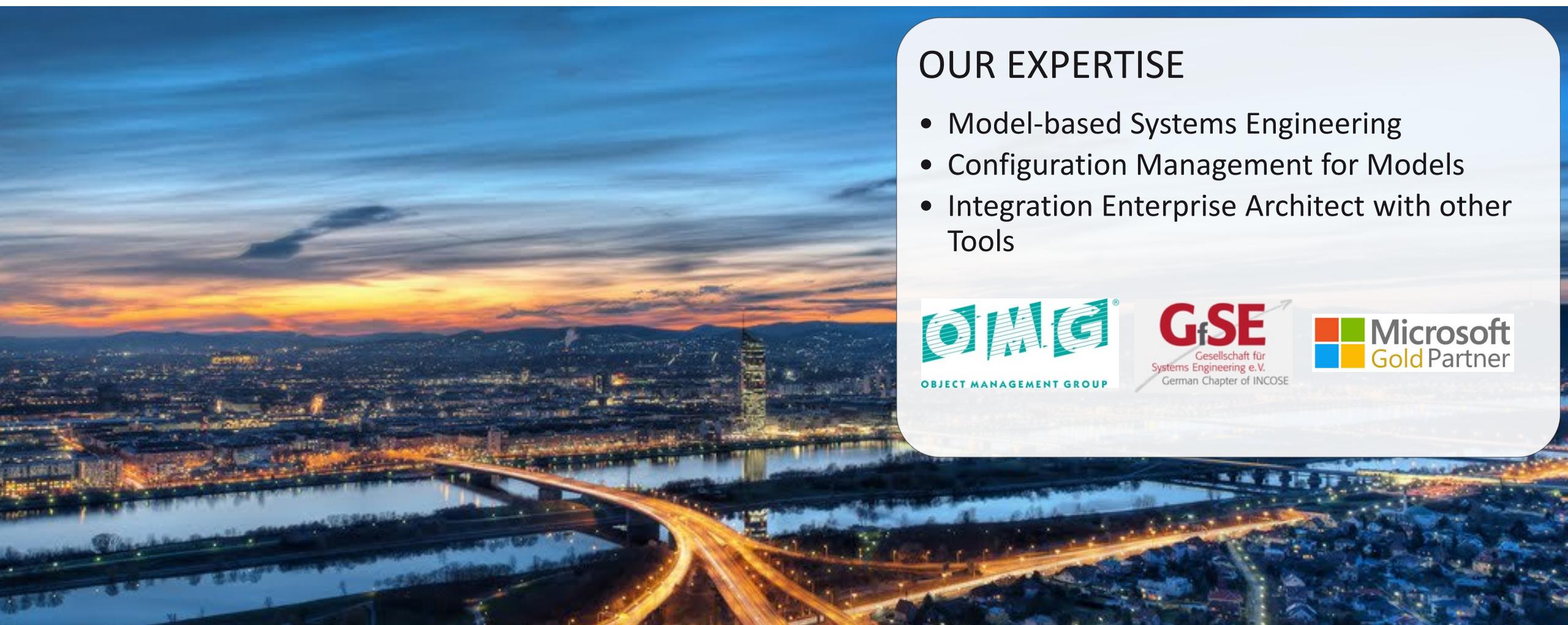


Modeling based on Feature-Branches





Vienna, Austria



OUR EXPERTISE

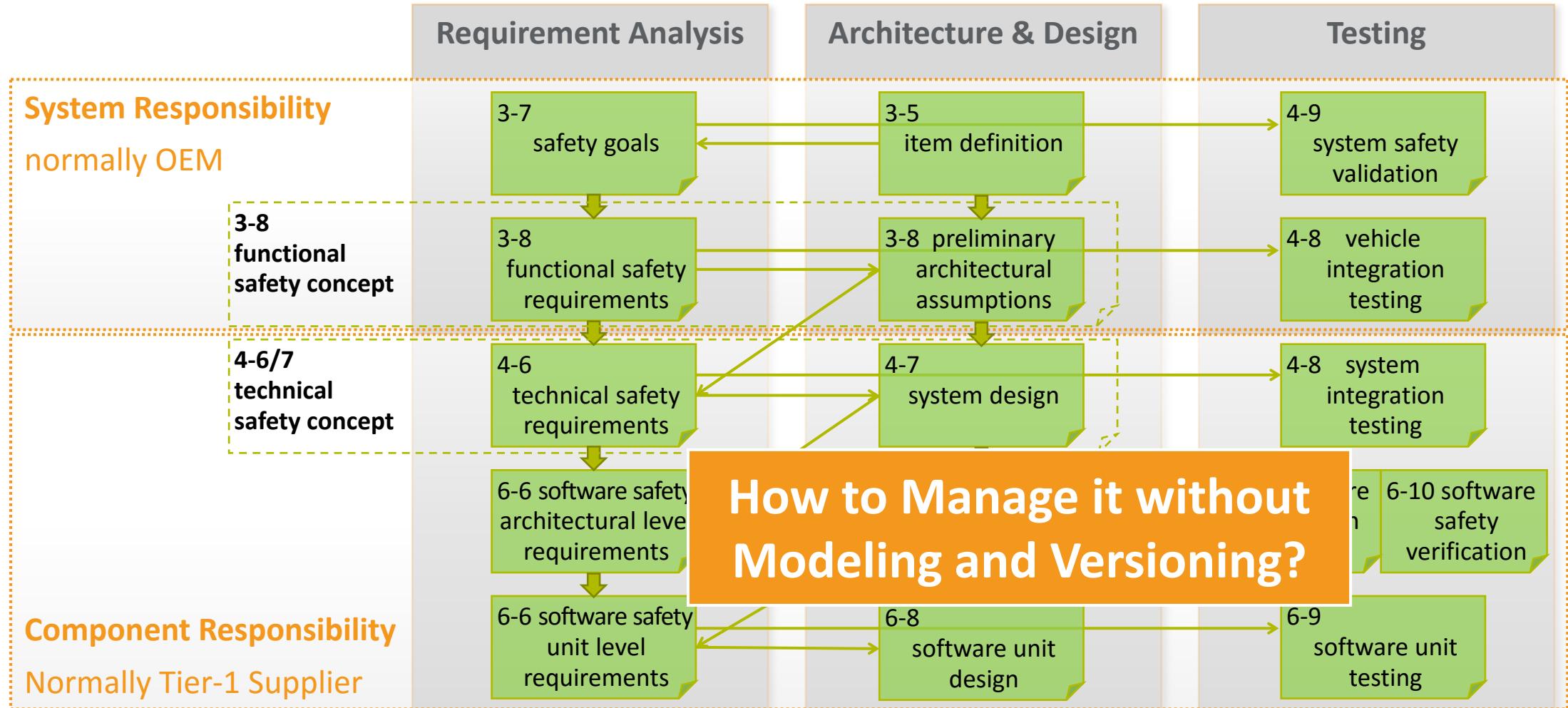
- Model-based Systems Engineering
- Configuration Management for Models
- Integration Enterprise Architect with other Tools



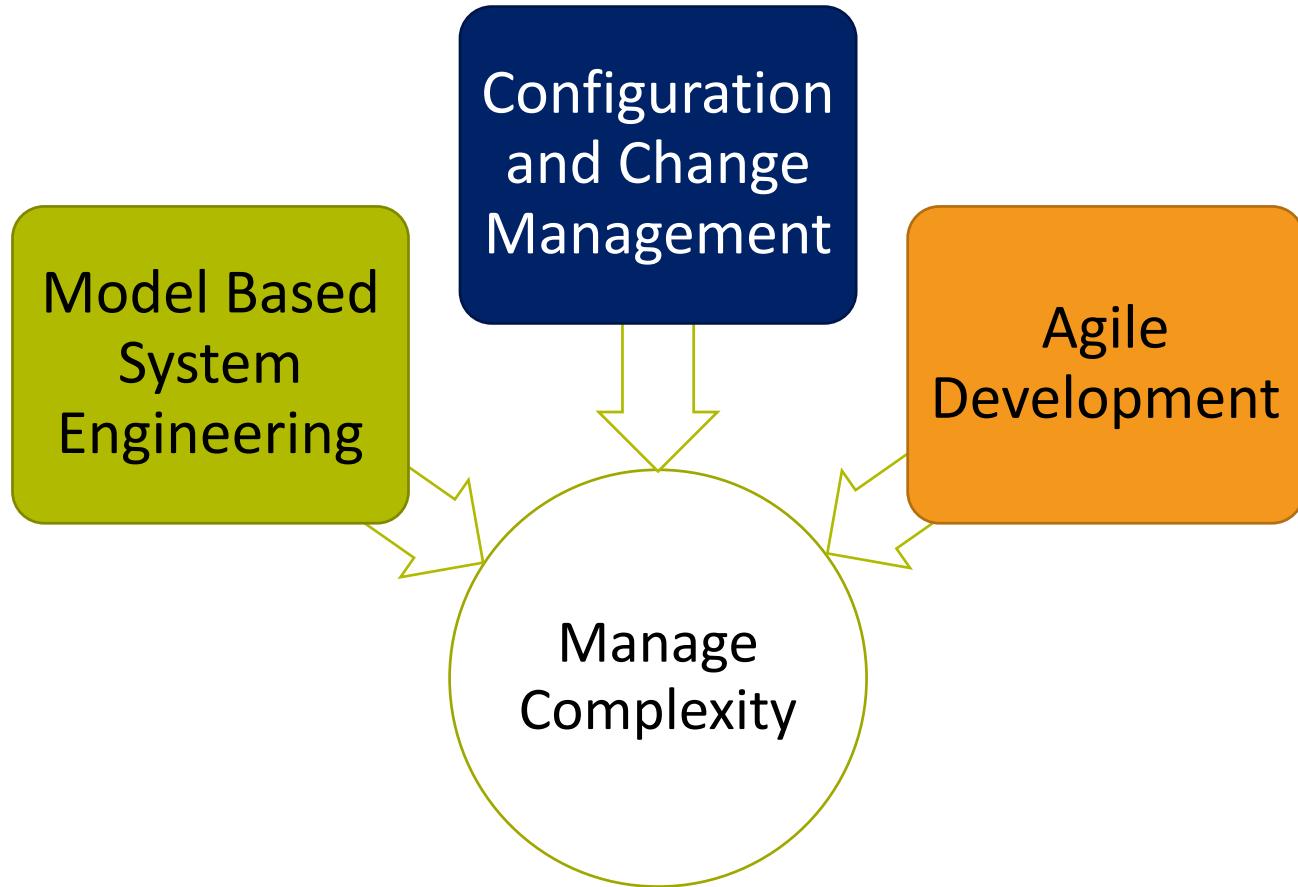
The Industry Challenge



From Concept to Solution as required by ISO 26262



Solution Strategies



Key Take Away

1. Agile team collaboration with models for safety projects
2. Consistent development state
3. Perfect triggers for peer reviews



Goals of Configuration and Change Management

1

Systematically tracking of changes during development and maintenance

2

Preserving the integrity of the system after changes

3

Preventing unwanted and unpredictable effects

4

Standardizing the process of making changes



The History 2005 -> 2008

The ModelCVS Project The ModelCVS Project

A Semantic Infrastructure for Model-based Tool Integration



Arikan Productivity Group

→ G. Kappel, G. Kramler, E. Kapsammer, T. Reiter, W. Retschitzegger, W. Schwinger:
ModelCVS - A Semantic Infrastructure for Model-based Tool Integration, Technical Report, 2005

→ Gerti Kappel, Elisabeth Kapsammer, Horst Kargl, Gerhard Kramler, Thomas Reiter, Werner Retschitzegger, Wieland Schwinger, and Manuel Wimmer,
Lifting metamodels to ontologies - a step to the semantic integration of modeling languages to be presented at the ACM/IEEE 9th
International Conference on Model Driven Engineering Languages and Systems, Genova, Italy, 2006

→ Gerti Kappel, Horst Kargl, Gerhard Kramler, Andrea Schauerhuber, Martina Seidl, Michael Strommer and Manuel Wimmer,
Matching Metamodels with Semantic Systems - An Experience Report, BTW 2007 Workshop Model Management und
Metadaten-Verwaltung, Aachen; 05.03.2007 - 09.03.2007 (2007).

→ M. Strommer, M. Wimmer, H. Kargl, G. Kramler:
"Towards Model Transformation Generation By-Example";
Vortrag: 40th Hawaii International Conference On System Science (HICSS 40th), Hawaii, USA; 03.01.2007 - 06.01.2007; in: "Proceedings of the
Fortieth Annual Hawaii International Conference on System Sciences", IEEE Computer Society, 40 (2007), ISBN: 0769527558; S. 285 - 286.

→ H. Kargl, M. Wimmer:
"SmartMatcher: Improving Automatic Matching Quality";
IEEE Intelligent Systems, 23 (2008), 6; S. 75 - 77.

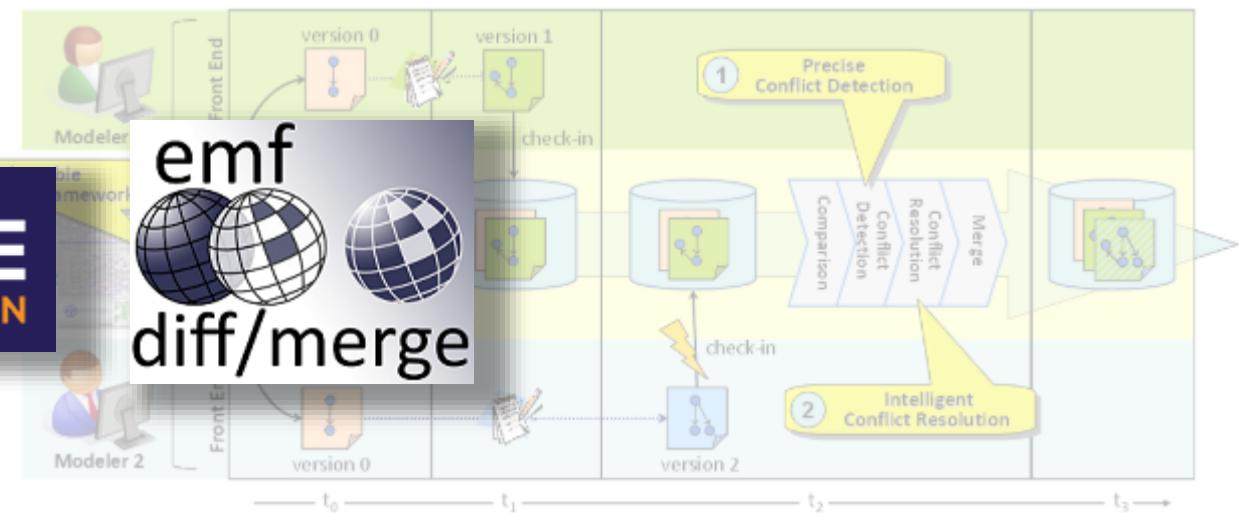
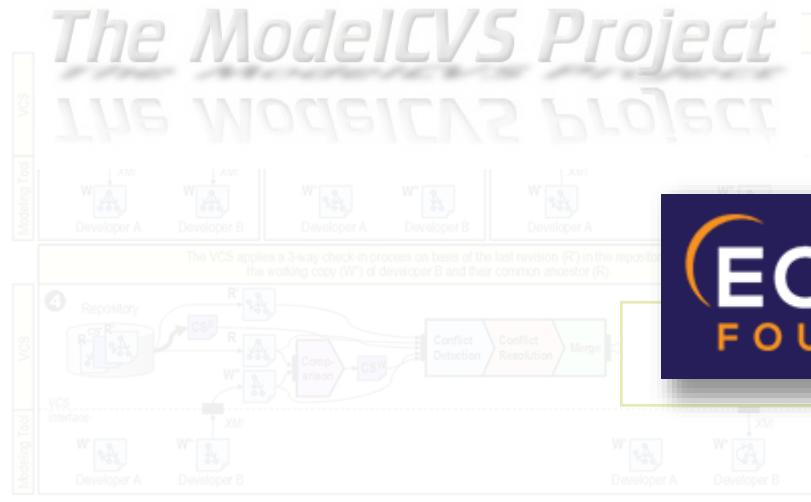
Complete List of Publications:
<http://www.modelcvs.org/publications/>

→ G. Kappel, H. Kargl, T. Reiter, W. Retschitzegger, W. Schwinger, M. Strommer, M. Wimmer:
"A Framework for Building Mapping Operators Resolving Structural Heterogeneities";
Vortrag: 2nd International United Information Systems Conference (UNISCON'2008), Klagenfurt (eingeladen); 22.04.2008 - 25.04.2008; in: "Information Systems and
e-Business Technologies (UNISCON'2008)", R. Kaschek, C. Kop, C. Steinberger, G. Fliedl (Hrg.); Springer, LNBIP 5 (2008), ISSN: 1865-1348; S. 158 - 174.

The History 2005 -> 2008 – 2009 -2011



Adaptable Model Versioning



The History 2005 -> 2008 – 2009 -2011



- Missing or not standardized Unique IDs
 - In SysML V2: there will be a standardized ID.

The History 2005 -> 2008 – 2009 -2011



Adaptable Model Versioning

- K. Altmanninger, G. Kappel, A. Kusel, W. Retschitzegger, M. Seidl, W. Schwinger, and M. Wimmer, **AMOR - Towards Adaptable Model Versioning**, presented at the 1st Int. Workshop on Model Co-Evolution and Consistency Management, in conjunction with Models'08, 2008
- K. Altmanninger, M. Seidl, and M. Wimmer, **A survey on model versioning approaches**, International Journal of Web Information Systems (IJWIS), vol. 5, no. 3, pp. 271-304, 2009
- M. Wimmer, M. Seidl, P. Brosch, H. Kargl, and G. Kappel, **On Realizing a Framework for Self-tuning Mappings**, in Objects, Components, Models and Patterns - Proceedings of the 47th International Conference TOOLS EUROPE 2009, Springer, pp. 1-16, 2009
- P. Brosch, M. Seidl , K. Wieland, M. Wimmer, and P. Langer, **We can work it out: Collaborative Conflict Resolution in Model Versioning**, in Proceedings of the 11th European Conference on Computer Supported Cooperative Work (ECSCW 2009), Springer, pp. 207-214, 2009
- P. Brosch, P. Langer, M. Seidl, K. Wieland, M. Wimmer, G. Kappel, Colex: **A Web-based Collaborative Conflict Lexicon**, in Proceedings of the 1st International Workshop on Model Comparison in Practice @ TOOLS 2010, ACM, pp. 42-49, 2010.

Complete List of Publications:
<http://www.modelversioning.org/>



The History 2005 -> 2008 – 2009 -> 2011 – 2012 ->



LieberLieber
software gmbh

The History 2005 -> 2012 -> 2020



The ModelCVS Project

ITS WORKFLOW LOGIC

A Semantic Infrastructure for Model-based Tool Integration

AMOR
Adaptable Model Versioning

Adaptable Model Versioning

LemonTree®
Fresh Model Versioning

15 years of research and product development and already a big step forward.



JOHANNES KEPLER
UNIVERSITÄT LINZ



UNSER HEER

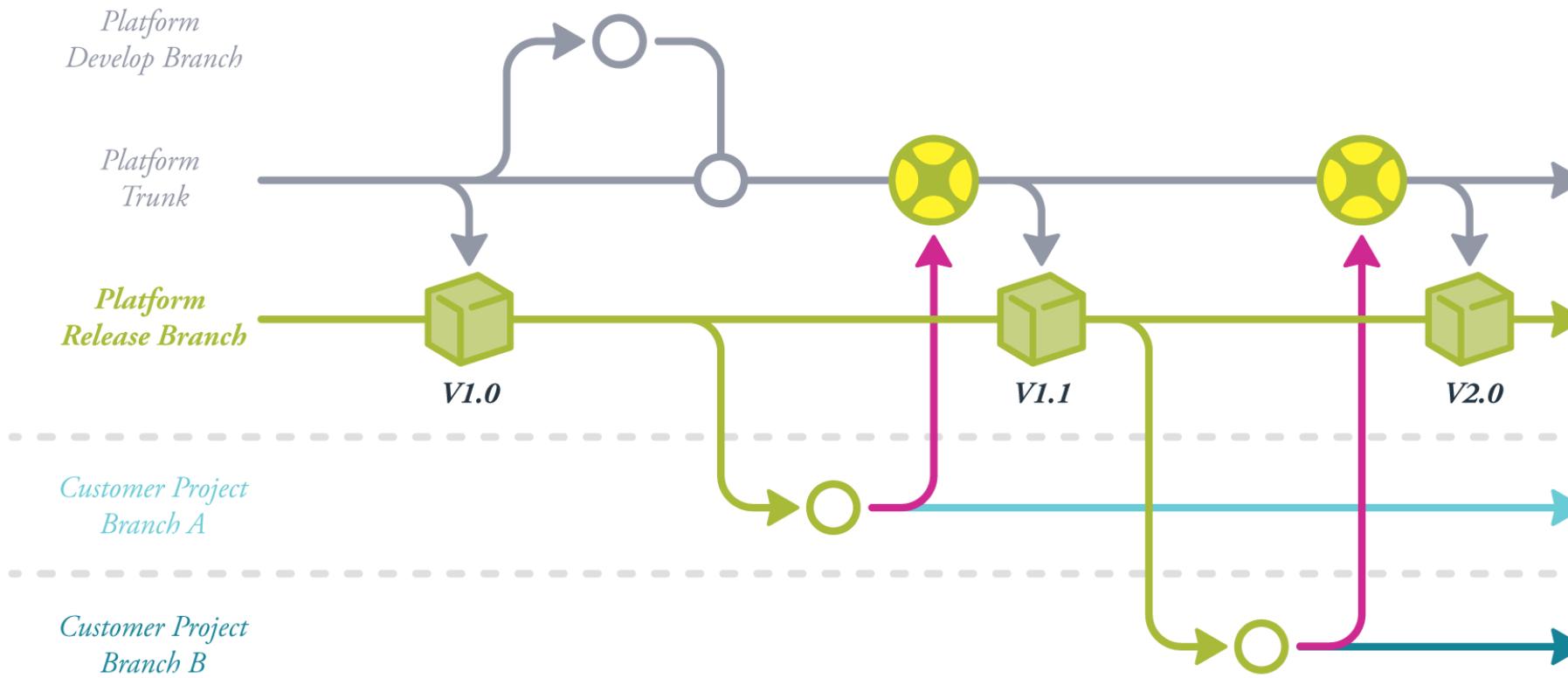
Arikan Productivity Group

SPARX
SYSTEMS
CENTRAL EUROPE

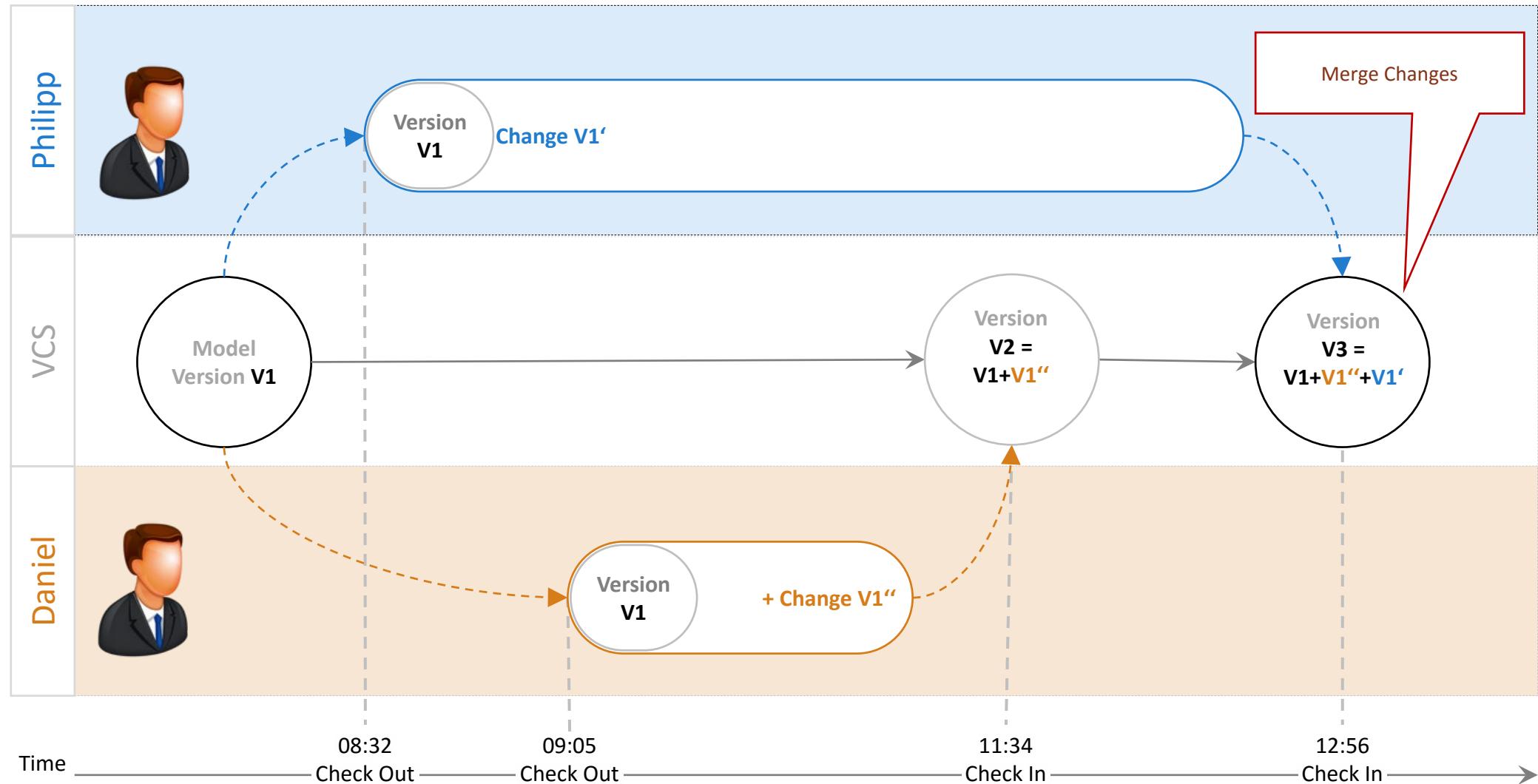
LieberLieber
software gmbh



Typical Scenario with Branching



3-Way Merging as Key Technology

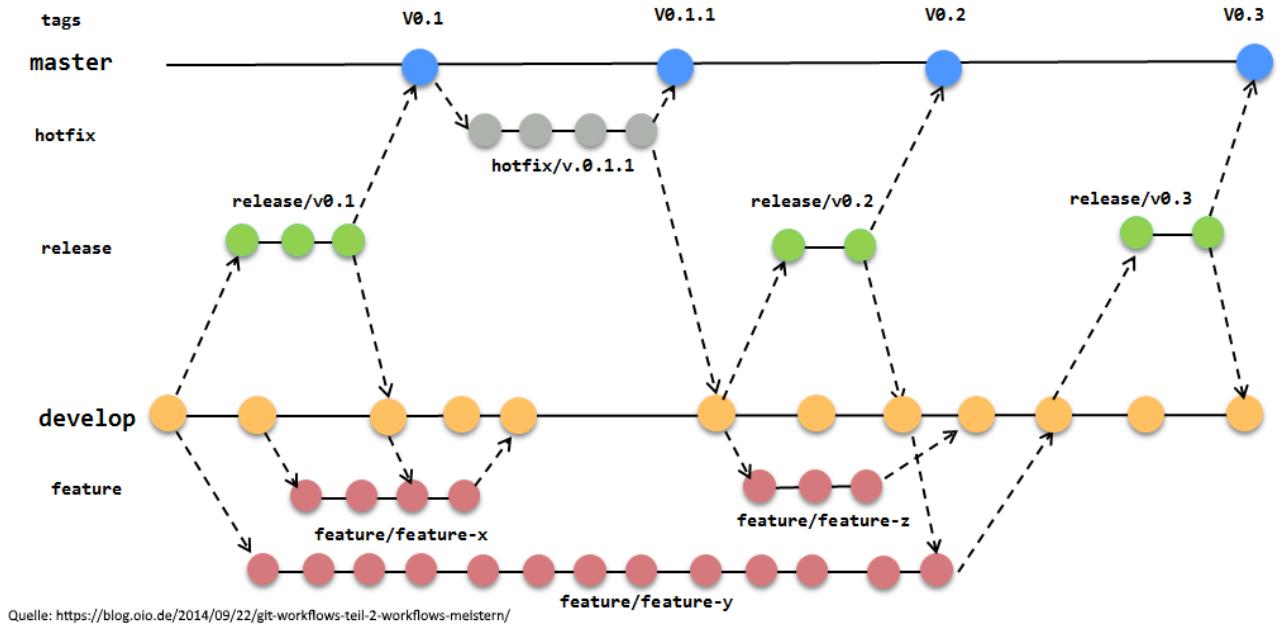


Goals for Branching in MBSE

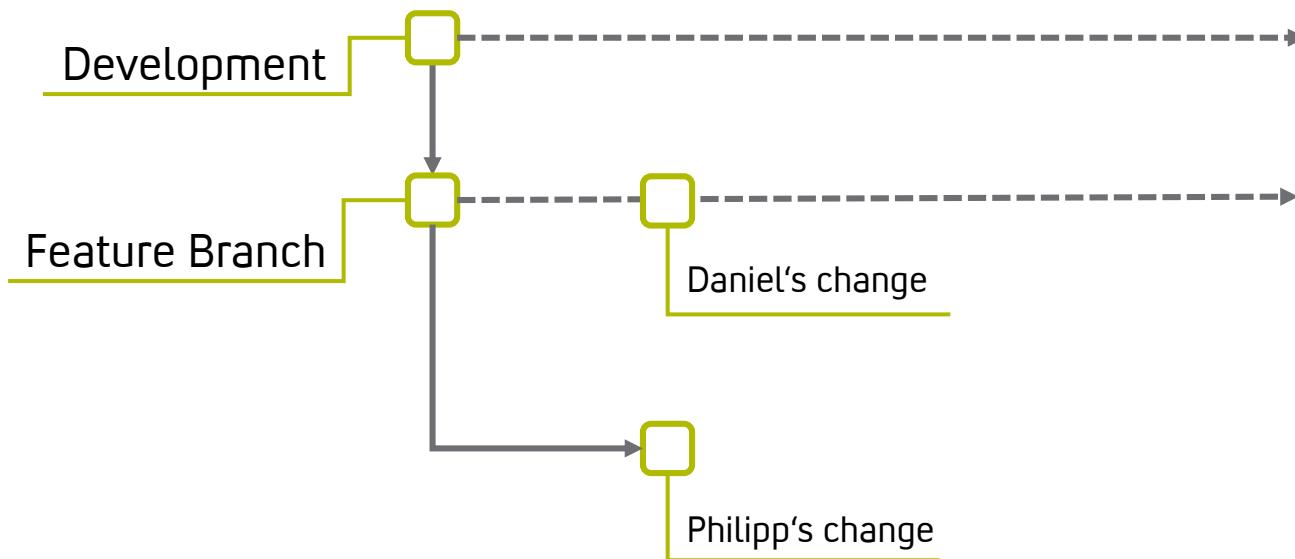
- Enhance modeling processes in the day-to-day work of software configuration management
- **Longer-Term, Parallel Development of Versions and Variants**
- Reuse of existing tools and workflows for system modeling
Example: Gitflow for Feature Branch based product development
- **Provide support for Functional Safety Critical Norms** – currently we have a certification tool kit for ISO26262



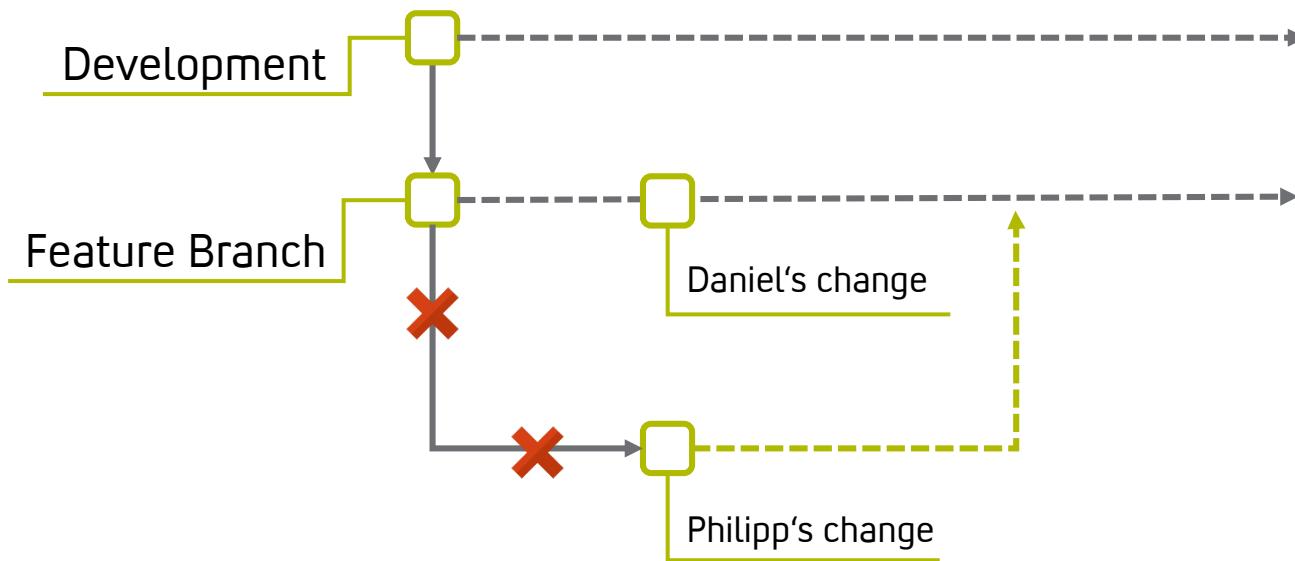
Initial situation



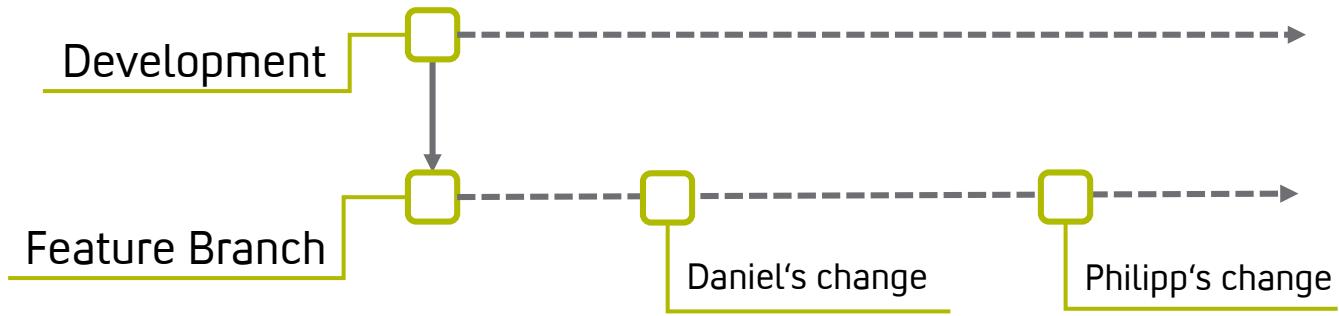
Working on a feature



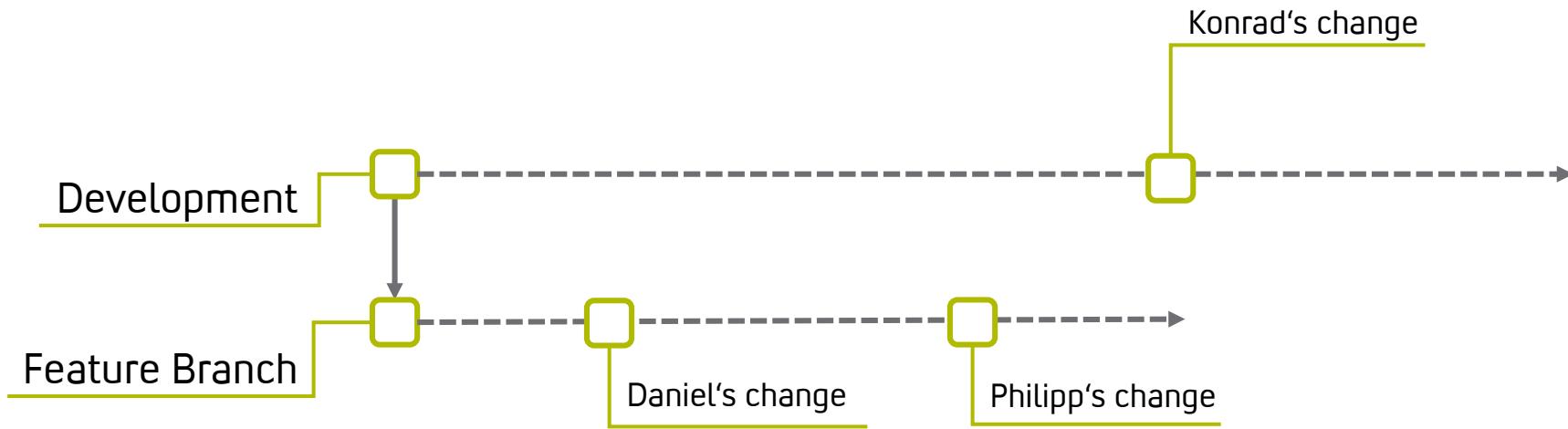
Working on a feature



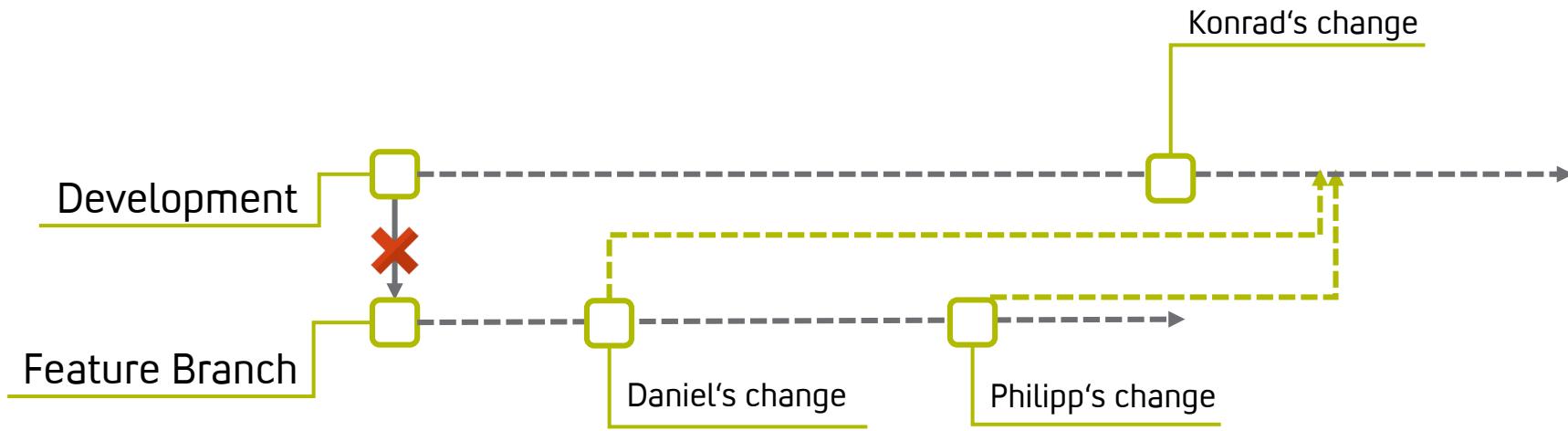
Working on a feature



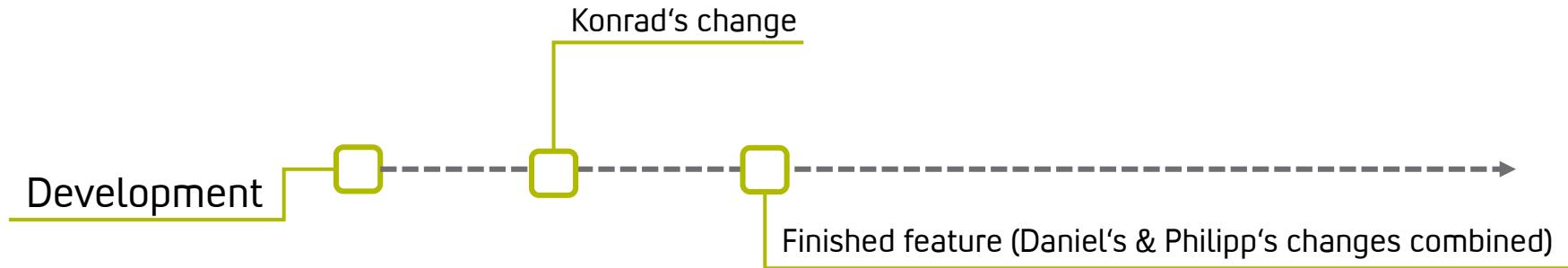
Integrate finished feature to develop



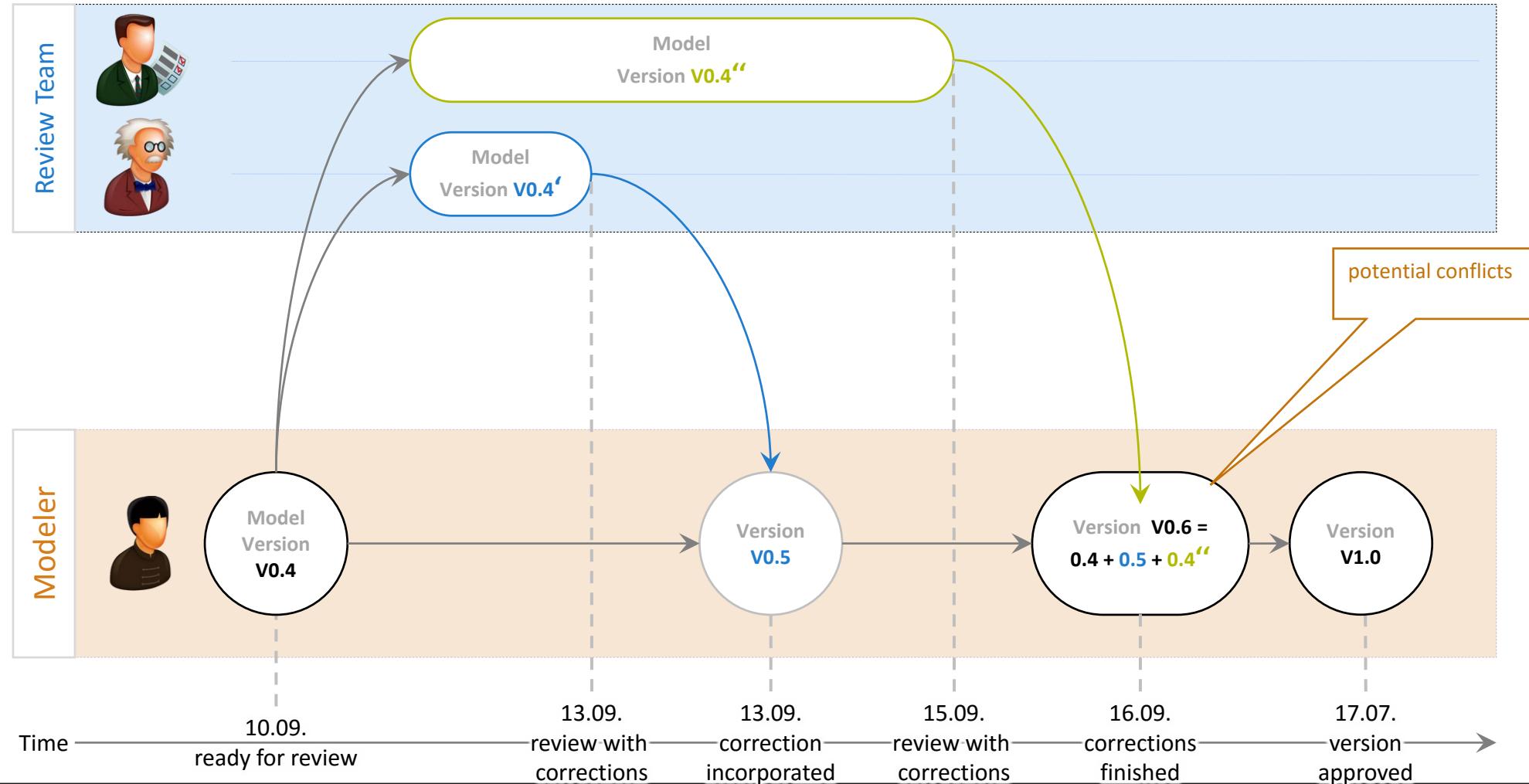
Integrate finished feature to develop



Integrate finished feature to develop



Review Process



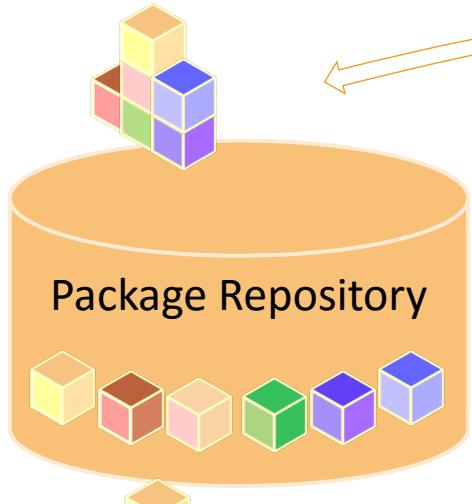
Conclusion

- Established workflows from SE for MBSE
- Agile team collaboration based on branching
- Consistent development state due to precise versioning
- Perfect triggers for peer reviews
- Outlook:
 - Continuous Integration for models

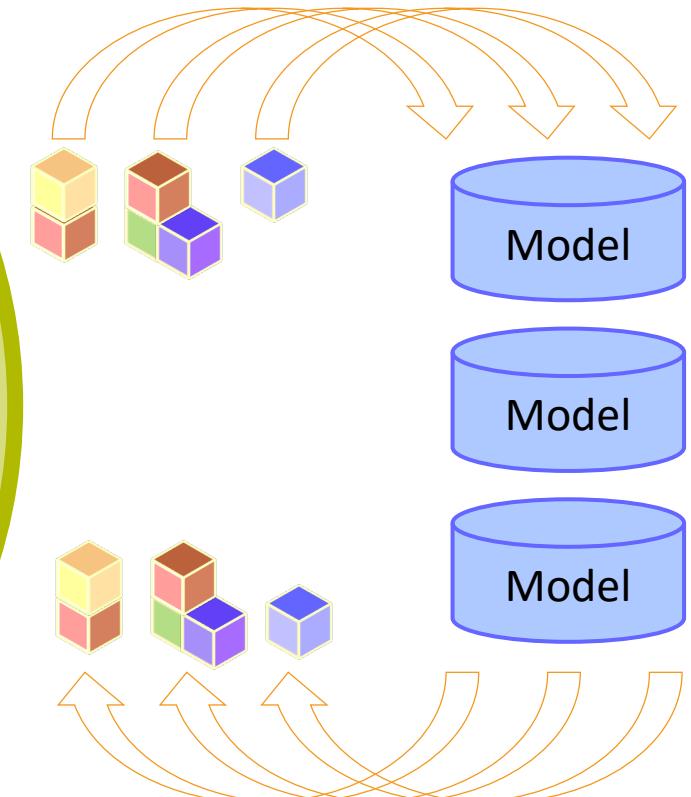
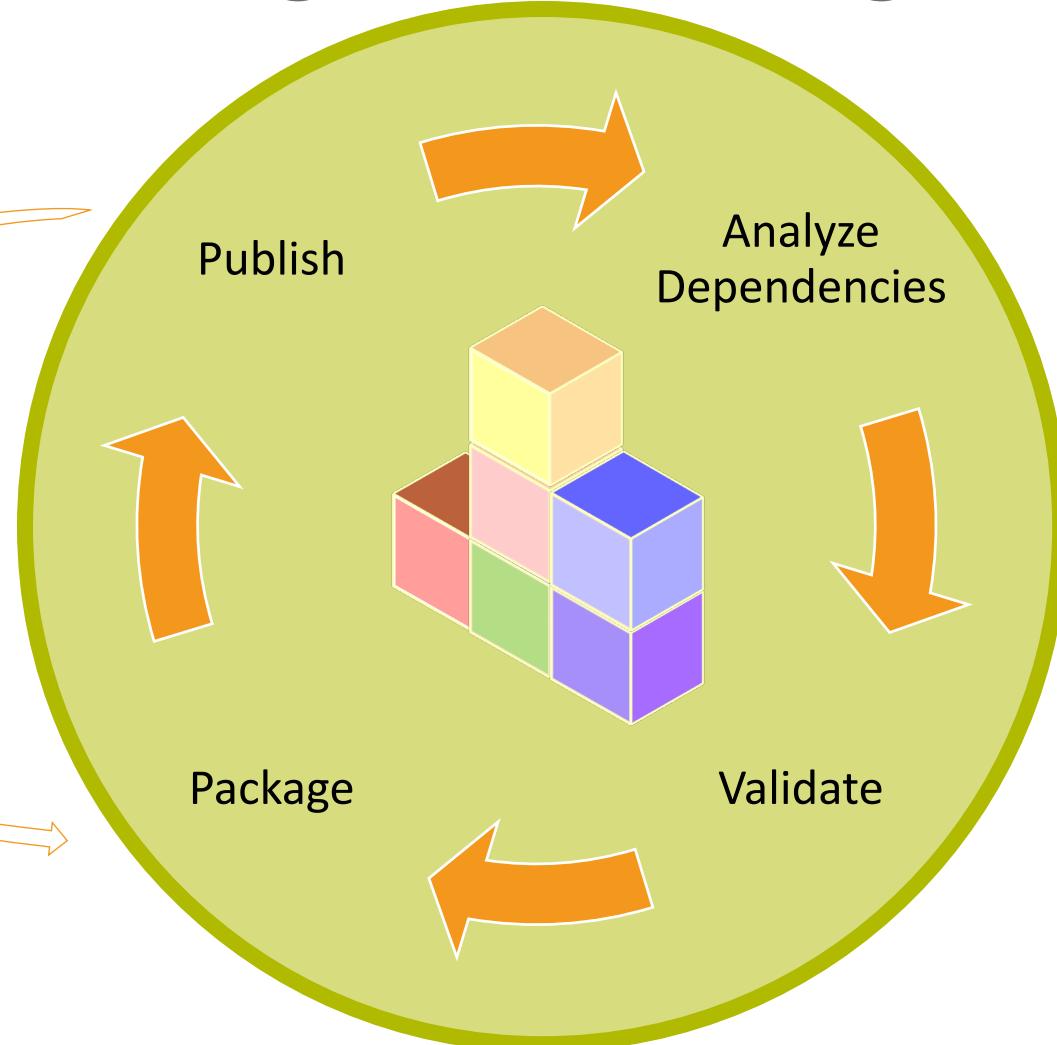


Outlook: Continuous Engineering as the high-end Agile Modeling

Consume valid Model Packages
with valid dependencies



Provide valid Model Packages
with valid dependencies



Thank you!

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