Grant ANR-12-INSE-0011

ANR INS GEMOC

D0.1.2 - Project Activity and Management Report, Period 1

Task T0.1

Version 0.1

DOCUMENT CONTROL

	–: 12/11/2013	A: 24/11/2013	B: 01/12/2013	C: 03/12/2013	D:
Written by Signature	B. Combemale	B. Combemale	B. Combemale	B. Combemale	

Revision index	Modifications
–	Initial structure
A	Partial draft
B	Complete draft
C	Final version
D	

Authors

Author	Partner	Role
Benoit Combemale	Inria	Lead author
All partner coordinators	Inria, I3S, ENSTA, IRIT, Obeo and Thales	Contributor
All WP leaders	Inria, I3S, ENSTA, IRIT, Obeo and Thales	Contributor

Contents

Project Activity and Management Report, Period 1

1. Introduction

1.1 Purpose

This document (*D0.1.2 – Project Activity and Management Report, Period 1*) collects the overall activity of the ANR INS project GEMOC (grant #ANR-12-INSE-0011) during its first year. This document provides a detailed description of the current status of the project, both in terms of research & development activities, and management.

1.2 Perimeter

The overall period considered in this document is the first year of the project GEMOC (Period 1), from December 1^{st}, 2012 (t0) to November 31^{st}, 2013 (t0+12).

1.3 Definitions, Acronyms and Abbreviations

- **Model**: model which contributes to the convent of a View
- **Language workbench**: a language workbench offers the facilities for designing and implementing modeling languages.
- **Language designer**: a language designer is the user of the langage workbench.
- **Modeling workbench**: a modeling workbench offers all the required facilities for editing and animating domain specific models according to a given modeling language.
- **Domain engineer**: user of the modeling workbench.
- **GEMOC Studio**: Eclipse-based studio integrating both a language workbench and the corresponding modeling workbenches.
- **DSML**: Domain Specific Modeling Language
- **xDSML**: Executable Domain Specific Modeling Language
- **AS**: Abstract Syntax
- **MOC**: Model of Computation
- **DSA**: Domain Specific Action
- **DSE**: Domain Specific Event
- **GUI**: Graphical User Interface
- **Eclipse Plugin**: an eclipse plugin is a java project with associated metadata that allow to be bundled and deployed as a contribution to an Eclipse based IDE.

2. Project Description

The ANR Project GEMOC (French Agency for Research, grant ANR-12-INSE-0011) focuses on a generic framework for heterogeneous software model execution and dynamic analysis. This work has the ambition to propose an innovative environment for the design of complex software-intensive systems by providing:

- a formal framework that integrates state-of-the-art in model-driven engineering (MDE) to build domain-specific modeling languages (DSMLs), and models of computation (MoC) to reason over the composition of heterogeneous concerns;
- an open-source design and modeling environment associated to a well-defined method for the definition of DSMLs, MoCs and rigorous composition of all concerns for execution and analysis purposes.

This requires addressing two major scientific issues: the design and verification of a formal framework to combine several different DSMLs relying on distinct MoCs; the design and validation of a methodology for DSMLs and MoC development. GEMOC aims at participating in the development of next generation MDE environments through a rigorous, tool-supported process for the definition of executable DSMLs and the simulation of heterogeneous models.

Project Identification

- Consortium: ENSTA Bretagne, Inria, IRIT, I3S, Obeo, Thales Research & Technology
- Project leader: Inria (Benoit Combemale)
- Duration: 01.12.12 – 30.03.16 (40 months)
- Funded by the French Agency for Research (ANR), Program INS (Ingénierie Numérique & Sécurité). Grant ANR-12-INSE-0011
- Labels from the competitiveness clusters: Image & Réseaux, Aerospace Valley, Systematic

3. Overall Achievements

3.1 Validation of the challenges and objectives

All the partners were devoted during the first year in accurately describing and validating the challenges addressed by the project and the solutions proposed. This work received a very strong interest from both academia and industry, being invited to various presentations of the project activity, and validating the interest and relevance of the work. As another major achievement, the project contributed to the emergence of the international GEMOC initiative[1], bringing together all the outstanding researchers and practitioners in the field of the globalization of modeling languages. The project plays a key role in the federation of this international community, thus taking an international leading position in regards to the issues at hand.

[1] Cf. `http://gemoc.org`

3.2 Breakthroughs

Leveraging on the intense collective work of all the partners during the definition of the project proposal, the first year of the project was immediately devoted to propose the first breakthroughs. In particular, we focused during the first year on investigating the modular design of a modeling language for exposing a behavioral interface used in language composition.

As a first key result, we explored the current lack of explicit concurrency model in the behavioral semantics of the modeling languages. The lack of an explicit concurrency model has several drawbacks: it prevents from developing a complete understanding of the DSML's behavioral semantics, as well as effective concurrency-aware analysis techniques, and explicit models of semantic variants. We proposed to reify concurrency as a metamodeling facility, leveraging formalization work from the concurrency theory and models of computation (MoC) community. The essential contribution of this work is a language workbench for binding domain-specific concepts and models of computation through an explicit event structure at the metamodel level. We experimented our approach on the case studies of the project to demonstrate the utility of the novel metamodeling facilities and clarify the scope of the approach. These experimentations are currently leading to a preliminary innovative methodology for language design and implementation.

We leverage on the event structure proposed at the metamodel level to provide an explicit (behavioral) interface of the behavioral semantics of a modeling language. This behavioral interface is being used for experimenting the definition of composition operators between (the behavioral semantics of) modeling languages to support concurrent execution of the conforming, possibly heterogeneous, models.

3.3 Integrated Studio

In addition to the theoretical and foundational activities to emerge breakthroughs in language development and coordination, all partners are also intensively implicated into supporting the proposed ideas with innovative tooling. Consequently, a huge effort was made during the first year to offer an infrastructure to provide an up-to-date integrated GEMOC studio both for all partners to develop the new solutions, and final users of the project results to experiment the proposed solutions (see `http://gemoc.org/studio/`).

The GEMOC Studio is an Eclipse package that contains components supporting the GEMOC methodology for building and composing executable DSMLs. It includes the two workbenches:

- The GEMOC Language Workbench: intended to be used by language designers (aka domain experts), it allows to build and compose new executable DSMLs.
- The GEMOC Modeling Workbench: intended to be used by domain designers, it allows to create and execute models conformant to executable DSMLs.

The GEMOC studio is freely available directly on the continuous integration server[2], making everyone to obtain the last results of the project for experimentation or development. This enables anyone to download the last version of GEMOC Studio to experiment or extend the latest developments of the project. It also helps to make easy the realization of demonstrations, especially by including all the case studies of the project as tutorials in the studio.

3.4 Task force and working group

A major strength of the project is characterized by the excellent teamwork that lead to a great task force in the working group. Everyone is strongly involved in the project, and closed partnerships and complementarity appeared in the group. The great atmosphere during physical meetings with intensive work also helps to support continuous remote work in between.

Moreover, an important effort was dedicated to provide an efficient collaborative platform, both for sharing information and developing innovative solutions into the studio.

[2] Cf. `https://ci.inria.fr/gemoc/job/org.gemoc.gemoc_studio.root/`

Consequently, this excellent collaborative work leads to an effective implementation of the project with outstanding results.

4. Deliverables and Milestones

Deliverables	Type	Leader	Participants	Date	Status (M6)	Status (M12)
D0.1.1 – Project web site facility	Web Site	INRIA	ALL	M6	done	
D0.1.2 – Project Activity and Management Report, Period 1	Report	INRIA	ALL	M12		done
D0.1.3 – Project Activity and Management Report, Period 2	Report	INRIA	ALL	M24		
D0.1.4 – Final Project Report	Report	INRIA	ALL	M36		
D0.2.1 – Whitepaper including bibliography of scientific papers	Report	INRIA	ALL	M36		
D0.2.2 – Definition of the long-term strategy for the GEMOC Exploitation	Report	THALES	ALL	M36		
D1.1.1 – Metaprogramming with Kermeta and xDSML pattern guidelines	Report	IRIT	INRIA, IRIT	V0: M6	done	
				V1: M12		done
				V2: M24		
D1.2.1 – DSML behavioral semantics definition tools	Software	INRIA	INRIA, IRIT, OBEO	V0: M12	in progress	done
				V1: M24		
				V2: M30		
D1.3.1 – xDSML/MoCC mapping language, tools and methodology	Report, Software	ENSTA-B	ENSTA/B, I3S, INRIA, IRIT	V0: M12	in progress	(postponed at M18)
		(now IRIT)		V1: M24		
				V2: M30		
D2.1.1 – Ecore-based metamodel of the MoCC modeling language	Report, Metamodel	I3S	I3S, IRIT, ENSTA/B, INRIA	V0:M6	done	
				V1:M12		done
D2.2.1 – Model editor and Operational semantics of the MoCC modelling language	Software	ENSTA/B	ENSTA/B, I3S, OBEO	V0:M12		done
				V1:M24		
				V2:M30		
D3.1.1 – Identification and formal characterization of the operator for composition, and Eclipse-based hierarchical component metamodel	Report	I3S	I3S, IRIT, INRIA	V0:M6	done	
				V1:M12		done
D3.1.2 – Language composition operators	Report	I3S	I3S, INRIA	V1: M24		in progress
D3.2.1 – Description of the denotational semantics of the WP2 metamodel	Report	I3S	I3S, IRIT	M18		in progress
D3.3.1 – Formalization and restriction for the DSL operational semantics	Report	IRIT	IRIT, I3S, INRIA	V1: M18		in progress
				V2: M24		
D3.4.1 – Encoding of the formal model (composition operators and MoCCs/xDSMLs)	Report, Software	ENSTA-B	IRIT, I3S, ENSTA-B	M24		
D3.4.2 – Experimental validation (comparison with WP4 prototype)	Report	ENSTA-B	IRIT, I3S, ENSTA-B	M36		
D4.1.1 – GEMOC architectural description	Report	INRIA	INRIA, ENSTA-B, I3S, OBEO, IRIT	M6	done	
D4.1.2 – Eclipse-based tool to model heterogeneous model execution and GEMOC studio	Software	OBEO	OBEO, INRIA	V0: M18		
				V1: M30		
				V2: M36		
D4.2.1 – Generic Engine for heterogeneous models execution	Software	IRIT	OBEO, INRIA, IRIT, ENSTA-B	V0: M12	in progress	done
				V1: M24		
				V2: M30		
D4.3.1 – Animation engine Eclipse-based plugins	Software	OBEO	OBEO, INRIA, IRIT	V0: M24		in progress
				V1: M30		
D4.4.1 – API for Trace Management	Report, Metamodel	I3S	INRIA, OBEO, IRIT, I3S	V1: M24	in progress	in progress
				V2: M30		
D5.1.1 – Technical requirements, uses-cases specification and metrics	Report	THALES	THALES, OBEO, IRIT, INRIA	M6	done	
D5.2.1 – DSL and MOCC for Use Cases	Software	IRIT	OBEO, I3S, INRIA, IRIT, ENSTA/B	V0: M18	in progress	in progress
				V1: M24		
D5.3.1 – Uses-case models and simulation	Software	THALES	IRIT, ENSTA, THALES, I3S	V0: M24		
				V1: M36		
D5.4.1 – Experimentation results analysis	Report	OBEO	THALES, OBEO, IRIT, INRIA	M36		

All the deliverables of the ANR INS project GEMOC are available at `http://gemoc.org/ins-deliverables` (password: ins12.0011). The detailed description of the progresses is given in Chapter 5 (Project activity) and Chapter 6 (Dissemination). All deviations with the initial plan are described in Section 7.4.

5. Activity Summary

5.1 Work-Package Activity

5.1.1 WP0 – Management and Dissemination

Task 0.1: Project Management As the main leader of the project, Inria ensures the coordination and management of the project. Inria also provided all the required ressources for the project coordination and dissemination: a domain and a public website (`http://gemoc.org/ins`), and two projects on the Inria forge: one used as intranet with the mailing lists and a subversion server for collaborative writing (`https://gforge.inria.fr/projects/gemoc`), and one used as development server hosting the GIT repository and a feature-request/bug-tracking application (`https://gforge.inria.fr/projects/gemoc-dev`). Finally, the GEMOC Studio is publicly available on the Inria Continuous Integration server (`https://ci.inria.fr/gemoc`).

To ensure the coordination of the project, a board meeting (including all partner coordinators and WP leaders) has been organized at each face to face technical meeting (TM13.1, TM13.2, TM13.3 and TM13.4), and an annual project meeting (PM13, co-located with TM13.4) has been organized to a retrospective of the past year. The overall management activity is detailed in Chapter 7.

Task 0.2: Project Dissemination and Exploitation The first year of the project was intensively devoted by all the partners to disseminate the project challenges and motivations, as well as the first scientific and technological breakthroughs already achieved. The partners of the project have been invited to give various presentations, including demonstrations of the first prototype of the GEMOC Studio, and various scientific and industrial papers have been accepted and published. The overall dissemination activity is detailed in Chapter 6.

5.1.2 WP1 – Executable Metamodeling

During this first year, the WP1 has been working on all the tasks associated to the WP.

Task 1.1 Based on the previous works of the partners and experimentations, we have defined an architecture for an executable DSML to clearly separate the abstract syntax (AS) of the language, its operational semantics (DSA) and the concurrency aspects (MoC). Furthermore, the methodology to define such an executable DSML has been defined and a first version of the tool to support it has been developed. The two first versions of the D1.1.1 have been delivered in time, M6 and M12.

Task 1.2 Inria has developed a first version of the xDSML definition tools. These tools offers a dashboard for building an xDSML. This dashboard reuses or extends technology-dependend wizards for helping the user in his language development activity. This first version — D1.2.1 — has been delivered on time (M12).

Task 1.3 To put together DSA and MoC, we are defining (work in progress) a mapping between them that exposes elements that defines the interface of the language and will be the base to coordinate heterogeneous models execution. The first version of D1.3.1 was due at M12. However, the project has decided a change in the lead of this task and a shift of manpower (see 7.4). It is now IRIT that leads this tasks and the D1.3.1 will be delivered at M18 instead of M12.

5.1.3 WP2 – Timed Models of Concurrent Entities

Task 2.1 The focus of the WP2 is to provide the definition of the metalanguage dedicated to timed Model of Computation and Communication (aka MoC) and its associated tooling. The MoCs described by using this language will be applied on the entities of the DSML specified by the definitions of DSA (Domain Specific Action) and/or DSE (Domain Specific Event) that are provided by the WP1. During the first year of the project, we have integrated two existing metamodels, one based on state machines (Cometa) and the other one based on declarative clock constraints (CCSL). The provided result is the first version of the MoC language metamodel mainly performed as an extension of the CCSL one. Concurrently of this work, the semantics of the Cometa metamodel, and the metamodel itself, have been extended to take into account the synchronous communications, in order to be aligned with the CCSL semantics.

Task 2.2 To integrate the MoC language in the GEMOC Studio, a textual syntax has been developed as a prototype to be integrated in the demonstration studio presented at several workshops and industrial demonstrations. To extend this tooling, a first version of a graphical editor has been developed based on the software component Sirius, proposed by our Obeo partner from the WP4. The final goal of our model editor is to mix graphical and textual syntax to produce a user friendly editor to facilitate the use of our MoC language. In a first step, the semantics definition of the MoC language has been defined as an extension of the CCSL semantics corresponding to the metamodel. Based on our analysis of the

two proposed formalisms, we have identified several use cases to merge the two formalisms in the D2.1.1 deliverable. To proceed iteratively, we want to integrate one by one the merged use-cases to consolidate both the proposed metamodel and the associated semantics.

The deliverable D2.2.1 is in version 1. The version will be updated on M24 and M30.

5.1.4 WP3 – Formalization of the Connection between Different MoCs

After a first deliverable describing a hierarchical component model, we found out that the description of composition operators at the language level is a very good and beneficial idea. We consequently started a totally new approach based on the state of the art. This approach is twofold. First, it consists in the understanding of what could be a behavioral language interface on which composition operator could be described. Secondly, on what are the key features of a language that describes the coordination of models at the language level. The second version of the D3.1.1 elaborates on these points. On the formalization part, we first provided a denotational semantics of CCSL to be completed with the state machine semantics to cover the MoC language. We are currently trying to understand what formalization would be the most suitable to the project. More specifically we are trying to understand how to avoid state space exploration while being able to check some important properties like deadlocks. This is also related to the protocol between the MoC and the DSA where the formalization should allow for verification of data related properties like race conditions.

5.1.5 WP4 – Generic Execution Framework for Heterogeneous Models

During this first year, the WP4 has been working on all the tasks associated to the WP.

Task 4.1: Execution Environment for Heterogeneous Models The architecture of the studio has been defined in D4.1.1 and delivered on time (M6). The document continues to evolve in order to reflect the current status of the GEMOC studio development. The deliverable D4.1.2 (*The GEMOC Studio*) has been initiated early in the project in order to ensure continuous integration of the other deliverables. As an major result, the GEMOC Studio can be downloaded from the continuous integration server as a fully integrated Eclipse package, available for all platforms: `http://ci.inria.fr/gemoc/job/org.gemoc.gemoc_studio.root/`. Yet, the GEMOC studio already includes the exploratory use cases as examples, to demonstrate some of the achievements of the project.

Task 4.2: Generic Execution Engine Several prototypes of the execution engine have been experienced. Some have been developed by fixing the technologies used for the solver in order to be demonstrated in the scientific conferences. For example, one demo using Kermeta 3, and Timesquare is shipped in the GEMOC Studio. A first version of the execution engine using its expected architecture has been implemented. It runs the execution engine using different implementations of the xDSML components. It makes possible to use various editors, DSA implementations or solver implementations. The first version of the execution engine (v0.1) has been delivered on time at M12 in the GEMOC Studio.

Task 4.3: Generic Animator Framework a new version of Obeo designer have been released as an open source Eclipse project (aka Sirius framework). Several experiments using Sirius as an animation backend have been done by different partners. They refine the requirements of the animation with regards to the execution engine.

Task 4.4: API for Trace Management This task officially starts at M12. Yet, several discussions have taken place to start the definition of the trace management according to the other component requirements.

5.1.6 WP5 – GEMOC Experimentations

Several use cases are considered in order to assess various aspects of the project results.

Task T5.1: Requirements and Assessment Criteria Starting with the Project Kick-Off in December 2012 the industrial and academic partners have developed a consolidate view of the needs in the area of the definition of definition and integration of heterogeneous executable Domain Specific Languages. Until M6 a general description and associated languages used by the three different use cases have been formalized at M6 (D5.1.1), representing examples of today's industrial practices in system modelling (e.g., using a dedicated method and modelling environment for Thales) and an academic use case provided by INRIA. However, it has been discovered that there is a significant gap between existing industrial practices and tools. capabilities and the new proposed GEMOC methods and technologies for defining the coordination a set of xDSMLs. In order to overcome this present methodological gap, the INRIA academic use case developed integration of two languages for benchmark during the implementation of the tools in the other work packages. As a result, at M12 we are able to identify the gaps where further elaboration of the GEMOC requirements is necessary and the definition of the assessment criteria. This gap analysis and continuous improvement of the quality of the requirements and associated examples will be continued up to M18, and we will provide an updated version of the D5.1.1 at M18.

Task T5.2: Definition of DSLs and MoCs for use cases Thanks to the availability of first prototype of the GEMOC studio, two of the three use cases have started the definition of the DSMLs (incl. abstract syntax, and semantics with DSA and MoCs). Only one of the two use cases started the implementation of the composition operators between DSMLs.

- Exploratory use case (lead Inria): from M0, Inria and I3S have implemented both fUML and TFSM (Timed Finite State Machine) following the GEMOC methodology and using the GEMOC Studio. These two DSMLs are used as a benchmark during the implementation of the various tools. Note that even if only fUML was initially planned in this use case, TFSM was also implemented for experimenting the definition of composition operators. This use case is deployed as a free tutorial in the GEMOC studio.

- Radar application (lead Thales): from M6, Thales has started the definition of the DSMLs to be coordinated. An enhancement of the state machine abstract syntax has been performed and a first definition of the Domain Specific Action (DSA) has been initialized with the GEMOC language workbench. I3S has provided its expertise at Thales for the definition of MoCs on Dataflow. The next step is to formalize the MoCs for the two used DSMLs.

- Flight Control & Guidance Unit (lead IRIT): this task has not started during the first year. The next step is to elaborate a detailed work plan for this use Case.

Task T5.3: Framework Experimentations As Thales uses a complex dedicated system modeling environment, Thales has started this task at M9, three months before the planned starting date (M12). The goal is to prototype the feasibility of building an enhanced version of the Thales modeling environment based on the GEMOC studio. Some adaptations of the current version of the Thales modeling environment have been done in order to be able to deploy it in the GEMOC studio.

Task T5.4: Experimentation analysis This Task has not started (starting date: M30)

Major Challenges & Deviations The major challenge in the first year of the project was the establishment of a common understanding of the needs in the area of the definition and integration of heterogeneous executable DSMLs. There was no major deviation on WP5 activities in the first year of the project.

5.2 Partner Activity

5.2.1 Inria

WP	Task	Deliverable	Activity
WP0	T0.1	D0.1.1	Inria provided all the required facilities for the coordination and dissemination of the project results (public website, intranet, development server, integration continuous, etc.).
WP0	T0.1	D0.1.2	Inria was the main contributor and led the collaborative writing of the entire deliverable.
WP0	T0.2	–	As project leader, Inria was extremely devoted into the dissemination of the project motivations and preliminary results. Many presentation of the project have been done in specific seminars and to external collaborators (both from academia and industry). A poster about the project has been also established to be presented in various industrial and academic events as well as to be disseminated on the GEMOC website.
WP1	T1.1	D1.1.1	Inria participated to the technical discussions of this task, and on the writing of the deliverable.
WP1	T1.2	D1.2.1	Inria has developed a first version of the xDSML definition tool. This tool offers a dashboard for building an xDSML. This dashboard reuse or extend technology-based wizards for helping the user in his activity.
WP1	T1.3	–	Inria participated to the technical discussions of this task.
WP3	T3.1	D3.1.1	Inria participated to the technical discussions of this task, and on the writing of the deliverable.
WP3	T3.3	–	This activity is based on the first results from T1.3 to identify the requirement and possible problems that can arise from the different solutions that could be taken in WP1 and WP2. Our immediate objective is to provide a formal protocol communication between the MOC and the DSAs as a DSEs specification.
WP4	T4.1	D4.1.1	Inria has delivered the document at M6. Inria also continuously updates in order to reflect the current state of the GEMOC studio.
WP4	T4.1	D4.1.2	Inria has installed a continuous integration service in order to build the GEMOC Studio as soon as the other WPs contribute their software. Inria has helped the other partners in the packaging of their contributions in a suitable deliverable form.
WP4	T4.2	D4.2.1	Inria has developed the execution support for DSA that is used by the execution engine. Inria has contributed to the design, architecture and implementation that allow the engine to run on different implementations of the xDSML components.
WP4	T4.3	D4.3.1	Inria has started the design of the interface enabling the communication between the engine and the simulation view.
WP4	T4.4	D4.4.1	Inria has participated to the discussions about the trace management and currently realizes some experimentations.
WP5	T5.1	D5.1.1	Inria provided the the description of the fUML use case.
WP5	T5.2	–	Inria, in collaboration with I3S, provided the first prototype implementation of the exploratory use case (incl. fUML and TFSM).

5.2.2 I3S

WP	Task	Deliverable	Activity
WP1	T1.3	D1.3.1	I3S provided a first prototype of the xDSML/MOC mapping language (ECL), which has been used as a basis for understanding the GEMOC needs and for the first experiments
WP2	T2.1	D2.1.1	Based on its experiments on CCSL and on the understanding of Cometa, I3S provided the two versions of the metamodel for MOC description
WP2	T2.2	D2.2.1	In order to experiment the MOC metamodel, I3S provided crude (but usable) textual and graphical editor of MOC libraries. Additionally, I3S extended the TimeSquare tool and its underlying semantics with the one of the state machines.
WP3	T3.1	D3.1.1	In collaboration with the other partners (and specifically INRIA) we first proposed a hierarchical component model. After tests and errors, we understood that it is more appropriate to specify language composition operators that describe model coordination. These composition operators must be specified in a dedicated language, based on a behavioral interface of the language. The dedicated language is under specification based on a deep understanding of state of the art approaches.
WP3	T3.2	–	We are almost done with a denotational semantics specification of the CCSL language. However, we are actually wondering if such a specification of the semantics is really suitable to proove some of the properties. We are exploring how some behavioral properties like deadlock-free for instance can be checked statically by exploiting a graph representation of a CCSL specification.
WP3	T3.3	–	This activity is based on the first results from T1.3. We identified the requirement and possible problem that can arise from the different solutions that could be taken in WP1. Our goal is to understand how we can provide (1) a protocol in between the S.O.S. rules of the DSA and the ones from the MoCC and (2) an adequate abstraction of the DSA and the constraints in order to be able to check some properties of the assembly (*e.g.* race conditions)

5.2.3 IRIT

WP	Task	Deliverable	Activity
WP1	T1.1	D1.1.1	IRIT, with the other partners, has defined the architecture of an xDSML language as well as a methodology to build it.
WP1	T1.3	D1.3.1	IRIT has started defining the mapping between MOC and operation semantics. Due to a change in the leading of this task, the corresponding deliverable has been postponed at M18.
WP3	T3.3	–	This activity is based on the first results from T1.3 to identify the requirement and possible problems that can arise from the different solutions that could be taken in WP1 and WP2. Our immediate objective is to provide a formal protocol communication between the MOC and the DSAs as a DSEs specification.
WP4	T4.2	D4.2.1	IRIT has, in collaboration with Inria and I3S, developed the execution engine orchestrating the different components of a xDSML.
WP5	T5.1	D5.1.1	IRIT has started discussions with Airbus but has not yet been able to provide the full requirements. Other uses cases are being internally defined to validate the GEMOC technology and methodology.

5.2.4 ENSTA Bretagne

WP	Task	Deliverable	Activity
WP2	T2.1	D2.1.1	ENSTA Bretagne has participated to the D2.1.1 by the definition of the strategy of the two existing metamodels, one based on state machines (Cometa from Lab-STICC) and the other one based on declarative clock constraints (CCSL from I3S). Concurrently to this work, the semantics of the Cometa metamodel, and the metamodel itself, was extended to take into account the synchronous communications, in order to be aligned with the CCSL semantics. During this work, ENSTA Breatgne has studied the opportunity to map the Cometa approach to a new behavioral model explorer called Nemo. Nemo is integrated in the redefinition of the task 3.4 of the WP3 and will be integrated in the Gemoc studio as a verification tool.
WP2	T2.2	D2.2.1	ENSTA Bretagne is involved in the development of the MoC language editor. After a first prototype from the I3S partner, we develop a first version of the graphical and textual editor that would be improved after the first used.

5.2.5 Obeo

WP	Task	Deliverable	Activity
WP1	T1.2	D1.2.1	Obeo is using the methodology for xDSML specification as in input to enhance and validate a process-aware tool named "assist" with the idea of using it to support the methodology in the Gemoc Studio. Obeo formalised the information required to go through this process and is working on being able to reverse-engineer a workspace content as a model to control the workflow.
WP2	T2.2	D2.2.1	Obeo worked on preparing and integrating the Sirius technology to be consumed by the Gemoc Studio for creating the model editors related to the MoCC modeling language.
WP2	T2.2	D2.2.1	Obeo started to develop the base components to ease the definition of editors and animators for xDSMLs in the GEMOC language workbench.
WP4	T4.1	D4.1.1	Obeo contributed to the architecture description and integration requirements with a goal of easing the reuse of the Gemoc components in other contexts or products.
WP4	T4.1	D4.1.2	Obeo worked on components like UML Designer to get a better integration in the Gemoc Studio
WP4	T4.2	D4.2.1	Obeo tested the compatibility of technology choices made by Inria with other Eclipse Modeling Technologies
WP4	T4.3	D4.3.1	Obeo created a first prototype of a component enabling the integration of an Execution engine with the Eclipse debug UI and the Sirius technology. This first prototype has been used to gather feedback and identify areas which are needing more work.
WP4	T4.4	D4.4.1	Obeo started to design elements to manipulate the traces within the context of an execution in order to bridge it with the animator.

5.2.6 Thales Research & Technology

WP	Task	Deliverable	Activity
WP0	T0.1	D0.1.2	TRT has mainly contributed as leader of the Work package 5.
WP0	T0.2	D0.2.2	TRT realized three industrial presentations related to Gemoc. No long term strategy has been formalized today.
WP2	T2.1	–	TRT has participated to the technical discussions to provide the Thales use case needs.
WP3	T3.1	–	TRT has participated to the technical discussions to provide the Thales use case needs.
WP4	T4.1	–	TRT has participated to the technical discussions about the definition of the GEMOC studio.
WP4	T4.1	D4.1.2	TRT has experienced the GEMOC Studio provided by the continuous integration service.
WP4	T4.3	–	TRT participated to the technical discussions to share industrial practices.
WP5	T5.1	D5.1.1	As task leader, TRT has coordinated the collobarative writing of this deliverable. As use case provider Thales has described the Radar application, the current modelling practices (methods and tools).
WP5	T5.2	–	TRT has started the definition of the DSMLs to be coordinated.
WP5	T5.3	D5.1.3	TRT has adapted the current version of the Thales modeling environment in order to be able to deploy it in the GEMOC studio.

6. Dissemination

6.1 Scientific Dissemination

6.1.1 Publications

Here is the list of the publications accepted or published during the first year of the ANR INS project GEMOC (period 1) on the results of the project. In **bold** are the publications written in collaboration with different partners of the project.

[CDKLN13] Benoit Combemale, Julien Deantoni, Ali Koudri, and Jérôme Le Noir. Le nouveau d'efis de la coordination des langages de modélisation. Gestion de l'hétérogénéité des modèles dans le développement et l'exécution de systèmes logiciels complexes. *Génie logiciel*, (105):4–11, 2013.

[CDVL+13] Benoit Combemale, Julien Deantoni, Matias Vara Larsen, Frédéric Mallet, Olivier Barais, Benoit Baudry, and Robert France. Reifying Concurrency for Executable Metamodeling. In Richard F. Paige Martin Erwig and Eric van Wyk, editors, *6th International Conference on Software Language Engineering (SLE 2013)*, Lecture Notes in Computer Science, Indianapolis, États-Unis, 2013. Springer-Verlag.

[DCL13] Papa Issa Diallo, Joël Champeau, and Loïc Lagadec. A Model-Driven Approach to Enhance Tool Interoperability using the Theory of Models of Computation. In Richard F. Paige Martin Erwig and Eric van Wyk, editors, *6th International Conference on Software Language Engineering (SLE 2013)*, Lecture Notes in Computer Science, Indianapolis, États-Unis, 2013. Springer-Verlag.

[VLG13] Matias Vara Larsen and Arda Goknil. Railroad Crossing Heterogeneous Model. In *International Workshop on The Globalization of Modeling Languages (GEMOC 2013)*, Miami, Florida, USA, September 2013.

[DCL13] Papa Issa Diallo, Joël Champeau, and Loïc Lagadec. Enhance the reusability of models and their behavioral correctness. In *International Workshop on The Globalization of Modeling Languages (GEMOC 2013)*, Miami, Florida, USA, September 2013.

[WCDF13] Sun Wuliang, Benoit Combemale, Steven Derrien, and Robert France. Using Model Types to Support Contract-Aware Model Substitutability. In P. Van Gorp, T. Ritter, and L.M. Rose, editors, *9th European Conference on Modelling Foundations and Applications (ECMFA 2013)*, volume 7949 of *Lecture Notes in Computer Science*, pages 118–133, Montpellier, France, 2013. Springer-Verlag.

[JCB+13] Jean-Marc Jézéquel, Benoit Combemale, Olivier Barais, Martin Monperrus, and Francois Fouquet. Mashup of Meta-Languages and its Implementation in the Kermeta Language Workbench. *Journal of Software and Systems Modeling (SoSyM)*, 2013.

[ZCP13b] Faiez Zalila, Xavier Crégut, and Marc Pantel. Formal verification integration approach for dsml. In *The ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2013)*, September 2013. Springer-Verlag.

[GDPFM13] Arda Goknil, Julien DeAntoni, Marie-Agnès Peraldi-Frati, and Frédéric Mallet. Tool support for the analysis of tadl2 timing constraints using timesquare. In Jin Song Dong, Jun Sun, Yang Liu, and Andrew Martin, editors, *18th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS 2013)*. IEEE Computer Society, 2013.

[ZCP13a] Faiez Zalila, Xavier Crégut, and Marc Pantel. A transformation-driven approach to automate feedback verification results. In *International Conference On Model and Data Engineering (MEDI)*, Lecture Notes in Computer Science. Springer-Verlag, 2013.

[CCP12] Benoit Combemale, Xavier Crégut, and Marc Pantel. A Design Pattern to Build Executable DSMLs and associated V&V tools. In *The 19th Asia-Pacific Software Engineering Conference (APSEC 2012)*, Hong Kong, December 2012. IEEE.

[CHJ+12] Benoit Combemale, Cécile Hardebolle, Christophe Jacquet, Frédéric Boulanger, and Benoit Baudry. Bridging the Chasm between Executable Metamodeling and Models of Computation. In *5th International Conference on Software Language Engineering (SLE 2012)*, LNCS. Springer, September 2012.

[MAA+12] Gunter Mussbacher, Omar Alam, Mohammed Alhaj, Shaukat Ali, Nuno Am'alio, Balbir Barn, Rolv Bræk, Tony Clark, Benoit Combemale, Luiz Marcio Cysneiros, Urooj Fatima, Robert France, Geri Georg, Jennifer Horkoff, Jörg Kienzle, Julio Cesar Leite, Timothy C. Lethbridge, Markus Luckey, Ana Moreira, Felix Mutz, A. Padua A. Oliveira, Dorina C. Petriu, Matthias Schöttle, Lucy Troup, and Vera M. B. Werneck. Assessing composition in modeling approaches. In *Proceedings of the Workshop about Comparing Modeling Approaches 2012 (workshop at MODELS 2012)*, CMA'12, New York, NY, USA, 2012. ACM.

All the publications are available at `http://gemoc.org/publications`.

6.1.2 Talks

- *On Modeling and Testing When Unpredictability Becomes the Pattern*, invited keynote at *CIEL 2013* (Cf. `https://sites.google.com/site/gdrgpl2013/ciel`). Talk given by B. Combemale (Inria) and available at `http://people.irisa.fr/Benoit.Combemale/ciel2013`.
- *On the globalization of the modeling languages*, invited plenary seminar at *5th Bellairs Modelling Workshop* (Cf. `http://www.cs.mcgill.ca/~joerg/SEL/AOM_Bellairs_2013.html`). Talk given by B. Combemale (Inria).

- *Models, Representations, Animations: The Eclipse Sirius Project and Gemoc*, invited talk at *8th Workshop on Model Based Software, Data, Process and Tool Integration*. This talk has been given by Obeo during this workshop to present the current state of the Eclipse Modeling domain and the contribution expected from the Gemoc project.

- *Modélisation, composition et simulation de modèles métiers hétérogènes: l'initiative GEMOC*, invited talk at *Journée Devlog: IDM et modèles scientifiques* organized by the CNRS national network Devlog (Cf. `http://devlog.cnrs.fr/journee-idm-et-modeles-scientifiques`). Talk given by B. Combemale (Inria) and available at `http://devlog.cnrs.fr/_media/idm-devlog10102013-web_gemoc_combemale.pdf`.

- *The GEMOC Initiative*, invited talk at *ESEO* in October, 2013. Talk given by B. Combemale (Inria).

6.1.3 Poster

A poster about the GEMOC initiative and the ANR INS project GEMOC has been produced (see Annex A). The poster has been presented during the joint conferences ECOOP, ECSA and ECMFA 2013 at Montpellier, France. The poster is also available on the GEMOC website: `http://gemoc.org/pub/gemoc-poster.pdf`.

6.1.4 Events

International Workshop GlobalDSL 2013 (co-located with ECMFA, ECOOP and ECSA 2013) GlobalDSL 2013 was a full-day workshop that brought together researchers and practitioners in the programming and modeling languages communities to discuss the challenges associated with integrating multiple, heterogeneous software languages. The languages of interest range from requirements to runtime languages, and include domain-specific modeling and programming languages. Challenges related to engineering composable languages, semantic composition of languages and to reasoning about systems described using heterogeneous languages was of particular interest. More information on `http://gemoc.org/globaldsl2013`. Proceedings can be found on `http://dl.acm.org/citation.cfm?id=2489812`.

International Workshop GEMOC 2013 (co-located with MODELS 2013) GEMOC 2013 was a full-day workshop that brought together researchers and practitioners in the modeling languages community to discuss the challenges associated with integrating multiple, heterogeneous modeling languages. The languages of interest range from requirements to runtime languages, and include both general-purpose and domain-specific languages. Challenges related to engineering composable languages, semantic composition of languages and to reasoning about systems described using heterogeneous languages was of particular interest. More information on `http://gemoc.org/gemoc2013`.

6.2 Technological Dissemination

6.2.1 The GEMOC Studio

The tools resulting from the project are distributed via an integrated Eclipse-based studio called *the GEMOC studio*. This studio is built in a continuous integration server for early integration of the results of all the partners. It is used both internally to test the components in a homogeneous way, and externally to diffuse the latest results and associated technologies from the project. It is bundled with a running example for simplifying the demonstrations. It provides an all-in-one, easy to install software that is already used by several partners and contacts as a convenient language and modeling workbench as well as a development platform.

6.2.2 Demonstrations

Demonstrations of the GEMOC studio was produced as online videos on Youtube to illustrate the construction of executable modeling language using the GEMOC studio. The videos can be found here: `http://gemoc.org/sle13`.

6.3 Industrial Dissemination

6.3.1 Talks

Two invited keynotes was given at Neptune 2013 (`http://neptune.irit.fr`), the French industrial conference on model driven engineering:

- *On the globalization of the modeling languages*, by B. Combemale (Inria). Cf. `http://neptune.irit.fr/images/Neptune_2013/transparents/P02_BCombemale.pdf`
- *Les langages de modélisation en ingénierie du logiciel et système : un point de vue industriel sur l'état de la pratique et les perspectives*, by J. Le Noir (Thales Research & Technology). Cf. `http://neptune.irit.fr/images/Neptune_2013/transparents/P03_JLenoir.pdf`

6.3.2 Events

Meeting of the GEMOC Initiative, Research-Project Symposium at ECOOP, ECMFA and ECSA 2013, Montpellier, France (July 1st, 2013) The GEMOC initiative meeting provided an open forum for sharing experiences, problems and solutions on the conjoint use of multiple modeling languages. This meeting was the place where concrete artifacts, ideas and opinions was exchanged and constructive feedback provided. A major objective was to encourage collaborations and to start building a community that is focused on solving the problems arising from such a globalization of modeling languages. More information on `http://gemoc.org/meeting-ec2013`.

6.4 The GEMOC Initiative

The GEMOC Initiative is an open and international initiative that aims to develop breakthrough software language engineering (SLE) approaches that support global software engineering through the use of multiple domain-specific languages. GEMOC researchers aim to provide effective SLE solutions to problems associated with the design and implementation of collaborative, interoperable and composable modeling languages.

The GEMOC initiative aims to provide a framework that facilitates collaborative work on the challenges of using multiple domain-specific languages in software development projects. The framework consists of mechanisms for coordinating the work of members, and for disseminating research results and other related information on GEMOC activities. The framework also provides the required infrastructure for sharing artifacts produced by members, including publications, case studies, and tools.

The Advisory Board is currently led by Dr. Benoit Combemale, also coordinator of the ANR INS project GEMOC. The role of the Advisory Board is to coordinate the GEMOC work and to ensure proper dissemination of work products and information about GEMOC events (e.g., meetings, workshops). The GEMOC Initiative provides one of the main channels of dissemination of the project results. This situation ensures early dissemination of the project results to all outstanding researchers and practitioners in the fields of

interest, and to benefit from early feedbacks.

7. Project Management

7.1 Project Coordination

All the project activities have been coordinated through regular face to face meetings and video-conferences.

The face-to-face meetings organized during the first year of the project are the following:

Date	Location	Participants	Purpose of the meeting
4-5/12/12	Inria, Rennes	ALL	Kickoff meeting (cf. `http://gemoc.org/kickoff-201212`)
19-20/03/13	ENSTA, Brest	ALL	Technical meeting (TM13.1, cf. `http://gemoc.org/tm13-1`)
18-19/04/13	ENSEEIHT, Toulouse	IRIT, I3S, Inria	Code camp
23/04/13	Thales RT, Paris	TRT, Inria	Meeting about the case studies
15/05/13	Inria, Rennes	IRIT, Inria	Meeting about the case studies
27/05/13	Inria, Sophia	ALL	Code camp
28-29/05/13	Inria, Sophia	ALL	Technical meeting (TM13.2, cf. `http://gemoc.org/tm13-2`)
4/09/13	ENSEEIHT, Toulouse	ALL	Code camp
5-6/09/13	ENSEEIHT, Toulouse	ALL	Technical meeting (TM13.3, cf. `http://gemoc.org/tm13-3`)
12/11/13	Inria, Rennes	ALL	Code camp
13-14/11/13	Inria, Rennes	ALL	Technical meeting (TM13.3, cf. `http://gemoc.org/tm13-4`)

Regular videoconferences are also held every two to three weeks to coordinate the work of all partners. All partners participate in video conferences. Each task is being addressed (progress, discussions on scientific and / or technical activities), and presentations on specific approaches can be organized by partners:

- December 20th, 2012, 2pm-4pm
- January 17th, 2013, 1:30pm-4pm
- April 5th, 2013, 10am-noon
- April 19th, 2013, 10am-noon
- May 17th, 2013, 10am-noon
- June 28, 10am-noon
- July 16, 10am-noon
- September 27, 2013, 10am-noon
- October 16, 2013, 10am-noon
- November 7, 2013, 10am-noon

7.2 Consortium Agreement

The project consortium agreement (PCA) has been elaborated and coordinated by Inria in the first year of the project. All partners finally approved and signed the PCA by November, 2013.

7.3 Ressource Management

7.3.1 Project Members

Two PhD students have been recruited in the project:

- Matias Vara Larsen is currently a GEMOC PhD student at the I3S laboratory. He has been employed since January, 2013.
- Florent Latombe is currently a GEMOC PhD student at the IRIT laboratory. He has been employed since February 2013.

Vincent Fontanella was recruited by Inria as Software Engineer from February, 2013 to October, 2013. He conducted development tasks into the WP4 led by Inria.

Papa Issa Diallo has also been recruited by ENSTA Bretagne on a GEMOC post-doctoral position since June 2013.

7.3.2 Travels

7.3.2.1 Inria

- Travel and accommodation for TM13.1 at Brest in march 2013 (three person)
- Travel and accommodation for a technical meeting at Toulouse in April (two person)
- Travel and accommodation for TM13.2 at Nice in may 2013 (four person)
- Travel and accommodation for TM13.3 at Toulouse in September 2013 (three person)
- Travel and accommodation for the workshop MOTB 2014; cf. `http://www.cs.mcgill.ca/~joerg/SEL/MOTB_Bellairs_2014.html` (one person)

7.3.2.2 IRIT

- Travel and accommodation for the kick-off meeting, December 2012, Rennes (three persons)
- Travel and accommodation for TM13.1, March 2013, Brest (three persons)
- Travel and accommodation for TM13.2, May 2013, Nice (three persons)
- Travel and accommodation for dissemination day at Montpellier in July 2013 conjointly with ECOOP, ECMFA and ECSA 2013 (three persons)
- Travel and accommodation for the conference MoDELS and the workshop GEMOC, Miami (FL) in September 2013 (two persons)
- Travel and accommodation for TM13.4, November 2013, Rennes (three persons)

7.3.2.3 I3S

- Travel and accommodation for the kick-off meeting at Rennes in december 2012 (two persons)
- Travel and accommodation for TM13.1 at Brest in march 2013 (two persons)
- Travel and accommodation for a physical technical workshop with IRIT at Toulouse in June 2013 (two persons)
- Travel and accommodation for dissemination day at Montpellier in July 2013 conjointly with ECOOP, ECMFA and ECSA 2013 (two persons)

- Travel and accommodation for TM13.3 at Toulouse in September 2013 (two persons)
- Travel and accommodation for the GEMOC workshop conjointly with Models in Miami (FL) in September 2013 (one person)
- Travel and accommodation for TM13.4 at Rennes in November 2013 (two persons)

7.3.2.4 ENSTA Bretagne

- Travel and accommodation for the kick-off meeting at Rennes in december 2012 (two persons)
- Travel and accommodation for TM13.2, May 2013, Nice (three persons)
- Travel and accommodation for dissemination day at Montpellier in July 2013 conjointly with ECOOP, ECMFA and ECSA 2013 (one person)
- Travel and accommodation for TM13.3 at Toulouse in September 2013 (two persons)
- Travel and accommodation for the GEMOC workshop conjointly with Models in Miami (FL) in September 2013 (one person)
- Travel and accommodation for TM13.4 at Rennes in November 2013 (two persons)

7.3.2.5 Obeo

- Travel and accommodation for the kick-off meeting at Rennes in december 2012 (two people)
- Travel and accommodation for TM13.1 at Brest in march 2013 (one person)
- Travel and accommodation for TM13.2 at Nice in may 2013 (one person)
- Travel and accommodation for dissemination talk at Montpellier in July 2013 at the 8th Workshop on Model Based Software, Data, Process and Tool Integration (one person)
- Travel and accommodation for TM13.3 at Toulouse in September 2013 (one person)
- Travel and accommodation for TM13.4 at Rennes in November 2013 (one person)

7.3.2.6 Thales Research & Technology

- Travel and accommodation for the kick-off meeting at Rennes in December 2012 (two persons).
- Travel and accommodation for TM13.1 at Brest in march 2013 (two persons).
- Travel and accommodation for TM13.2 at Nice in May 2013 (one person).
- Travel for dissemination of the GEMOC project at Thales Brest in May 2013 (one person).
- Travel and accommodation for TM13.3 at Toulouse in September 2013 (one person).
- Travel and accommodation for TM13.4 at Rennes in November 2013 (one person).

7.3.3 Other Expenses

7.3.3.1 Inria

- One laptop computer for the development tasks
- Organization of the code camp on November 12, 2013, and organization of the TM13.4 (+ PM13) on November 13-14, 2013
- Dropbox subscription

7.3.3.2 I3S

Organization of a GEMOC code camp followed by the TM13.2 technical meeting in May 2013 in Sophia Antipolis.

7.3.3.3 IRIT

- Laptop computer and equipment.
- Organization of a GEMOC Code Camp in April 2013 and July 2013, Toulouse.
- Organization of the technical meeting TM13.3 in September 2013, Toulouse.

7.3.3.4 ENSTA Bretagne

Organization of the technical meeting TM13.1 in March 2013, Brest.

7.3.3.5 Obeo

Laptop computer and equipment.

7.4 Major Challenges & Deviations

D1.3.1 postponed at M18 It appeared that Task T1.3 is closely related to the definition of an xDSML because its purpose is to make a mapping between the operational semantics part of the xDSML and the model of concurrency. Thus, it has been decided that the lead will be taken by IRIT which already leads T1.1 (architecture of the xDSML and methodology). IRIT will leverage on the results from T1.1 (deliverable at M12) to lead to production of D1.3.1, therefore postponed to M18. T1.3 was initially led by ENSTA Bretagne with an effort of 6mm. Efforts of IRIT will increase to 10mm and ENSTA Bretagne will decrease to 1mm. The 5mm added and removed have been swapped with T3.4.

Redefinition of the scope of the task 3.4 Being able to schedule T1.3 right after the first version of the results from T1.1 allowed us to redefine the scope of Task 3.4, now including additional V&V tools that will be provided by ENSTA Bretagne. Thus, it has been decided that the lead will be taken by ENSTA Bretagne (initially IRIT). Here is the new scope of the task:

> **Task 3.4: V&V of the formalized semantics** When a language animator or a language composition is available, a final goal could be to evaluate some formal properties on the models or on coordinated models. To provide this capacity, the formalization of the MoC language and of the coordination language should be used to provide the adequate verification tool. In this context, the V&V should take benefits of the knowledge about the various models and their coordination.
>
> So the main objective of this task is to provide a verification tool implementing the reference semantics given in terms of Structural Operational rules. This verification will be based on an exhaustive exploration of the labeled transition system (possibly an extended LTS to take into account synchronous aspects) resulting from the execution models. This verification activity, even if not scalable regarding the industrial use cases, will provide reference LTS, which could be analyzed regarding with traces from the prototype issued from WP4. Additionally, the tool could be used either as an execution model simulation engine or as a verification of the execution obtained by the WP4 prototype.

Creation of a new deliverable D.3.1.2 due on M24 After the final version of the D.3.1.1 deliverable, we found that the creation of a hierarchical component is quite suitable for model composition but not for language composition. We would like to continue the effort further, toward a dedicated language for language composition operators specification. We want to push the expected result of this effort in a new report *D3.1.2 – Language composition operators* (due on M24), lead by I3S and the additional participation of INRIA.

Estimation of the industrial needs The first exploitation studies and implementations helped to confront the approach proposed with current practices. In particular, current technical and theoretical limitations in terms of behavioral composition of heterogeneous models had to be circumvented by the definition of unified language on which various concepts used to extract a partial view. In consequence, a significant work has been devoted early in the project to extract relevant use cases from current practices to demonstrate the proposed approach.

Software engineers recruitment Inria encountered difficulties early in the project to recruit the software engineers initially planned. This was counterbalanced by additional efforts from the Inria permanent staffs.

7.5 Additional Remarks

All project members provided a strong involvement during the first year of the project and an active participation in the various tasks. This provides a pleasant and efficient task force and working group for the project. Relying on a lot of work during the establishment of the project proposal, the results achieved during the first year of the project is very encouraging. In particular, the first year helped to bring the ideas, contributions, and even tools with the production of an integrated studio to share and integrate the tools of the various partners. Many preliminary disseminations, both in academia and industry, are used to validate the foundations and the real needs addressed by the ANR project GEMOC. Early emerging ideas are also massively validated through high quality publications in the major conferences of the field.

A. GEMOC Poster

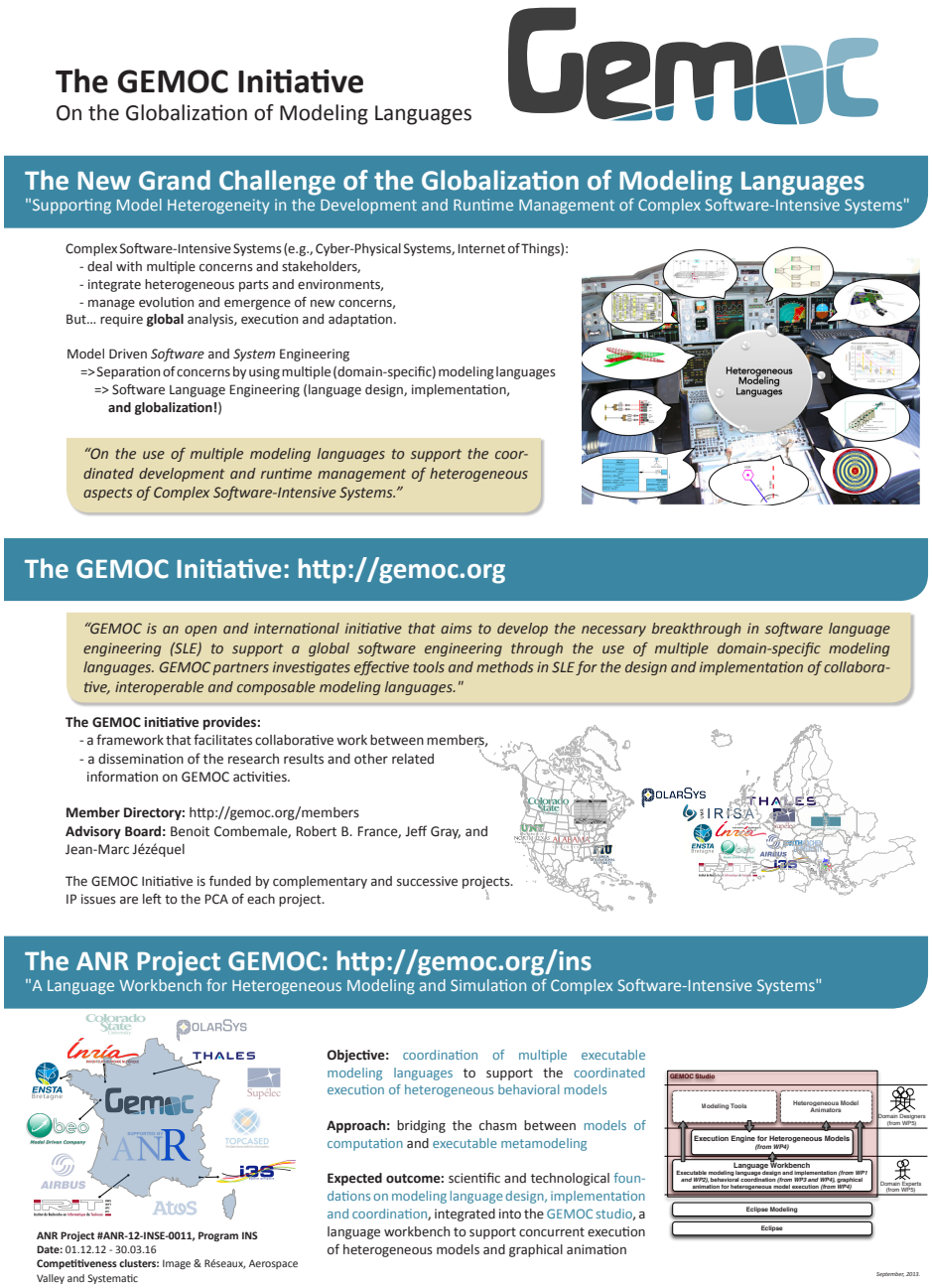

Figure A.1: Poster of GEMOC (version: September, 2013)

B. GEMOC Artwork

- GEMOC Initiative:

- GEMOC Initiative (member):

- GEMOC ANR Project:

- GEMOC Studio:

- GEMOC Eclipse Project:

See http://gemoc.org/artwork