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# Virtual EMF - Transparent Composition, Weaving and Linking of Models

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# Virtual EMF

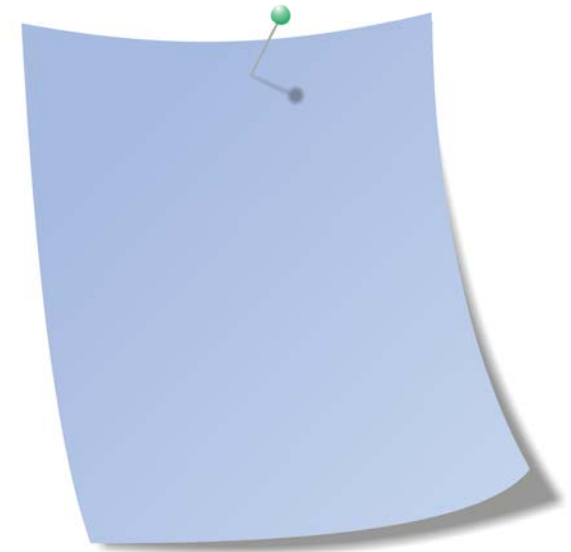
## Transparent Composition, Weaving and Linking of Models

Hugo Brunelière (AtlanMod)  
& Grégoire Dupé (Mia-Software)

EclipseCon Europe 2011  
November 2<sup>nd</sup>, 2011

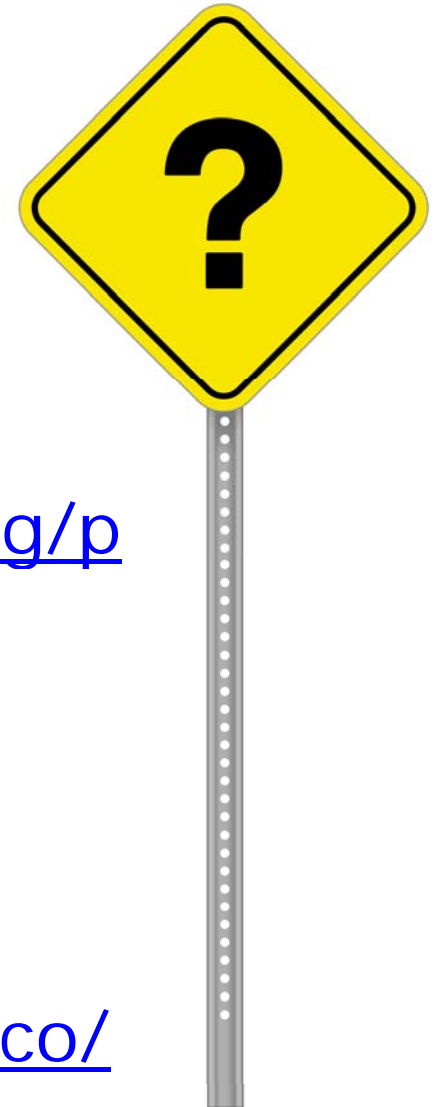
# Outline

- **What's this talk about?**
  - Everything in one slide!
- **Virtual EMF in a Nutshell...**
  - Why “virtual”? Overview...
  - How “virtual”? Architecture...
  - Many potential real applications!
  - A brand new prototype on Eclipse Labs
- **MoDisco for the Use Case...**
  - What? The Eclipse-MDT project...
  - What for? The generic and extensible framework...
- **Virtual EMF in Action on a MoDisco Scenario...**
  - Demo time!!!
- **Who We Are...**
  - AtlanMod (INRIA) & Mia-Software

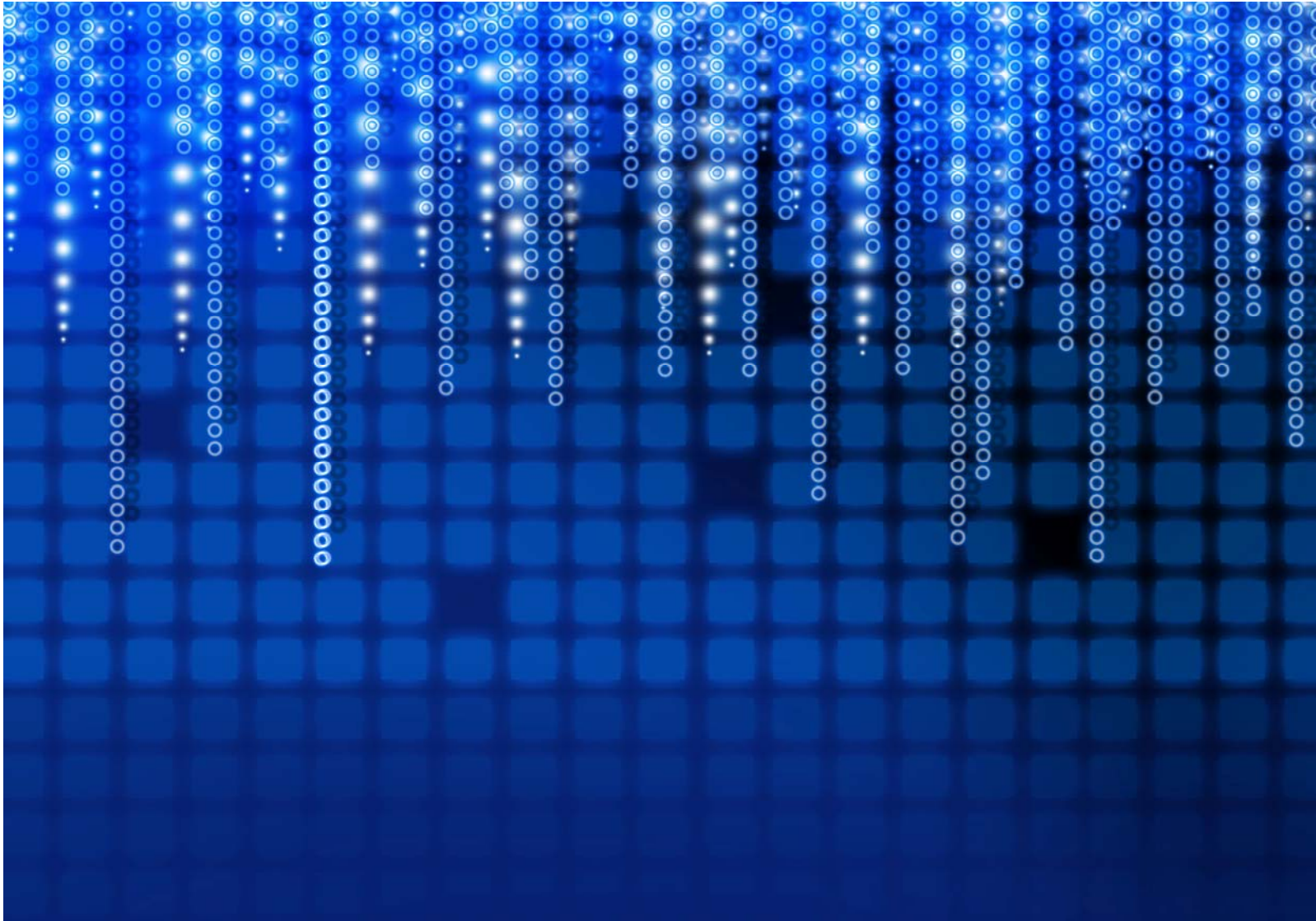


# What's this talk about?

- **Virtual EMF** (for the purpose)
  - A new prototype dedicated to the transparent composition, weaving and linking of models
  - A direct extension of EMF
  - An Eclipse Labs project  
<http://code.google.com/a/eclipselabs.org/p/virtual-emf/>
- **MoDisco** (for a possible use case)
  - A generic and extensible framework for elaborating on Model Driven Reverse Engineering solutions
  - A MDT project: <http://eclipse.org/MoDisco/>

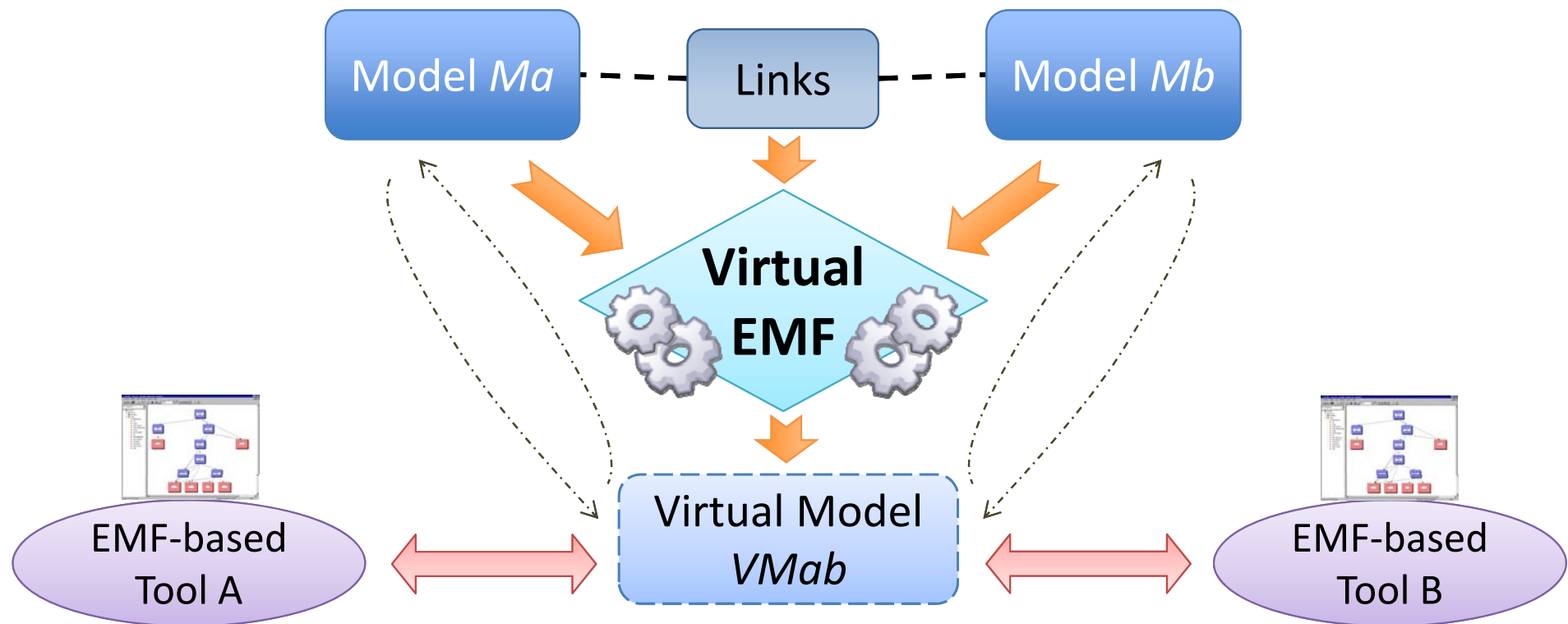


# Virtual EMF in a Nutshell...



# Why “virtual”? Overview...

- Definition: *“a virtual model is a model whose (virtual) elements are proxies to elements contained in different models”*



# Why “virtual”? Overview...

- Virtual model properties:
  - **Interoperability.** Transparent use with all standard modeling tools
  - **Scalability.** Support for very big models
    - **Faster creation time.** No additional copy of model elements
    - **Low memory usage.** No data duplication, direct access to model elements
  - **Synchronization.** Automated because of shared model elements
  - **Genericity.** Support for all types of inter-model links (e.g.; associate, filter, merge, ...)

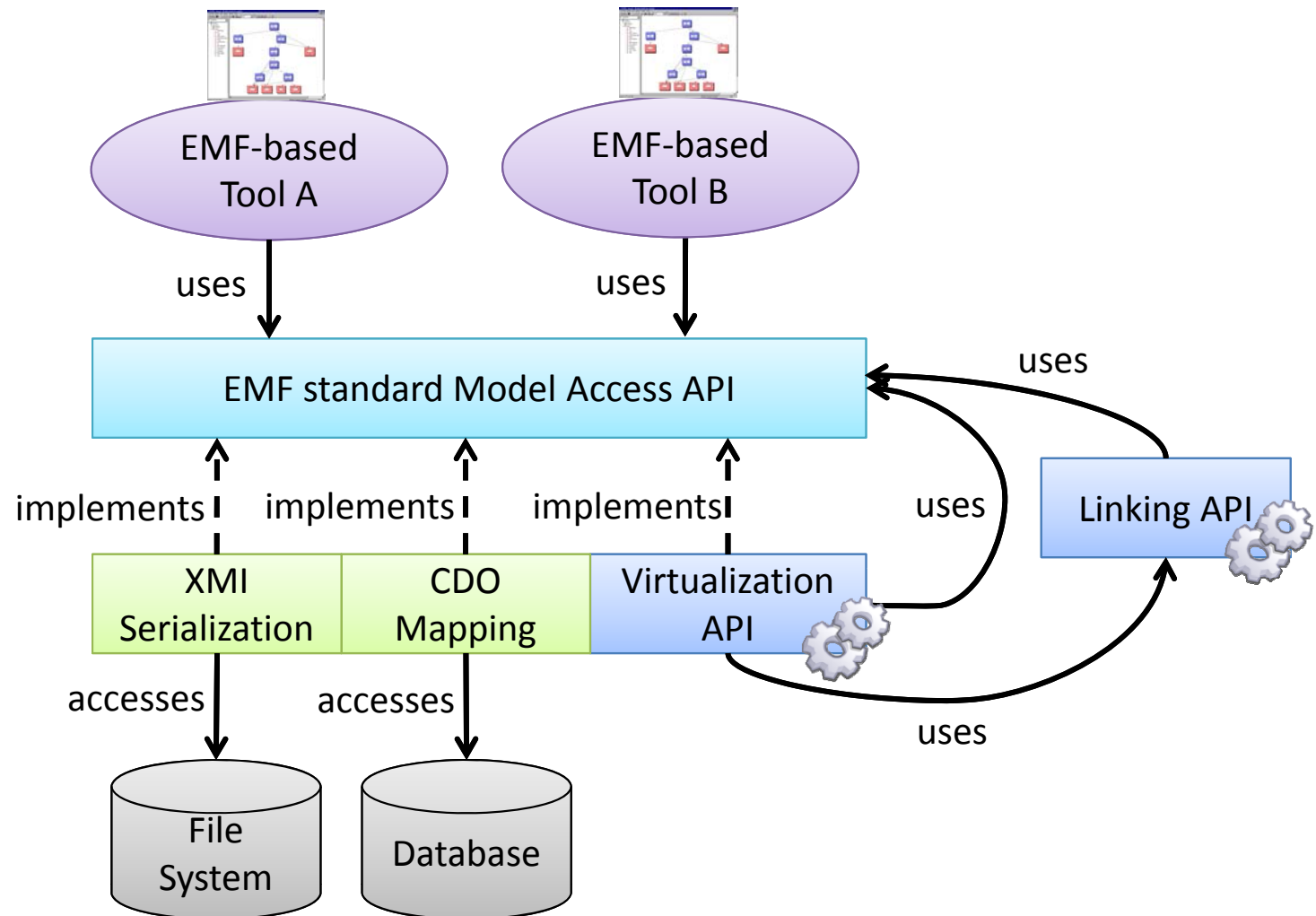


# How “virtual”? Architecture...

- **Virtual EMF** is made of 2 main components

- Implement the Model Access API

- Manage the “virtual” links





# How “virtual”? Architecture...

## ■ **Virtualization API**

- Refinement of base EMF model access operations (e.g.; *createResource*, *eGet*, *eSet*, ...)
  - Retrieval of referenced elements
  - Support for virtual links
- Generation of the “virtual” composed metamodel
  - Could be also “virtualized” in next versions

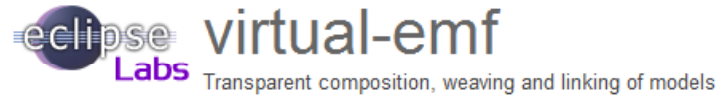
## ■ **Linking API**

- Current implementation via a model weaving technology (AMW), others may be provided later
  - Representation of inter-model relationships
  - Transparent usage of virtually linked elements

# Many potential real applications!

- **Model association** in general
  - E.g.; transparent inter-model dependencies
- **Model composition**
  - E.g.; complementary models integration
- **Model merging**
  - E.g.; similar models fusion
- **Model filtering**
  - E.g.; model elements hiding
- **Model overriding**
  - E.g.; duplicated elements removal
- **Etc.**

# A brand new prototype on Eclipse Labs

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## Project Information

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## Virtual EMF

When using the Eclipse Modeling Framework (EMF), one frequently faces the problem of having to deal with several large heterogeneous and interrelated models. The information relevant for a specific user at a given time is often scattered across those models. Therefore, we often have the need for composing, weaving or simply linking (parts of) these models in order to provide a more unified and usable view of the modeled system(s). With the currently available technologies, this is not a trivial task. Ideally, we would like to have a kind of *virtual model* offering a centralized and transparent access point to a global view on these different interconnected models.

The nature of a (EMF) virtual model should be such that:

- It behaves as a normal model, so interoperability (compatibility with existing EMF-based solutions/tools) is guaranteed;
- There is a perfect synchronization between the composed view (virtual resource) and the original models;
- Performance is not an issue, because neither creating nor accessing the global view results in additional costs (loading time, memory usage, etc.).

Virtual EMF is a brand new tool to allow tackling this issue. The tool enables users to efficiently access, handle and combine a set of interrelated EMF models in a completely transparent way.

A [talk](#) presenting Virtual EMF has been accepted at [EclipseCon Europe 2011](#).

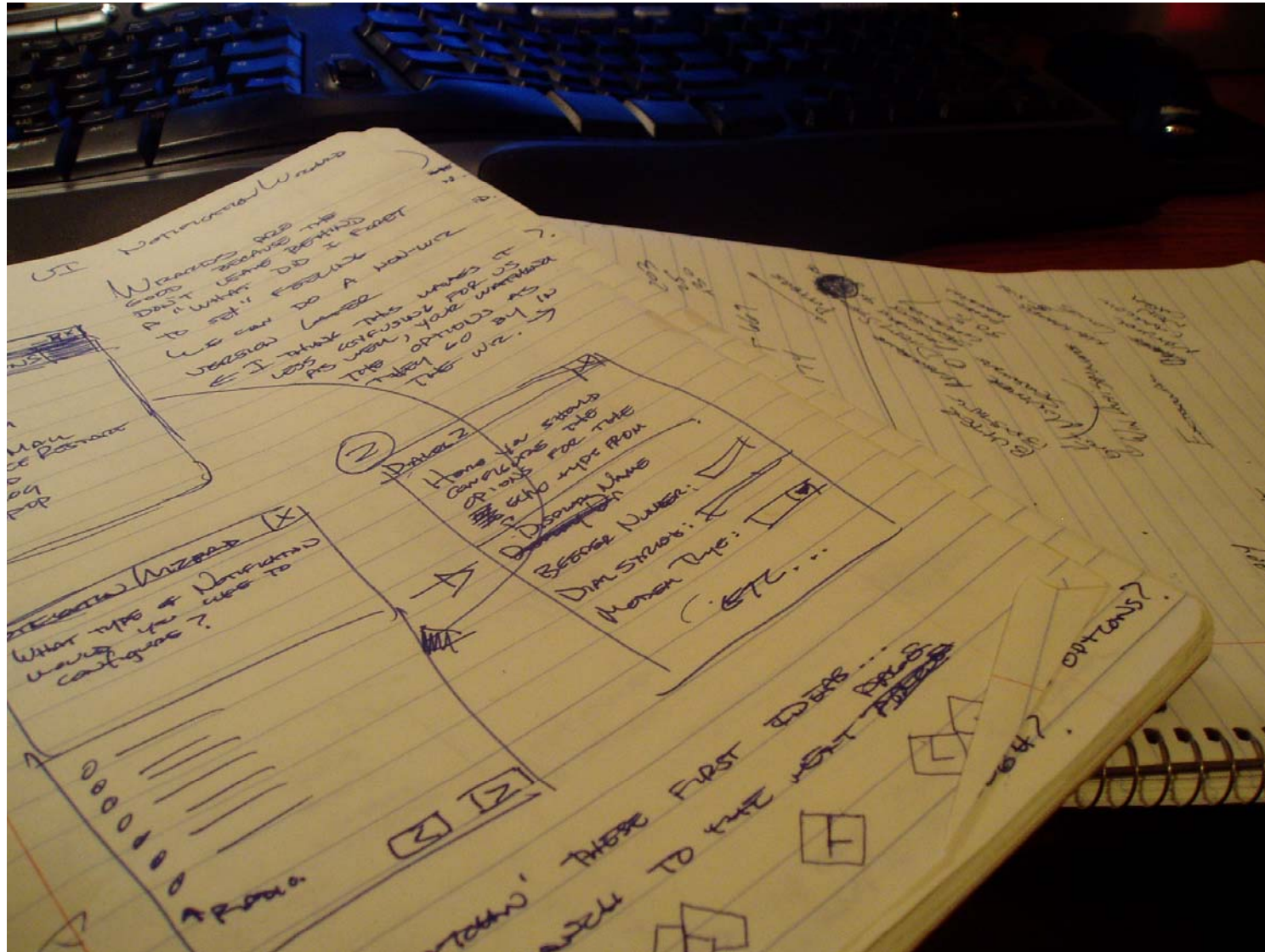
## Documentation

- [Installation](#)
- [User guide](#)
- [Examples](#)

## Publications

- Cauê Clasen, Frédéric Jouault, Jordi Cabot. "[Virtual Composition of EMF Models](#)". In: *IDM2011 - 7èmes Journées sur l'Ingénierie Dirigée par les Modèles*. Jul 2011, Lille, France.
- Cauê Clasen, Frédéric Jouault, Jordi Cabot. "VirtualEMF: a Model Virtualization Tool". In: *ER2011 - 30th International Conference on Conceptual Modeling*. Oct 2011, Brussels, Belgium. To appear.


# MoDisco for the Use Case...



# Eclipse-MDT MoDisco



An **Eclipse framework** to support the elaboration of **Model Driven Reverse Engineering** solutions

- Official Eclipse Modeling project (in MDT)
  - Open-source (EPL)
  - Based on other Eclipse Modeling projects
  - Released with Helios & Indigo
- Supported by the 
  - Reference implementations for ADM (Architecture Driven Modernization) standards:
    - KDM (Knowledge Discovery Metamodel)
    - SMM (Structured Metrics Metamodel)
    - ASTM (Abstract Syntax Tree Metamodel)





# MoDisco Overall Architecture

## Supported Technologies

### Java

- ✓ Metamodel
- ✓ Discoverer
- ✓ Generator
- ✓ Transfo. to KDM/UML

### JSP

- ✓ Metamodel
- ✓ Discoverer
- ✓ Generator

### XML

- ✓ Metamodel
- ✓ Discoverer
- ✓ Generator

...

## Discovery Manager



Plug and orchestrate transformations

## Model Browser



Navigation through complex models

## Customization & Extensibility



Definition of specific viewpoints

## OMG/ADM Standards



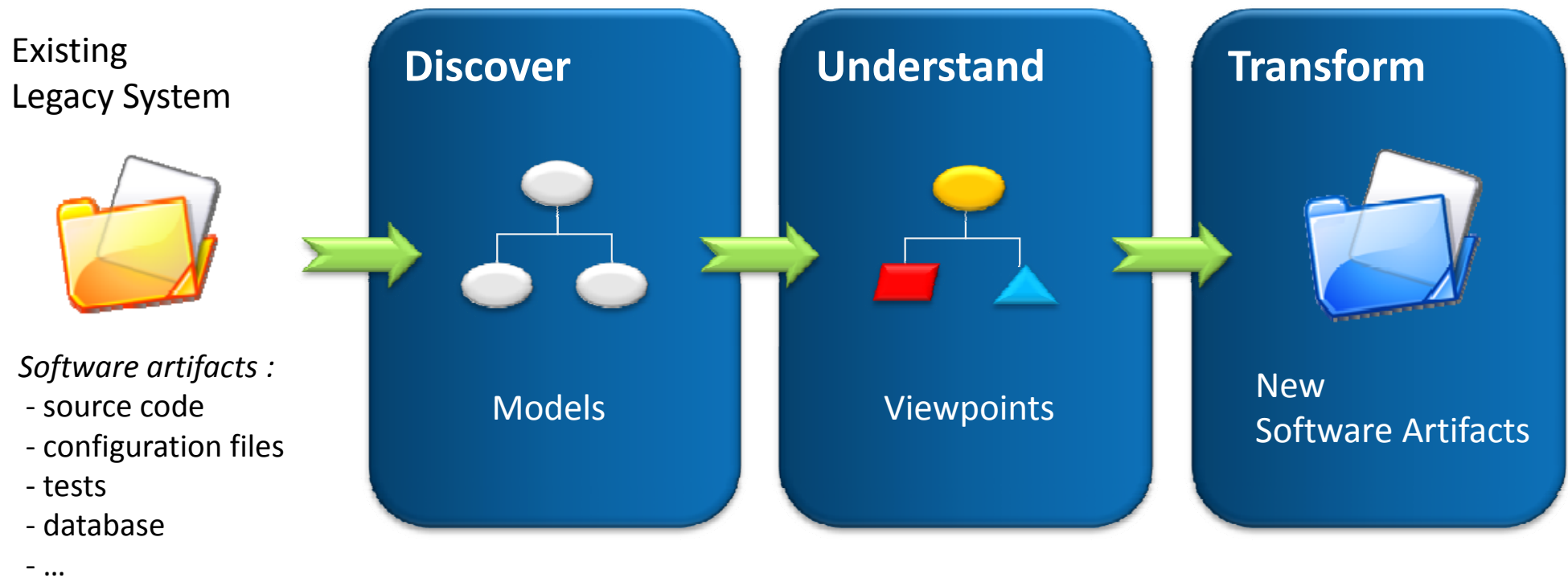
Pivot metamodels (KDM, ASTM, SMM)

## Infrastructure

## Eclipse Modeling projects

# Model Driven Reverse Engineering (MDRE) Approach in MoDisco

- Use **models** to represent and manipulate **artifacts** from existing systems



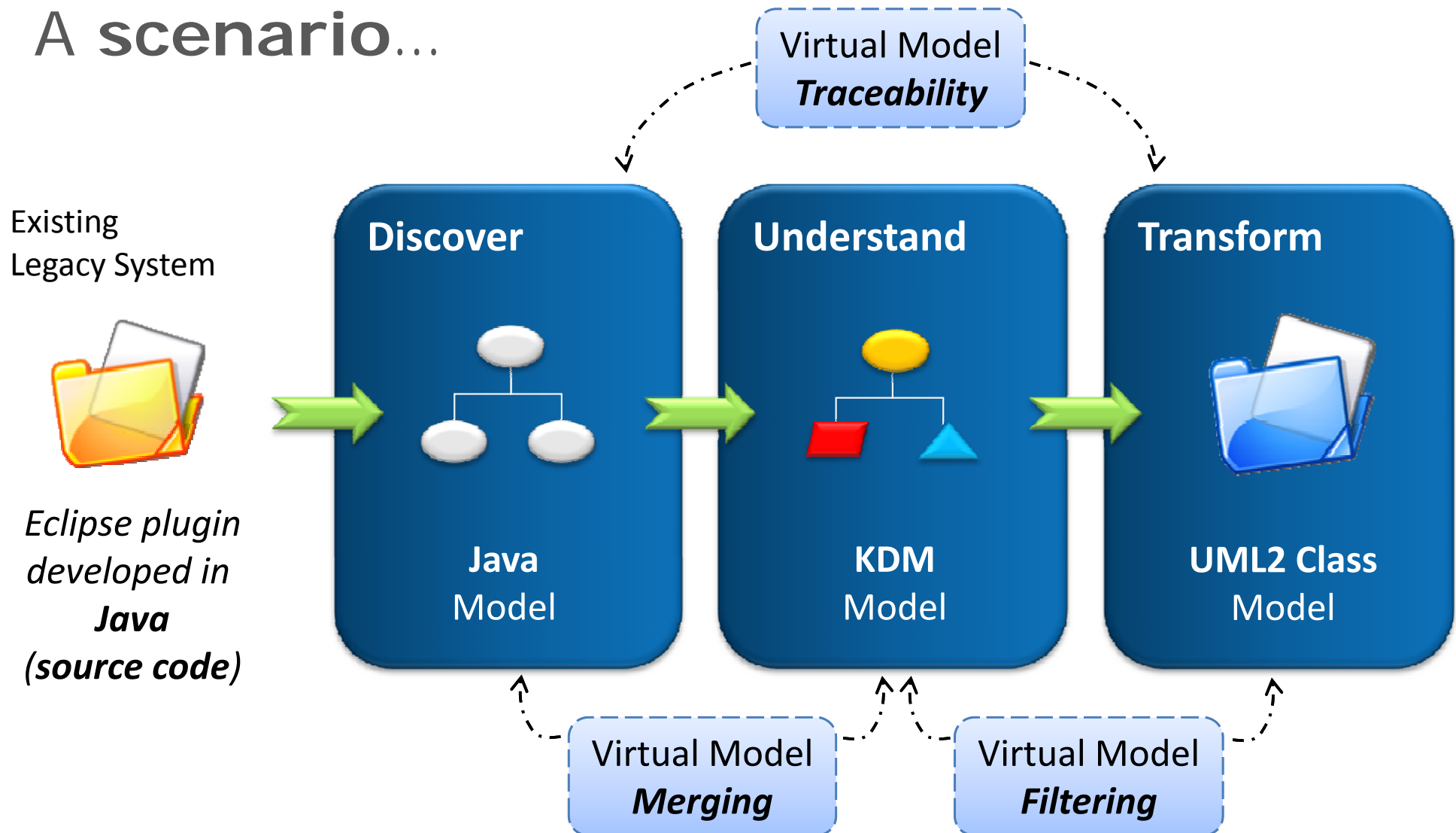


# Virtual EMF in Action on a MoDisco Scenario...



# Virtual EMF Applied in a (MoDisco) Reverse Engineering Context

## ■ A scenario...

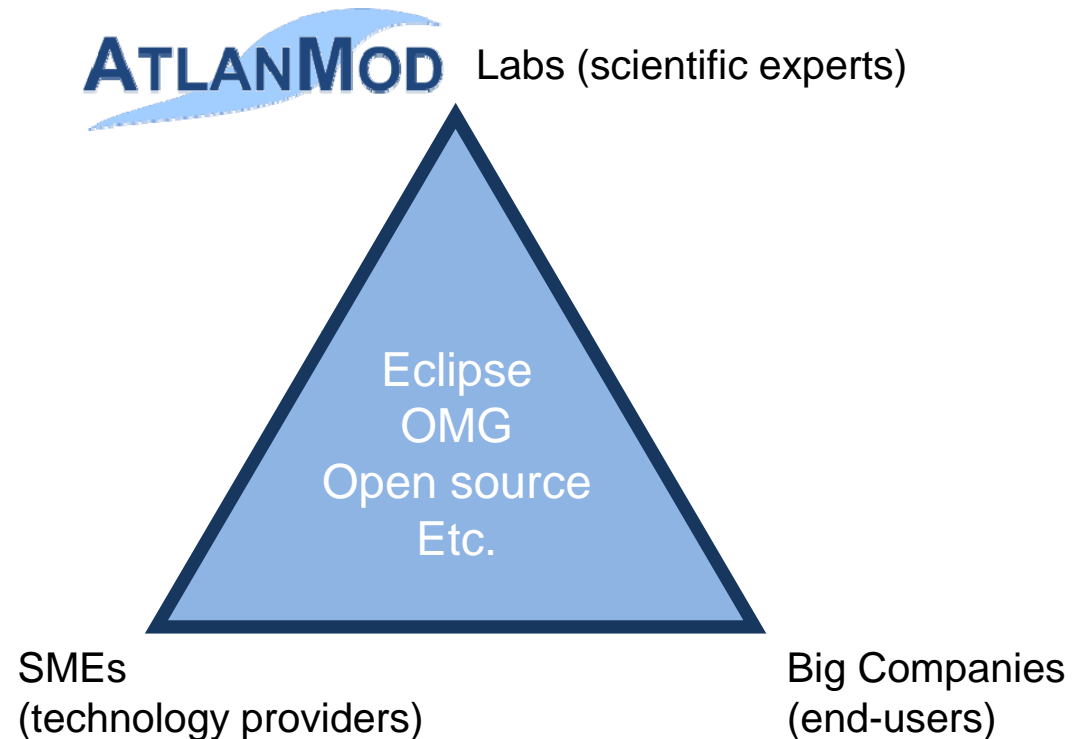


# Who We Are?



# AtlanMod – An Expert Research Team in Modeling

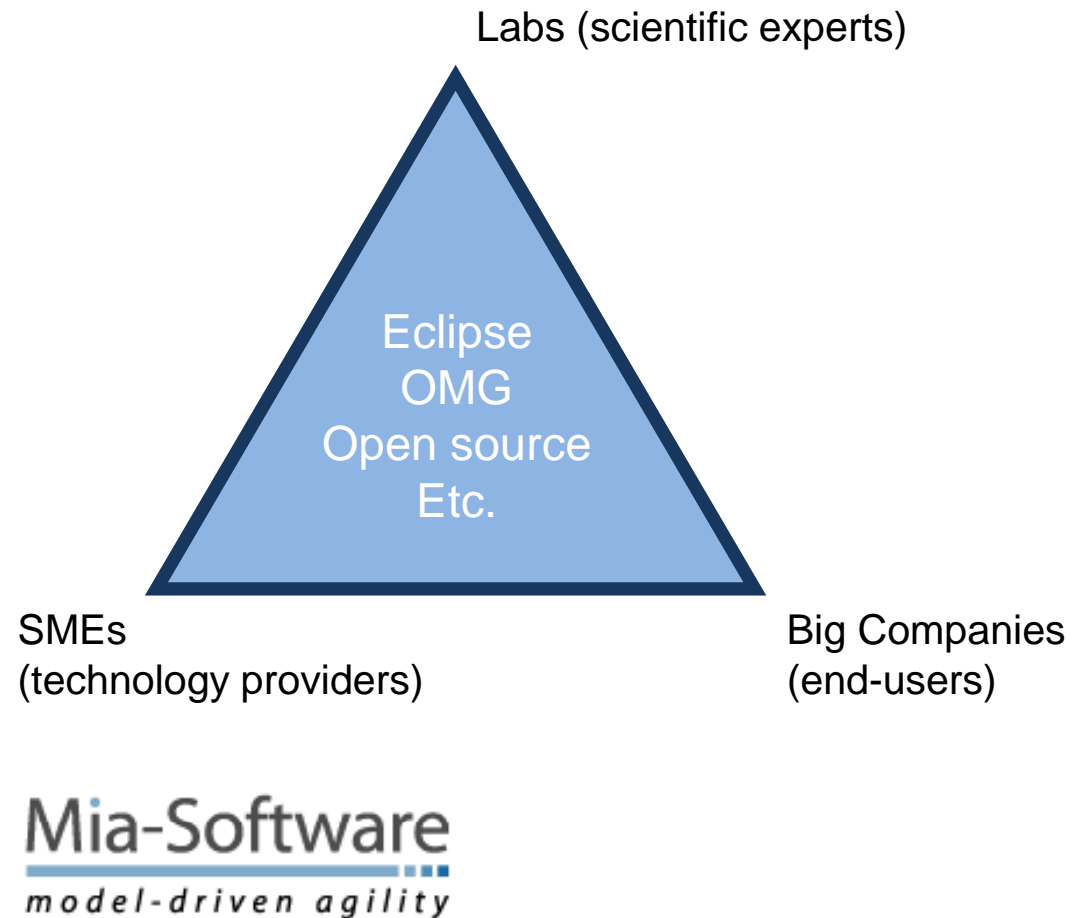
- A common team between INRIA, Ecole des Mines de Nantes (EMN) & LINA
- Expertise on **Model Driven Engineering (MDE)**
- Focus on “Modeling Technologies for Software Production, Evolution, and Operation”
- Actively involved in Eclipse via **MoDisco**, **EMF Facet**, **ATL**



**Application Driven Research**  
A virtuous triangle...

# Mia-Software – Model Driven Agility Company

- A software provider specialized in the Model-Driven approach
- Involved in Eclipse via **MoDisco, EMF Facet & Papyrus**
  - A subsidiary of SODIFRANCE Group benefiting from the efforts engaged in R&D about the evolution of legacy systems



# Thanks for your attention!

## ■ Useful links

### – **Virtual EMF** on Eclipse Labs

- <http://code.google.com/a/eclipselabs.org/p/virtual-emf/>

### – Eclipse-MDT **MoDisco** project

- <http://www.eclipse.org/MoDisco>



## ■ Contacts

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- Virtual EMF

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- Virtual EMF & MoDisco

### – Grégoire Dupé – [gdupe@mia-software.com](mailto:gdupe@mia-software.com)

- MoDisco

