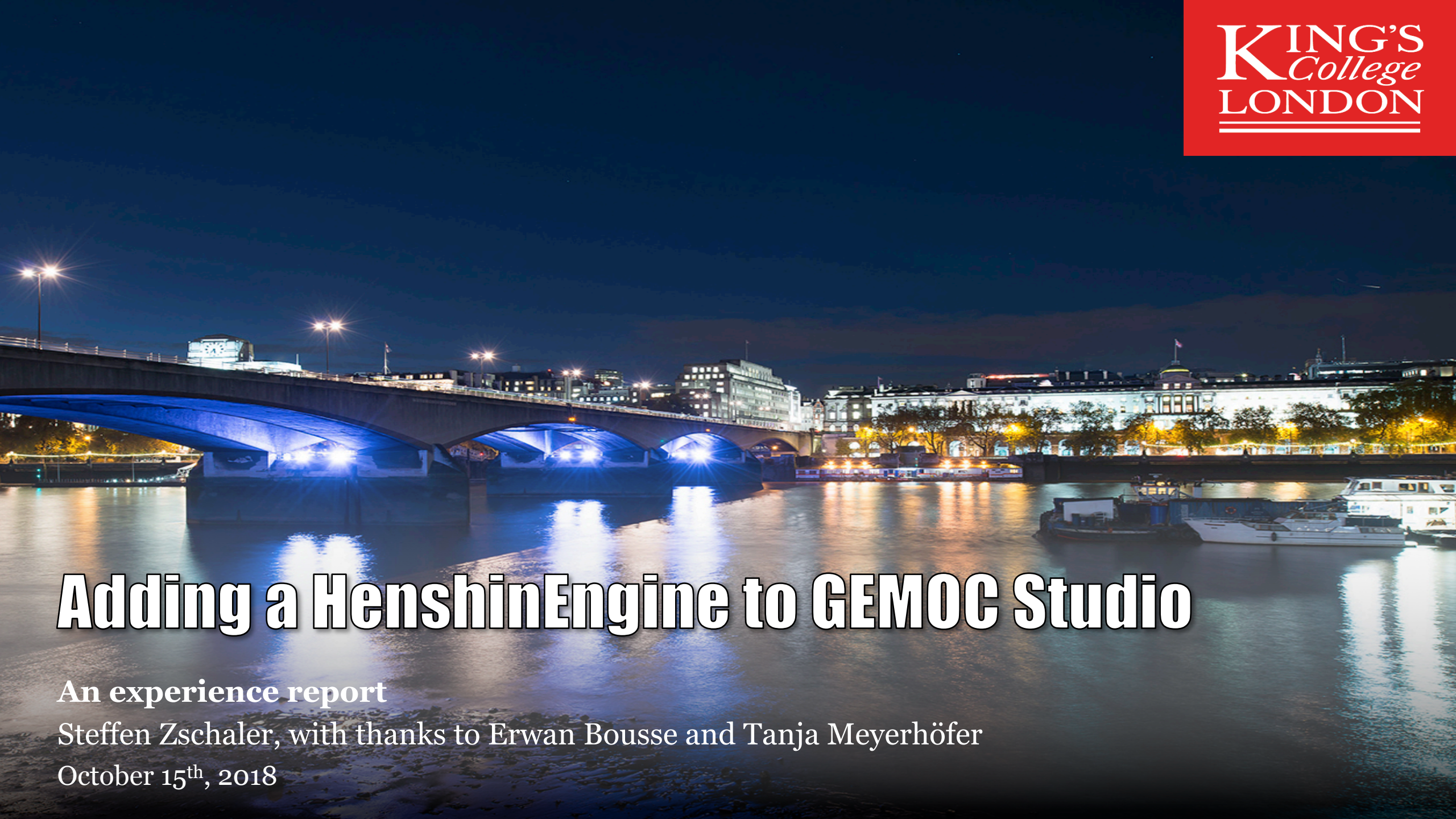


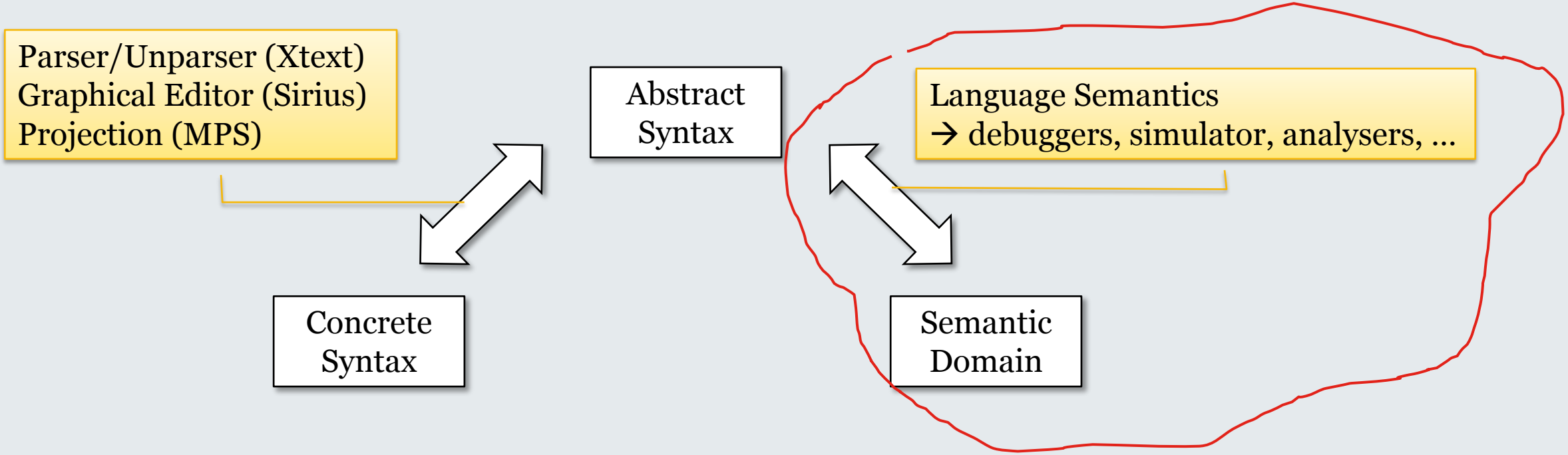
Adding a HenshinEngine to GEMOC Studio

An experience report

Steffen Zschaler, with thanks to Erwan Bousse and Tanja Meyerhöfer

October 15th, 2018

Executable Domain-Specific Modelling Languages



Language workbenches

Language workbenches generate tool support from (declarative) descriptions of software languages

- Editors, analysers, simulators, debuggers, …

- Many exist for syntax part, much fewer for semantics
- Here I build on **GEMOC Studio**
  - Built in Rennes/Toulouse
  - Generic description of language using:
    - *Abstract syntax:* EMF
    - *Graphical concrete syntax:* Sirius
    - *Operational Semantics:* a range of imperative options: Kermeta, fUML, …

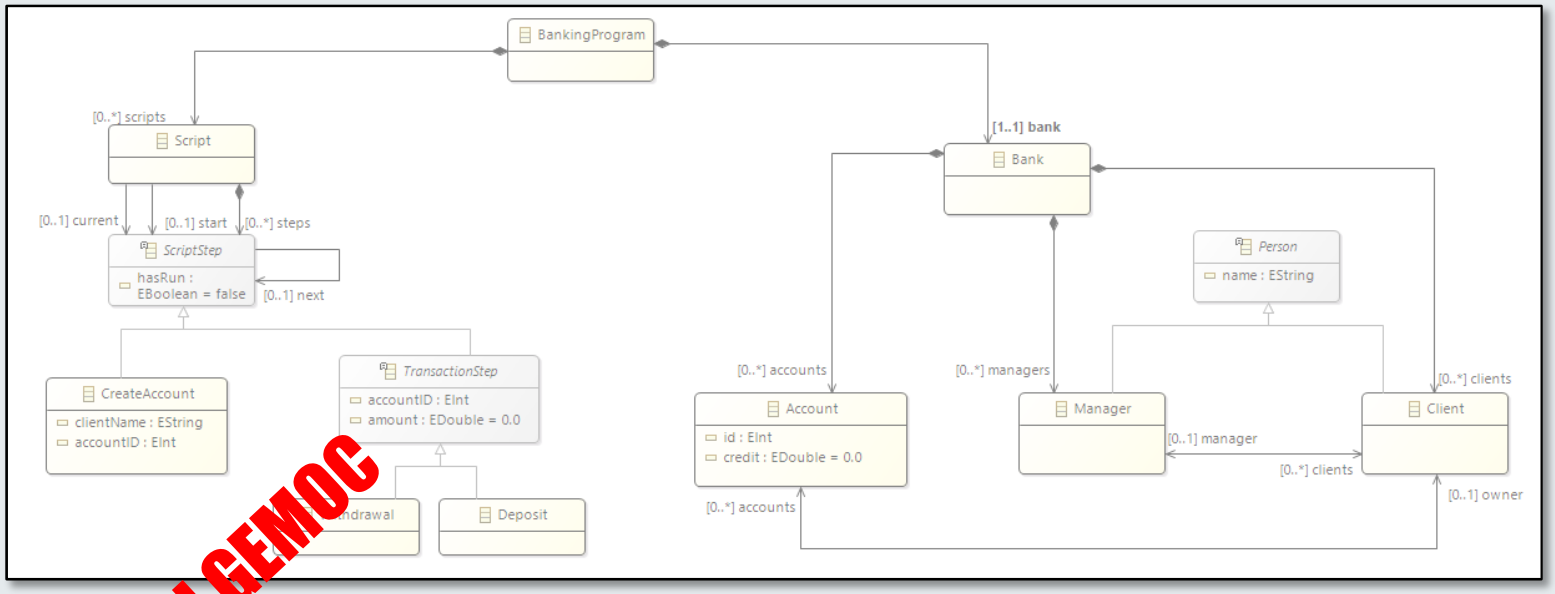
Goal

Add support for operational semantics specified using graph-transformation system (GTS)

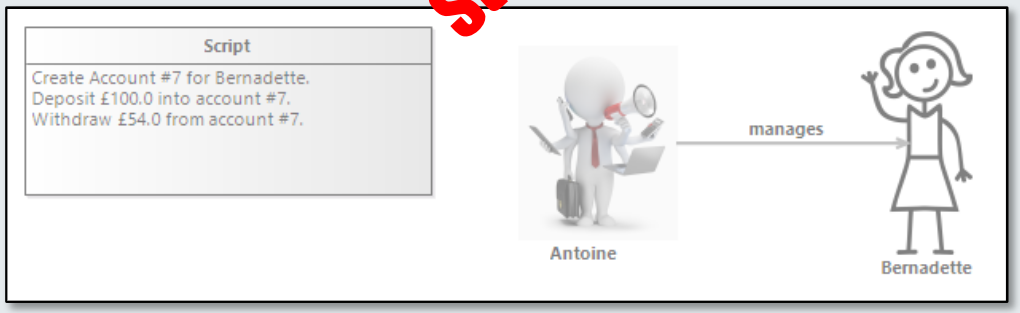
- **Why?**
  - Declarative description of semantics
    - Enables reasoning (e.g., about concurrency)
    - Enables robust composition and weaving to extend the language semantics and combine different languages
  - Not an interpreter, but a semantics
    - Implicit scheduling

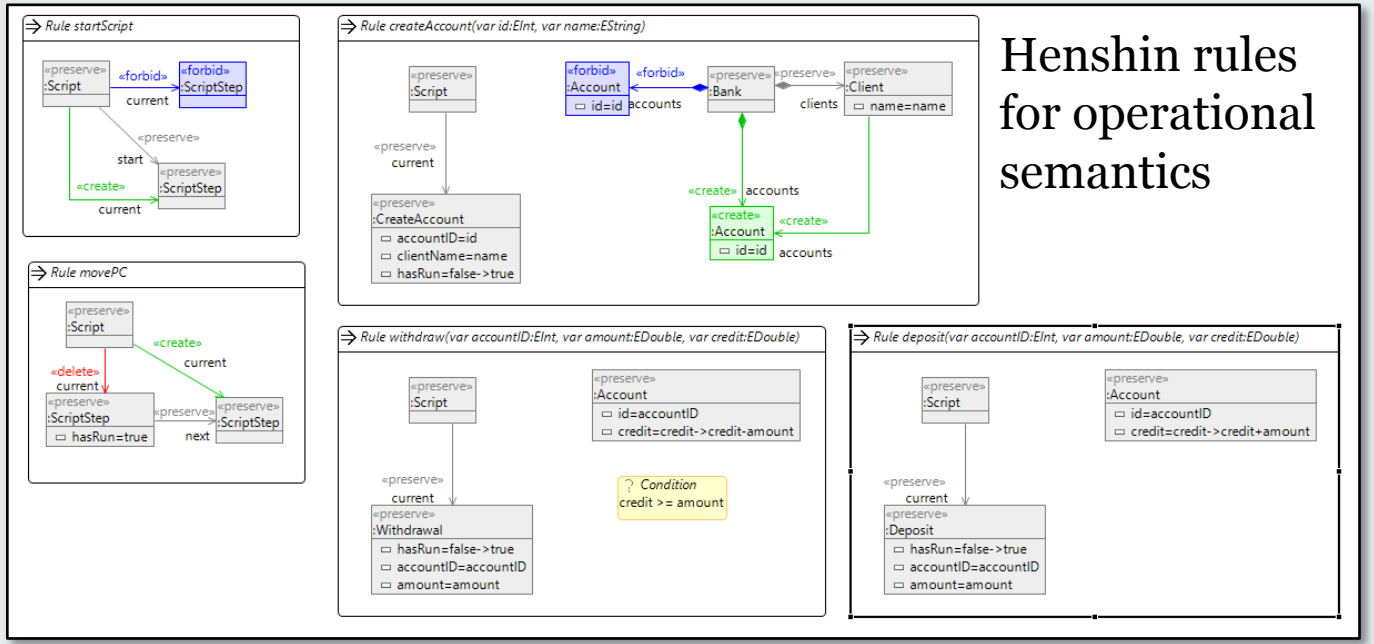
- **Why GEMOC Studio?**
  - Claims to be easily extensible with new semantics formalisms
  - Wanted to evaluate this claim

Core Idea



Standard GEMOC





Henshin rules for operational semantics

Demonstration: The Banking Example

So what's involved?

Execution Engine

- Implement interpretation of semantics
- Currently based on sequential execution engine
  - At each step randomly pick an available match
- Need to "fake" semantics operation names for GEMOC
  - Using rule names
  - "Flat" semantics

ModelExecutionContext

- To remove dependency on Melange

Launch Configuration

- To wire all of the above for execution
- Needed to copy existing code because not accessible for reuse

Demonstration: The Production Line Model

Concurrency

Concurrency is currently badly supported

- Using sequential execution engine
  - Need to make a choice of the next step at each point rather than giving the choice to the user

- Should really build on concurrent execution engine
  - BUT: could not figure out how to extend this; it seems much less modular
  - HELP!

GTSs have the potential of making concurrent semantics much easier

- No need for explicit concurrency model → could potentially be inferred from semantics and model

Conclusions

Two contributions:

1. Support for GTS-based semantics in GEMOC Studio
2. Initial evaluation of extensibility of GEMOC Studio

Future work:

- Proper support for concurrency
- Support for time
- Connection to our previous composition work

Questions?

szschaler@acm.org
www.steffen-zschaler.de
With thanks to Erwan Bousse and Tanja Meyerhöfer