RobMoSys

H2020—ICT—732410

RobMoSys

Composable Models and Software for Robotics Systems

Deliverable D1.2: Periodic Progress Report

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Executive Summary

During the first six months of the project, RobMoSys consortium has dedicated efforts on two important aspects of the project: (1) work on the technical foundations of the RobMoSys approach, and (2) communication and dissemination of the project approach and opportunities to get the community involved in the construction of the EU digital industrial platform for robotics.

The first aspect was mainly addressed by two work packages. WP2 has focused on the definition of the modeling foundation guidelines to ensure the production composable modules following the RobMoSys methodology. These foundations are defined in a way to make sure the project will fulfil its objectives in terms of achieving better models, as the basis for better tools and better software, which then allow to build better robotic systems. Based on WP2 foundation and methodology definitions, WP3 has focused its efforts in the specification of the motion and perception stacks which are two essential functionalities in any robotic system, and both have a rich and mature history. Concrete suggestions about how to turn those state-of-the-art insights into a concrete set of (meta-)models, on which to base any concrete implementation for any concrete application has been made. WP2 and WP3 have produced inputs for the open call I in terms of envisioned approach and technical specifications. These inputs are provided to the community in the form of a rich wiki (robmosys.eu/wiki) which content is intended to evolve during the course of the project with core partners as well as third parties inputs.

The second aspect was mainly addressed by two work packages. WP5 has focused on the open call preparation in terms of expected contributions content. Experts workshop was organized to gather the knowledge (from near communities and industrial representatives) to evaluate the best practices established in mature domains applying model-driven development and to identify showstoppers that could arise in the robotics domain. This understanding was necessary to make sure that Open Calls will be prepared to provide concrete answers to the community, to finally overcome identified showstoppers and secure broad adoption of the approach. Moreover, in WP5 efforts have been spent to set-up the legal documents as well as the tooled infrastructure to support the management of the open call procedures for submission, evaluation, etc. In WP6, the dissemination strategy of the project approach and the open calls has been defined and applied to reach relevant groups of actors in the robotics and its peripherals communities that will contribute to the building of the EU digital industrial platform for robotics.

In WP1, a quality management plan has been defined and applied for the project management. At M6, all quality indicators have been fulfilled for the technical and dissemination work packages (WP2, WP3, WP5 and WP6). Moreover, some preliminary work has been initiated in WP4 before its starting date (M6) to be able to reach the expected outcomes of this work package at M12.

Content

1 Explanation of the work carried out by the beneficiaries and Overview of the progress

This section explains the work carried out by RobMoSys beneficiaries. First, the global objectives of RobMoSys are listed and an overview of the work done during the reporting period (M1-M6) to progress in these objectives fulfillment is described. Then the objectives and their associated work progress is declined for each work package.

1.1 RobMoSys objectives

Project Objective	Work carried out during the reporting period
RobMoSys will organize the platforms for digitization of robotic systems by establishing a common methodology based on the use of composable software models and by nourishing an ecosystem of methodology-based tool chains to support and automate the implementation of the methodology.	During the first six months of the project, an initial version of modeling foundations that enable the specification of composable software models has been specified in WP2 and used for the specification of domain specific building blocks for motion and perception in WP3. Beside the work on RobMoSys modeling foundations and methodology, the work of organizing the contribution of the community to the platforms for digitization of robotics has been initiated with the definition of the first RobMoSys open call in WP5. Eligible activities that will nourish the RobMoSys platforms have been defined. The first open call will be focused on the (meta-)modeling and methodology tooling activities to provide an industrial grade platforms that will be used by the second open call contributors to produce better (composable) robotics software components and systems. In WP6, an important effort has been dedicated to the dissemination of the RobMoSys approach and means to foster the community involvement. Different communication channels (participation to forums, workshops, conference, newsletters, press releases, etc.) have been used to reach different groups of actors in the robotics and its peripherals communities.
RobMoSys methodology, models and tools should be oriented to the management of the interfaces between different roles (robotics expert, domain expert, component supplier, system integrator, installation and deployment, operation), at different levels of abstraction (e.g. from "move and perceive" to "grasp firmly" to "manipulate with pinch grasp and	In the work carried out in WP2&WP3, initial version of the modeling foundation guidelines and the meta-meta-model structures are provided in M6 (with updates scheduled in M18 and in M33). Such foundations provide the formal basis for model structures and their processing.

non-slipping prehension pressure"), and with respect to different concerns (computation, coordination, configuration, communication, composition and transformation) in an efficient and systematic way.	Modeling foundation guidelines and meta-meta-model structures provide the means to express the structures to manage the interfaces between different roles (robotics expert, domain expert, component supplier, system builder, installation and deployment, operation), at different levels of abstraction (e.g. from move and perceive to grasp firmly to manipulate with pinch grasp and non-slipping prehension pressure), and with respect to different concerns (computation, coordination, configuration, communication).
RobMoSys methodology, models and tools should be grounded on composable software models where a model represents not only one or more software modules, with auto-descriptive interfaces and high degree of (auto-) configuration, but also makes the connection to formally represented common and domain knowledge (so-called "taxonomies", or even "ontologies"). A single module is conceived to be re-used in different contexts and applications, not in the least by composing it together with other such modules to cover a wider application domain relying on more interconnected knowledge relationships.	RobMoSys modeling foundations are based on hierarchical hypergraphs that allows n-ary relationships that are necessary for the modeling of knowledge. Knowledge models are formal relationships between entities and parameters in the structural and the behavioral models, to encode dependencies between them that hold in particular contexts. Knowledge models are best served by plain formal n-ary (or "graph") relationships. Hierarchy is an extremely important structural property of knowledge relationships and such knowledge hierarchies can overlap, which is a fundamental ("compositional") property of "contexts" or "namespaces". Therefore, the basis of reusing modules in different contexts and applications has been provided in WP2. Next steps will be to apply this basis for the definition of robotics domain-specific models.
RobMoSys models must be first-class citizens in the development process: formal relationships between the models and actual pieces of code must be established and automated.	The modeling foundations and principles defined in WP2&WP3 are based on the concepts of abstraction and refinement that enable formal and explicit relationships between the hierarchy of models and their corresponding code. These defined relationships will be exploited by the methodology and its future tooling to ensure a formal traceability from the code back to the model and vice-versa.
RobMoSys models must be abstractions of technologies, leaving technologies-specific details and decisions to later in the development process.	Different levels of abstraction have been defined in WP2 going from the mission level to the hardware realizing the abstract mission. The intermediate levels like task plot, skill, service and function are technology agnostic levels. Lower levels like middleware, operating systems and hardware allows the choice of a

	specific platform resources to implement the abstract (platform-agnostic) models. Therefore, the RobMoSys defined separation of levels of abstractions with platform-agnostic levels and platform specific levels allows to use a same model for different technologies (platforms) and let the choice decision of the technologies-specific choices to the later development process.
RobMoSys models must be independent of technologies, but able to be instantiated in existing platforms and infrastructures. Some of the latter will be helped by the project to refactor their code bases in order to exploit the project results.	ROS is one of major existing platforms used in robotics. Joint meetings between RobMoSys and ROSIN projects have been organized at the European Commission premises and at the European Robotics Forum for Robotics. Preliminary discussions on potential solutions for the reuse or refactoring of existing code base were conducted. No decision has been made with regard to the solution to go for at M6.
RobMoSys methodology must foster compositionality: the ability to compose different modules in a methodological way in order to meet predictable functional and non-functional requirements.	Compositionality is a main concern of RobMoSys. Modeling foundation guidelines to build a composition-oriented engineering process for robotic systems have been provided in WP2. Following these guidelines should enable the design of a robotic system and building a robotic system to become a process of composition and configuration of building blocks. During the first six months, an initial version of the modeling foundation guidelines and the meta-meta-model structures that are the basis for composition have been achieved.
RobMoSys tools must be interoperable (that is, be able to transform models without losing their semantics) and able to flexibly compose in tool-chains tailored to specific needs. Runtime monitoring, diagnosis and recovery must be elevated to first-class citizenship in a new generation of robot management tools.	The RobMoSys meta-models structures, specified during the first six months of the project, define the foundation guidelines to ensure interoperability of tools that will implement them. In WP2, a prototypical implementations (exploiting existing background of the partners) has been provided. A reference Eclipse Ecore implementation of RobMoSys meta-meta-model that will serve as a "pivot" model to ensure interoperability of RobMoSys tools has been delivered. This reference implementation will be enriched with the future evolutions of the (meta-)meta-model that will be contributed by the core partners and the community through the open calls.

1.2 Explanation of the work carried per Work Package

This section gives a work package view of RobMoSys objectives and provides a summary of the work progress for these local objectives.

1.2.1 Work Package 1: Project Management and Quality Assurance

1.2.1.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To effectively monitor the project, in administrative, technical and financial terms and to ensure its strategic and everyday management.	A quality management plan (D1.1) has been delivered in M3. It defines the quality indicators, tools and processes to be applied during the RobMoSys project in order to ensure the quality of all project deliverables, support and track the successful and timely implementation of the project's objectives. Key Performance Indicators (KPI) have been defined for each Work Package in D1.1. Monitoring of the progress of the project objectives will be done through KPIs, which will be monitored annually.
To guarantee the adherence of the work to the overall project plans, available resources and timing.	The very close and frequent communication between RobMoSys partners plays a central role to guarantee the adherence of the work to the project plans: • The kick off meeting has presented the overall project plans, timing and organization plan of the work. • Quarterly general assemblies are used to monitor the work with regards to the the project plans. A general assembly was held 3-4th of April. • Technical WPs meetings to synchronize technical contributions. • Day-by-day communication via emails, phone, webex, online tools like wiki and internal discussion pages has been setup to facilitate, foster and keep track of the exchange between RobMoSys partners.
To offer the necessary interface to the EU services and external actors.	RobMoSys public website (http://robmosys.eu/) has been set up and is maintained up to date to provide information on: • The project objectives and approach. • The events in which the project participates.

	• The project communication materials. • Information on the Open Calls content. • Main contact points.
To assure the high quality of the project outcomes and to provide the guarantee that the project development will be in line with existing and emerging international standards and application guidelines for collaborating robots in industrial and service domains.	During the first six months of the project, this objective has been covered by the participation and the presentation of RobMoSys expected outcome to relevant robotics events (e.g. the European Robotics Forum in Edinburgh, Innorobo in Paris, the IEEE International Conference on Robotics and Automation in Singapore) where emerging robotics innovations (including applications and standards) were presented and discussed. Moreover, some RobMoSys partners are involved in European robotics topic groups which are sources of emerging standards and guidelines. Furthermore, industrial RobMoSys partners play an important role in this objective fulfillment.
To identify project risks by performing an effective risk management.	The frequent meetings of the project bodies therefore serve as the main forum for risk identification and monitoring. The identified risks are then analyzed and graded, based on impact and probability of occurrence. A list of identified risks and their mitigation measures are listed in section 5.4 of deliverable D1.1.

1.2.1.2 Contributions of the beneficiaries

Participant	Contribution
CEA	(WP leader and Tasks 1.1 & 1.3 leader) Management of the RobMoSys project (Kick off Meeting, General Assembly, PCA & Grant Agreement preparation, project management strategy); Participation to first General Assembly; Editing of Project Quality Management Plan; Editing of Periodic Progress Report.
HSU	Participation to Kick off Meeting; Organization of first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.
KU Leuven	Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.
TUM	(Task 1.2 leader) Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.
SIEMENS	Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress

	Report.
PAL ROBOTICS	Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.
COMAU	Participation to Kick off Meeting; Contribution to Project Quality Management Plan and Periodic Progress Report.
EFE	Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.
EUnited	Participation to Kick off Meeting; Participation to first General Assembly; Contribution to Project Quality Management Plan and Periodic Progress Report.

1.2.1.3 Deliverables released during the Period

Deliverable	Title	Delivery Date (in months)	Lead
D1.1	Quality Management Plan.	M3	CEA
D1.2	Periodic Progress Reports.	M6	CEA

1.2.1.4 Milestones for the period

MS number	MS title	Lead	Date (in months)	Achievements
MS2	Management structures finalized	CEA	M3	Roles of each partner has been assigned during the kick-off meeting at M1. This assignment has been reported in the quality management plan (D1.1) delivered at M3.
MS3	Kick-off workshop	CEA	M3	The Kick-off meeting has been held at M1 January 17-18th 2017.
MS4	Personnel employed	CEA	M4	Every partner has put in place the required resources for the planned tasks. The execution of the plan is nominal.
MS5	Work started	CEA	M4	The planned work in DoA has successfully started. Furthermore, some actions in WP4 have started in advance to the initial planning.
MS6	Management structures in place	CEA	M4	Management structures were in place at M1 and successfully started to work.

1.2.1.5 WP meetings during the Period

Meeting	Date	Venue	Purpose
Kick off meeting	17-18 Jan. 2017	Palaiseau, France (CEA premises)	Overall project presentation, discussions, planning and coordination of first actions.
RobMoSys/ROSIN	17 Feb. 2017	Brussels, Belgium (EC premises)	RobMoSys/ROSIN joint meeting to discuss both projects synergies.
General Assembly	3-4 Apr. 2017	Ulm, Germany (HSU premises)	Project quality management (identification of KPIs and risks). Monitoring and discussions of the work done from M1 to M3 in all WPs. Planning of actions from M4 to M6.

1.2.2 Work Package 2: Methodology, (Meta)Models, Tooling

1.2.2.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To provide consolidated and sound formal foundations for robotic system composition by model-driven engineering.	Modeling foundation guidelines are needed to build a composition-oriented engineering process for robotic systems. Design of a robotic system and building a robotic system becomes then a process of composition and configuration of building blocks. During the first six months, an initial version of the modeling foundation guidelines and the meta-meta-model structures that are the basis for composition have been achieved. These provide the means to express the structures to manage the interfaces between different roles (robotics expert, domain expert, component supplier, system builder, installation and deployment, operation), at different levels of abstraction (e.g. from move and perceive to grasp firmly to manipulate with pinch grasp and non-slipping prehension pressure). This contribution has been constructed by WP2 partners in a wiki that is intended to be a living document with a continuous publishing process. A coherent and consistent snapshot of the wiki content at M6 is provided in the

	deliverable D2.1 (delivered at M6).
Prototypical proof-of-concept tooling (exploiting as much as possible the existing rich body of work accessible within the labs of the partners) ensures viability of the formal foundations and their processing.	Robotics (software) component (meta-)models for composition-oriented (software) engineering and their prototypical implementations (exploiting existing background of the partners) has been provided. It serves as a software baseline for the other WPs and for preparing the first wave of open calls. Deliverable D2.2 (delivered at M6) provides a description of this prototypical baseline which will be enriched during the course of the project.

1.2.2.2 Contributions of the beneficiaries

Participant	Contribution
CEA	(Tasks 2.6, 2.7 leader) Contribution to the modeling foundation guidelines and tooling baseline for Open Call I; Contribution to RobMoSys wiki, D2.1 and D2.2; Implementation of initial versions of structural meta-models; Participation to technical meetings of WP2.
HSU	(WP leader, Tasks 2.2, 2.3, 2.4, 2.5 leader) Elaboration of the modeling foundation guidelines and tooling baseline for Open Call I; Editing of RobMoSys wiki, D2.1 and D2.2; Organization and participation to WP2technical meetings.
KU Leuven	(Task 2.1 leader) Contribution to the modeling foundation guidelines for Open Call I; Contribution to RobMoSys wiki, D2.1 and D2.2; Participation to technical meetings of WP2.
TUM	Participation to WP2&WP4 technical meeting.
SIEMENS	Organization and participation to WP2&WP4 technical meeting.

1.2.2.3 Deliverables released during the Period

Deliverable	Title	Delivery Date (in months)	Lead
D2.1	Modeling Foundation Guidelines and Meta-Meta-Model Structure.	M6	HSU
D2.2	Initial preparation of (meta-)models, prototypical DSLs, tools and implementation.	M6	HSU

1.2.2.4 Milestones for the period

MS number	MS title	Lead	Date (in months)	Achievements
MS7	Technical Specifications for Open Call I	HSU	M6	Technical specifications of meta-models and tooling needed for issuing the first Open Call I are available on the project public wiki (http://robmosys.eu/wiki/) and frozen in deliverables D2.1 And D2.2 (delivered at M6).

1.2.2.5 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly. In addition, the following dedicated meetings were organized.

Meeting	Date	Venue	Purpose
Technical Meeting	9 Feb. 2017	Frankfurt, Germany	WP2 technical meeting.
Technical meeting	26-27 Apr. 2017	Frankfurt, Germany	WP2/WP3 technical meeting.
WP2 & WP4 meeting	18-19 May 2017	Munich (Siemens premises)	WP2 & WP4 meeting. Presentation and discussion of the RobMoSys approach basis. Presentation and discussion of pilots basis and their initial requirements.

1.2.3 Work Package 3: Basic Building Blocks

1.2.3.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To consolidate about 50 years of experience and "best practices" in the core robotics technology domains: motion control, perception and world modeling stacks and their real-time integration, as well as specification, execution and monitoring of robot tasks in navigation and manipulation.	The past 50 years of experience in the robotics domain, is essentially capitalized in the form of code. The work toward this objective to consolidate the best practices was initiated during the first six months of RobMoSys project. Initial WP2 contributions on methods and tools is used to create the generic foundations that the domain of robotics shares with a lot of other domains in terms of formal representations of entities, relations and properties at different levels of abstractions following a separation of concerns principle. Until M6, the work was focused on motion and

	perception which are two essential functionalities in any robotic system, and both have a rich and mature history. Concrete suggestions about how to turn those state-of-the-art insights into a concrete set of (meta) models, on which to base any concrete implementation for any concrete application in robotics were made in D3.1 delivered at M6.
To provide the functional infrastructure (set of components, models, software and tools) to allow any lab or company to enter the field of robotics, with minimal efforts and yet state of the art sensori-motion and perception functionalities.	During the six first months the work on this objective was initiated with efforts focused on providing a specification of the so-called motion stack and perception stack, since these are foundations of any digital platform for robotic systems. These specifications provided in D3.1 are needed inputs for Open Call I.
To provide a rich ecosystem of (open source) software for robotics companies to select, download and install the relevant subset of this infrastructure, and start innovating on top of it.	An initial list of components existing from RobMoSys core partners background is made available (e.g. SmartSoft components). This list of building blocks (accessible via RobMoSys public wiki) will be extended during the course of the project with contributions of core partners and contributions from the community through the open calls.

1.2.3.2 Contributions of the beneficiaries

Participant	Contribution
CEA	Coordination of contents with the first open call preparations. Participation to WP3 technical meeting.
HSU	Contribution to the specification of motion stack and perception stack (guaranteeing conformance to the design and development guidelines of WP 2); Contribution to D3.1; Participation to WP3 technical meeting.
KU Leuven	(WP leader and all tasks leader) Elaboration of specification of motion stack and perception stack; Editing of D3.1; Participation to WP3 technical meeting.
TUM	Coordination of activities with the management of the first open call preparations.
SIEMENS	Activity not started at M6.

1.2.3.3 Deliverables released during the Period

Deliverable	Title	Delivery Date (in months)	Lead
D3.1	First motion, perception and world-model stacks specifications.	M6	KU Leuven

1.2.3.4 Milestones for the period

MS number	MS title	Lead	Date (in months)	Achievements
MS7	Technical Specifications for Open Call I	HSU	M6	Technical specifications of motion and perception stacks (that are foundations of any digital platform for robotic systems) needed for issuing the first Open Call I are provided in D3.1 (delivered at M6).

1.2.3.5 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly. In addition, the following dedicated meetings were organized.

Meeting	Date	Venue	Purpose
Technical meeting	26-27 Apr. 2017	Frankfurt, Germany	WP2/WP3 technical meeting

1.2.4 Work Package 4: Pilots

This work-package activities are planned to start at M6, however some activities have started during the first six months.

1.2.4.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To bring in pilot applications, as examples of full applications made with modern service robot platforms, to illustrate vendor-neutral and environment-neutral composition of systems.	First descriptions and map of pilots has been provided in the internal wiki of RobMoSys project. The identified pilots are the following ones: • Human Robot Collaboration for Assembly (CEA) • Intra-logistics industry 4.0 Robot Fleet (HSU)

	• Flexible Assembly Cell (SIEMENS) • Assistive Mobile Manipulator (PAL ROBOTICS) • Modular Educational Robot (COMAU)
To provide the Pilots to third-parties and helps them to design, develop, test and benchmark, their demo.	Not started.
To demonstrate the contributions that this project develops in its other technical work-packages.	A first workshop has been held the 18-19th May 2017 at Siemens, where on the one hand the approach under construction in WP2 has been presented and discussed, and on the other hand initial structures and needs of pilots were presented.
To provide the appropriate levels of interfacing conforming to the Methodology of WP 2 and the Basic Building Blocks of WP 3, and create a minimal application "skeleton" on Pilot hardware.	Not started.

1.2.4.2 Contributions of the beneficiaries

Participant	Contribution
CEA	First description of the Human Robot Collaboration for Assembly pilot; Participation to WP4 technical meeting.
HSU	(Tasks 4.2, 4.3 leader) First description of the Intra-logistics industry 4.0 Robot Fleet pilot; Participation to WP4 technical meeting.
KU Leuven	(Tasks 4.1, 4.4 leader) Participation to WP4 technical meeting.
TUM	Participation to WP4 technical meeting.
SIEMENS	(WP leader) First description of the Flexible Assembly Cell pilot; Organization and participation to WP4 technical meeting.
PAL ROBOTICS	First description of the Assistive Mobile Manipulator pilot; Participation to WP4 technical meeting.
COMAU	First description of the Modular Educational Robot pilot; Participation to WP4 technical meeting.

1.2.4.3 Deliverables released during the Period

None.

1.2.4.4 Milestones for the period

None.

1.2.4.5 WP meetings and/or conference-calls during the Period

Meeting	Date	Venue	Purpose

WP2 & WP4 meeting	18-19 May 2017	Munich (Siemens premises)	WP2 & WP4 meeting. Presentation and discussion of the RobMoSys approach basis. Presentation and discussion of pilots basis and initial requirements.

1.2.5 Work Package 5: Open Calls

1.2.5.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To manage the full process of open calls according to the cascading funding mechanisms foreseen in the call.	The first action for the preparation of open calls was the organization of experts workshop in order to gather the knowledge (from near communities and industrial representatives) to evaluate the best practices established in mature domains applying model-driven development and to identify showstoppers that could arise in the robotics domain. This understanding was necessary to make sure that Open Calls will be prepared to provide concrete answers to the community, to finally overcome identified showstoppers and secure broad adoption. Two workshops were organized (one in Frankfurt in February with 4 experts and one Odense in April with Universal Robots). Annex 1 of D5.1 gives a summary of the experts' recommendations. The next achieved actions for the preparation of the first open call were: • The writing of the call description in terms of eligible activities, budget information, and timeline, which was submitted to the European Commission for publication on 10th July 2017. • The writing of documents (guide for applicants, proposal template, the model of contract that will be used for the successful applicants). Furthermore, electronic tools for the open call management were setup. This platform has been developed to comply with the European Commission requirements for a fair, transparent and impartial approach in the management of Open Calls for Third Party funding. The platform provides the services for

	managing submissions as well as a ticketing service that allows all incoming inquiries to be channeled to those members of the core consortium who are most competent to answer them (Administrative, General, and Scientific/ Technical). Different channels are used to announce the open call: • RobMoSys website. • Two brokerage days are organized for the first call (5th July, and 24th August). • Newsletter. • Press releases. • Robotics and relevant software mailing lists. • Participation to robotics and software development forums and conferences (European Robotics Forum 2017, Innorobo 2017, International Conference on Robotics and Automation (ICRA) 2017, Eclipse conference France 2017). More details on all the work done at M6 for open calls management is available in D5.1 delivered at M6.
To ensure the selection of the most performant experiments in order to achieve at better tools, better (functional) software and better software models within RobMoSys.	Not started.

1.2.5.2 Contributions of the beneficiaries

Participant	Contribution
CEA	(Task 5.1 leader) Participation to the experts workshop; Contribution to the open call I text description; Editing of the contract model for successful third parties to the open calls; Contribution to D5.1; Dissemination of the open call I.
HSU	Participation to the experts workshop; Contribution to the open call I text description; Technical specifications inputs for the open call I; Dissemination of the open call I.
KU Leuven	Participation to the experts workshop; Contribution to the open call I text description; Technical specifications inputs for the open call I; Dissemination of the open call I.
TUM	(WP leader, Tasks 5.2, 5.3, 5.4, 5.5 leader) Contribution to the open call I text description; Editing of documents for the call (guide for applicants, proposal template); Setting up the tooling infrastructure for the open call management;

	Editing of D5.1. Dissemination of the open call I.

1.2.5.3 Deliverables released during the Period

Deliverable	Title	Delivery Date (in months)	Lead
D5.1	Open Call I preparation documents.	M6	TUM

1.2.5.4 Milestones for the period

MS number	MS title	Lead	Date (in months)	Achievements
MS7	Technical Specifications for Open Call I	HSU	6	Technical specifications needed for issuing the first Open Call I are available on the project public wiki (http://robmosys.eu/wiki/) and frozen in deliverables D2.1, D2.2 and D3.1 (delivered at M6).

1.2.5.5 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly. In addition, the following dedicated meetings were organized.

Meeting	Date	Venue	Purpose
Experts workshop	7-8 Feb. 2017	Frankfurt, Germany	Gathering the knowledge (from near communities and industrial representatives) to evaluate the best practices established in mature domains applying model-driven development.
Experts workshop	11 Apr. 2017	Odense, Denmark	Meeting with Universal Robots to gather inputs on the motion stack for the open calls.

1.2.6 Work Package 6: Dissemination and Community Building

1.2.6.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To ensure specific dissemination of results towards the industry (as potential users of the	Whereas in typical research projects, dissemination is focusing at communicating

framework and supporters of the foundation), research institutions (to integrate the findings of RobMoSys and the model-driven approach in their future research activities) and to higher education (next generation of professionals as well as life-long learning for professionals)	results generated during the runtime of the project, dissemination for RobMoSys aims at securing adoption of the developed concepts in the industrial and software community. To reach this, different levels of communication and interaction are addressed: awareness, understanding, commitment and action (active participation). To achieve this, a dissemination strategy has been defined. First, target groups and stakeholders have been identified, and second, the appropriate communication channels to reach each group is identified and used. The dissemination strategy is detailed in deliverable D6.1 (initial version of the dissemination plan delivered at M3).
To create visibility for the project and advance dissemination in coherent fashion to the general public and other external stakeholders affected by the outcome of the project in order to generate understanding and commitment.	The dissemination plan is structuring and listing all communication and dissemination activities for all work packages throughout the runtime of the project in a coherent manner. During the first six months of the project, an important effort has been dedicated to make RobMoSys visible, which is of a primary importance to generate understanding of the approach and commitment of the community. Until M6, 10 press releases and newsletters were made. The project has been presented in 10 forums/conferences/workshops targeting industry, research, and software developers. The detailed achieved and planned dissemination activities for 2017 are listed in D6.1.
To generate interest of potential applicants for the Open Calls among relevant stakeholders.	In order to generate interest for potential applicants for the open call, different channels of communication were used during the first six months of the project: • RobMoSys website. • Two brokerage days are organized for the first call (5th July, and 24th August) and call for participation to these events promoted. • Newsletter. • Press releases. • Robotics and relevant software mailing lists. • Participation to robotics and software development forums and conferences (European Robotics Forum 2017,

	Innorobo 2017, International Conference on Robotics and Automation (ICRA) 2017, Eclipse conference France 2017).
To secure the active involvement of stakeholders outside of the core consortium to the extent possible in order to generate acceptance.	Not started.
To educate companies in how to apply the developed technology/framework.	Not started.

1.2.6.2 Contributions of the beneficiaries

Participant	Contribution
CEA	RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh), Innorobo (Paris), EclipseCon France (Toulouse); Editing of Press releases;
HSU	(Task 6.5 leader) RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh), Schloß Dagstuhl.
KU Leuven	RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh).
TUM	(WP leader, Tasks 6.1, 6.2 leader) RobMoSys website; Editing of D6.1; Participation to ERF (Edinburgh); Editing of Press releases.
SIEMENS	RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh).
PAL ROBOTICS	RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh), Advanced Factories Expo & Congress, EclipseCon France (Toulouse), International Conference on Robotics and Automation (Singapore).
COMAU	RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh).
EFE	(Tasks 6.4, 6.6 leader) RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh), EclipseCon France (Toulouse).
EUnited	(Tasks 6.3 leader) RobMoSys website contribution; Contribution to D6.1; Participation to ERF (Edinburgh); Editing of Press releases.

1.2.6.3 Deliverables released during the Period

Deliverable	Title	Delivery Date (in months)	Lead
D6.1	Dissemination Plan.	M3	TUM

1.2.6.4 Milestones for the period

MS number	MS title	Lead	Date (in months)	Achievements
MS1	Project Website Launched	TUM	M3	The project website is launched and publically available: robmosys.eu
MS8	Free Access Webinar Platform Launched	TUM	M6	Several project core partners have a webinar platform that can be used for dissemination activities and open call related communication.

1.2.6.5 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly.

1.2.7 Work Package 7: Exploitation

1.2.7.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To create the conditions and prepare a convincing exploitation of RobMoSys outcomes for industries and SMEs in robotics-related domains and for software companies aiming at using RobMoSys commodities as building blocks to further improve their business and expand in the robotics domain.	RobMoSys will drive the non-competitive part of building a professional quality ecosystem by encouraging the community involvement. Preliminary discussions on the business model for the future RobMoSys outcomes has been initiated. A license that offers openness for both the community contributions and business oriented exploitation of outcomes will be chosen. Currently no decision has been taken for the choice of specific license(s).
To plan and set-up a sustainability plan aiming at securing the continuity of RobMoSys activities beyond the project life-time.	Existing software development eco-systems provide infrastructures for the long term support (e.g. Polarsys for the Eclipse Foundation). A first webinar was organized by EFE to present the open source model of the Eclipse Foundation.

1.2.7.2 Contributions of the beneficiaries

Participant	Contribution
CEA	(WP leader, Tasks 7.2, 7.3 leader) Participation to the Eclipse ecosystem webinar.

HSU	Participation to the Eclipse ecosystem webinar.
KU Leuven	Participation to the Eclipse ecosystem webinar.
TUM	Participation to the Eclipse ecosystem webinar.
SIEMENS	(Task 7.1 leader) Participation to the Eclipse ecosystem webinar.
PAL ROBOTICS	Participation to the Eclipse ecosystem webinar.
COMAU	Participation to the Eclipse ecosystem webinar.
EFE	Organization of the Eclipse ecosystem webinar.
EUnited	Participation to the Eclipse ecosystem webinar.

1.2.7.3 Deliverables released during the Period

None.

1.2.7.4 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly. In addition, the following dedicated meetings were organized.

Meeting	Date	Venue	Purpose
Eclipse ecosystem	15 Mar. 2017	Webinar	Presentation of the Eclipse ecosystem.

1.2.8 Work Package 8: Ethics requirements

1.2.8.1 Summary of work progress and achievements during the period

Main objectives of the WP	Summary of work progress
To set out the 'ethics requirements' that the project must comply with.	Most common ethical issues raised by projects are identified.

1.2.8.2 Contributions of the beneficiaries

Participant	Contribution
CEA	Identification of common ethical issues raised by projects.

1.2.8.3 Deliverables released during the Period

None.

1.2.8.4 WP meetings during the Period

This work package had dedicated slots in the agendas of the Kick off Meeting and the first General Assembly.

2 Update of the plan for exploitation and dissemination of results (if applicable)

A dissemination plan (D6.1) has been delivered in M3. All planned communications from M1 to M6 have been done. The following table provides an update of the dissemination plan for Q3-Q4 2017. Updated events are in **bold** while canceled events are strikethrough. One communication at Euromicro Conference on Digital System Design has been canceled because the conference is too hardware oriented while RobMoSys is currently targeting the software community.

2017-07	**Website**	**Short video: RobMoSys explained in 1 minute on website and youtube channel**		**All**
05-07	**Workshop**	**Brokerage day for the Open Call at KU Leuven, Belgium**		**Industry, Research & Academia, Software Developers**
	Newsletter	Reminder Open Call!		Industry, Research & Academia, Software Developers
2017-08		Reminder Open Call (tbd.)		
	Education	Summer School (Robotics Software Design Schools, tbd.)		
24-08	**Workshop**	**Brokerage day for the Open Call in Frankfurt, Germany**		**Industry, Research & Academia, Software Developers**
2017-09	Competitions	European Robotics League competition in Piombino, Italy (through PAL Robotics)		Robotics Researchers (Industry and Academia)
2017-09	Newsletter/ Website	Open Calls closed – number of proposals, evaluation begins		Industry, Research & Academia, Software Developers
2017-09-12	Conference	SafeComp Conference in Trento, Italy International workshop on the Timing Performance in Safety Engineering ; Presentation of RobMoSys project with a focus on "Safety by		Software developers, Industry

		Design" user story (CEA)		
2017-10	Education	Application in "Autonomous mobile systems" lecture, bachelor course at HSU		Students
2017-11		Promotion of RobMoSys during the European Robotics Week		General public
2017-12	Website	RobMoSys Christmas wishes		all
2018-01	Website/ Newsletter/ Press release	Announcement of the finalists of the Open Call		all

3 Deviations from Annex 1 (if applicable)

Not applicable.