

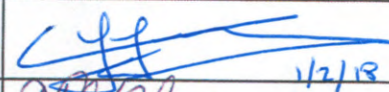




H2020- EEB - 2017 - 2015 - 766464 – SCORES

Self Consumption Of Renewable Energy by hybrid Storage systems



D1.2 Quality Assurance and Risk Management Plan

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1 Background

“The SCORES project aim is to develop and demonstrate in the field a building energy system including new compact hybrid storage technologies, that optimizes supply, storage and demand of electricity and heat in residential buildings, increasing self-consumption of local renewable energy in residential buildings at the lowest cost. Combination and optimization of multi-energy generation, storage and consumption of local renewable energy (electricity and heat) brings new sources of flexibility to the grid and giving options for tradability and economic benefits, enabling reliable operation with a positive business case in Europe’s building stock. SCORES optimizes self-consumption of renewable energy and defers investments in the energy grid.”

This document is deliverable D1.2 and illustrates the measures that are taken in the SCORES project with regard to quality assurance and (financial, organizational and managerial) risk management. It covers topics such as the project governance, expert advisory board, milestones, communication, online project archive, progress monitoring and document control.

TNO has compiled this document based on:

- the Grant Agreement,
- the Consortium Agreement,
- the Description of Action (mainly section 3.2),
- the Agreements during Kick Off and
- TNO’s best practice on document management and review

AEE INTEC has formally reviewed this document. Moreover, this document has been reviewed by all the partners within the SCORES program before publication.

2 References

2.1 Applicable Documents

	Document	Reference	Issue
AD-01	SCORES Grant Agreement	No. 766464	
AD-02	SCORES Consortium Agreement	No. 0100308813	

2.2 Reference Documents

	Document	Reference	
RD-01	SCORES Sharepoint user Guide and FAQs	TNO-SCORES-PROC-007	1
RD-02	Minutes of Meeting of SCORES kick off November 2017	TNO-SCORES-MOM-002	1
RD-03	Set of presentations shown at SCORES kick off November 2017	TNO-SCORES-HO-001	1
RD-04	D 1.1 Meeting plan including all consortium meetings	TNO-SCORES-RP-004	1

3 Terms, definitions and abbreviated terms

RP	Report
PROC	Procedure
DoA	Description of Action
GA	General Assembly
EB	Executive Board
EAB	Expert Advisory Board
PO	Project Officer
PC	Project Coordinator
PM	Project Manager
MOM	Minutes of Meeting
ECM	Engineering Coordination Memo's

4 Executive summary

This document illustrates the measures that have been taken in the SCORES project with regard to quality assurance and (financial, organizational and managerial) risk management. It covers topics such as the project governance, expert advisory board, milestones, communication, online project archive, progress monitoring and document control.

All partners will perform their part of the work according to their internal quality control and assurance procedures.

The organizational structure matches the complexity of the project and is in accordance with the recommended management structure of the DESCAs Consortium Agreement. The General Assembly (GA) consists of one representative of each partner and supervises the project and takes decisions in major issues. The Executive Board (EB) consists of all WP Leaders and monitors the technical progress. Other key roles in the project are fulfilled by the Project Coordinator and the Work Package Leaders. Clear quorum, voting and veto rules are set out to facilitate the decision making process.

The GA will be supported by the Expert Advisory Board (EAB) that consists of a number of external experts to advise about aligning the results of the project with the reference markets and European policy on renewable energy.

A major tool for making technical decisions during the execution of the project is the assessment of identified milestones.

The communication strategy will be based on three pillars: the day-to-day communication, the web-based communication and the project meetings. A detailed meeting plan is available in a separate document [RD-04].

For the SCORES project a restricted internet accessible site is generated with access only for SCORES participants that functions as document repository.

Technical progress within the work packages and status of deliverables will be monitored and discussed during EB and GA meetings (every 2 months).

Within SCORES a lot of documents will be generated in a joint effort. A possible risk is to lose track of documents or their validity. In order to keep all produced and published documentation traceable for all project members document control will take place. Each document will have a unique document ID. Moreover, to ensure good quality deliverables a 5-step review process is implemented.

In view of the highly innovative character of the proposed research, several risks are identified that may occur during the implementation of the project. The monitoring of these risks, and the reporting of new, as yet unidentified risks, is a task of everyone involved in the associated part of the work plan.

The measures reported in this document should enable the project consortium to perform their work with good quality, whilst managing any foreseen and unforeseen risk.

5 Quality Assurance plan

5.1 Introduction

All partners will perform their part of the work according to their internal quality control and assurance procedures, e.g. with respect to experimental procedures and review of reports. If necessary, quality issues will be on the agenda of the EB meetings, possibly resulting in preventive or corrective actions. The overall quality of the execution of the research program is also controlled by the use of milestones and deliverables, and updated timetables within the project. All deliverables have to be approved by the General Assembly (GA). The milestones will be assessed by the GA and, if appropriate, decisions or selections will be approved. The coordinating partner is ISO 9001 certified.

TNO has a broad experience in European projects, (> 100 FP5, FP6, FP7 and H2020 projects) both as coordinator and as partner and/or WP leader in the development of new technologies. Therefore, the administrative and financial department within TNO has procedures in place on how to handle the administration of the EC's financial contribution and distribution of these funds over the partners.

5.2 Project governance

In order to adequately manage the activities and risks within this project, interests of partners and general interests concerning the development of a hybrid thermal/electrical storage system in Europe towards a successful outcome, we have adopted a management structure that fits the size and complexity of the project. The number of partners and relatively straight forward objective allows for a relatively flat management structure with short communication lines and low hierarchy.

5.2.1 Organizational Structure

The organizational structure of the SCORES project is shown in the following diagram. This structure matches the complexity of the project well, and is in accordance with the recommended management structure of the DESCAs Consortium Agreement.

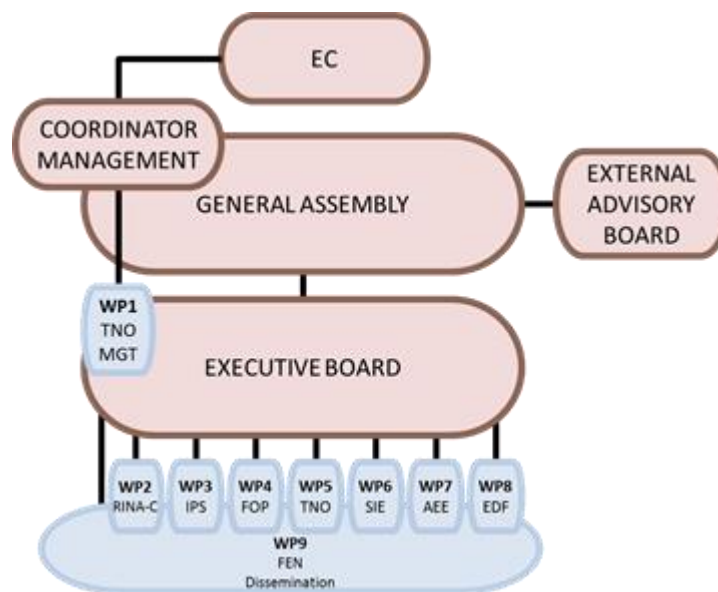


Figure 1. Organizational structure of the project

TNO, as the Project Coordinator, is responsible for the overall project management and deals with all EC contacts, both for technical and administrative/financial matters. The Project Manager (PM) at TNO receives administrative, financial and legal support from experts within the TNO organization, that have a vast experience in the administration and management of national and international collaborative projects.

In the organization structure two management bodies are identified:

- General Assembly (GA): consists of one representative of each partner, chaired by the representative of the Coordinator (the PM). The task of the GA is to supervise the project and to take decisions in major issues that may affect the wide implementation and strategy of the entire project like changes of work plan, change of Project Manager or WP Leader, budget relocations, IPR, entrance/leave of partners and other non-technical matters of general importance.
- Executive Board (EB): consists of all WP Leaders, chaired by the representative of the Coordinator (the PM). The EB monitors the technical progress, approves progress reports and deliverables, assesses milestones, and deals with technical problems that concern two or more WPs.

5.2.2 Decision making process & responsibilities

A detailed description of the responsibilities of GA and EB and the decision making process (including voting procedure) is agreed in the Consortium Agreement and is based on the principles below.

The Coordinator (TNO) is responsible for the overall management of the project, including the administrative tasks and all contacts with the EC and the Project Officer. The coordinator will regularly update and consult the European Commission's Project Officer; The Project

Manager at TNO will coordinate all technical activities (including progress reporting), organize and chair the meetings of the GA and EB managing bodies, assist in coordinating the dissemination and exploitation activities, and represent the project in public exposure and media contacts.

The WP Leaders coordinate the technical work in the WPs (including contribution to reporting), identify IPR issues and opportunities, organize WP meetings and contribute to the dissemination activities. In the case of technical problems at WP level, the WP Leader should be notified as soon as possible. The WP Leader will initiate all actions necessary for reaching a solution or decision in consultation with the researchers involved and the PM.

The GA is the highest management body and decides on:

- major changes of the work plan (such decisions always need consultation with the EC Project Officer)
- major budget shifts (between partners or WPs),
- entrance or exit of partner(s),
- IPR issues,
- basic criteria for exploitation plan for infrastructure beyond the project,
- change of Coordinator or WP Leader,
- how to resolve conflicts,
- any unforeseen major non-technical issues.
- Nomination of EAB members
- Approval of deliverables

At project technical level the EB is responsible for decision-making and the monitoring of technical progress. More specifically, the tasks of the EB are:

- monitor and discuss the overall progress (timely meeting of deadlines),
- discuss and decide on technical problems when two or more WPs are involved,
- discuss and update the possible risks in the project and contingency plans,
- approval of deliverables and progress reports, and assessment of milestones,
- coordination of meetings and conference visits,
- prepare issues that should be decided by the General Assembly, e.g. IPR and major changes in work plan.

Each Consortium Body shall not deliberate and decide validly unless two-thirds (2/3) of its Members are present or represented (quorum). Each Member of a Consortium Body present or represented in the meeting shall have one vote. Decisions shall be taken by a majority of two-thirds (2/3) of the votes cast. A Member which can show that its own work, time for performance, costs, liabilities, intellectual property rights or other legitimate interests would be severely affected by a decision of a Consortium Body may exercise a veto with respect to the corresponding decision or relevant part of the decision.

5.2.3 Procedure with regard to handling of disputes

Internal conflicts, i.e. disagreement of project partners regarding the project, are handled and shall be solved on the lowest stage possible of the following escalation staircase:

1. discussions between / among disagreeing partners

2. conflict moderation between / among disagreeing partners by the Work Package Leader
3. conflict moderation between / among disagreeing partners by the Project Coordinator (PC)
4. conflict moderation between / among disagreeing partners by the Executive Board
5. conflict moderation between / among disagreeing partners by the General Assembly
6. final stage of escalation (before legal action): discussion and agreement on further action by the PC with a representative of the European Commission.

If the Project Coordinator is one of the conflicting parties, the conflicting parties may agree on another partner as moderator for stage 3. Otherwise, they go directly to stage 4. Disputing partners, who are members of the Executive Board are excluded from the moderation in stage 4.

5.3 Expert Advisory Board

In the performance of its tasks, the GA will be supported by the Expert Advisory Board (EAB). The EAB will consist of a number of external (third party) experts that will be selected on the basis of their profound and long-lasting expertise in the field of research, innovation and industrialisation. The EAB role is to advise about aligning the results of the project with the reference markets and European policy on renewable energy and thus to support the project consortium to undertake the most appropriate routes towards market up take of the developed technologies. This will guarantee that the project will focus on concepts and products that are likely to be adopted for manufacturing by the industry. During the preparation of the proposal, several companies, branche organisation and organisations already expressed their interest to participate in the Advisory Board (e.g. Vaillant, Euro Heat and Power, European Association for the Storage of Energy EASE and International Copper Association). Further candidates will be approached after acceptance of the proposal. The potential candidates must be willing to sign an NDA with the consortium. At the beginning of the project a kick-off meeting for the EAB will be held, of which the minutes are the proof of the establishment of the Board. The EAB will furthermore be invited during dedicated workshops and at the end of the project a final meeting will be held where all members of the EAB will be invited for the presentation of the final project results. Starting point is that the members will pay for their travel costs themselves.

5.4 Milestones

A major tool for making technical decisions during the execution of the project is the assessment of identified milestones. For this project the milestones and the associated means of verification are assembled in Table 1. On approaching the dates indicated in the table, the involved WP Leaders and collaborators will evaluate the progress towards the identified milestones. The accomplishment of the milestone will be decided upon during an EB meeting. Whenever necessary, the work plan will be modified as a result of the milestone decision. Major changes of work plan will be communicated to the EC Project Officer as soon as possible, and adequate steps will be taken to proceed in the best way in order to achieve the project objectives.

Table 1 List of milestones

Milestone number	Milestone name	Related work package(s)	Estimated date	Means of verification
M9.1	Project website designed	9	M3	Website online and operative.
M2.1	KPI's quantified	2	M6	Validated and reviewed report (D2.1)
M6.1	Design freeze of the preliminary design of the BEMS	6	M11	A report which is validated and approved by all partners involved
M4.1	Used EV battery source selected	4	M12	A report which is validated and approved by all partners
M7.1	Design freeze of the overall demonstration system A	7	M12	A report which is validated and approved by all partners
M8.1	Design freeze of the overall demonstration system B	8	M12	A report which is validated and approved by all partners
M5.1	Design freeze of the CLC subsystem	5	M14	A report which is validated and approved by all partners
M4.2	Design freeze of the ESS	4	M16	A report which is validated
M6.2	System components implemented, ready for deployment at the demonstration sites	6	M18	Agreement for starting of deployment
M5.2	CLC subsystem commissioned	5	M20	Photographs and designs drawings of the CLC subsystem
M3.1	Prototype of the electro-thermal storage unit.	3	M24	Deliverable of the prototype. Photographs.
M3.2	Prototype of the PCM storage coupling with air-to-air HP.	3	M24	Deliverable of the prototype. Photographs.
M3.3	Testing and validation of the DHW subsystem.	3	M24	A report which is validated and approved by all partners
M4.3	Delivery of the ESS	4	M24	Effective delivery of the items
M6.3	BEMS integration at the demonstration sites completed, i.e. installed, commissioned, tested and validated	6	M24	A report which is validated and approved by all partners

M7.2	Demonstration system A installed built and commissioned	7	M27	Agreement for starting operation
M8.2	Demonstration system B installed built and commissioned	8	M27	Agreement for starting operation
M5.3	CLC subsystem tested and validated	5	M30	A report which is validated and approved by all partners
M7.3	End of testing , ready for global evaluation	7	M42	A report which is validated and approved by all partners
M8.3	End of testing , ready for global evaluation	8	M42	A report which is validated and approved by all partners
M7.4	End of global evaluations regarding demonstration system A	7	M46	A report which is validated and approved by all partners
M8.4	End of global evaluations regarding demonstration system B	8	M46	A report which is validated and approved by all partners

5.5 Internal communication

The above described organizational structure and decision-making mechanisms rely on an effective communication within the consortium. The communication strategy will be based on three pillars: the day-to-day communication, the web-based communication and the project meetings. The reported organizational structure, together with the outlined communication approach, is expected to be highly appropriate to manage the project.

1. The day-to-day communication between the partners will mainly take place by telephone and e-mail. The PM will actively stimulate and facilitate a smooth communication and interaction between all researchers involved in the project.
2. The web-based communication will consist of an external, public website and an internal, password restricted web-based shared working environment (i.e. SharePoint-based). On the internal site all relevant project documents (reports, meeting minutes, presentations, etc.) will be posted and project members will have access to download and upload data and documents.
3. Physical meetings. A comprehensive list of meetings can be found in [RD-04].

5.6 Online project documentation archive and project procedures manual – SCORES Sharepoint site

For the SCORES project a restricted site was generated with access only for SCORES participants. The site functions mainly as document repository, including

- Sharepoint site user manual
- Management & contractual information
- Dropbox & archive

- Action Item list

A screenshot of the Sharepoint site can be seen below.

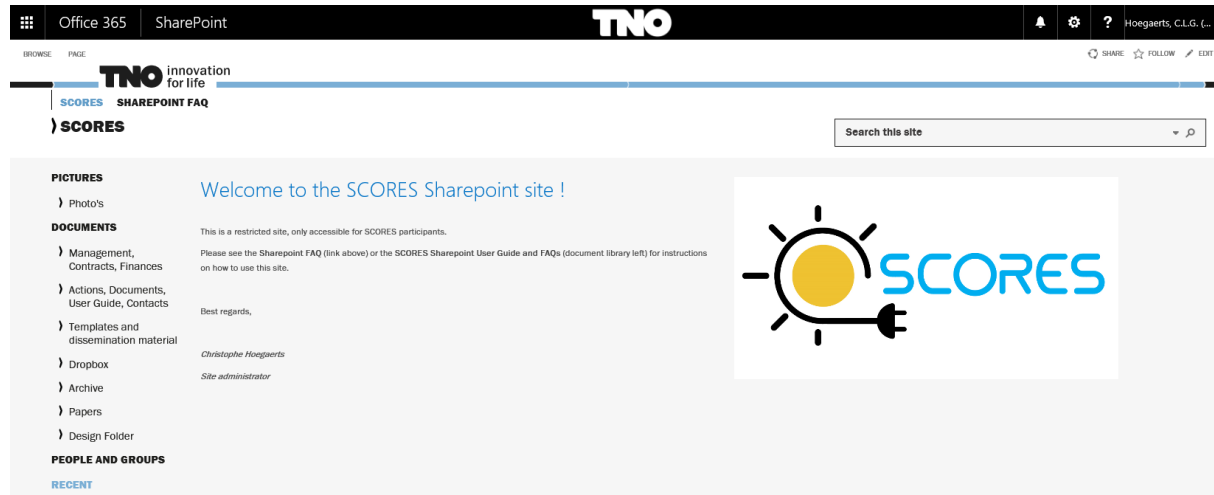


Figure 2. SCORES Sharepoint site

5.7 Monitoring of technical and financial progress

Technical progress within the work packages and status of deliverables will be monitored and discussed during EB and GA meetings (every 2 months). In the case that one partner does not comply sufficiently to his obligations in supporting the tasks and deliverables in a work package this will be discussed.

Financial progress monitoring is primarily a task of each partner. However, the coordinator supports this by regular checks. In preparation of every GA meeting the partners are requested to provide an update on their financial progress (costs and budget situation) per work package and to indicate whether they anticipate problems.

The above measures result in an early warning system on technical and financial progress. Moreover, the actual status of the project's progress in terms of deliverables, milestones, task completion and resource use will be made available to the partners via the SCORES Sharepoint site.

5.8 Document Control

Within SCORES a lot of documents will be generated in a joint effort. A possible risk is to lose track of documents or their validity. In order to keep all produced and published documentation traceable for all project members document control will take place. This is done by the following methods:

- Standard templates
- Unique document ID
- Version control
- Document review

Practical information on the document control in SCORES is given in [RD-01].

5.8.1 Document template

TNO and FENIX will generate templates for:

- Minutes of Meeting (MOM)
- Reports (RP)
- Engineering Coordination Memo's (ECM)
- Presentations
- Etc.

5.8.2 Unique document ID

The document ID is a unique identifier for each document. It consists of

- the name of the issuing company,
- the name of the project, i.e. SCORES
- the document type, e.g. RP for a report, PL for a plan, etc and
- a unique document number.

The Document ID is written in the format <Company Name>-SCORES-<Doc Type>-<Doc No>, e.g. the Doc ID for this document is "TNO-SCORES-RP-005".

5.8.3 Version Control

Version control will be done manually. The SharePoint version control functionality is not used. The first issue of a document is issue 1. This issue will be maintained up to formal review of the document and/or delivery to the EC. After an issue of a document has received the status "Authorized" after formal review, any updates should be made in a new issue, e.g. issue 2, 3, etc. Issue numbers other than integral numbers are not allowed.

5.8.4 Review Process

In SCORES document review follows a five-step process:

Step 1. Task Leader (together with other participants): Responsible for technical content and on-time delivery

The task leader coordinates the task that a final draft version of the document is made together with all participating partners. The document is then uploaded to the Sharepoint dropbox. If the author is of the opinion that the document is ready for review, he will change the status of the document from "draft" to "in review" and notify the work package leader.

Step 2. Work package leader: Checks consistency and "fit" into the Work Package

The work package leader is the first reviewer of the document. He checks if the contents of the document is consistent with the task description of the DoA. If he is of the opinion that this is the case he gives green light to the author to inform the "independent" reviewer.

Step 3. Independent reviewer (from the consortium) that has not worked on the report: Checks quality.

The independent reviewer should preferably be a members of the consortium partners, who needs this document as input for their work or an expert colleague (can also be a person of another participating company). The aim of the review is to check the quality, clarity and completeness of the document. The assignment of independent reviewers to deliverables has been done at the beginning of the project.

As proof of review, the independent reviewer signs the cover letter of the document.

Step 4. All partners (GA): Approve document



As a last step all project partners will have the opportunity to review the document. The aim of the review by other members of the consortium is to check whether the provided information is sufficient input for work in subsequent work packages and to check that no confidential information is provided in public documents.

5. Coordinator: Signs the deliverable on behalf of the GA and uploads the document into the EC system.

After successful review by all partners the TNO Coordinator signs the cover sheet and changes the status of the document from “in review” to “authorized”. He then moves the document from the SharePoint Dropbox to the Archive. The cover letter is scanned and attached to the PDF version of the document. Previous issues of the same document will receive the status “superceeded”. The document can then be distributed to relevant parties, e.g. the EC.

The above mentioned procedure is applicable to formal documents for which the report template is used, e.g. a deliverable document or important plans or procedures. For these documents it is important that besides an expert colleague also other consortium members review the document. For other documents, e.g. for which the ECM or MOM template is used, a less extensive review process is sufficient. For ECM's review by an expert colleague is sufficient. For a MOM review by the participating people is sufficient.

The above process is illustrated in Figure 3. One must account for a review period of at least 1 month, so the review process should start at least 1 month before the delivery date of the document.

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1. Task Leader (together with other participants):
 - Responsible for technical content and on-time delivery
 2. Work package leader:
 - Checks consistency and “fit” into the Work Package
 3. Independent reviewer (from the consortium) that has not worked on the report:
 - Checks quality. **ACTION TNO** to propose assignment of specific reviewers to each deliverable
 4. All partners (GA):
 - Approve document
 5. Coordinator:
 - Signs the deliverable on behalf of the GA and uploads the document into the EC system.

The task leader is responsible for initiating and monitoring this review procedure and to make sure it is finished before the deliverable deadline.

Figure 3. Document review process

6 Risk management plan

In view of the highly innovative character of the proposed research, several risks are identified that may occur during the implementation of the project. The most important risks that were identified in the beginning of the project are summarized in Table 2.

Table 2 Critical risks for implementation

Description of risk and work packages involved	Likelihood	Proposed risk-mitigation measures
The SCORES technology is not sufficiently economically affordable (WP2)	Medium	During the project emphasis will be put on low cost materials and components, e.g. used EV batteries. Involvement of a broad range of industrial suppliers and manufacturers ensures this.
Limitations of the thermal properties of bio-sourced PCM according to system requirements (WP3).	Low	Use of PCM existent in the market as paraffins or other organic materials. At any time, this PCM may be replaced by the bio-sourced PCM as soon as an appropriate one is found.
Difficulties to fit all the functions of the air-air heat pump in a limited volume (WP3)	Low	Separate the appliance in two units or have a bigger appliance as expected or decrease the performance of the heat pump
Difficulties to build an optimized full scale aluminum foam heat exchanger (WP3)	Medium	Use of a less efficient heat exchanger technology made out of aluminum material in another shape or use of multiple small scaled aluminum foam heat exchangers
Battery and converter work correctly alone, but when they are used together, the whole system do not work as planned (WP4)	Low	Partners will work on a functional analysis before and during the design
Too high heat losses during charging / discharging of the CLC heat storage (WP5)	Low	Use special vacuum insulation from König Metall to insulate the CLC heat storage unit.
Safety issues regarding high temperatures and H2 presence in CLC heat storage unit (WP5)	Low	Perform safety study in WP5. This review will be done also in the framework of EU hazardous substances regulations (e.g. REACH, RoHS, SOHC) using standardized safety approaches like HAZID and HAZOP.
The BEMS design is too generic to implement within the available budget and time frame (WP6).	Low	Apply systems engineering approach (requirements management) and develop the BEMS in an iterative way (using the build model rather than the waterfall model).
The final product is not working because the various subsystems/components	Medium	TNO will assign a system engineer in tasks 7.1 and 8.1 in order to monitor the design process and prevent interfacing problems.

developed by the various partners are not complementary (WP7, WP8)		
Lack of standardized validation methods hamper successful evaluation of the SCORES technology (WP7, WP8)	Low	During evaluation of the technology special attention will be paid to use and, if necessary, adapt as much as possible accepted standards, e.g. EN 12977.
Lack of adequate policy hampers successful market uptake of the SCORES technology (WP9)	Low	Dissemination and exploitation activities will specifically target EU institutions and policy makers A Policy workshop will be organised in Brussels, bringing together policy makers and other relevant stakeholders to promote the project results and address policy issues.

During the kick off 2 additional risks were identified/stressed, which are summarized in the table below.

Table 3 Newly identified critical risks for implementation

Description of risk and work packages involved	Likelihood	Proposed risk-mitigation measures
The various work packages and tasks are highly inter-dependent, which makes the project complex and creates the risk that various tasks do not align well.	Medium	TNO will assign a system engineer in tasks 7.1 and 8.1 in order to monitor the design process and prevent interfacing problems.
The project schedule is very challenging, including product development up to demonstration in the field	Medium	TNO will set-up and monitor a detailed integral project schedule.

The monitoring of these risks, and the reporting of new, as yet unidentified risks, is a task of everyone involved in the associated part of the work plan.

In the end it is the responsibility of the Executive Board to assess the possible occurrence of the risks, and to decide on the mitigation measures or, eventually, a modification of the work plan.