

Brief history

- **Paul was my 2nd “promotor” in 1992**
- **In 1992 I started as assistant professor in his group at the UvA:**
 - **pretty printer generation**
- **In 1997 I moved to his group at CWI:**
 - **ASF+SDF Meta-Environment**
 - **ASF2C compiler**
- **In 2006 I left CWI and moved to Eindhoven University of Technology**
 - **Model Driven Software Engineering**

Context

Model Driven Engineering is gaining popularity

Academia



Industry



Context

Model transformations are software too



Design
Methodology



Reuse



Maintenance

Context



Reuse

1. As-is

2. With modifications

Context



Maintenance

- 1. Corrective**
- 2. Adaptive**
- 3. Perfective**

Analysis techniques are required for model transformations



Metrics for Model Transformations

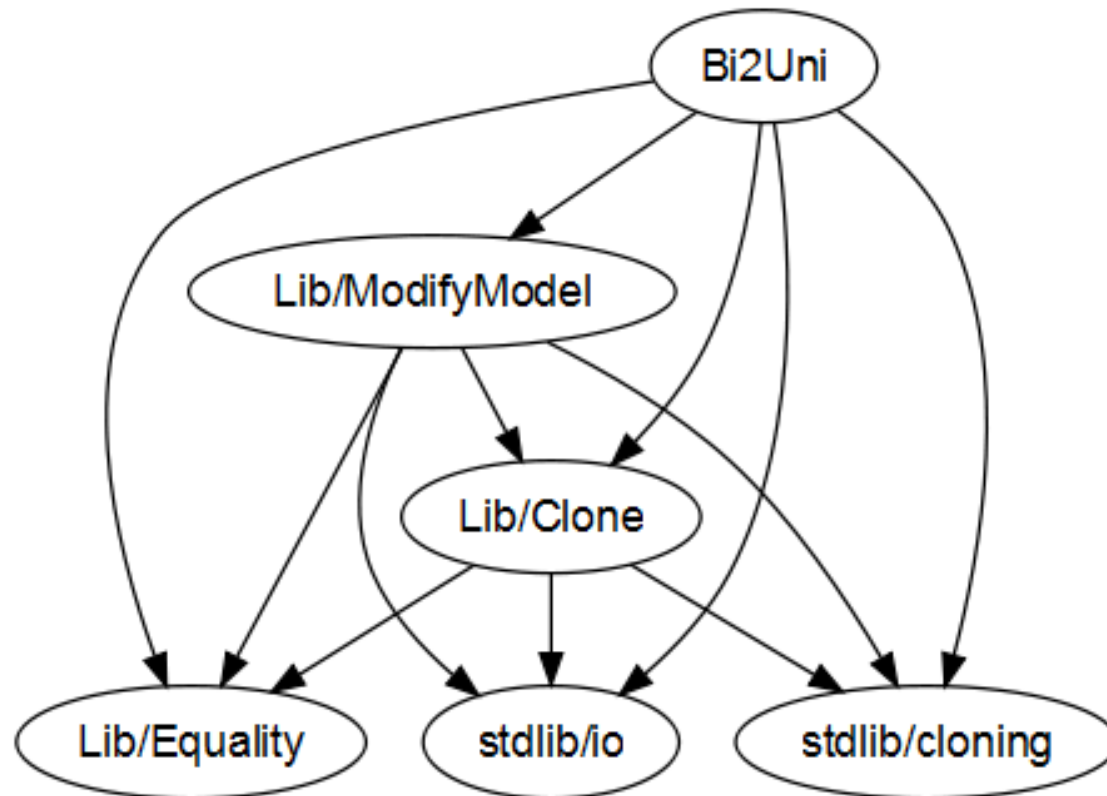
Number of Output Models	1
Number of Transformation Rules	93
Number of Matched Rules (Excluding Lazy Matched Rules)	1
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Number of Transformation Rules	93
Number of Matched Rules (Excluding Lazy Matched Rules)	1
Number of Matched Rules (Including Lazy Matched Rules)	93
Number of Lazy Matched Rules (Excluding Unique)	92
Number of Lazy Matched Rules (Including Unique)	92
Number of Unique Lazy Matched Rules	0
Number of Called Rules	1
Number of Unused Called Rules	0
Number of Rules with a Filter Condition on the Input Pattern	0
Number of Unused Input Pattern Elements	85
Number of Rules with a do section	0
Number of Direct Copies	0
Number of Abstract Transformation Rules	0
Number of Abstract Matched Rules	0
Number of Abstract Lazy Matched Rules	0
Number of Abstract Unique Lazy Matched Rules	0
Number of Rule Inheritance Trees	93
Number of Rules with a Using Clause	57
Number of Unused Variables Defined in Using Clauses	0
Number of Helpers	28
Number of Helpers with Context	11
Number of Helpers without Context	17
Number of Attribute Helpers	1
Number of Attribute Helpers with Context	0
Number of Attribute Helpers without Context	1
Number of Operation Helpers	27

Using Metrics for Assessing the Quality of ASF+SDF Model Transformations

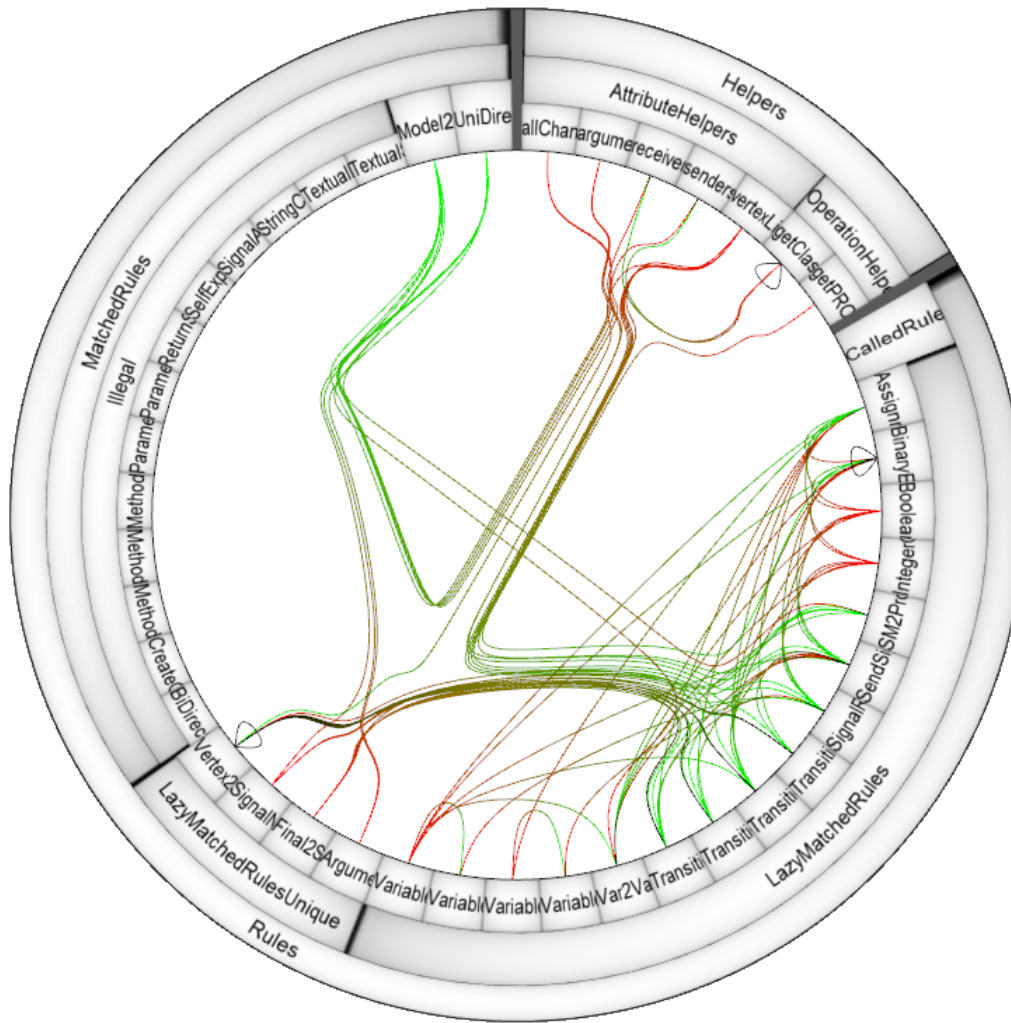
M.F. van Amstel, C.F.J. Lange, M.G.J. van den Brand

In *Proceedings of the Second International Conference on Model Transformation (ICMT 2009)*

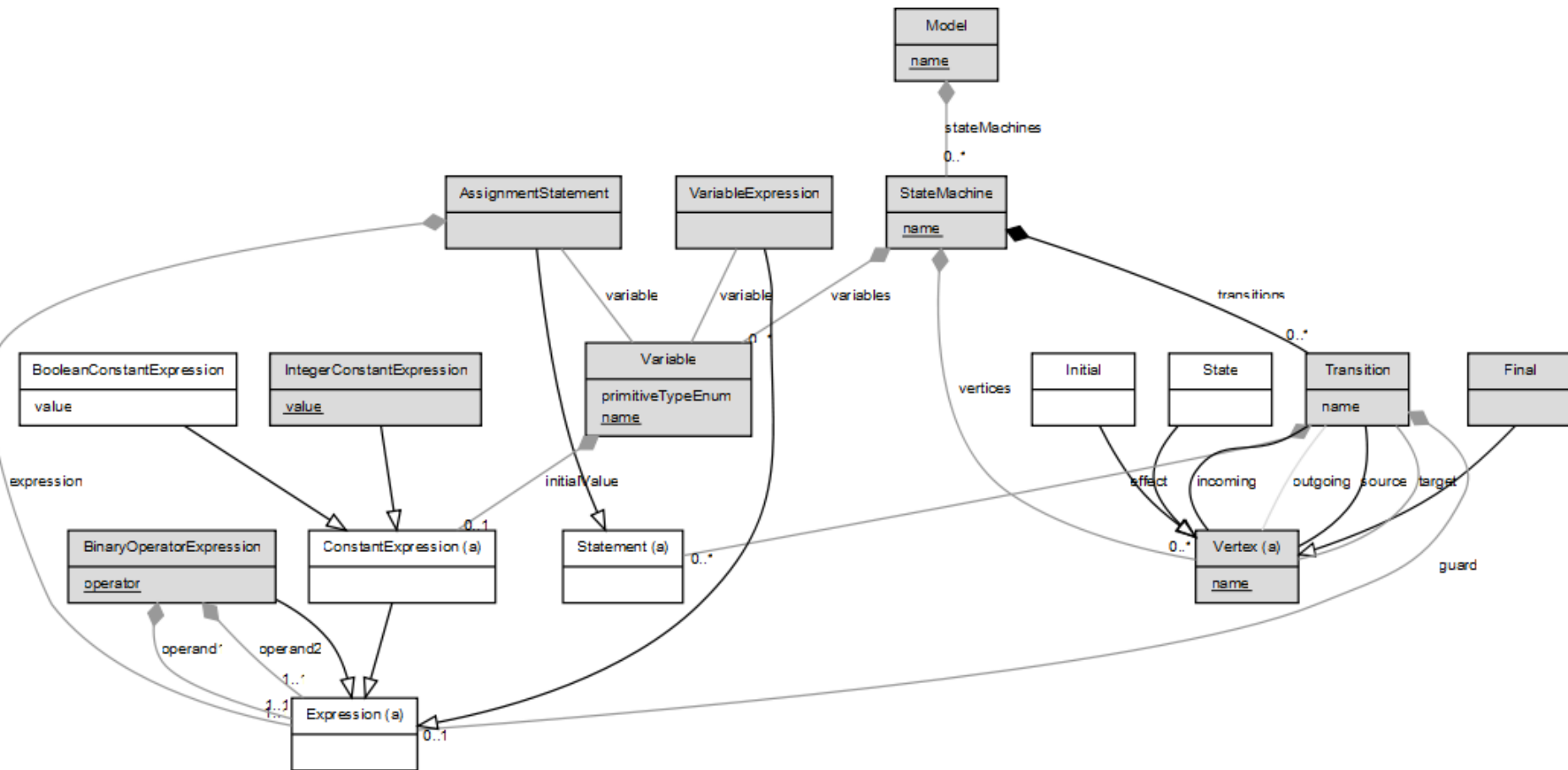
Structure Analysis



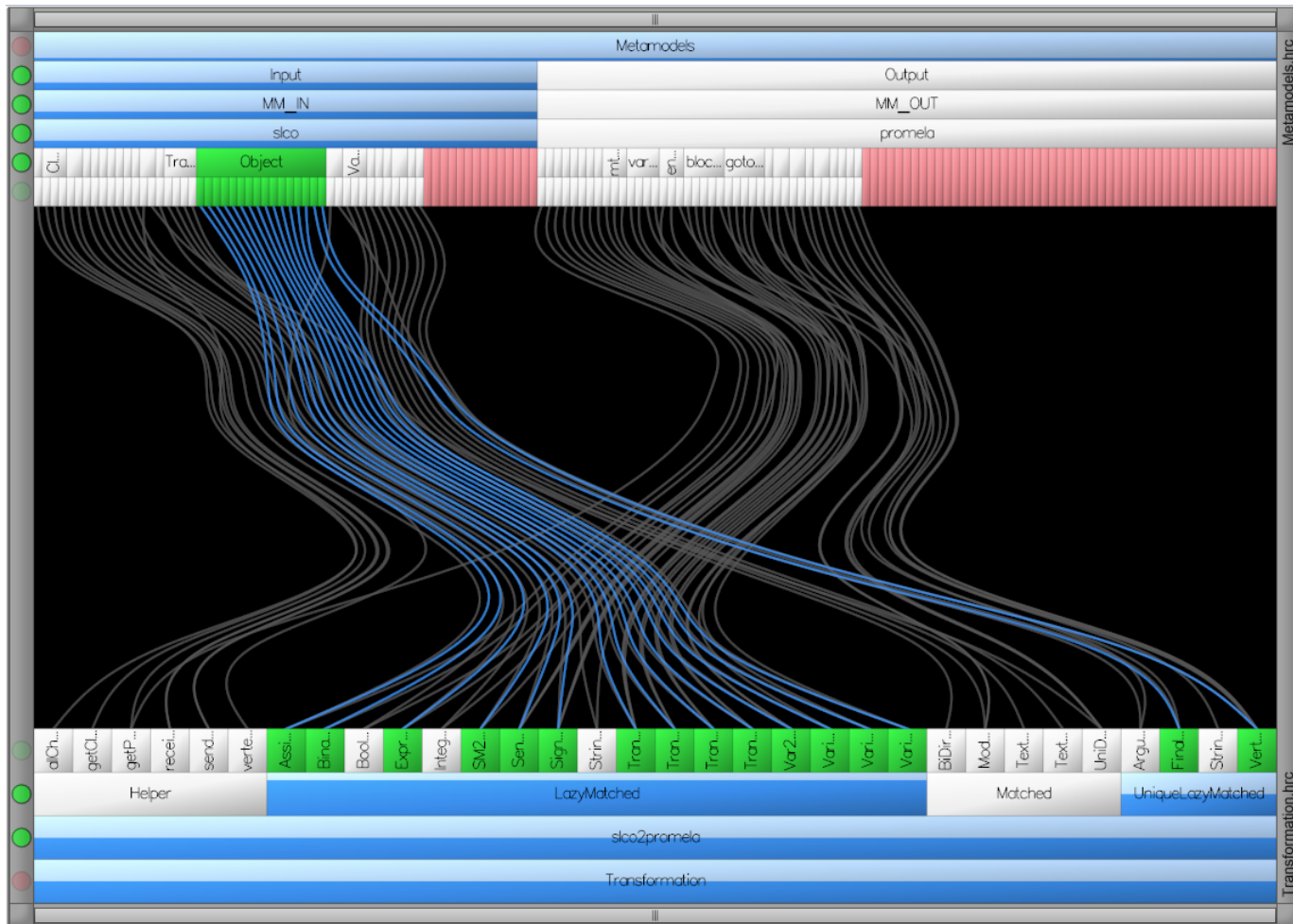
Structure and Dependency Analysis



Meta-model Coverage



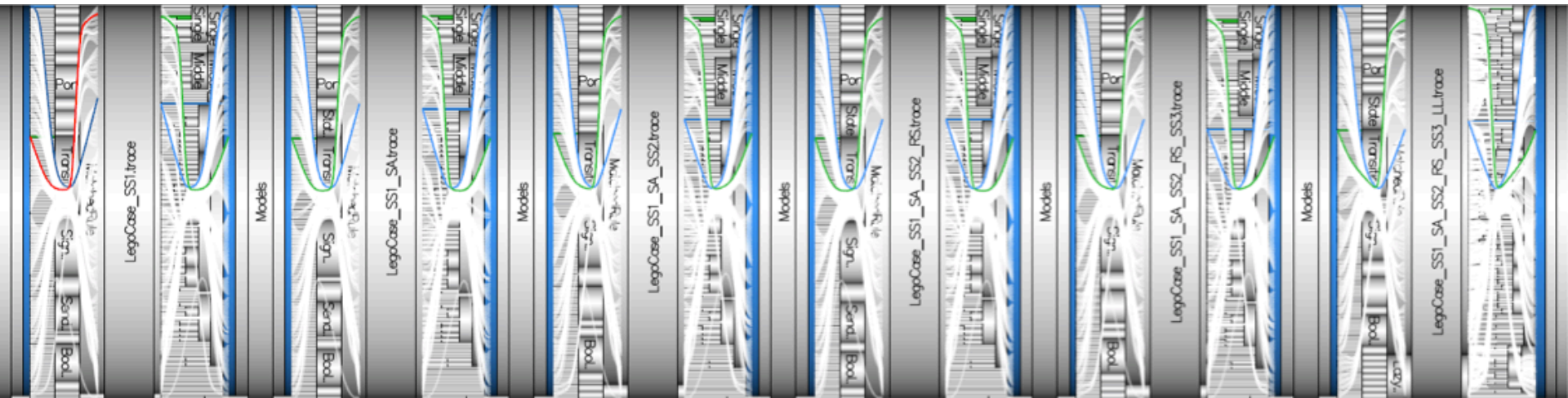
Meta-model Coverage



Model transformation traceability

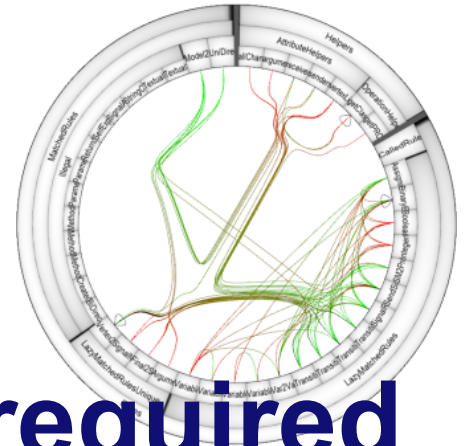
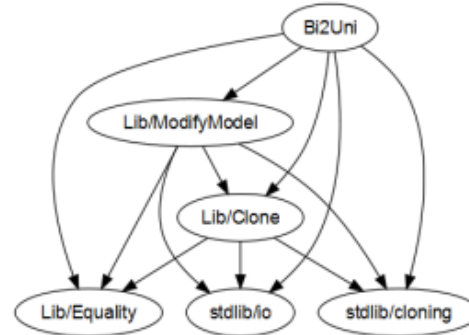
- **Origin tracking of model transformations:**
 - **Debugging domain-specific models**
 - **Analysis of domain-specific models**
 - **Determining the effect of a source model change**

Model transformation traceability

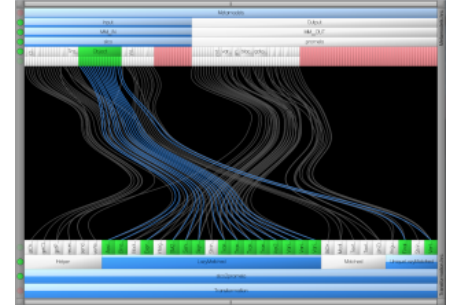
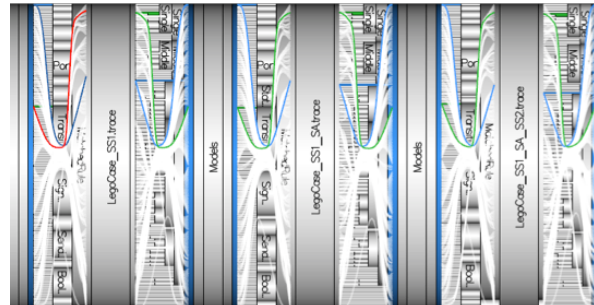
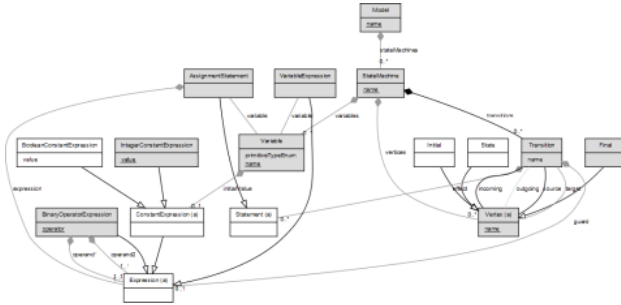


Conclusions

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Number of Lazy Matched Rules (Excluding Unique)	1
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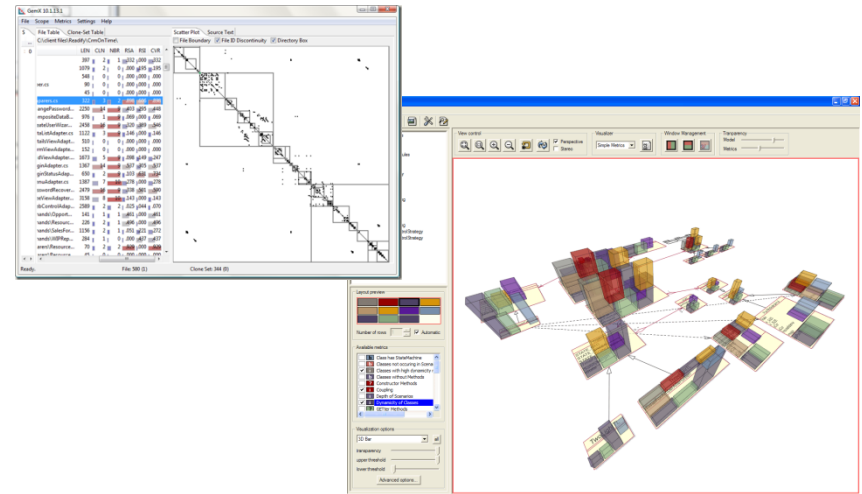


Analysis techniques are required



Future Work

- More analysis techniques
 - Code clone detection
 - Visualization of metrics
 - ...
- Improving current analysis techniques
 - Dynamic analysis
 - Coverage on model level



Acknowledgements

- **Marcel van Amstel and Luc Engelen** for participating in this research
- **Danny Holten** for the visualizations
- **Paul Klint** for providing the stimulating environment
and his back to the basics question:
“Is dat nu wel zo?”

Questions

