Collected Experience and Thoughts on Long Term Development of an Open Source MDE Tool

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Lars Hamann, Frank Hilken, and Martin Gogolla

Universität Bremen

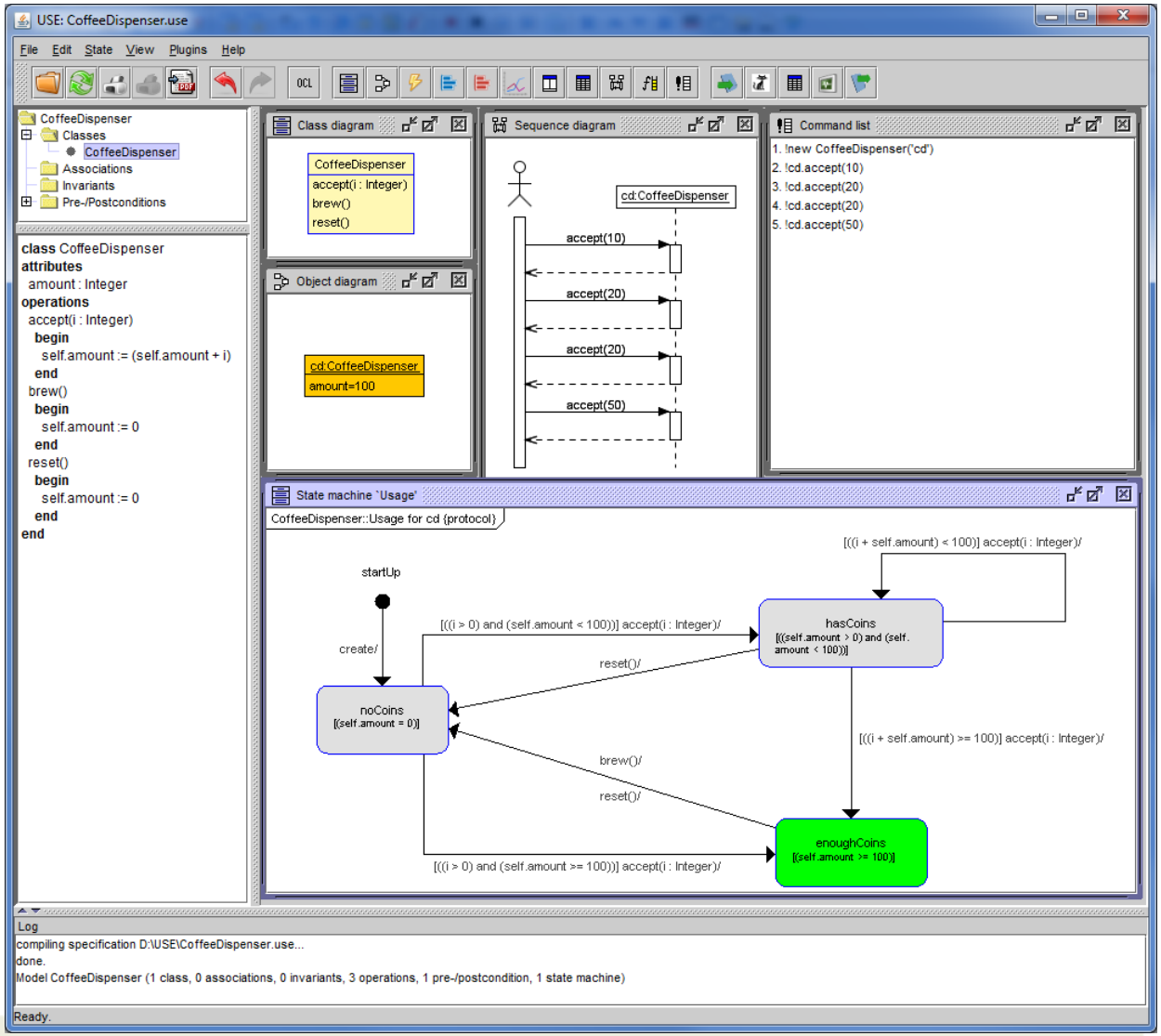
Database Systems Group
Department for Mathematics and Computer Science
University of Bremen, Germany

Overview

- USE
  - Applications
  - History
- Lessons learned
  - Factory of Success
  - Work of Students
    - Chamber of Horrors
- Conclusion

USE

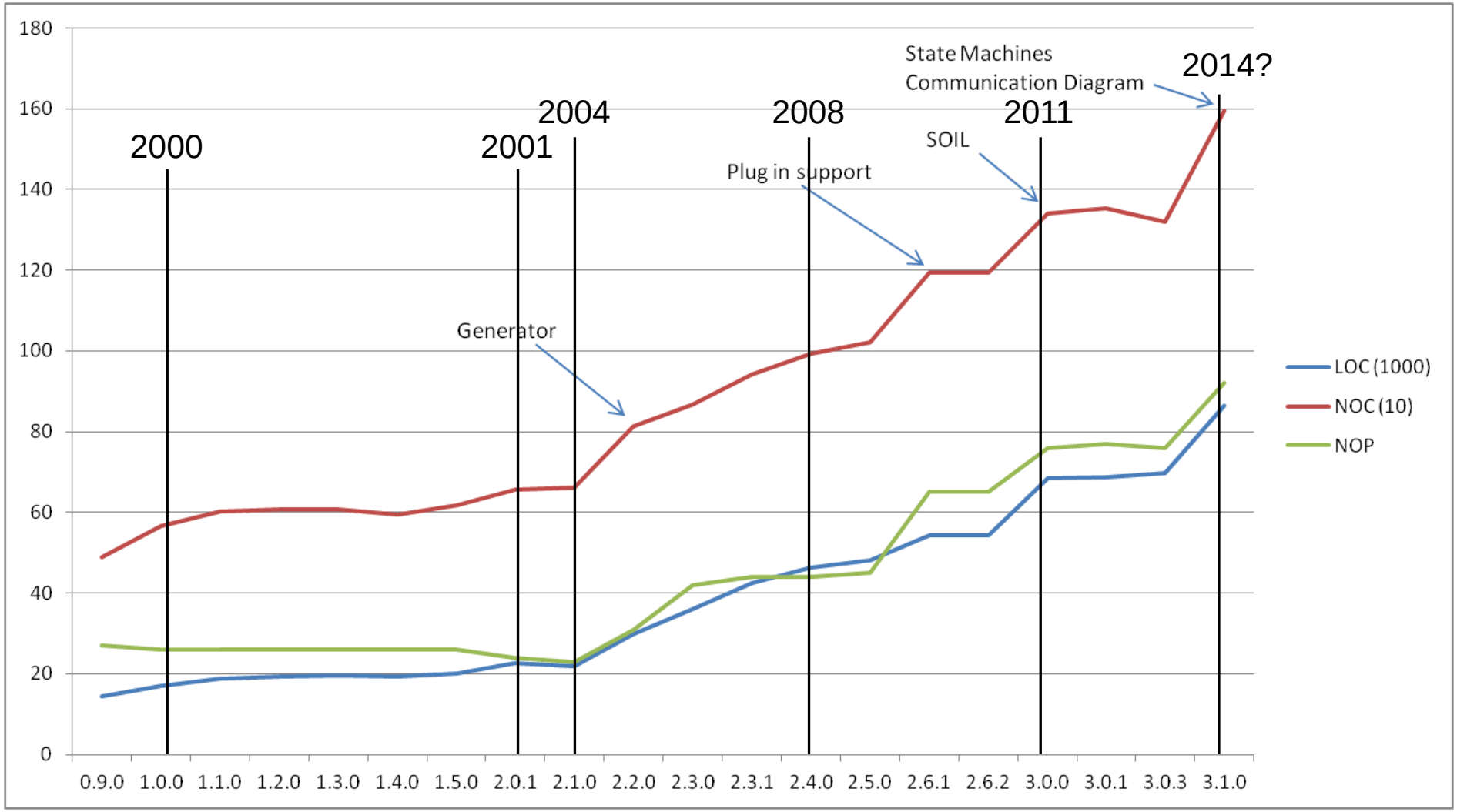
- Acronym for:
  UML-based **S**pecification **E**nvironment
- Broad reach:
  - some 4,700 downloads in 2013
  - used by research projects
  - industrial use
- Based on the JRE, only


USE: CoffeeDispenser.use
File Edit State View Plugins Help
CoffeeDispenser
Classes
CoffeeDispenser
Associations
Invariants
Pre-/Postconditions
class CoffeeDispenser
attributes
amount : Integer
operations
accept(i : Integer)
begin
self.amount := (self.amount + i)
end
brew()
begin
self.amount := 0
end
reset()
begin
self.amount := 0
end
end
Class diagram
CoffeeDispenser
accept(i : Integer)
brew()
reset()
Object diagram
cd:CoffeeDispenser
amount=100
Sequence diagram
cd:CoffeeDispenser
accept(10)
accept(20)
accept(20)
accept(50)
Command list
1. !new CoffeeDispenser('cd')
2. !cd.accept(10)
3. !cd.accept(20)
4. !cd.accept(20)
5. !cd.accept(50)
State machine 'Usage'
CoffeeDispenser::Usage for cd {protocol}
startUp
create/
noCoins
[(self.amount = 0)]
[((i > 0) and (self.amount < 100))] accept(i : Integer)/
hasCoins
[((self.amount > 0) and (self.amount < 100))]
[((i + self.amount) < 100)] accept(i : Integer)/
reset()/
[((i + self.amount) >= 100)] accept(i : Integer)/
brew()/
reset()/
enoughCoins
[(self.amount >= 100)]
[((i > 0) and (self.amount >= 100))] accept(i : Integer)/
Log
compiling specification D:\USE\CoffeeDispenser.use...
done.
Model CoffeeDispenser (1 class, 0 associations, 0 invariants, 3 operations, 1 pre-/postcondition, 1 state machine)
Ready.

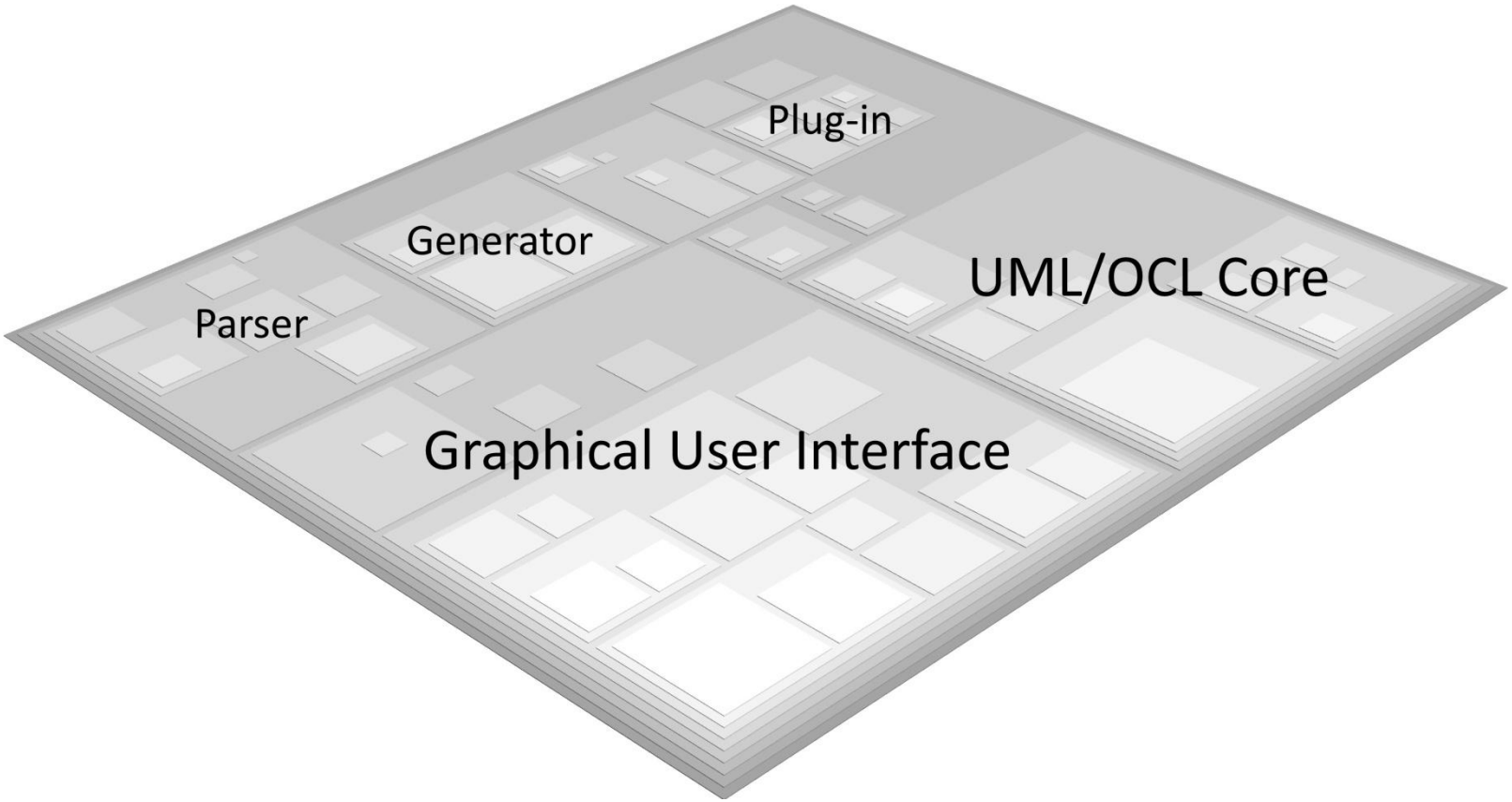
Applications of USE

- Modeling
  - Validation
  - Verification
  - Simulation
- Education
  - “Playing with models”
- Component
  - OCL-Compiler and Interpreter

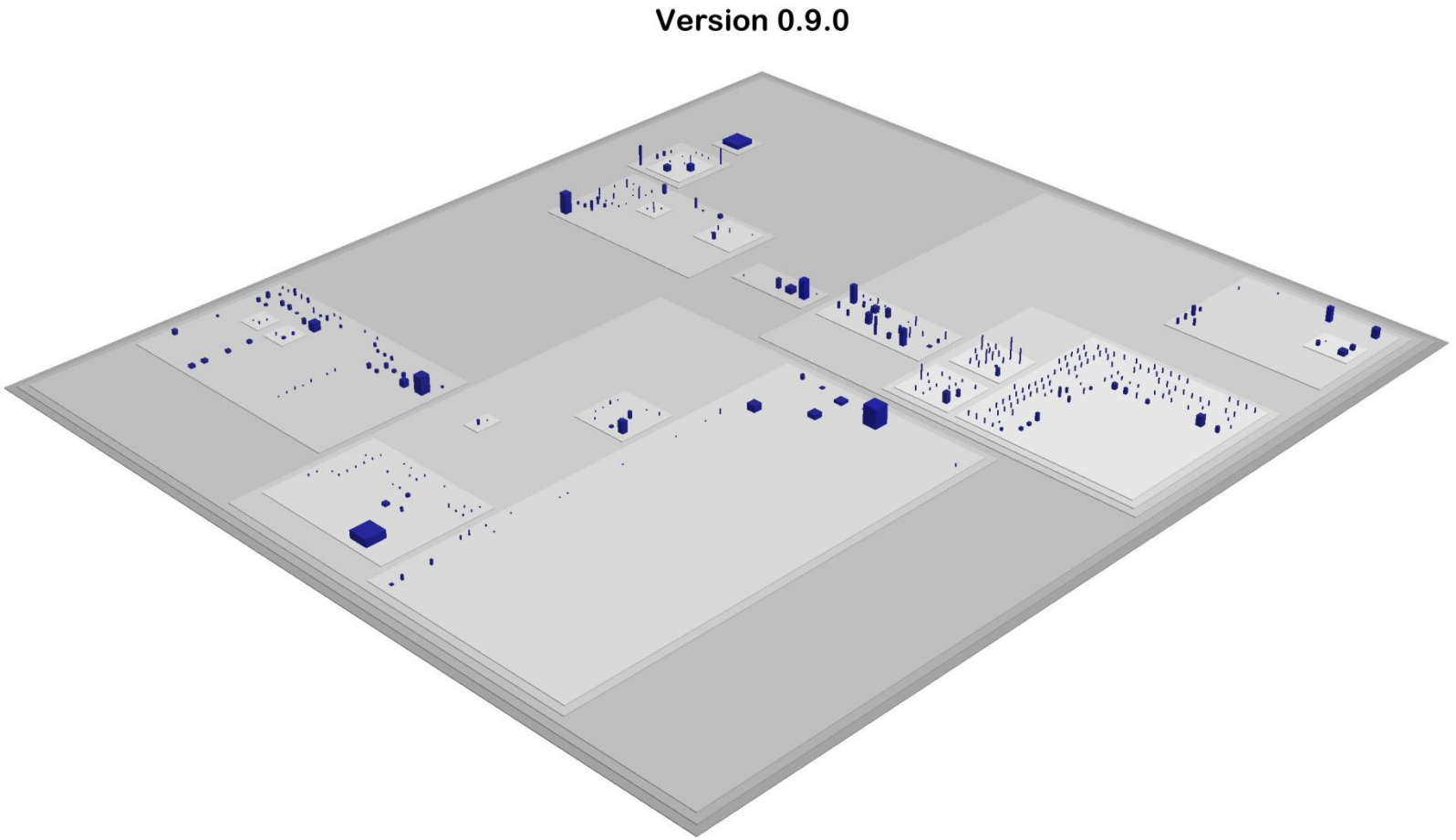
History of USE by Numbers



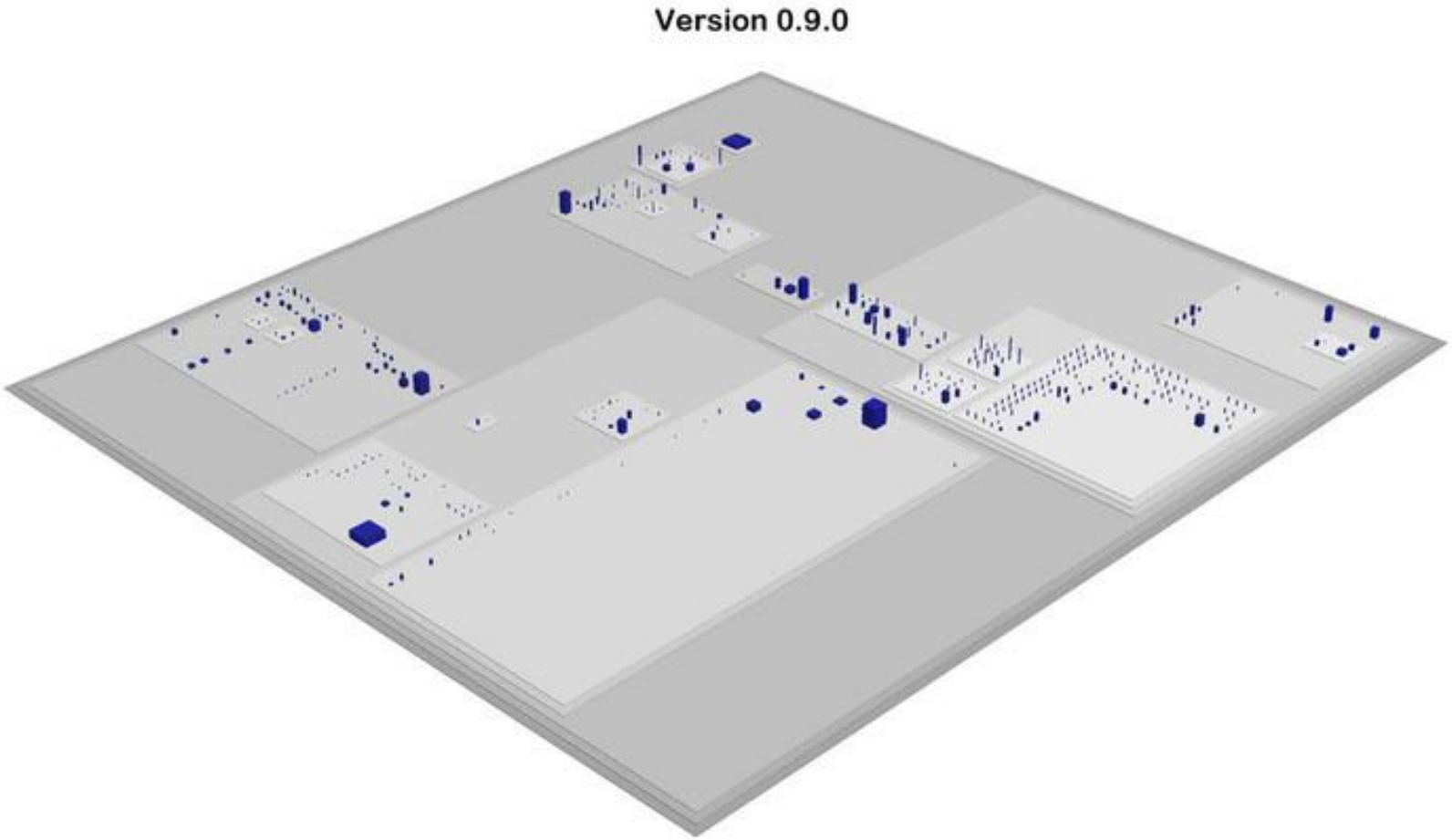
USE: a growing city



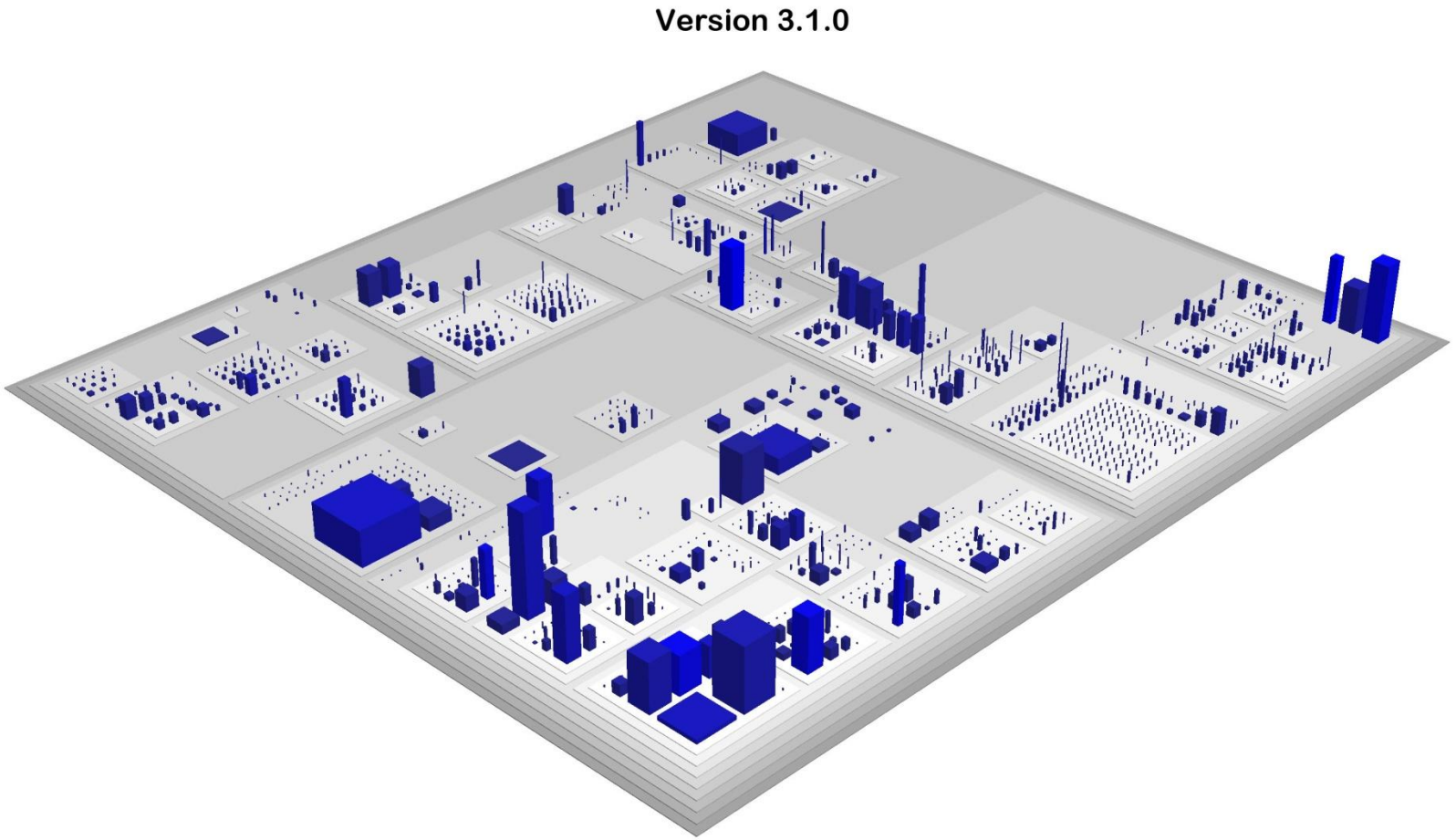
USE: a growing city



USE: a growing city



USE: a growing city



Technical

- Stable Core
- Test, test, test…
  - More than 20,000 OCL expressions
- Continuous Integration
- Team including leading „Geek“

Organizational

- Industrial Cooperations (Money…)
- How to not become a service provider?
  - We don‘t have an answer, yet

Community and Feedback

- Open Source does not provide Devs „for free“
- Publications
- Research Cooperations
- Feedback by Users, e. g., Students and Modeler
- Profound and fast(!) Support
- Students help to identify usability issues

Extensions by Students

- Quality varies heavily
- Required time, too
  - Can block interesting topics)

- How to improve quality?
  - Kick-off meeting to explain:
    - topic and
    - relevant parts of the system

Extensions by Students

- How to improve quality?
  - Best practice guide to overcome simple errors
  - Regular meetings (also reduces required time)
    - if possible: Code Review
- Not all work is going to be useful
- After Integration, if any:
  - Refactoring
  - Developer left the company!

Chamber of Horros

Controle structures?

```
 1: // compile command
 2: MSystem system = system();
 3: List<MCmd> cmdList = CMDCompiler.compileCmdList(…)
 4:
 5: // compile errors?
 6: String message = (new ShowHideExec(line)).exec();
 7: System.out.println(message);
 8:
 9: if (cmdList == null){ return; }
10:
11: for (MCmd cmd : cmdList) {
12:   …
13: }
```

Strings rule the world!

```
1: // break if the parent node is an exists node
2: // and child evaluates to "true"
3: // for minimal evaluation
4: else if (!fExtendedExists.isSelected()
5:           && parentExpr.name() == "exists"
6:           && child.getResult() == "true")
7:    break breakLabel;
```

```
1: // break if the parent node is an exists node
2: // and child evaluates to "true"
3: // for minimal evaluation
4: else if (!fExtendedExists.isSelected()
5:           && parentExpr instanceof ExpExists
6:           && child.getResult().equals(BooleanValue.TRUE))
7:    break breakLabel;
```

Who needs the M in MVC?

```
 1: for (int i = 0; i < fAttributes.size(); i++) {
 2: // Class is shown in a table, e.g., „Person (1-7)“
 3: String cname =
 4:  fAttributes.get(i).toString().substring(0,
 5:  fAttributes.get(i).toString().indexOf("(")).trim();
 6: Iterator it = selectedClasses.iterator();
 7: // find out, which mclass selected
 8: while (it.hasNext()) {
 9:   MClass mc = (MClass) (it.next());
10:   if (mc.name().equals(cname))
11:     break;
12: }
13: …
```

Why reuse?

```
MMultiplicity mult1 = null, mult2 = null;

// for many
if (multiplicity1 == "0..*")
  mult1 = new MMultiplicity(0, -1);
// zero to one
else if (multiplicity1 == "0..1")
  mult1 = new MMultiplicity(0, 1);
…
if (multiplicity2 == "0..*")
  mult1 = new MMultiplicity(0, -1);
else if (multiplicity2 == "0..1")
  mult1 = new MMultiplicity(0, 1);
```

Summary

- Stability over Features
  - Continuous Integration
  - Test
- Cooperation
- Students need assistance
- Integration of work of students usually not “as-is”

USE can be found here:
http://www.sourceforge.net/projects/useocl/
or google “use ocl bremen”

Thank you for your attention!

Any questions or remarks?