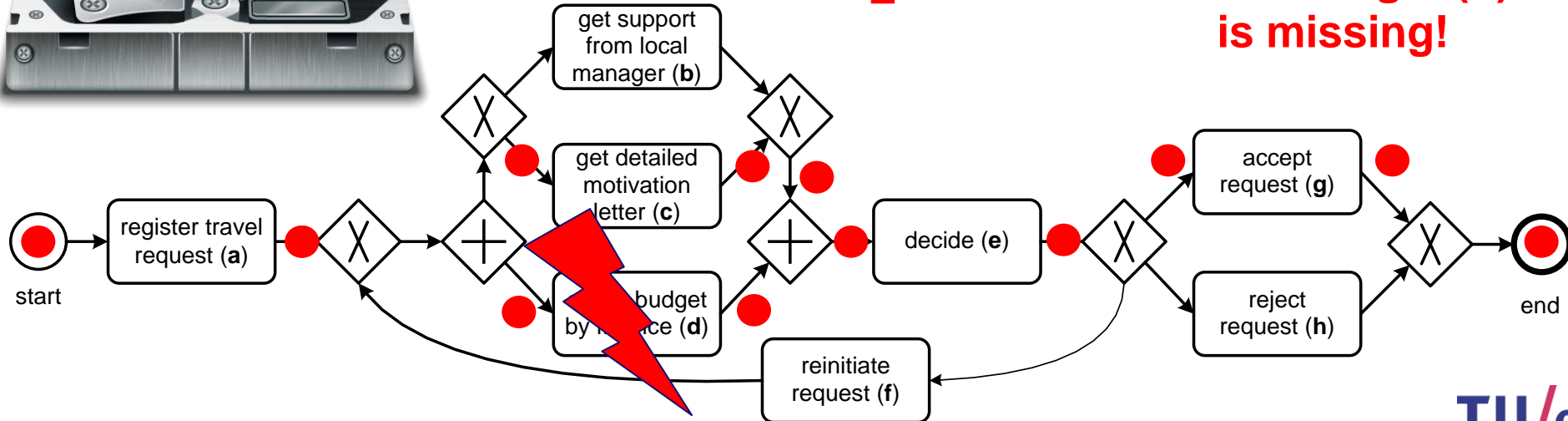
Replay example used before



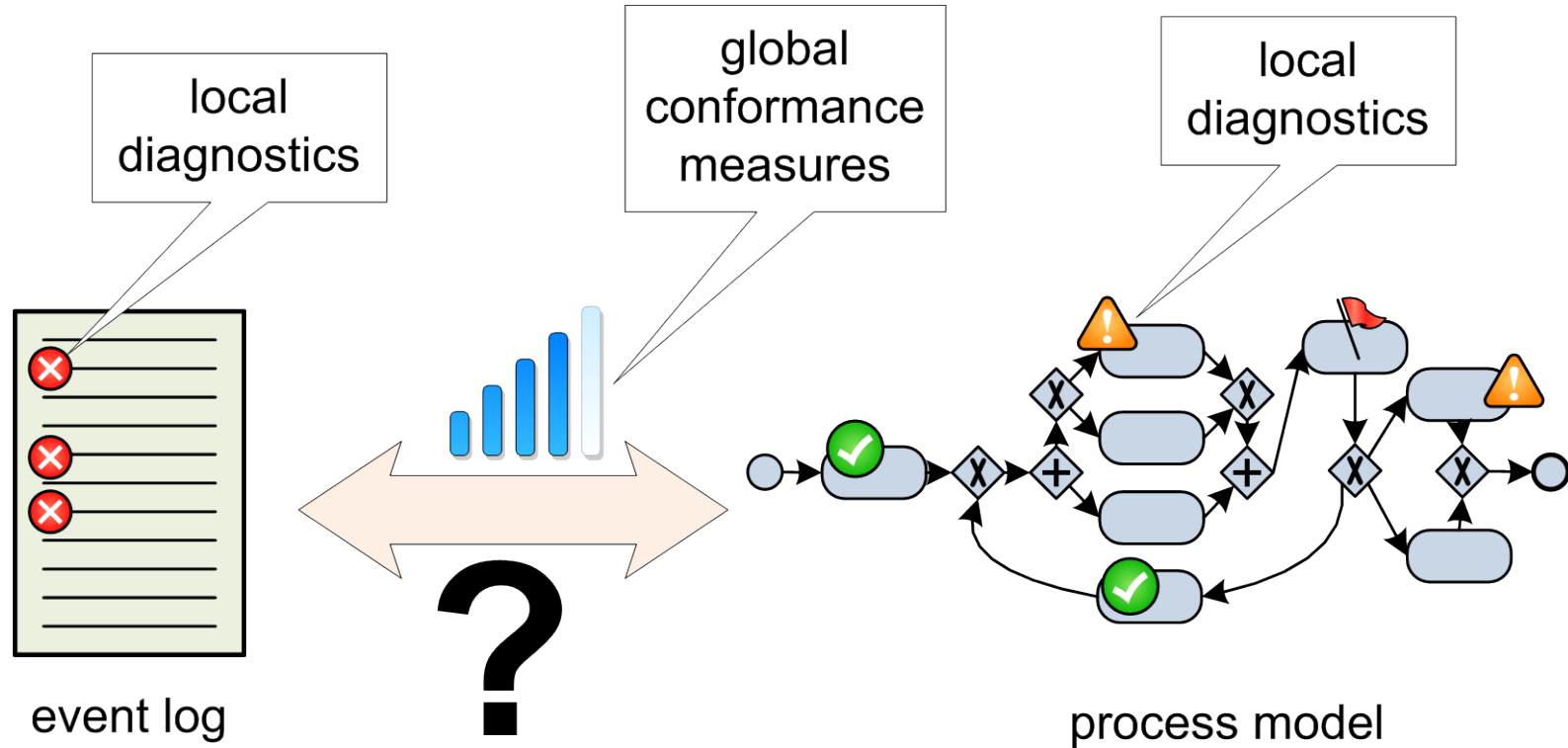
a c e g
?



check budget (d)
is missing!



Conformance diagnostics and measures



Use cases for conformance checking

- **Auditing and compliance.**
- **Evaluating process discovery algorithms.**
- **Conformance to specification (software, services, etc.).**



Different types of normative models ...



Auditing

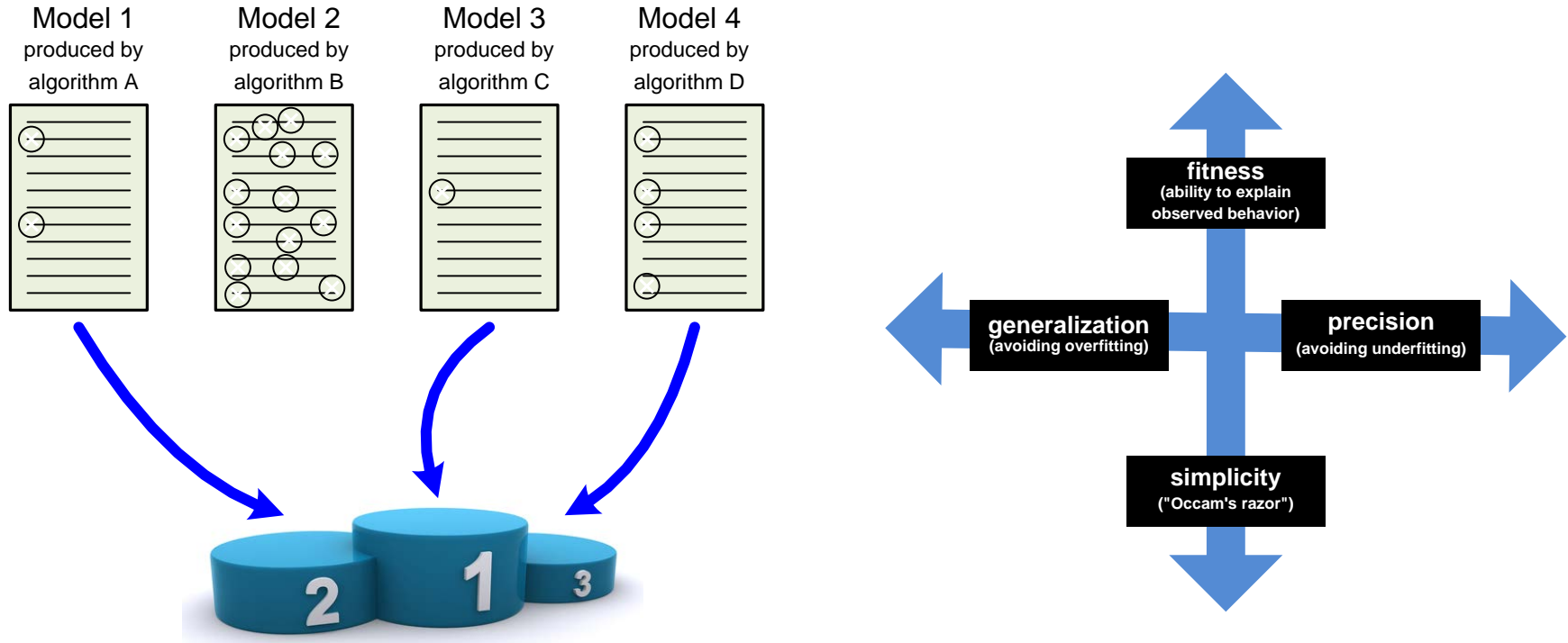
- Audits are performed **to ascertain the validity and reliability of information** about organizations and their associated processes.
- This is done to check whether business processes are executed **within certain boundaries** set by managers, governments, and other stakeholders.

Increased emphasis on compliance

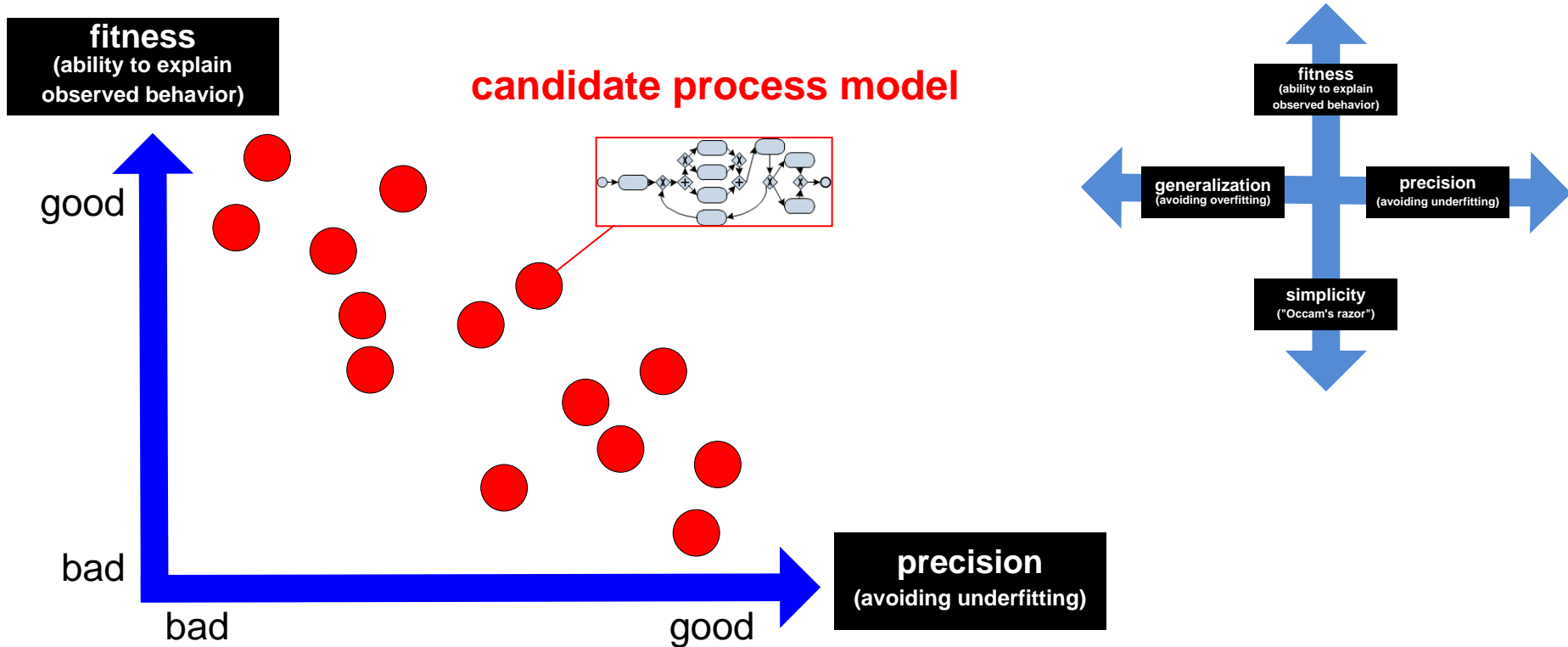
- Corporate governance, risk, compliance, and legislation such as the **Sarbanes-Oxley** (US), **Basel II/III** (EU), J-SOX (Japan), C-SOX (Canada), ...
- **ISO 9001:2008/2015** requires organizations to model their operational processes.



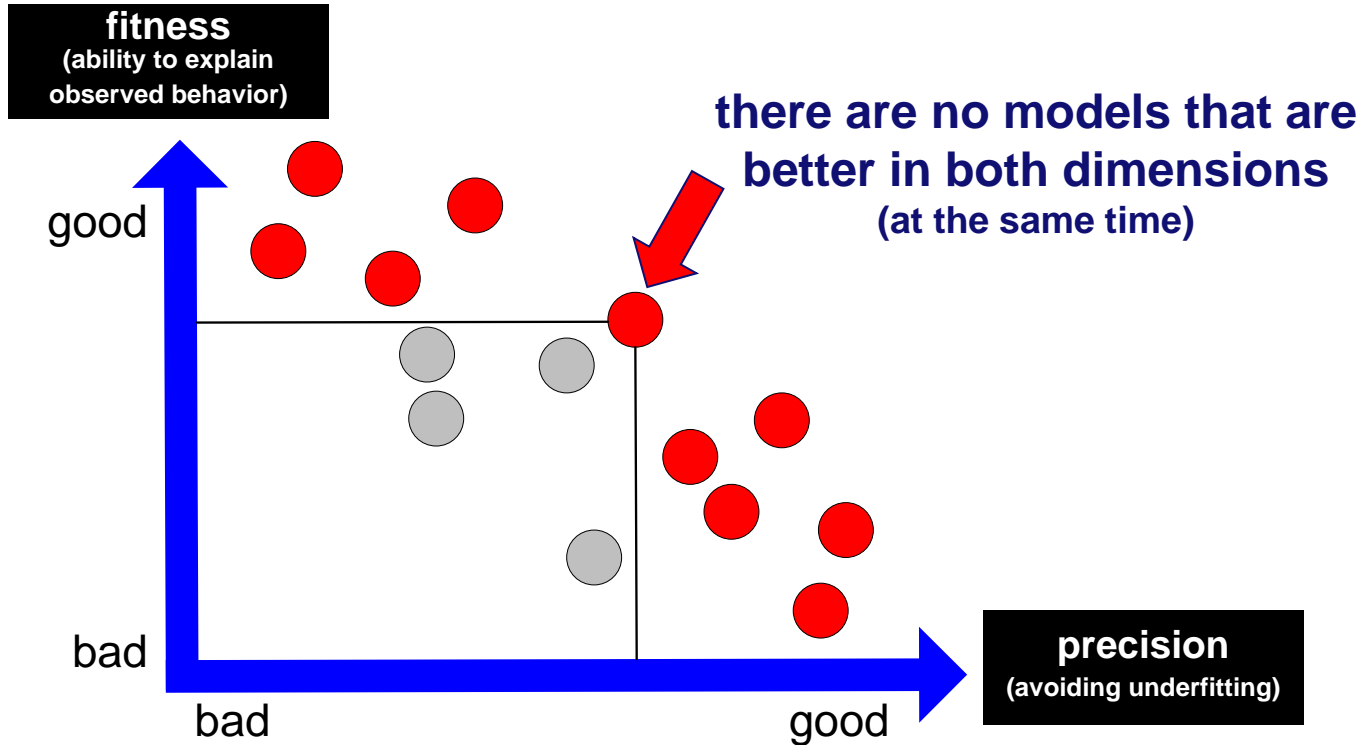
Evaluating process discovery algorithms



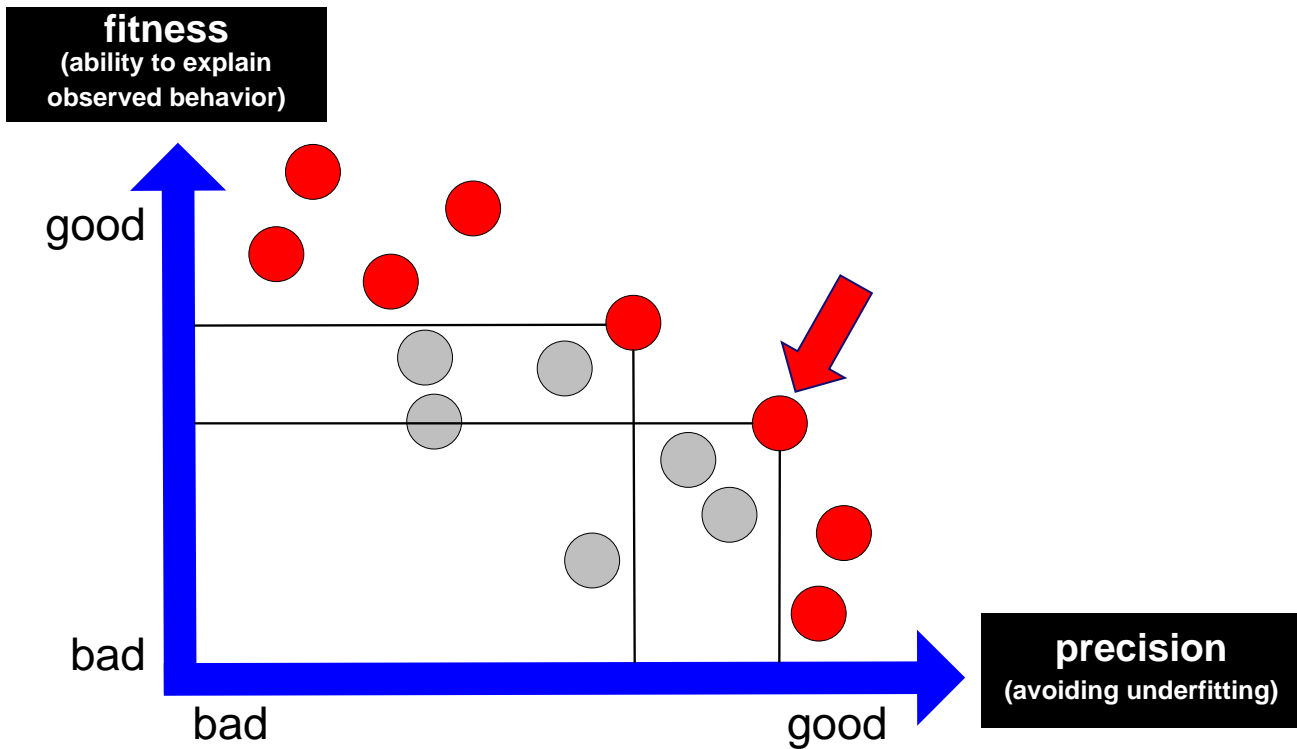
Pareto front considering two dimensions



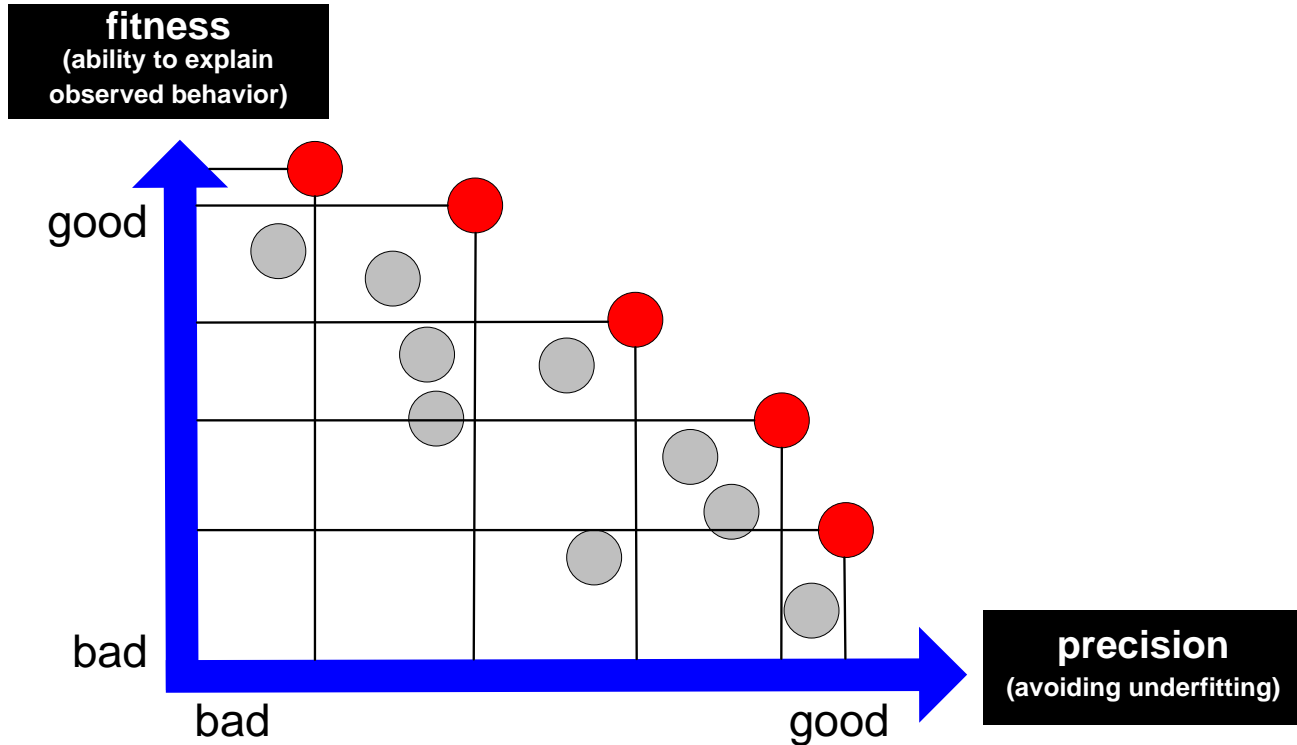
Pareto front considering two dimensions



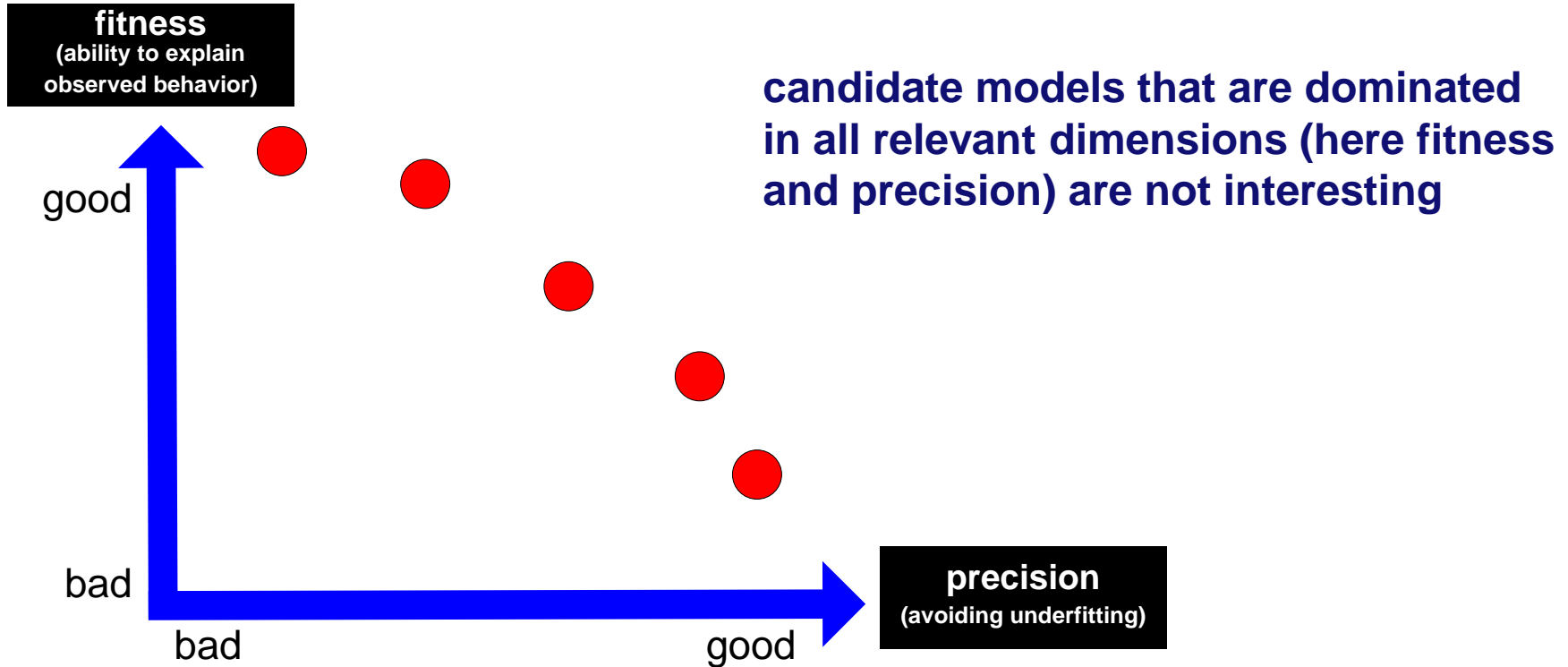
Pareto front considering two dimensions



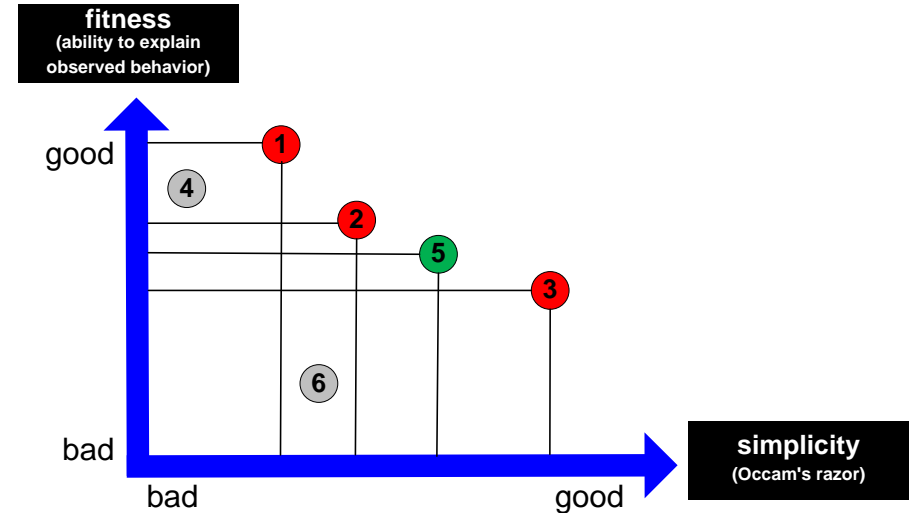
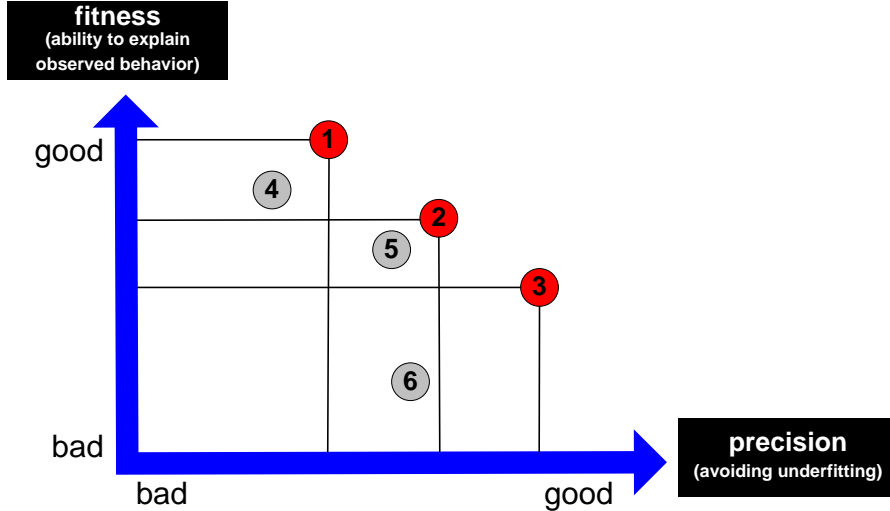
Pareto front considering two dimensions



Pareto front considering two dimensions

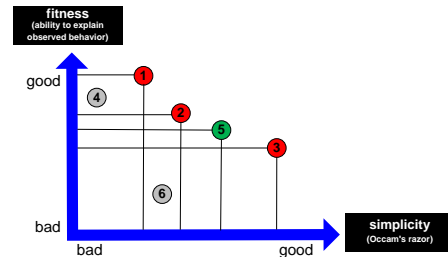
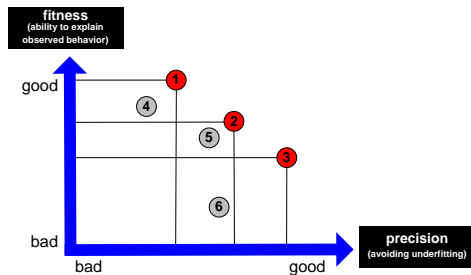
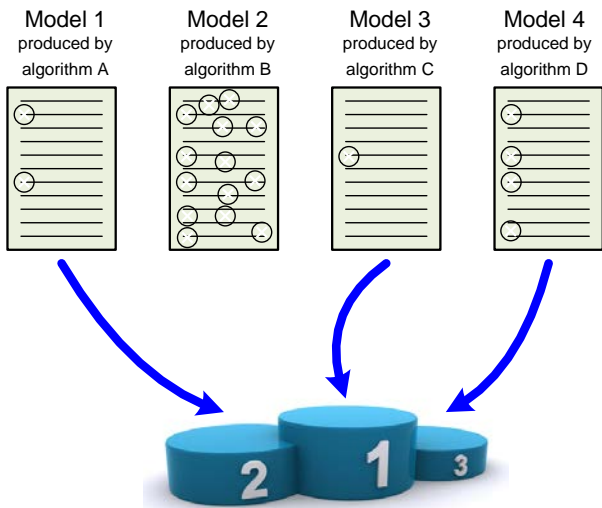


Adding another dimension: Simplicity



There is no model that (at the same time) has a better fitness, precision, and simplicity than model 5, i.e., it is not dominated.

Comparing discovered models is not easy



There is no such thing as "the best model"...

back to compliance-related questions

Positive or negative deviants?

“Breaking the glass” may save lives!



Is the model wrong or is the

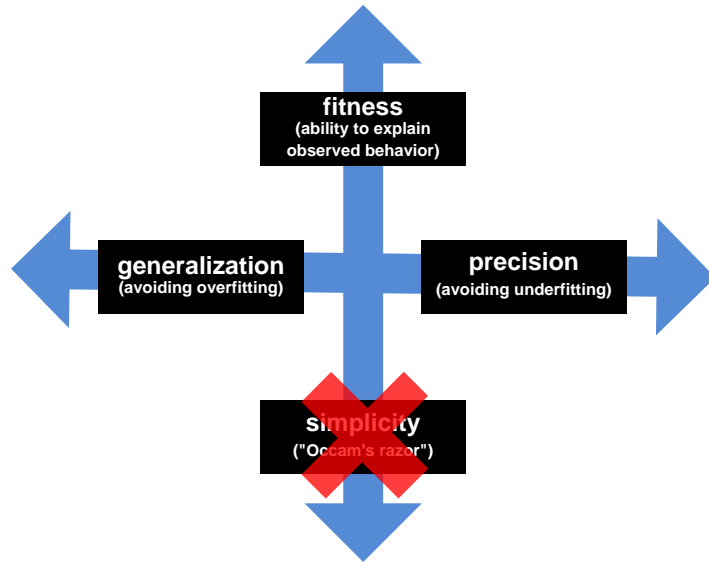


learning from
positive deviants

Conformance checking: also at runtime!

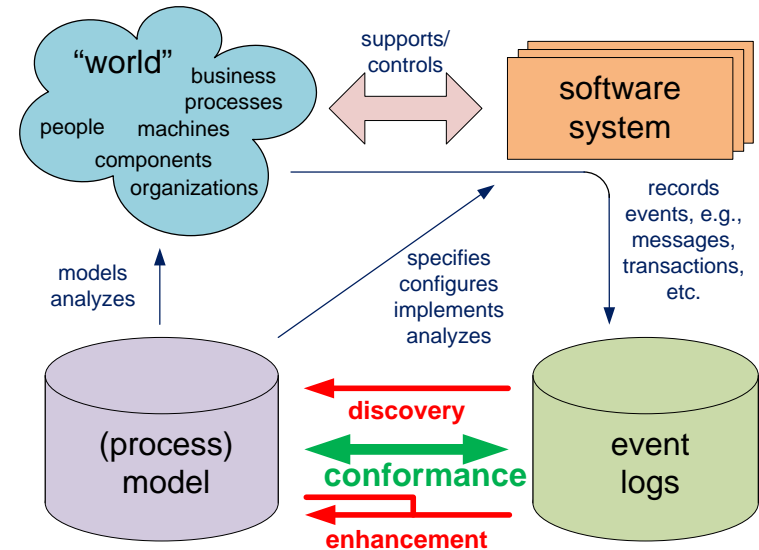


Next we focus on control-flow



Conformance checking approaches

1. Conformance checking using **causal footprints**.
2. Conformance checking based on **token-based replay**.
3. **Alignment-based** conformance checking.



Part I: Preliminaries

Chapter 1
Introduction

Chapter 2
Process Modeling and
Analysis

Chapter 3
Data Mining

Part III: Beyond Process Discovery

Chapter 7
Conformance
Checking

Chapter 8
Mining Additional
Perspectives

Chapter 9
Operational Support

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 IV: Putting Process Mining to Work

Chapter 10
Tool Support

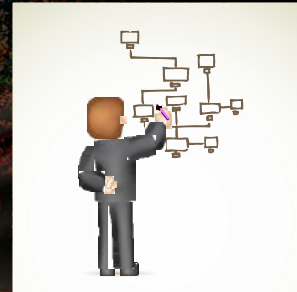
Chapter 11
Analyzing “Lasagna
Processes”

Chapter 12
Analyzing “Spaghetti
Processes”

Part V: Reflection

Chapter 13
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Navigation

Chapter 14
Epilogue



Wil M. P. van der Aalst

Process Mining

Discovery, Conformance and
Enhancement of Business Processes

 Springer