Model-Driven Software Development in Technical Spaces (MOST)
- aka Software Factories -

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http://st.inf.tu-dresden.de/teaching/most

WS 19/20-0.1, 10/3/19

DRESDEN concept
Exzellenz aus Wissenschaft und Kultur

Relation of the Course to Modules

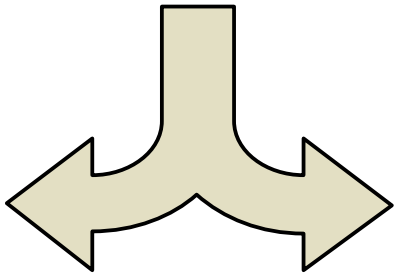
The course can be used for the following modules:

- Diplom Informatik: INF-BAS3, INF-VERT3
- Master Informatik: INF-BAS3, INF-VERT3
- Bachelor Medieninformatik: INF-B-540
- Master Medieninformatik: INF-BI-4, INF-BI-5
- Diplom IST: IST-B-321
- Diplom Informatik (2004): INF-04-FG-SWT
- Diplom Informatik (2004): FG 4 SE

For other programs, special rules may hold; consult the manuals of your "Nebenfach".

Master‘s Courses (Hauptstudium)

Softwaretechnologie II (Bachelor)
Modellierung, Entwurfsmethoden, Produktlinien, Geschäftsmodelle (WS)



Model-Driven Software Development in Technical Spaces
How to be productive in software development (WS)

Academic Skills in Computer Science
How to work scientifically (WS)

Requirements Engineering und Testen (Dr. Demuth)
Wie man Qualität für Software erzielt (WS)

Software-Management
Wie man Projekte macht (SS)

Design Patterns and Frameworks
Architektur objektorientierter Systeme (WS)

Softwarentwicklung in der industriellen Praxis
Ringvorlesung mit Industriedozenten

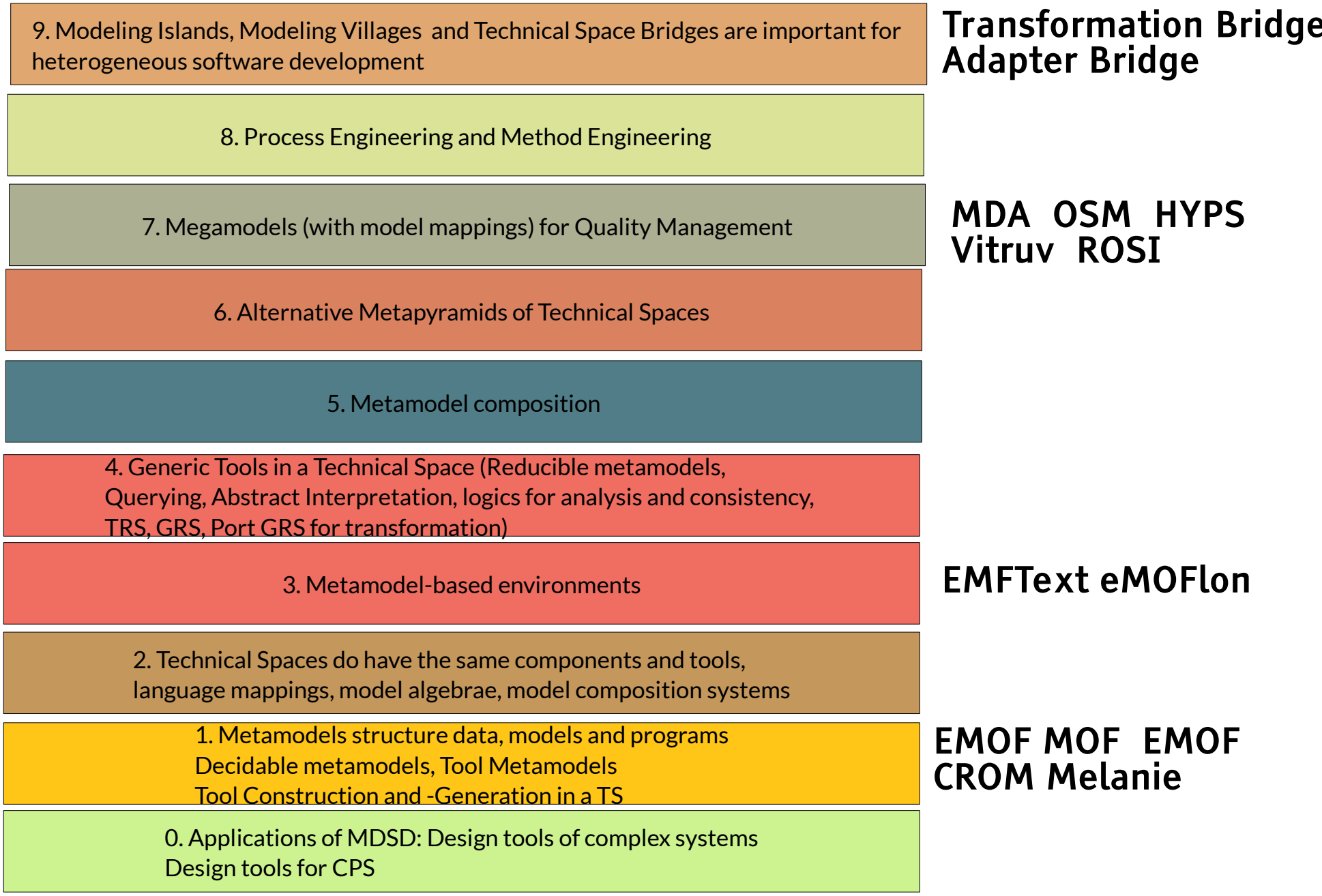
Ausgewählte Kapitel aus der Softwaretechnik (Dr. Götz)
Softwarearchitektur (SS)

Component-Based Software Engineering
Produktlinien mit anderen Komponentenmodellen (SS)

Software as a Business (WS)
How to develop a business model and a startup

Future-Proof Software Systems (Dr. Furrer)
Evolvable architectures (WS)

Central Topics of the Course



MDSD and Software Factories

- MDSD is the engineering of applications with *several related models* (inclusively code), based on systematic engineering of metamodels (languages) in technical spaces.
- MDSD therefore treats *heterogeneous models*
  - Treating different aspects of a system
  - Specified in different modeling languages
  - Living in different *technical spaces*
- How are models related?
  - Model cover by matching rules
  - Model mappings
  - Model transformations
- How are the languages related?
  - By mapping
  - By role fattening
- How are the technical spaces related?
  - By macromodelling

Engineering of Technical Spaces, Megamodels, and Software Factories

- Def.: A ***megamodel*** is a set of systematically related, heterogeneous models.
- Megamodelling treats heterogenity
  - Requires model integration techniques
- Engineering of Technical Spaces and Megamodels is one of the most important topics of the future of software and systems development
- Dresden has modern technologies and tools based on megamodels
  - Role-and context-based languages (CROM, SCROLL)
  - Invasive composition (SkAT)
  - Metacomposition tools (Reuseware, SkAT, Style Sheets)
  - Round-Trip Engineering and Role-based tools

Outline

Teil I: Basics

- 1. Modeling
- 2. MDSD Applications
- 3. Tools and Materials Pattern Language (TAM)
  - Roles and collaborations
- 4. Metamodeling in the (E)MOF technical space
  - The Technical Space House
- 5. Bridging the TS Grammarware and EMOF with EMFText
- 6. Tool architecture
  - Repositories
  - Role modeling and the Role-Object Pattern
- 7 Megamodels

- Part II Treating heterogenity in TreeWare
- 20. Grammarware
  - Parser generators
  - Text algebrae
- 21 Treeware
  - Query
- 22 Deep Analysis in Treeware
  - Abstract interpretation
- 23 Link-Treeware
  - XML, JSON, Xcerpt
- Part III Treating heterogenity in GraphWare
- 24 Flat Analysis in Graph- and Modelware
  - Semmle .QL, TGreQL
- 25 Deep Analysis in Graphware
  - Reachability
- 26 Graph and Model Transformations
- 28. MOFLON as example

Outline Part III-VI – Architecture of Software Factories

Part IV: Architecture and Composition of Tools to Applications

- 30. Architecture
  - Tool integration
  - Exchange formats
  - Bridges between technical spaces
  - Composition of stream-based tools
- 31. Role-based composition of languages for the composition of materials
  - And tools
- 32. Stream-Based integration
- 33. MetaCASE tools (MetaEdit+)
- 34. MOFLON

- Part V: 1-TS Software Factories
  - 40. Requirements and Test Management in ReDeCT
  - 41. Model-Driven Architecture
  - 42. Documentation
- Part VI: Synchronization and Round-Trip Engineering
  - 40. Round-Trip Engineering
  - 41. Triple Graph Grammars
  - 42. Orthographic Software Modeling
- Part VII: Multi-TS Software Factories
  - 60. The MOST factory
  - 61. Conclusion

Literature - Books

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- Wolfgang Hesse. More matters on (meta-)modelling: remarks on Thomas Kühne's 'matters'. Software and System Modeling, 5(4):387-394, 2006.

ST Works in the Last Years

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