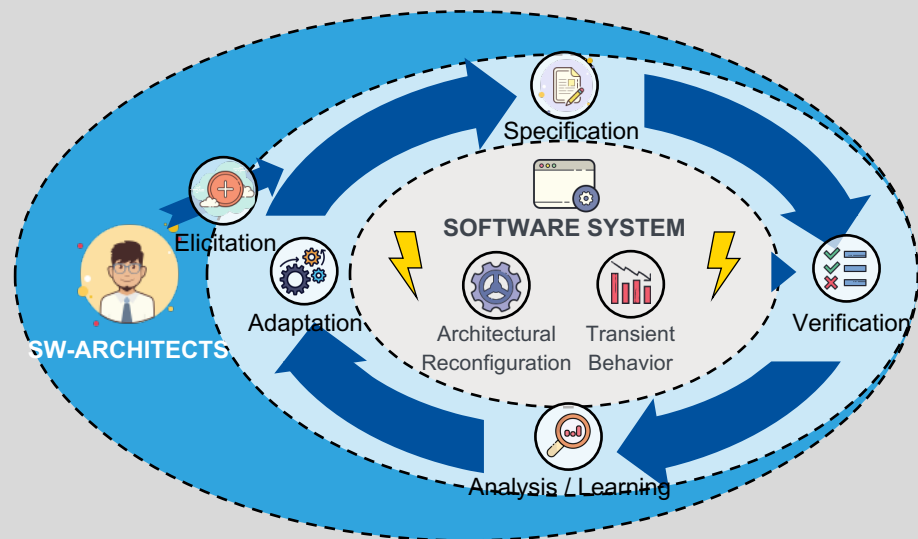


University of Stuttgart

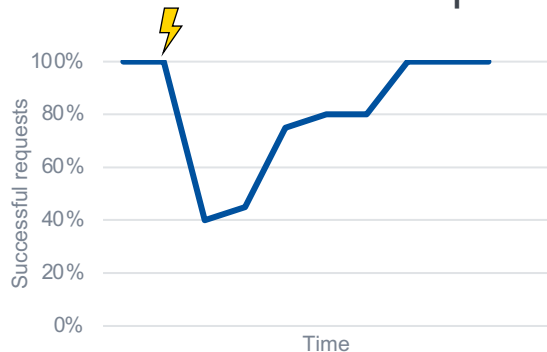
Institute of Software Engineering
Software Quality and Architecture Group

Scenario-based Elicitation, Specification, and Comprehension of Transient Software Behavior

Sebastian Frank, Alireza Hakamian,
Samuel Beck, Christoph Zorn,
André van Hoorn

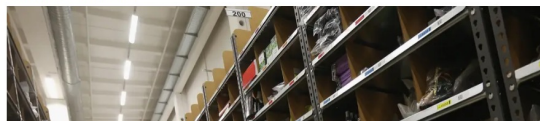


Transient Behavior can be costly,... ... but hard to comprehend and specify



Amazon's one hour of downtime on Prime Day may have cost it up to \$100 million in lost sales

Sean Wolfe Jul 19, 2018, 4:53 PM

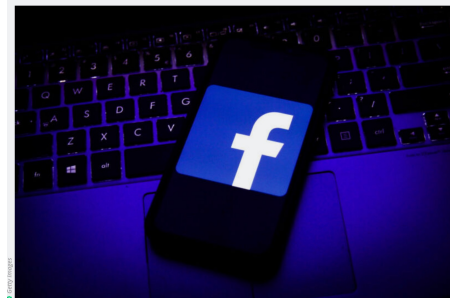


<https://www.businessinsider.com/amazon-prime-day-website-issues-cost-it-millions-in-lost-sales-2018-7>

Facebook's outage likely cost the company over \$60 million

Configuration change cascaded down the data centers, bringing systems to a halt.

AC 310888A - 10/9/2021, 2:23 PM



<https://arstechnica.com/information-technology/2021/10/facebook-outage-likely-caused-60m-loss-impacted-small-businesses/>



Source

Wage Clerks



Stimulus

Load Peak
- 2x Requests
- Linear Increase



Artifact

Backend
Services



Environment

Payslip Period,
Regular Service
Hours



Response

- Correct
- In time
- Autoscaling helps



**Response
Measure**

Response Time
< 1s in 99%

S. Frank, A. Hakamian, L. Wagner, D. Kesim, J. von Kistowski, A. van Hoorn, Scenario-based resilience evaluation and improvement of microservice architectures: An experience report, FAACS@ECSA, 2021.

Goal: Interactive & Continuous Specification Process

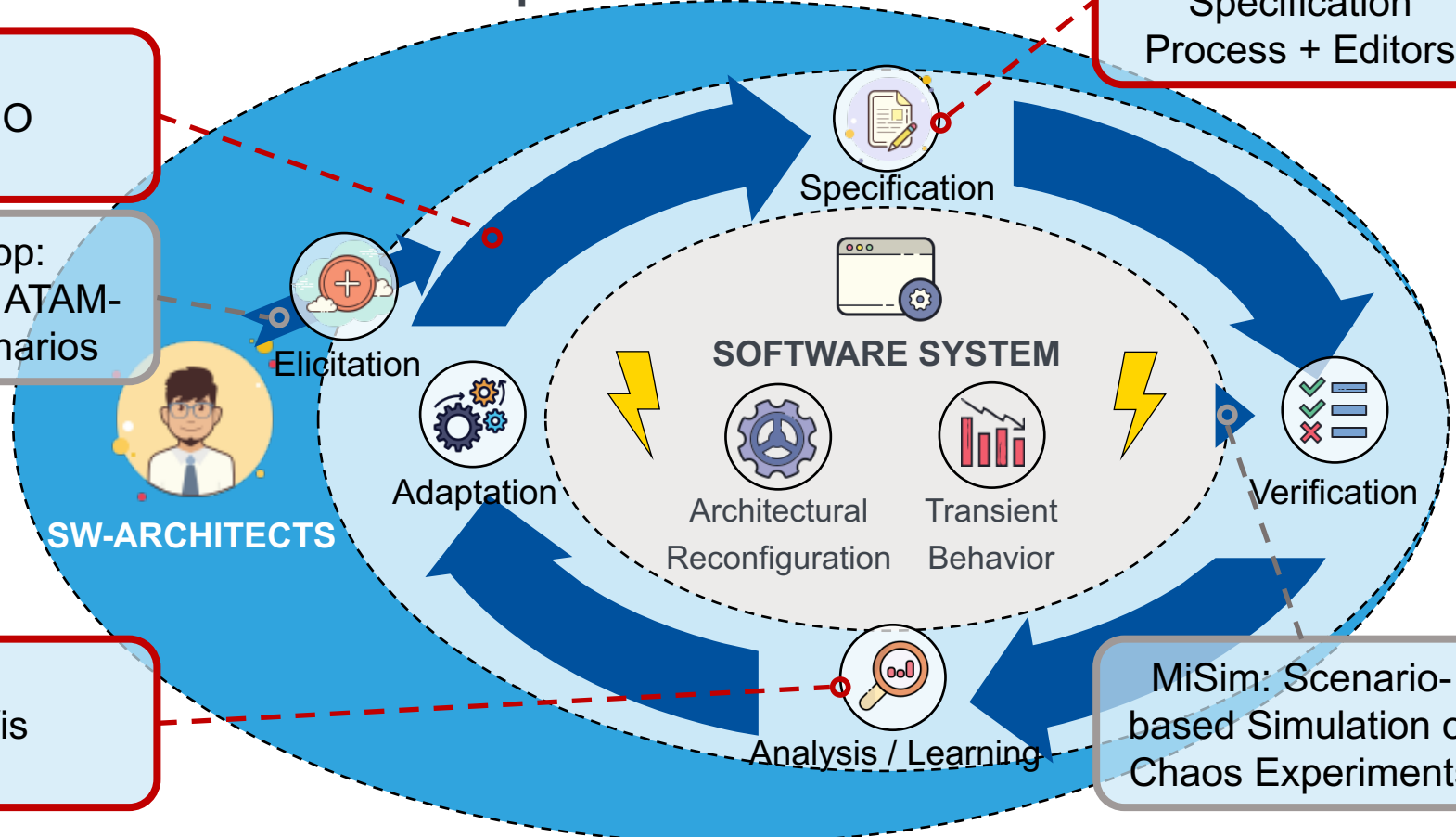
Current Work:
Specification
Process + Editors

RESIRIO

Workshop:
Elicitation of ATAM-
based Scenarios

SW-ARCHITECTS

TransVis

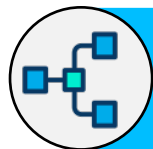


RESIRIO: Interactive Requirement Elicitation

C. Zorn, Interactive Elicitation of Resilience Scenarios in Microservice Architectures, Master's thesis, University of Stuttgart, Germany, 2021



**Quick, Simple, Systematic Elicitation
and Precise Requirement Specification**



Architecture
Extraction



Hazard
Analysis



Chatbot



Requirement



CHAZOPS

django



Scenarios (ATAM) &
Property Spec. Patterns



- Successful Scenario Creation
- Architecture Graph
- Quick Replies



5 min / task
(after learning)



Limited functionality
(Too few metrics, stimuli types,
quick replies, ...)



TransVis: Comprehension



Simple, Interactive Comprehension (and Specification) of Transient Behavior



Specification



Trans. Behavior
Identification



Visualization



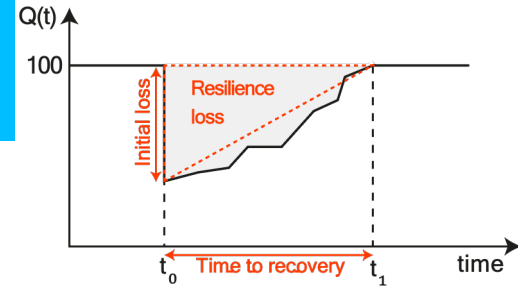
Chatbot



Dialogflow

django

Resilience Triangle
(Bruneau et al., 2007)



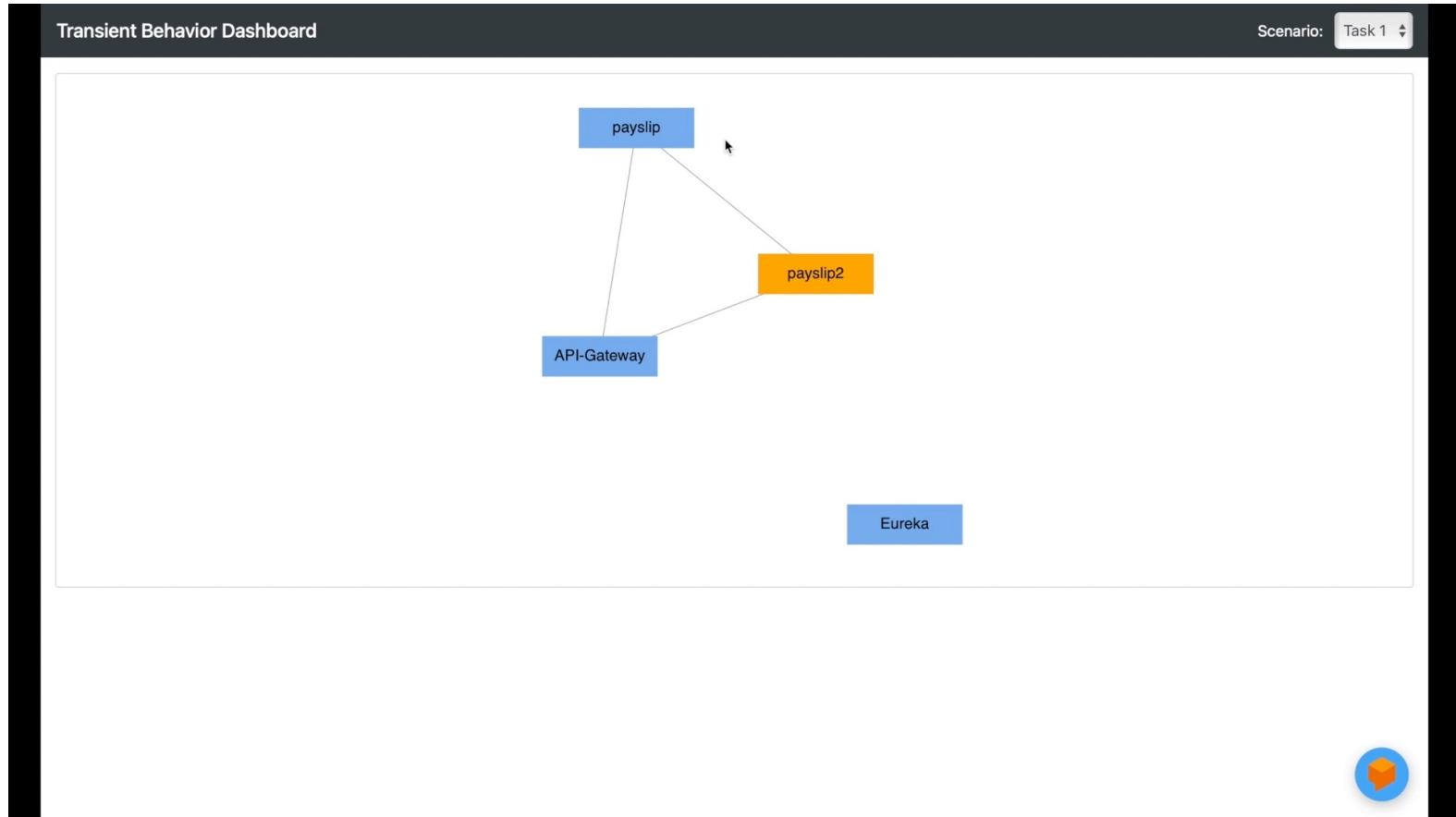
- Correct Specification and Comprehension Tasks
- Helpful + Simple Visualizations



- Chatbot (almost) not used
 - - Missing Overview

TransVis: Tool Demo

<https://youtu.be/0IraekYS5oA>



Current Work: Specification Process

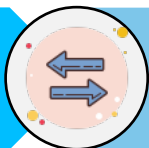


Specification of more **complex**, **testable**, and **traceable** requirements

Editor Chain



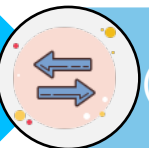
Elicitation



(Mapping)



Structuring



(Mapping)



Quantification



Natural
Language

Scenarios
(ATAM)

Property Specification Patterns

Logic

Resilience Curves

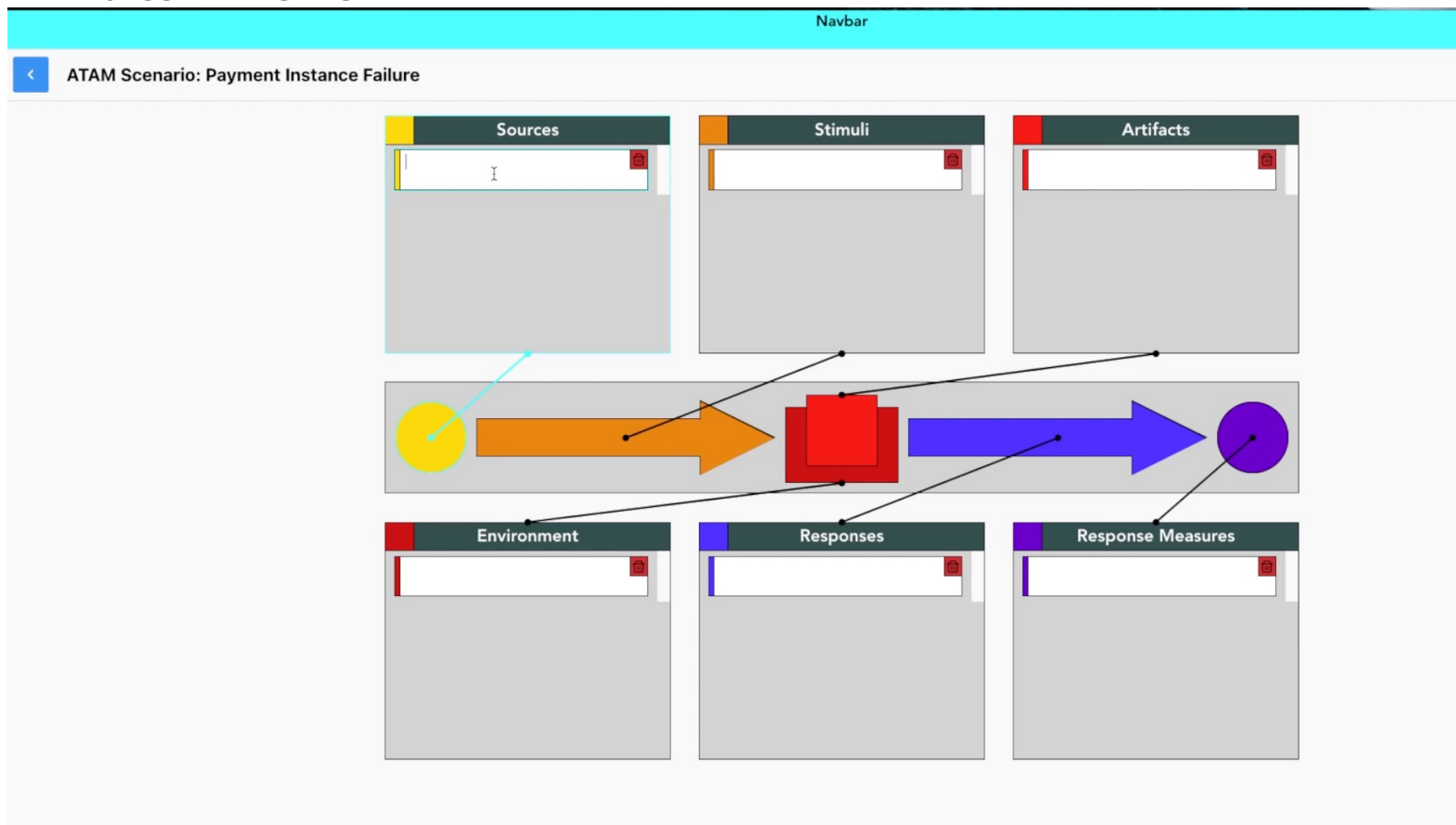
PCTL,
MTL,...



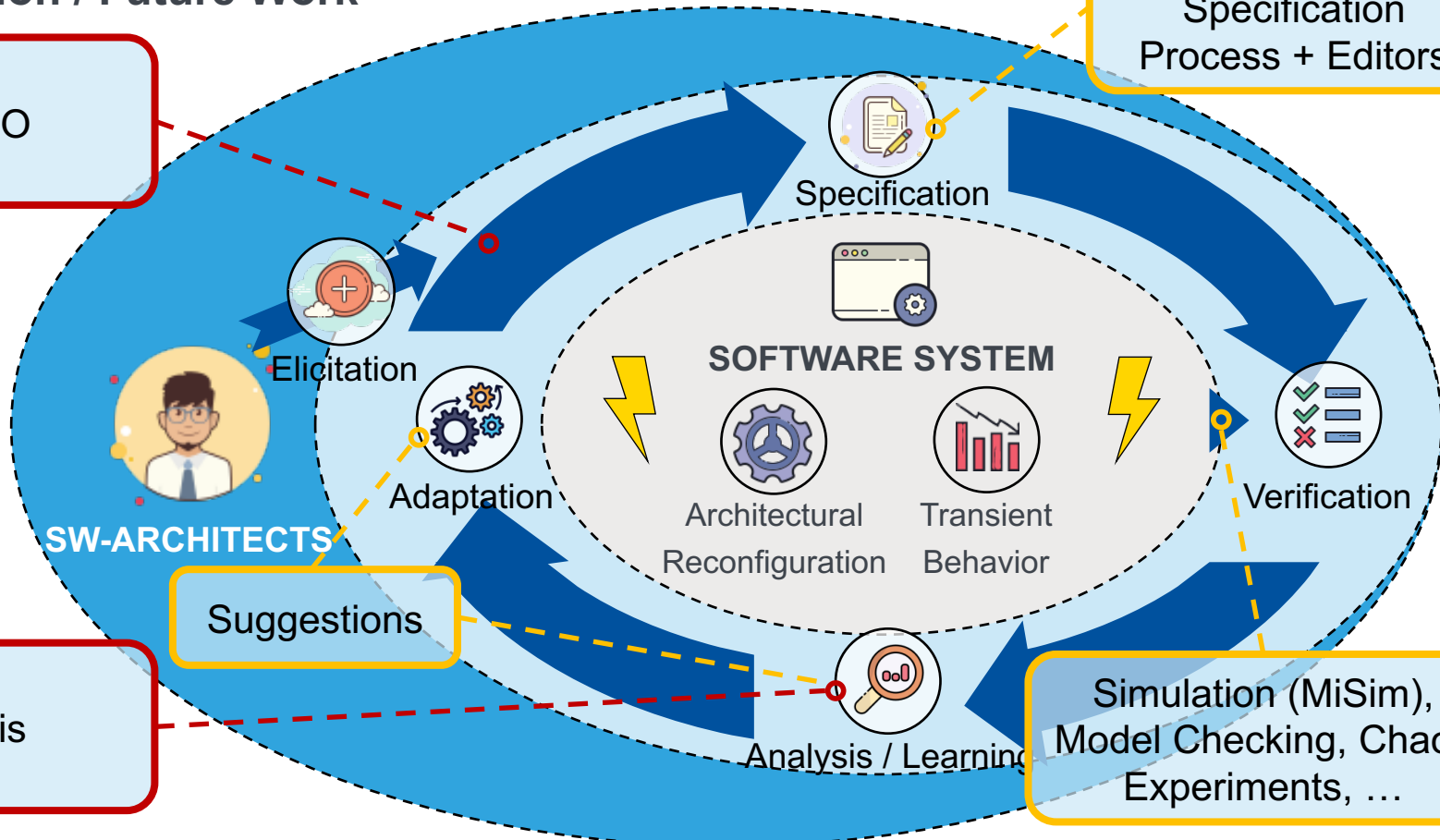
Formal
Language

ATAM-Editor: Preview

<https://youtu.be/dwrTtjqcDzM>



Current Work:
Specification
Process + Editors



TransVis

Simulation (MiSim),
Model Checking, Chaos
Experiments, ...