Naomod 2024

Massimo Tisi

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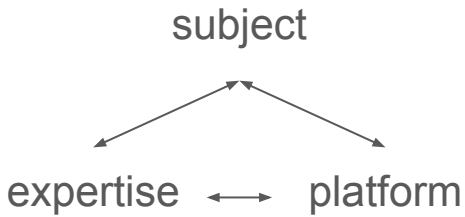
Process

“Team engineering”

- Subject
  - Defining motivating mission
  - Being attractive for companies, students, funding agencies
- Expertise
  - Defining perimeter (wider than subject)
  - Monitoring literature
- Platform
  - Getting users
  - Accessing funding
  - Increasing synergies



Timeline

- Feb
  - Agreeing on main points
  - Updating naomod.github.io with **expertise**
- Mar-Apr
  - Writing a paper, e.g. “Towards …: Overview of the State-of-the-Art and Research Directions”
- May-Aug
  - Working at papers and proposals on the subject
- Sep
  - If we are happy, publishing team **subject** and **platform**

State

Neighbor teams

Velo (LS2N, Nantes)

- Verification for Environment and Software
- The VELO team studies formal methods for the modelling and analysis of models for complex systems.
- These systems can be of any type, but we are particularly interested in the modelling of large-scale natural systems (from the environment) and software systems.

P4S (IMT Atlantique, Brest)

- Processes for Safe and Secure Software and Systems
- Our interest is in (methods and tools) to (specify and describe) (systems and software) so that (evaluation and analysis) ((increase confidence) and (ensure (safety and security)))
- We use: System modeling; Process modeling
- We rely on: Models federation; Free modeling; Formal Verification
- We apply to Industry of the Future.

Diverse (Inria, Rennes)

- Variability-centric software engineering
- Main Topics: Modeling and Languages Engineering, Advanced testing, DevOps for distributed and heterogeneous systems, Variability Engineering

Other teams

- York: Automated Software Engineering Research Group
- Madrid: Modeling and Software Engineering
- Malaga: Atenea Research Group - Modeling Software Systems
- Luxembourg: Software Engineering
- Aachen: Software Engineering
- Linz: Software Engineering

GEODES

GEODES is the **software engineering** research group of the Department of Computer Science and Operations Research (DIRO) at the University of Montreal. Growing in numbers, our group is currently led by **4 professors**: Houari SAHRAOUI, Benoit BAUDRY, Eugene SYRIANI, Michalis FAMELIS, and counts 22 students and researchers.
Our research spans through the whole software engineering lifecycle, with a special emphasis on the requirements, design, development, and maintenance phases.

Focus areas

Requirements & Design

- Goal modeling
- Design-time uncertainty
- Product lines
- Software rationale

Modeling & Simulation

- Domain-specific languages
- Collaborative modeling
- Simulation-based design
- Digital twins

AI & Optimization

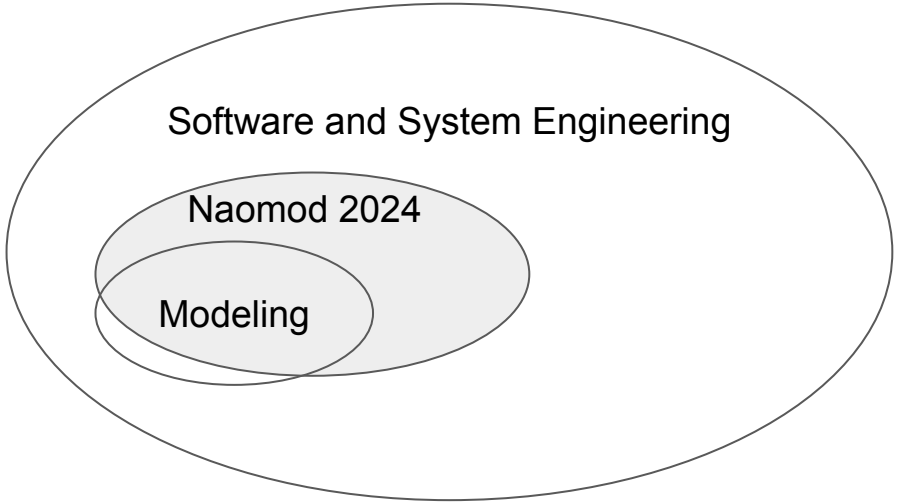
- Code synthesis
- AI-powered assistance
- Pattern mining
- Recommender systems

Github repositories

Team	Role	Repository	Stars
Stack	contrib	https://github.com/openstack/openstack	5100
Gallinette	contrib	https://github.com/coq/coq	4500
TASC	maint	https://github.com/chocoteam/choco-solver	656
Naomod	maint	https://github.com/atlanmod/NeoEMF	49
Naomod	user	https://github.com/microsoft/vscode	155000
Naomod	user	https://github.com/langchain-ai/langchain	74800
Naomod	user	https://github.com/eclipse-theia/theia	18700
Naomod	user	https://github.com/eclipse/xtext	734
Naomod	user	https://github.com/eclipse-langium/langium	533
Naomod	user	https://github.com/eclipse/capella	189
Naomod	user	https://github.com/eclipse-emfcloud/coffee-editor	67

Some ideas

Naomod 2024



we may also just increase the domains

Modeling

Modeling languages are specifically designed for:

- **reasoning** on software and systems
  - by humans and/or machines
- **communication** about software and systems
  - human/human, human/machine, machine/machine

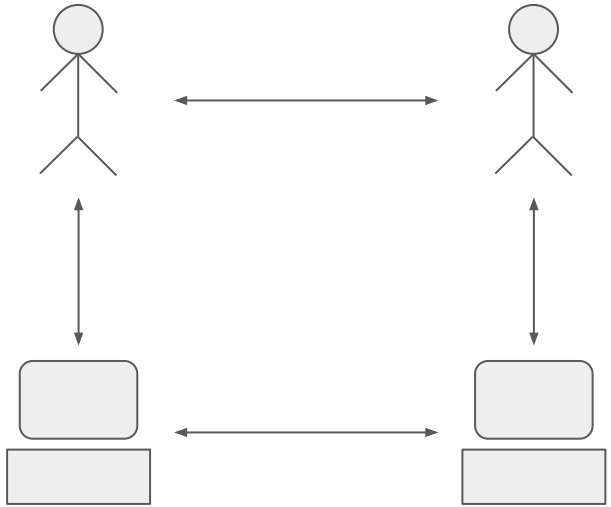
Modeling is successful

- it takes one third of [Roger Pressman and Bruce Maxim. Software Engineering: A Practitioner's Approach 9th Edition. McGraw Hill, 09 2019. ISBN 9781259872976]

MDSE not too much

- e.g. wide gap model/system (no "platform models")

What about low-code?



2024: (Generative) AI as engineers

Fundamentally new

- as **reasoning** capabilities
- as actors for **communication**

Best simulators so far of human-like reasoning

Related work from 2023

Can be used without training

- i.e. no need of strong background in ML

Interesting for our community:

- Modeling 4 AI
  - more precise communication
  - better reasoning
  - …
- AI 4 Modeling
  - helping citizen developers
  - filling the model/system gap
  - evaluating modeling languages
  - …

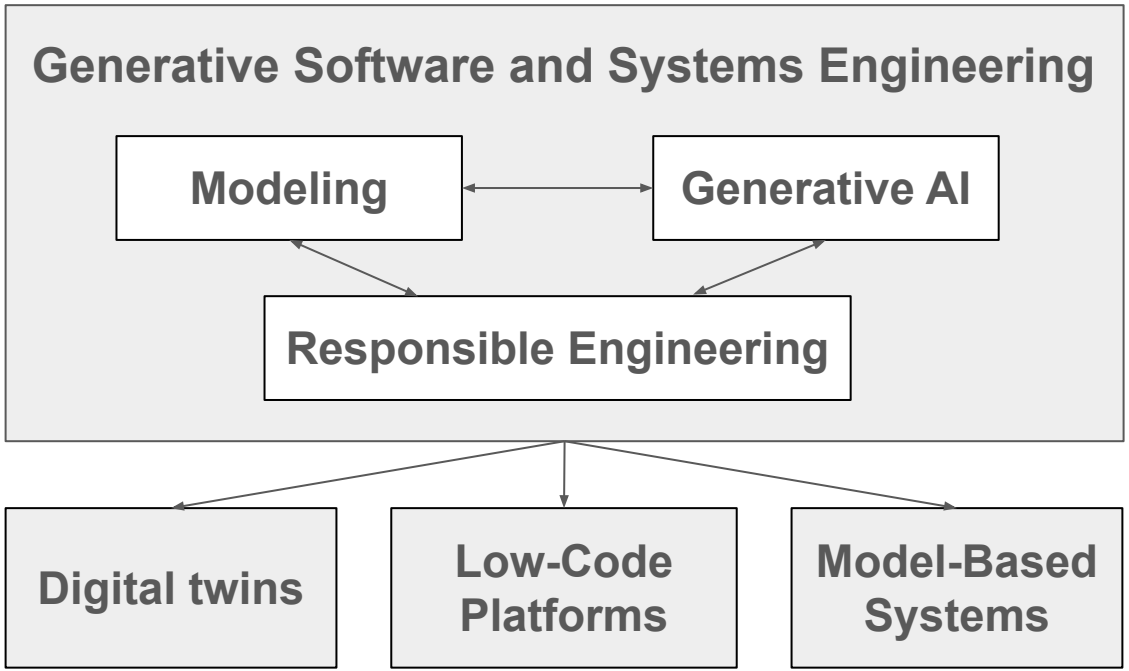
Expertise (short term)

Responsible SE
- Sustainability
- Testing
- Debugging
- Verification
- Energy efficiency
- Sovereignty

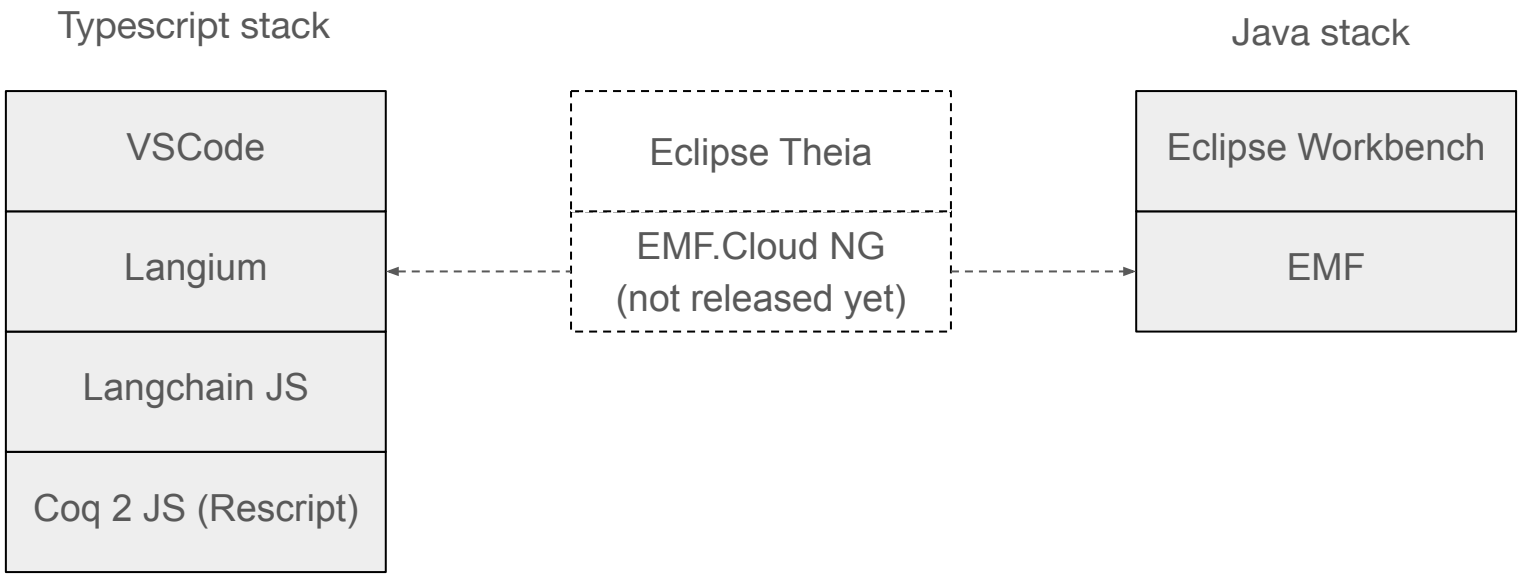
Modeling
- Domain-Specific Languages
- Transformations
- Views
- Architecture
- Low-code
- Digital twins

AI for SE
- Generative AI
- Graph neural networks
- Constraint programming
- Automated theorem proving

Focused subject (long term)



Platform stacks



To be continued