RobMoSys

H2020—ICT—732410

RobMoSys

COMPOSABLE MODELS AND SOFTWARE FOR ROBOTICS SYSTEMS

DELIVERABLE D1.6:

QUALITY MANAGEMENT PLAN

Huascar Espinoza (CEA)

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Author(s): Huascar Espinoza (CEA)

Reviewer: Luz Martinez (TUM)

Executive Summary

The purpose of this manual is to define 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.

The quality procedures are coordinated by the Coordination Team and is assisted by major partners' representatives. This document also covers the project risk management. Risks are constantly assessed and evaluated within the whole project duration. Risk Management is also the responsibility of the Coordination Team.

This deliverable presents an update of Deliverable D1.1 by providing:

- A better description of the quality control procedures
- Update of the Key Performance Indicators
- Update of the Risk list with unforeseen risks

Content

1 Introduction

RobMoSys' vision is that of an agile, multi-domain, model-driven European robotics software ecosystem. It will consist of a specialized set of players with both vertical and horizontal integration levels, providing both widely applicable software products and software-related services. This ecosystem will be able to rapidly address new functions and domains at a fraction of today's development costs.

Towards that purpose, RobMoSys creates a consolidated EU Digital Industrial Platform for Robotics which establishes a common methodology for software development, improves tools and fosters interoperability by model interchange and composability. The RobMoSys project quality management procedures aim to ensure the proper implementation of the project plan and the satisfaction of its objectives.

The purpose of this manual is to define 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.

This deliverable outlines the project's Key Performance Indicators (KPIs), which are specific and measurable in alignment with project objectives and main milestones. The KPIs form the basis for the Quality Assurance Task (T1.3) and all quality control procedures that will be established. The definition of KPIs includes enumerated performance indicators, framework of metrics with associated targets for each applicable timeframe. Monitoring of KPIs will be continuous and will be reported annually with the Project Periodic Reports.

The present document, thus, defines the main project's quality policies, procedures, criteria for and areas of application, roles, responsibilities and authorities.

It describes the quality procedures that are going to be used to monitor the project's working processes and ensure smooth project progress.

This document also covers the project risk management. Risks are constantly assessed and evaluated within the whole project duration. Timely awareness of and reaction to potential problems are crucial for the risk management effectiveness. Risk Management issues will be included in the Periodic Progress Reports of the project.

The structure of this document is as follows:

- **Section 2** briefly introduces the RobMoSys project and describes its nature and objectives.
- **Section 3** gives an outline of the management structure of the RobMoSys project together with the project bodies, the main roles and the responsible persons.
- **Section 4** contains a brief overview of the work packages and their major responsibilities together with the responsible lead participants.
- **Section 5** presents in detail the major principles of the Quality Assurance.
- **Section 6** described the Key Performance Indicators.
- **Section 7** presents Risk Management, which are set for the RobMoSys project in order to assess the quality of the project process and results.

2 Brief Description of the Project

RobMoSys is aimed at building an open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards that will ease the development of new smart applications in multiple sectors.

RobMoSys wants to coordinate the efforts and activities of the community in order to realize a step change towards a European ecosystem for open and sustainable industry-grade software development for robotics (see Figure 1). Specifically, RobMoSys addresses the following goals:

- RobMoSys envisions an integrated approach built on top of the current code-centric robotic platforms, by applying **model-driven** methods and tools.
- RobMoSys will enable the management of the interfaces between different robotics-related domains (**separation of concerns**) in an efficient and systematic way according to each system's needs (**digital datasheets**).
- RobMoSys aims to establish Quality-of-Service properties, enabling a **composition-oriented** approach while preserving modularity.
- RobMoSys will drive the non-competitive part of building a professional quality **ecosystem** by encouraging the **community** involvement.
- RobMoSys will elaborate many of the common robot functionalities based on broad involvement of the community via two **Open Calls**.

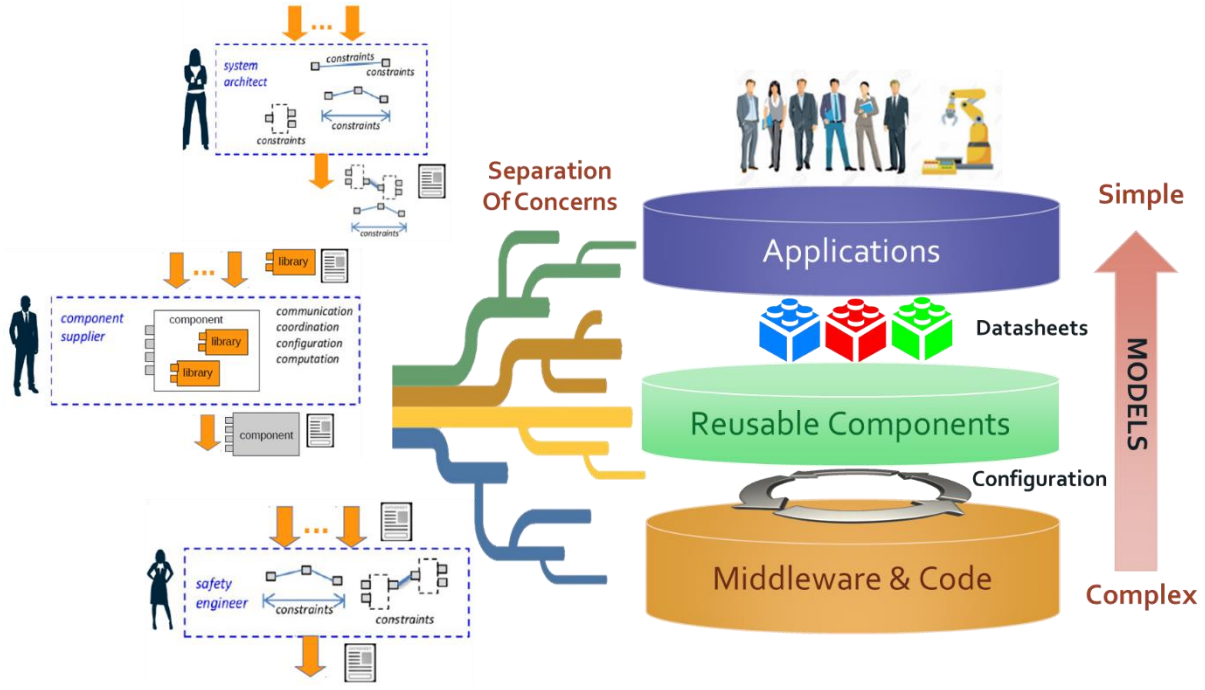

Figure 1: Towards an EU Industrial Digital Platform for Robotics

Towards that purpose, the RobMoSys approach aims at solving critical issues in the area of robotics software development observed in industry. Moreover, it draws a clear migration path for a step-by-step adoption of existing model-driven software and tool assets, the so-called RobMoSys ecosystem, for interested early adopters.

The RobMoSys Open Calls are one of the means implemented by the RobMoSys core consortium to achieve this goal.

3 Outline of the Project Management Structure

The project structure is designed to handle the most important aspects of management, namely decision-making, IPR policy, technical and administrative management, advisory functions and assessment. The overall management of the project will be facilitated by a consistent and formal approach. In any event, this detailed internal Project Plan defined in the preliminary stage of the project supports the contractual Work Plan of the project and to form the basis of the administrative structures and procedures to be used within its management. The reporting lines and decision making procedures are described in detail in the following sections.

3.1 Project Bodies and Main Roles

Project Coordination Team (PCT). The project coordination team will be responsible for the planning, execution and controlling of the project. More specifically it encompasses the following activities:

- Administration and scientific coordination activities
- Implementation of all action plans
- Establishing a budget and schedule-controlling system
- Quality assurance
- Handling of Intellectual Property issues
- Development and application of a communication and reporting culture
- Creation of efficient and effective team structures

The PCT is composed of:
Project Coordinator (PC), which acts as the primary contact point for the European Commission and is responsible for the overall project coordination and management. This comprises reporting to the Commission on progress, changes in the project consortium, or the project work plan as well receipt of feedback on the research results of each work package.

The main management task of the project coordinator is to ensure that the work packages and tasks achieve the expected results and the project makes adequate and timely progress towards achieving its objectives based on these results. Furthermore, the coordinator will convene and chair the regular technical meetings of the project steering committee.

Finally, the PC will be responsible for ensuring that the consortium agreement including issues of intellectual property rights and any other legal documents are properly prepared and managed.

Technical Manager. This role will ensure that the scientific and technological objectives of the project are met. The Technical Manager (or Scientific Manager) will cooperate closely with Work Package Leaders and deliver a really significant contribution to the scientific and technology coordination of the project.
Innovation, Dissemination & Exploitation Board (IDEB). The IDEB reports to the coordinator, collaborates with the steering committee, and is concerned with all matters relating to the dissemination and communication of the results of RobMoSys, the management of the knowledge acquired in the course of the project, innovation aspects, and quality of provided services. Furthermore, it is concerned with all matters relating to the exploitation of the results of the project, the management of the knowledge acquired during the project, IPRs. The members of the IDEB will primarily be selected from the commercial partners, but with a representation from the research partners, being IPR owners. **The Innovation, Dissemination & Exploitation Board is headed by the Innovation, Dissemination & Exploitation manager.**
Quality Assurance Supervisor (QAS). The QAS will cooperate with the PC, with the responsibility to ensure that an effective Quality Plan is developed and to ensure that the quality assurance function is being effectively executed. Each work package Leader will assume the role of Quality Controller

and take responsibility within that work package for implementing and executing the quality control procedures defined in the Quality Plan. A number of Quality Assessors will be designated from the staff of the partners of the Consortium, to take responsibility for assessing quality. The Quality Assessors will conduct their reviews on a defined periodic basis, and will report their findings to the PC.

Role	Partner	Name	Contact Details
Project Coordinator	Huascar Espinoza	CEA	Huascar.espinoza@cea.fr
Technical Manager	Christian Schlegel	HSU	schlegel@hs-ulm.de
Innovation, Dissemination and Exploitation Manager	Gael Blondelle	EFE	gael.blondelle@eclipse.org
Quality Assurance Supervisor	Christophe Leroux	CEA	christophe.leroux@cea.fr

Table 1: Project Coordination Team

Project Steering Committee. The project steering committee is the major decision-making committee of the RobMoSys project. It comprises one **principle investigator** (PI) from each project partner. The steering committee will meet each half a year. The purpose of the meetings is to discuss in detail the progress of the project and to decide its general technical direction. The steering committee will decide, whether the progress in each work package is acceptable, and if necessary, it will decide to amend the work plan, shift resources or initiate contingency actions. The steering committee will further discuss and decide on the project nuances, issues of intellectual property rights, and major disputes. In cases, where the project coordinator feels the need to discuss urgent matters with the whole steering committee in addition to the regular meetings (2 times per year), he will convene an additional electronic meeting of the steering committee. Each member of the steering committee has one vote, which may be made by proxy, if necessary. Preferably, decisions of the steering committee are taken by consensus. If this turns out not to be possible, decisions will be taken by majority vote with the project coordinator retaining the casting vote.

In cases, where the PC brings forward arguments that a decision of the steering committee may jeopardize the whole project by deviating from targeting the outcomes expected by the European Commission, the implementation will be delayed until feedback from the Commission has been received. The project coordinator will be responsible to seek advice from the commission immediately after such a decision has been made and embargoed.

Work Package Leaders. As outlined in the work plan, for each work package a work package leader (WPL) has been allocated. WPLs are senior investigators of the project partners. The work package leaders report directly to the project coordinator and are responsible for monitoring and reporting on progress in their work package and for the production and on the timing of the deliverables.

Work Package Task Leaders. For each task in a work package task leader (TL) will also be allocated. Work package task leaders will also organize meetings of the corresponding task teams, whenever it appears to be necessary to discuss the further progressing of work in the work package

3.2 Work Packages Description

The work plan of RobMoSys is organised in seven Work Packages (WPs) as shown in Figure 2 and described in the following.

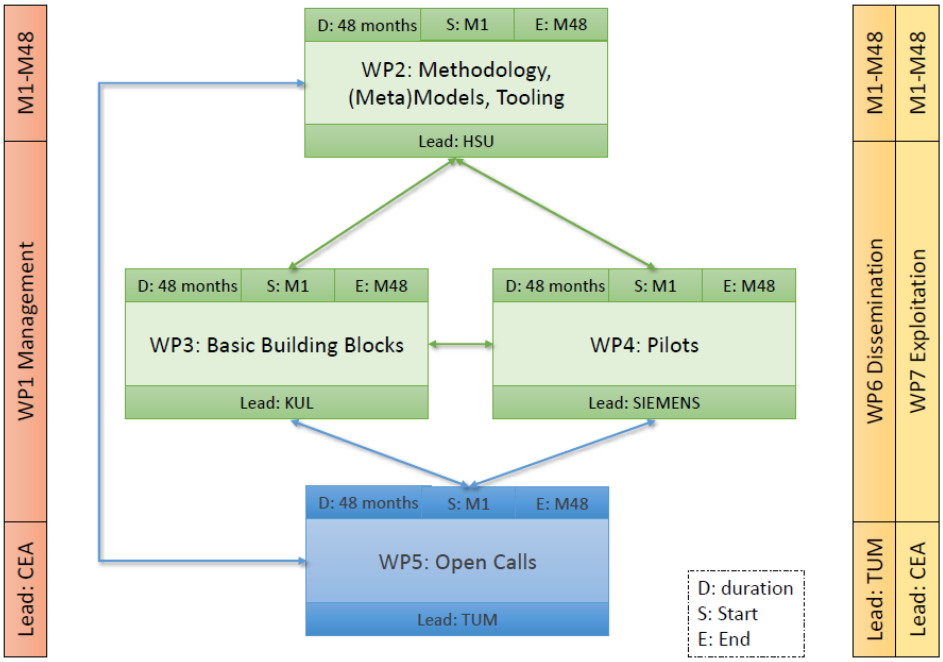

Figure 2: Inter-relation of RobMoSys work packages

Work Package 1: Project management and Quality assurance (CEA). This WP guarantees the successful realization and conclusion of the project including the project administration and control, risk management, problem handling and quality assurance on management levels.

Work Package 2: Methodology, (meta)models, tooling (HSU). This WP provides the modeling foundations for the project: (meta-) meta-models and the methodology to other technical work packages. Prototypical tooling and tool-chains are also included in this WP.

Work Package 3: Basic Building Blocks (KUL). This WP provides the models and the prototypical tooling for motion and perception stacks. The WP will design, write and documents as well the related prototypical software. Modeling and the methodology to obtain software is 100% compliant to specifications defined in WP 2. More complete modeling, tooling and software is obtained through the first wave of Open Calls.

Work Package 4: Pilots (SIE). This WP provides the models and the prototypical software for Pilot Cases. Modeling and the methodology to obtain software is 100% compliant to specifications defined in WP2. More complete modeling, tooling and software to showcase Pilot applications are obtained through the second wave of Open Calls.

Work Package 5: Open Calls (TUM). This WP manages the process and procedures to run the two rounds of Open Calls. Tier-1 workshops are also included in this WP to help project members to

prepare and monitor the Open Calls.

Work Package 6: Dissemination (TUM). This WP includes all the dissemination activities aiming at securing adoption in the industrial and software community.

Work Package 7: Exploitation (CEA). This WP includes exploitation-related activities as the establishment of an exploitation plan and sustainability activities aiming at engaging the eco-system behind the duration of the project. Business models and strategies for sustainability will be explored, including the possibility to create an organization (e.g. foundation) supporting the developments of RobMoSys after the project lifetime.

Work Package 8: Ethics Requirements (CEA). This WP sets out the 'ethics requirements' that the project must comply with and monitors their fulfillment.

List of work packages

WP number	Work package title	Lead participant name
WP1	Project Management and Quality Assurance	CEA
WP2	Methodology, (Meta)Models, Tooling	HSU
WP3	Basic Building Blocks	KU Leuven
WP4	Pilots	SIEMENS
WP5	Open Calls	TUM
WP6	Dissemination and Community Building	TUM
WP7	Exploitation	CEA
WP8	Ethics Requirements	CEA

Table 2: List of the project's work packages

3.3 Project Management Procedures

3.3.1 Communication among Partners

Special attention is paid to keeping the partners informed on the project's status, planning, business case news and other important issues. The project coordinator is responsible for channelling the relevant information to the partners: minutes of meetings, financial information, official technical and financial reports submitted to the EC, publications of results, etc.

Most of communication within the project is handled through e-mail and purpose-made mailing lists according to themes or interests of the partners. The mailing list are:

- General Mailing List robmosys@saxifrage.saclay.cea.fr
- Scientific Mailing List robmosys-scientific@saxifrage.saclay.cea.fr
- Integrated Technical Projects (ITPs) Mailing List robmosys-itp@saxifrage.saclay.cea.fr

A project website is hosted at the project coordinator to centralise all information related to the project.

- https://robmosys.eu/

and a technical sub-website (Wiki):

- https://robmosys.eu/wiki/

This technical wiki website has a public part and a private part reserved for consortium members, EC project officers, and ITPs. It centralises all documents related to the project grouped per activity and per task (draft and final deliverables, documentation, source codes, meeting reports, etc.). The private part will enable access to internal documents, meeting agendas, supporting material, and individual's to-do-lists.

In order to realize forum discussions, the Consortium and ITPs uses:

- https://discourse.robmosys.eu/

This forum is open to the public.

The consortium holds regular web-based or skype meetings and plenary F2F meetings. The Project Steering Committee physically meets twice per year.

3.3.2 Decision Making, Conflict Resolution and Risk Management

In the course of the project, the consortium has to agree on and develop technical, scientific and commercial ideas and specifications. Usually, agreement is reached first by informal contact, followed by official confirmation via electronic mail, letter or agreed written minutes. For important issues, the agreement may take the form of a short report that needs to be signed by those responsible for decision-making. Non-technical factors such as resource allocation and contractual terms also need to be agreed and documented in writing. Individual Technical Leaders and Work Package Leaders immediately inform the coordinator if potential conflict situations arise. Technical issues/conflicts within given contractual commitments that do not involve a change of contract, a change of budget and/or a change of resources/overall focus will be discussed/solved on the WP level first. Decisions are made by majority vote of the Technical Leaders of all principal and assistant contractors.

If the decision being taken is unacceptable to partners found in the minority positions, the resolution of the conflict is escalated according to the procedure is summarised in the following steps:

- First, the implementation team will inform the WP leader for the conflict occurred.
- The WP leader organizes the WP team meeting and the issue is discussed. In case of agreement the team informs the Coordinator.
- If no decision is taken the WP leader informs the Coordinator. The latter contacts with the responsible persons and tries to resolve the conflict.
- In case of agreement, the Coordinator informs the coordination team. Otherwise, the issue is escalated to the Coordination Team.

The Coordination Team meets with the relevant parties in order to discuss the conflict. If no agreement occurs the issue will go to the Technical Committee who has the authority for the final decision. The final decision must be accepted by all parties.

The decision scope at task level is that all partners being involved in a task are eligible to contribute to a decision regarding that certain task; in case that a capable decision cannot be taken at that level, the issue has to be forwarded to the WP leader who will act as mediator. The same procedure appears at the level of work packages, where resolution is attempted via mediation helped by the project coordinator. The ultimate decision for all unresolved conflicts is made by the project steering committee.

The only exception, where the European Commission shall be consulted, is when the project coordinator brings forward arguments that a decision of the steering committee may jeopardise the whole project, for example, by deviating from targets and outcomes expected by the European Commission.

In this case, implementation is delayed until feedback from the Commission is received. The project coordinator is responsible to seek advice from the Commission immediately after such a decision has been made.

In the case of persistent disputes, the consortium informs the Project Officer, solicits the advice of reviewers and calls for an extraordinary meeting. If it becomes necessary to involve the responsible EC officer, a formal request for a meeting is submitted.

4 Quality Assurance

4.1 Quality Assessment

RobMoSys will assess its progress via a number of internal and external control procedures, including regular meetings at key project milestones, project reviews and audits and a quality management plan. For the project deliverables, the RobMoSys project adopts at least the following quality criteria:

- Timeliness;
- Balanced structure with respect to content and resources;
- Appropriate usage of tables, figures;
- Usability, ease of implementation, appropriate user guide;
- Measurement of project progress.

Quality assurance actions include the following: standard format for given types of documents, coding standard, documented process for software developments that will include design and code reviews, conformance to design with reviewed test plans, management of all documents and software by a configuration control system, plan for control actions, standards and procedures for

- Organization of working teams with roles and responsibilities of each participant,
- Time schedules, development, testing, acceptance and maintenance quality criteria, procedures for acceptance and quality control.

At the beginning of the project and as a result of the deliverable D1.1: Quality Management Plan (due Month 3), the project's Key Performance Indicators are defined in detail for each WP with specific and measurable KPIs. The KPIs will form the basis for the Quality Assurance Task (T1.3) and all quality control procedures that will be established. The definition of KPIs includes enumerated performance indicator with associated targets for each applicable timeframe. Monitoring of KPIs will be continuous and will be reported with the Project Periodic Reports.

4.2 Deliverable Tracking and Quality Assurance

To ensure the quality of Deliverables, an internal review process has been defined. The main goal of this process is to establish internal feedback by partners who did not directly participate as editor to the Deliverable before submitting the Deliverable to the European Commission. The review process is shown in the Figure below.

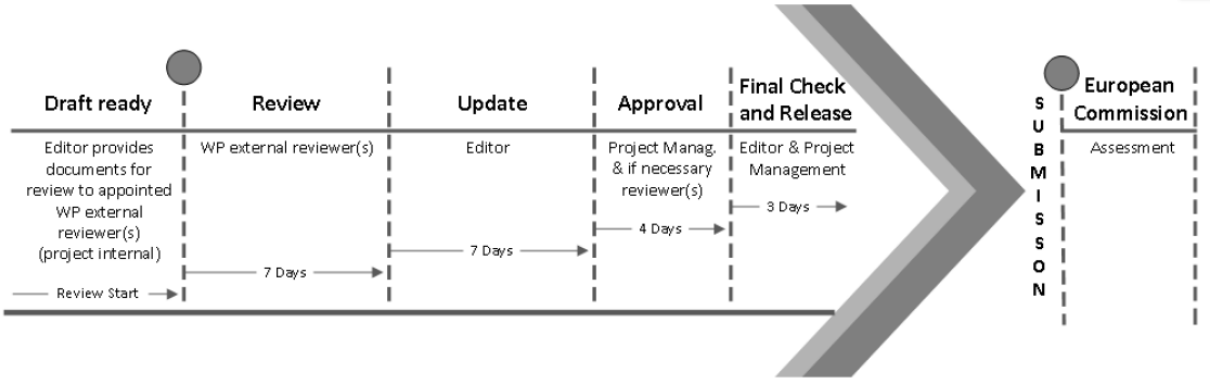

Figure 3: Internal Review Process

The table below presents an overview of the deliverables, related work packages, their due dates, the beneficiary in charge of drafting the deliverable (Editor), the beneficiary in charge of reviewing (Reviewer) and giving feedback to Editor, and the beneficiary who will act as a "rapporteur" and provide a consensus report in case that Editor and Reviewer are in conflict and cannot reach agreement.

Deliverable Number	Deliverable name	Lead beneficiary	Type	Dissemination level	Delivery date (in months)	Beneficiary in charge of revision
D1.1	Quality Management Plan	CEA	Report	Public	3	TUM
D1.2	Periodic Progress Reports	CEA	Report	Public	6	TUM
D2.1	Modeling Foundation Guidelines and Meta-Meta-Model Structures	HSU	Report	Public	6	PAL
D2.2	Initial preparation of (meta-)models, prototypical DSLs, tools and implementation	HSU	Report	Public	6	PAL
D3.1	First motion and perception stack contributions to Call text for third party funding	KU Leuven	Report	Public	6	SIE
D5.1	Open Call I preparation documents	TUM	Report	Public	6	EUR
D1.3	Annual Reports	CEA	Report	Public	12	TUM
D4.1	First report on progress of Pilot Cases	KU Leuven	Report	Public	12	EFE
D5.4	Evaluation and selection report for Open Call I	TUM	Report	Public	12	SIE
D6.3	Eclipse Project and Eclipse Project Proposal	EFE	Report	Public	12	EUR
D6.4	Reports of Experts Workshops	HSU	Report	Public	12	SIE
D7.1	Exploitation Plan	SIEMENS	Report	Confidential*	12	HSU
D7.2	Business Models for the EcoSystem	CEA	Report	Public	12	KUL
D7.3	Sustainability Plan	CEA	Report	Public	12	KUL
D8.1	Requirement No.1	CEA	Ethics	Confidential*	12	TUM
D2.5	Modeling Foundation Guidelines and Meta-Meta-Model Structure – m18	HSU	Report	Public	18	PAL
D1.4	Interim Progress Reports – m18	CEA	Report	Confidential	19	TUM
D5.6	Progress Report on Open Call I Experiments	TUM	Report	Public	24	EUR
D1.5	Interim Progress Reports – m24	CEA	Report	Confidential	25	TUM
D2.3	Improved (meta-)models, prototypical DSLs, tools and implementations	HSU	Report	Public	27	COMAU
D5.2	Open Call II preparation documents	TUM	Report	Public	27	EUR
D5.7	Final Report on Open Call I Experiments	TUM	Report	Public	27	EUR
D1.6	Quality Management Plan – m30	CEA	Report	Public	30	TUM
D1.7	Interim Progress Reports – m36	CEA	Report	Confidential	37	TUM
D1.8	Interim Progress Reports – m42	CEA	Report	Confidential	43	TUM
D2.4.	Final (meta-)models, prototypical DSLs, tools and implementations	HSU	Report	Public	48	COMAU
D2.6	Modeling Foundation Guidelines and Meta-Meta-Model Structure – m30	HSU	Report	Public	30	PAL
D3.2	First draft of software and tools for motion, perception and world model stack	KU Leuven	Report	Public	30	PAL
D3.3	Second motion, perception and world-model stacks specifications	KU Leuven	Report	Public	30	PAL
D3.4	Composable software and tooling for motion, perception and world-model stacks	KU Leuven	Report	Public	48	PAL
D3.5	Full documentation of motion, perception and world model stacks	KU Leuven	Report	Public	48	COMAU
D4.2	Second report on pilot cases	KU Leuven	Report	Public	30	EFE
D4.3	Final report on pilot cases	KU Leuven	Report	Public	48	EFE
D5.3	Tier-1 conclusive remarks and recommendations	CEA	Report	Public	48	SIE
D5.5	Evaluation and selection report for Open Call II	TUM	Report	Public	33	COMAU
D5.8	Progress report on Open Call II Experiments	TUM	Report	Public	39	EFE
D5.9	Final report on Open Call II Experiments	TUM	Report	Public	48	EFE
D6.1	Dissemination Plan	TUM	Report	Public	3, 13	CEA
D6.10	Reports of Experts Workshops – m48	HSU	Report	Public	48	SIE
D6.2	Foundation Supporters	EUR	Report	Public	48	CEA
D6.5	Eclipse Project and Eclipse Project Proposal – m30	EFE	Report	Public	30	EUR
D6.6	Reports of Experts Workshops – m30	CEA	Report	Public	30	SIE, HSU
D6.7	Dissemination Plan and Report – m30	TUM	Report	Public	30	CEA
D6.8	Dissemination Plan and Report – m48	TUM	Report	Public	48	CEA
D6.9	Eclipse Project and Eclipse Project Proposal – m48	EFE	Report	Public	48	EUR
D7.4	Exploitation Plan – m30	SIEMENS	Report	Confidential*	30	HSU
D7.5	Business Models for the EcoSystem – m30	CEA	Report	Public	30	EFE, KUL
D7.6	Sustainability Plan – m30	CEA	Report	Public	30	EFE, KUL
D7.7	Exploitation Plan – m48	SIEMENS	Report	Confidential*	48	HSU
D7.8	Business Models for the EcoSystem – m48	CEA	Report	Public	48	KUL
D7.9	Sustainability Plan – m48	CEA	Report	Public	48	KUL

Table 3: List of the deliverables

As the table 3 shows, in potential conflict situation and disagreement between the Editor (lead beneficiary) and the Reviewer (beneficiary in charge of revision), the resolution of the conflict will be escalated in the following steps:

- First, the beneficiaries will inform the WP leader about the conflict occurred.
- The WP leader will organize the WP team to discuss the issue. In case of disagreement or no decision the team will inform the Project Coordinator (PC). The latter will try to resolve the conflict or disagreement.

Table 4 gives an overview of the significant project milestones including related WPs, lead beneficiaries responsible for reaching them, and estimated date. To ensure the smooth and successful progress of the project, the Work Package Leaders will provide a short report with the description of the process after the milestone has been reached. This report is to be submitted both to the Project Coordinator and to the Quality Assurance Supervisor. In case the milestone has not been reached, the report should contain the reasons with the new estimated date.

Milestone number	Milestone name	WP	Lead beneficiary	Estimated date
M1	Management structure finalized	1	CEA	4
M2	Consortium has met (Kickoff workshop)	1	CEA	4
M3	Contract Ready	1	CEA	4
M4	Personnel has been employed	1	CEA	4
M5	Work has been started	1	CEA	4
M6	Management structure in place	1	CEA	4
M7	Specs 4 Building Blocks	2,3,5		6
M8	Free Access Webinar Platform Launched	6	TUM	6
M9	Communication to Applicants (Building Blocks)	1,5		12
M10	Completion of projects from open calls with their demos (Open Call I)	5	TUM	24
M11	Specs 4 Pilots	2,4,5		27
M12	Communication to Applicants (Pilots)	1,5		33
M13	Completion of projects from open calls with their demos (Open Call II)	5	TUM	45
M14	Final Specs	2	HSU	48

Table 4: Overview of the project's milestones

5 Key Performance Indicators

The Key Performance Indicators reflect those aspects, which are important to make RobMoSys a success. Monitoring of the progress of the project objectives will be done through Key Performance Indicators (KPIs), which will be monitored periodically and reported in the Periodic Project Reports.

During the General Assembly at M3, the consortium collectively decided to keep the number of KPI small, preferring to have a small number of strong KPIs. Strong KPIs imply ambitious target values in the area of dissemination, exploitation, and sustainability since the success of the project is directly related to the uptake of the proposed approach.

During the General Assembly at M17, the consortium considered that in addition to KPIs related to dissemination, exploitation and sustainability, the project should also measure technical goal achievements. It was deemed that project Pilots are the best way to measure technical performance indicators. Deliverable D4.2 (Second Report on Pilot Cases) provides further information about the technical KPIs per Pilot. We follow the "Goal-Question-Metric (GQM)" approach. In the GQM approach, a set of goals are first defined. Then, for each goal, a set of questions is specified to assess the achievement of the goal. To answer these questions, a set of metrics are defined. Once the goals, questions and metrics have been specified, a benchmarking plan can be elaborated assessing the overall benefit of the approach being evaluated. ITPs defines their own KPIs and perform their measurements in their reports.

In this document, we summarize the non-technical KPIs. Non-technical KPIs are presented in the following table, describing:

- Performance Indicator Identifier
- Description
- Related WP
- Target Value
- How to track the performance and when
- Beneficiary in charge of confirming that the indicator/target has been met

New KPIs proposed in Deliverable D1.6 (regarding D1.1) are marked the ID with the keyword "new".

Id	Description	WP	Target Value	Tracking	Milestones	Beneficiary in charge
Coaching Services						
KPI.CS.1	N° of companies requesting RobMoSys coaching services (individual solicitations of companies interested to adopt and deploy the RobMoSys approach internally)	6,7	Positive trend per year (positive slope in the trend line)	Trace in the Tuleap Collaborative Tool	Report KPI in progress report	KUL

KPI.CS.2	N° of EU projects requesting RobMoSys coaching services (individual solicitations of projects interested to adopt and deploy the RobMoSys approach internally)	6,7	Positive trend per year (positive slope in the trend line)	Trace in the Tuleap Collaborative Tool	Report KPI in progress report	CEA
KPI.CS.3	N° of organizations and individuals participating to Educational Workshops	6	Positive trend per year (positive slope in the trend line)	Trace in the Tuleap Collaborative Tool	Report KPI in progress report	KUL
KPI.CS.4 *(new)*	N° of people coached by RobMoSys	40	Positive trend from Open Call 1 to Open Call 2 (positive slope in the trend line)	Trace in the Tuleap Collaborative Tool	Report KPI in progress report	CEA
Community Involvement						
KPI.CI.1	Coverage of Open-call Topics in terms of N° of submitters per Topic	5	No significant unbalance in the distribution of participants w.r.t. proposed topics and non-zero participation per each topic.	Trace in the Open-call Monitoring Tool	Report KPI in progress report	TUM
KPI.CI.2	Interested organizations for RobMoSys sustainability as N° of "potential" founders	7, 6	Positive trend per year (positive slope in the trend line)	List of foundation supporters in D6.2	Report KPI in Progress Report	EUR

KPI.CI.3	Software Community activity expressed as trend in the N° of Committers, Downloads, Usage, Regularity of releases	6	Positive trend, start to be monitored during the experiments of the first Open-call	Trace in software repositories used (Eclipse, GitHub, etc)	Report KPI in Progress Report	EFE
KPI.CI.4 *(new)*	Number of new development projects contributing to the RobMoSYs ecosystem	18	Positive trend, start to be monitored during the experiments of the first Open-call and second Open call	Trace in software repositories used (Eclipse, GitHub, etc)	Report KPI in Progress Report	CEA
Tooling Support (Platform)						
KPI.TS.1	Coverage of the technical scope in terms of the distribution of tools supporting the meta-model depending on the ratio of the meta-model covered (e.g. N tools supporting 10%, M tools supporting 20%, …K tools supporting 100%) with distinction between commercial and open-source tools	2,3	Positive trend in the number and in the coverage for each tool, at least one open-source tool covering 100% of the meta-model (reference implementation)	Trace in the Monitoring Tool, Tuleap	Report KPI in Progress Report	CEA
KPI.TS.2	Coverage of the technical scope in terms of the distribution of tools providing V&V and code generation	2,3	Positive trend in the number and in the coverage for each tool, at least one open-source tool covering	Trace in the Monitoring Tool, Tuleap	Report KPI in Progress Report	HSU

	features		minimal V&V and code-generation features (reference implementation)			
KPI.TS.3 *(new)*	New tool features/module supported in the existing RobMoSys baselines	10	Positive trend in the number and in the coverage for each tool	Trace in the Monitoring Tool, Tuleap	Report KPI in Progress Report	CEA

Table 5: List of Key Performance Indicators

6 Risk Management

To guarantee the achievement of the objectives of the RobMoSys project, it is essential to identify and understand the significant project risks.

The continuous risk management process is based on the early identification of, and the fast reaction to, events that can negatively affect the outcome of the project. The frequent meetings of the project bodies therefore serve as the main forum for risk identification. The identified risks are then analyzed and graded, based on impact and probability of occurrence.

Technical risks were analyzed and graded, based on their probability of occurrence in order to answer the governing question: "How big is the risk and what its impact is?" Knowing how a risk impacts the project is important as several risks of the same type can be an indication of a larger problem.

The risks defined in the DoA, will be graded into low/medium/high risk levels.

low	low probability of occurrence and low impact
medium	low/high probability of occurrence and High/low impact
high	high probability of occurrence and high impact

The risks will be monitored on a regular basis and an updated risk table will be provided within the Periodic Reports.

In addition to the above-mentioned tools and procedures, the project partners' profound experience with H2020 projects implicates a high level of competence, expert knowledge, skills and qualifications, which further increases the quality of the project work. Furthermore, besides these hard skills, also soft skills, such as motivation, team spirit, and interpersonal interaction contribute to high quality project performance.

Table 6 shows the list of risk identified for the project.

Risk Number	Description of risk	WP Number	Proposed risk-mitigation measures
1	Unclear work and/or tasks responsibilities (Impact High, Risk Low). Specific tasks and – in case of core tasks – the whole project may be delayed.	WP1	The workplan of RobMoSys shows clear responsibilities of Work Packages and Tasks. Retain payments to beneficiaries payments are linked to timely delivery. Regular meetings (Video, Skype, phone and in person) to discuss the workflow openly.
2	RobMosys's visibility too low (Impact High, Risk Low). RobMoSys proposes different instruments (Tier- 1, Open-Calls, RiF and CoC), that could cause some dispersion and loss of efficiency in the global communication.	WP6	A clear communication plan including presentations at broad-spectrum and specific events will likely resolve this problem – just as we did very successfully within ECHORD and ECHORD++. Outreach to new potential communities is also secured by specific actions ca ried out by two foundations that hopefully will have a multiplier effect in their respective already established communities. The first list of members gathered for the Tier-1 group already witnesses the interest that the different communities may have in the project. Platforms and facilities will be chosen depending on the requirements and recommendations gathered during the project life- time.
3	Lack of acceptance by stakeholders (Impact High, Risk Low). RobMoSys proposes a technical solution based on a model-driven approach that can be tailored to stakeholder specific needs, but practitioners could refuse more formal, not code-based approaches.	WP6	Special information events, targeted campaigns and training will be undertaken. The project aims at show- ing the benefits of the approach since the very beginning through trials during the Tier-1 workshops especially targeted to software developers. Feedback will be taken into account to remove blocking points. RobMoSys will create related software projects in different platforms, such Eclipse, and web-based repositories, such as GitHub.
4	Lack of visibility of Open Calls with respect to SME (Impact Low, Risk Medium). The Open Call visibility is secured by an intensive dissemination and communication activity, however, the funding rate could prevent SMEs to apply.	WP5	To this end RobMoSys plan to intensively interface with Fortissimo 2 project, the first to run an I4MS project with Open Call, and that is successfully attracting a huge amount of SMEs.
5	Beneficiary bankruptcy (Impact Medium, Risk Low). Potential risk of a failure of a specific cascade funding project.	WP1,WP5	Rapid alert system due to additional reporting duties for beneficiaries with weak financial validation. Replace beneficiary Financial risk is safeguarded by guarantee fund. The Open Call Selection Process will steer at getting more than one project on a specific technical objective that must be achieved.
6	Delayed start of experiments and other instruments (Impact High, Risk Medium-High). No sound planning of resources and timeline possible for beneficiaries. Experiments cannot deliver the intended results on time. Project duration likely to be extended (cost- neutral). Bad image of the project and demotivation of SMEs to participate in future EU- funded projects.	WP5	Amendments. Communication of this timetable to the beneficiaries. Beneficiaries that do not meet start deadlines will be postponed to the next batch or replaced. Beneficiaries with complete documentation can start their experiments without prior signature of Amendment.

Table 6: List of Risks

Some additional risk have been identified during the project:

- **Unforeseen Risks**

Risk Number	Description of Risk	Work Packages Concerned	Proposed risk-mitigation measures
U1	RobMoSys features coverage in the RobMoSys Pilots application and use-cases (Impact: High, Risk: Low). The Pilot owners define their Pilot application and use cases according to their own motivation and requirements. This can lead to lack of coverage in the Pilots of some RobMoSys features.	WP2,WP1,WP4,WP3	Early identification of the RobMoSys features and the planned Pilot coverage. Regular monitoring of the Pilot feature coverage by all involved partners.
U2	The project may not have technologies delivered in open source in a timely manner.	WP6,WP7	Start to create and maintain the RobMoSys ecosystem and community from the early stages of the project.

For the period M01 to M12, the following status has been reported:

- **States of the Play for Risk Mitigation**

Risk Number	Period	Did you apply risk mitigation measures?	Did your risk materialise?	Comments
1	1	Yes	No	Regular General Assembly meetings (every 3 months), technical physical and phone conference meetings allowed the RobMoSys consortium to get aligned in task responsibilities.
2	1	Yes	No	Dissemination and communication worked well with workshops with Tier 1 experts, brokerage events for Open Calls, submission of 34 proposals, and cross fertilization with other related projects (e.g. ROSIN).
3	1	Yes	No	Acceptance by stakeholders is an incremental process. We started to define the tooling community around Eclipse (SmartSoft project in preparation), provided a human readable form of our metamodels (RobMoSys wiki) and prepare material for facilitating the acceptance of the RobMoSys model-driven approach (videos and presentations).
4	1	Yes	No	As we got a high number of Open Call applicants, this worked well. We plan to improve the visibility of the Second Call to other communities and domains, by adding new channels of communication.
5	1	No	No	Since there was not beneficiary bankruptcy, the mitigation actions were not needed
6	1	No	No	The experiments will start a couple of months later than planned as a whole, but this does not affect the project itself. Second Call will be open sooner.

7 Conclusions

This Project Quality Plan demonstrates that quality aspects are taken into account in a variety of processes and activities within the RobMoSys project. The project aims at obtaining a high degree of quality, where outcomes are achieved in terms of the effectiveness and efficiency of working practices, as well as products and standards of project deliverables and outputs. This plan seeks to establish the procedures and standards to be employed in the project, and to allocate responsibility for ensuring that these procedures and standards are followed. The project management team (monitors that the above-described processes are fulfilled). In case of any deviations to the planned work the management team is in charge of taking necessary mitigation measures. The plan is effective throughout the lifetime of the project, and open to revision if necessary.

Deliverable D1.6 presents an update of Deliverable D1.1 by providing:

- A better description of the quality control procedures
- Update of the Key Performance Indicators
- Update of the Risk list with unforeseen risks