Self Assessment Towards Optimization of Building Energy

Deliverable

D9.2 – Project Management Plan

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EXECUTIVE SUMMARY

This document presents the deliverable D9.2 – Project management plan, of the H2020 project SATO – Self Assessment Towards Optimization of building Energy.

The Project Management Plan (PMP) is the project main planning document, describing how the project is organized, managed, reported, and controlled. It provides guidance for specific activities such as schedule, cost, risk, quality, communication, and reporting. The document focuses on describing the approaches to manage work packages, project documents, communication within the consortium, the quality of deliverables, project execution and reporting, and risk mitigation.

When necessary, the PMP will be updated during project execution, to continuously provide the following benefits to the consortium:

- clearly identify and define roles and responsibilities, processes, and activities.
- increase the likelihood of executing the project on time, within budget, and with excellent results.
- ensure clear understanding of previous agreements.
- help participants to plan execution according to the different management activities.

1. Introduction

This document provides a plan to manage and control the necessary processes for a successful implementation of the SATO project. It outlines the goals, objectives, and organizational structure; defines the roles and corresponding responsibilities of the participants; identifies collaboration and management interactions among Partners; and defines and specifies the procedures and management tools that are in place to ensure efficient project management and completion.

When necessary, if relevant changes are required in project management, for instance regarding management processes and tools, the project schedule or budget, or in risk management, this Project Management Plan (PMP) will be updated by the project coordination.

The basis of the SATO PMP is a well-defined and documented timeline, active communication between Partners, formal quality control mechanisms, and risk mitigation measures. To support the management procedures, SATO uses a private shared cloud repository to store and share files across the consortium, a WIKI page for easy access to management information, and regular project tracking conference calls. These tools allow efficient management of work package tasks, tracking deliverables progress, scheduling of meetings, and, in general, ensuring that Partners can efficiently collaborate towards a successful project execution.

To enable timely and harmonized project reporting and communication, a set of templates and procedures were prepared. Email lists were created to allow on-going reporting and facilitate work package specific teamwork. Additionally, the project website was published to support communication, dissemination, and exploitation activities.

2. Project overview

The SATO project implements an IoT cloud-based platform for self assessment and self optimization of building energy, by:

- Creating a new energy self assessment and optimization platform that integrates all energy consuming equipment and devices in the building.
- Developing a Self Assessment Framework (SAF), aligned with the structure of the smart readiness indicator (SRI), that uses data analysis and machine learning to report energy performance, building behavior, occupancy and equipment faults.
- Developing a BIM-based interface for: (a) aggregated and disaggregated analysis and visualization of the assessments in various applicable scales; (b) setting locations and specifications of energy consuming equipment, sensors and actuators into a BIM of the building.
- Developing and demonstrate energy management services that use the SATO platform and show how the self assessment and optimization contributes to lower energy consumption, increased energy flexibility and efficiency, and user satisfaction.

2.1. Project objectives

SATO has four interconnected main objectives that are further divided into specific objectives. The following list describes the SATO main objectives, highlighting the innovation potential and capability to reach the objectives set in the project call.

Objective 1: Assess. Implement and test a cost-effective solution to assess the real-life energy performance of a building and its energy consuming equipment.

Objective 2: Optimize. Development of user-centered self optimized energy management services (SATO services). The proposed SATO services use the SATO platform and the SAF to efficiently control building equipment for simultaneous optimization of energy efficiency, flexibility and user satisfaction.

Objective 3: Interface. Develop BIM and WEB-based interfaces for the SATO platform. A 3D CAD tool BIM interface will be used for large buildings. Small buildings/fractions or apartments will rely on a WEB-based interface.

Objective 4: Test. Implement a set of diverse building pilots to test and demonstrate the SATO platform, SAF and services. The SATO project includes eight pilots in three different climate regions. In all pilots, the SATO platform will be deployed, demonstrating its capability to meet the target impacts of the B4E-10 call. Pilots involve control, assessment, and optimization of systems with long lifecycles (SATO-BMS) and shorter lifecycles (SATO-APL), and an AI powered comparative assessment tool (SATO Compare).

2.2. Project deliverables

Table 1 lists the SATO project deliverables. The column labeled "Diss. level" shows the dissemination level of deliverables: Public (P) or Confidential (C). Some deliverables have more than one release date because they will be updated later in the project. In most of these cases, the second release will be confidential since it will contain elements likely to require intellectual property protection.

Table 1 - List of deliverables

Deliverable		WP	Diss. level	Due month
No.	**Name**			
D1.1	Role of Actors and Design of Stakeholder Framework	1	P	6
D1.2	Requirements of the Self Assessment Framework		P	7
D1.3	SATO Platform, SRI and IT Security Requirements		P	4
D1.4	Description of the system architecture of the SATO platform		P	9
D1.5	Description of the Use Cases and Test Experiments		P	10
D1.6	Evaluation Framework for SATO Concept and Business Model		P	12
D1.7	Business Case, Business Model and Financing		P	14,36
D2.1	Concept of the SRI enabled SATO platform	2	P	7
D2.2	Interfaces between platform, services and stakeholders		P	12
D2.3	Upgrade and firmware modifications to IoT infrastructure		P, C	14,33
D2.4	Interoperability between proprietary platforms and SATO platform		P, C	13,33
D2.5	SATO Platform		P, C	16,33
D3.1	Parameter and system identification toolbox for SATO assessments	3	P, C	17,33
D3.2	Data quality and device failure assessments		P, C	12,24

D3.3	BIM-based sensor location and placement assessments		P, C	15,24
D3.4	Reference energy consumption/performance database		P, C	12,24
D3.5	Equipment/appliances energy performance assessments		P, C	12,20, 33
D3.6	Building energy performance assessments		P, C	12,20, 33
D3.7	User and occupancy behaviour assessments		P, C	12,20, 33
D3.8	Integrated self assessment framework		P, C	10,23
D4.1	Energy and Thermal Efficiency Management tool	4	P, C	18,33
D4.2	Coordinated flexibility management services tool		P, C	18,33
D4.3	Aggregated Optimal Control Services Tool		P, C	20,33
D4.4	Prototype, development, and final energy performance self assessment services tool		P, C	15, 21,33
D4.5	Integrated SATO services tool set		P, C	15,22
D5.1	BIM-based Interactive Applications Design	5	P	15
D5.2	WEB-based Interactive Applications Design		P	15
D5.3	BIM-based Interactive Applications		P	20,33
D5.4	WEB-based Interactive Applications		P	20,33
D5.5	Evaluation of Interactive Applications		P	22,33
D6.1	Deployment and integration of SATO platform and SA&O services	6	C	21
D6.2	Building baseline energy consumption		C	30
D6.3	Residential multi-apartment demonstrators: Aalborg (AAU), Milan (POLIMI), Seixal (FC.ID)		C	33
D6.4	Office building demonstrators: Aalborg (AAU), Aspern (EKAG), Seixal (FC.ID), Lisboa (FC.ID)		C	33
D6.5	Appliance retail store demonstrators: Lisboa and Madrid (SONAE)		C	33
D6.6	Monitoring, Validation and Results of the Pilots Report		P	36
D7.1	Certification Plan	7	P	36
D7.2	Patent application for selected project products		C	36
D7.3	Replication Plan		P	36
D7.4	Exploitation Plan		P	36

D8.1	Dissemination and Communication Plan, including project identity	8	P	3
D8.2	Project brochure, posters, roll-up, and infographics		P	3,36
D8.3	Project Web and Social Media Presence		P	3, 36
D8.4	Periodic Digital Dissemination Activities Report		P	6, 18, 30
D8.5	Periodic Stakeholder Engagement Report		P	12, 36
D8.6	SATO inputs to EU policy (EPBD, Ecodesign Directive and Energy Labelling Regulation), including the related (formatted) data		P	36
D9.1	Project Management Handbook	9	P	3
D9.2	Project Management Plan		P	3
D9.3-7	Progress and Final Publishable Report		P	6,12, 24,30, 36
D9.8	Risk, Innovation and Data Management Plans		P	6, 24

2.3. Project milestones

Table 2 lists the SATO project milestones. The last column indicates the deliverables required to validate the milestones.

Table 2 - List of milestones

Milestone Number	Milestone name	WP	Due month	Means of verification
M1	Platform requirements and stakeholder framework completed	WP1	10	D1.1 - D1.4
M2	Business model defined	WP1	14	D1.7
M3	Business Model fully validated	WP1	36	D7.3
M4	Integrated Prototype of SATO platform concluded	WP2	16	D2.2 - D2.4, D2.5(M16)
M5	Final SATO Platform	WP2	33	D2.5(M33)
M6	All SATO assessments fully developed	WP3	20	D3.2, D3.3, D3.5, D3.6, D3.7
M7	Integrated self assessment framework	WP3	23	D3.8(M10)
M8	Validated and integrated self assessment framework	WP3	33	D3.8(M23)
M9	Prototype of the SATO Services tool set concluded	WP4	21	D4.1 – D4.4, D4.5(M15)

M10	Final integrated and validated SATO Services tool set	WP4	33	D4.5(M22)
M11	Complete development of the SATO Interfaces	WP5	20	D5.3, D5.4
M12	Final SATO Interfaces	WP5	33	D5.5
M13	Pilots ready for Demonstration Activities	WP6	21	D6.1
M14	Demonstration and validation activities fully completed	WP6	36	D6.6
M15	Replication Plan ready	WP7	36	D7.3
M16	Exploitation Plan fully defined	WP7	36	D7.4
M17	Project website online	WP8	3	D8.3

3. Organization

The SATO project consortium is composed of 16 Partners and four linked third parties from 7 European countries. The project is coordinated by FCiencias.ID - *Associação para a investigacao e desenvolvimento de Ciências* (FC.ID) – in Lisbon, Portugal. FC.ID provides the project management capabilities and its linked third party, University of Lisbon – Sciences, is responsible for the technical and scientific project execution. FC.ID has solid experience in coordinating European research projects, supporting administrative, legal, and financial tasks.

The consortium is composed of: 10 commercial/industrial companies, including 5 SMEs in the energy services sector, 1 utility and 4 manufacturers and suppliers of appliances, devices, controls for buildings, and building management systems; 3 non-profit organizations with strong interest on energy assessment, efficiency, and optimization; and 3 prestigious research organizations with a strong expertise on computer science, energy efficiency, flexibility, indoor climate, and building automation. Table 3 presents the list of Partners in SATO.

Table 3 - SATO project list of Partners

#	Partner Name	Acronym	Country	Type
1	University of Lisbon – Sciences	FC.ID	Portugal	University
2	AALBORG UNIVERSITY	AAU	Denmark	University
3	eERG-PoliMi - Politecnico di Milano	POLIMI	Italy	University
4	CYPE Soft	CYPE	Spain	SME
5	CORE Innovation	CORE	Greece	SME

6	XTEL	XTEL	Denmark	SME
7	Vieira Lopes	VL	Portugal	HVAC Supplier
8	EDP	EDP CNET	Portugal	Large Energy Corp.
9	Sonae – Worten	SONAE	Portugal	Appliance Supplier
10	Frederikshavn Boligforening	FB	Denmark	Housing Association
11	Seixal Energy Agency	AMES	Portugal	Energy Agency
12	City Council of Milano	MIL	Italy	Energy Agency
13	Siemens Portugal	SIP	Portugal	Large BMS Corp.
14	Knauf Insulation	KI IT	Italy	Insulation Manufacturer
15	EK Energiekonzepte AG	EKAG	Switzerland	Energy Consulting
16	Siemens Aktiengesellschaft Oesterreich	SAGOE	Austria	Large BMS Corp.

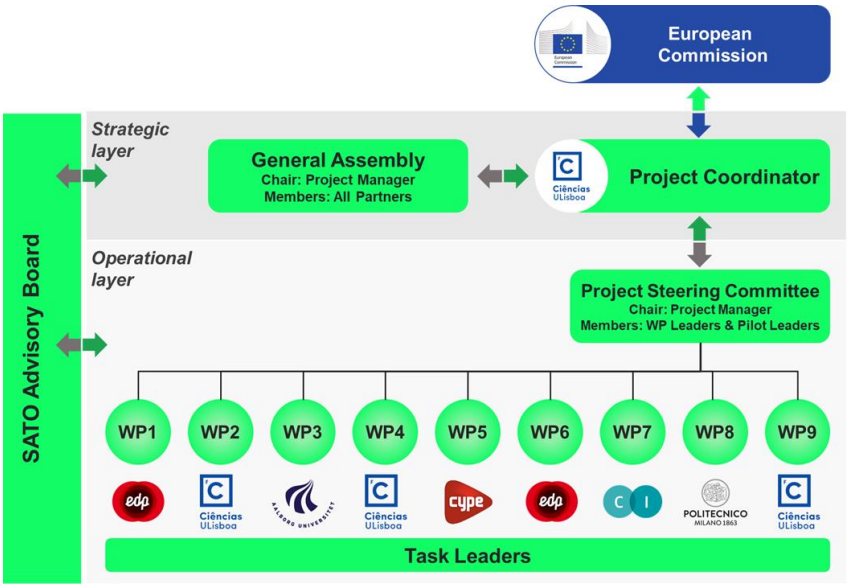

Figure 1 – SATO management structure

3.1. Management structure

The overall Project Management framework, organizational structure, and decision-making mechanisms have been accommodated to the size and complexity of the project. A project involving 16 Partners requires many decisions, which must be managed and adopted in an effective manner but with a global view of the whole project.

The general management structure of SATO is shown in Figure 1. The governance structure is defined in the Consortium Agreement (CA) that has been signed by the Partners before signing the Grant Agreement with the EC.

This structure considers the following governance bodies whose roles and responsibilities which are defined in the CA:

- Project Coordinator – PC (FC.ID): he main responsibility of the PC is to ensure the timely and effective overall progress of the project according to the Grant Agreement.
- General Assembly – GA (All Partners): the high-level management body in which all Partners are represented. It is chaired by the PC and membership consists of at least one representative from each Partner. The GA is the ultimate decision-making body of the Consortium.
- Management Support Team – MST (FC.ID): MST assists the General Assembly and the Coordinator in management, legal, and financial issues.
- Project Steering Committee – PSC (All Work Package Leaders: EDP CNET, FC.ID, AAU, CYPE, CORE, POLIMI): it is the supervisory body for the execution of the Project which shall report to and be accountable to the General Assembly. The executive decision-making of the project is incorporated in the body of the PSC.
- Work Package Leaders - WPL: the WPLs will be responsible for managing the tasks grouped in the Work Packages (WP).
- Task Leaders - TL: the TLs are responsible for the technical follow up of their specific task and the detailed coordination with the other dependent tasks.
- SATO Advisory Board - SAB: it is a key element of the project to be assembled during the first months of the project. The SAB will be composed of representatives from all sectors of the involved consortium Partners and stakeholders from the organizations which signed the letters of support.

3.2. Roles and responsibilities

According to the management structure presented, a brief description of the responsibilities for the main roles is given, as well as the persons already appointed to the roles.

Role: Project coordinator (PC)

Appointed persons: Pedro Ferreira – FC.ID (coordinator) and Guilherme Graça – FC.ID (co-coordinator).
Main responsibilities: ensure the timely and effective overall progress of the project; day-to-day administrative, legal, and financial issues; interface between the consortium and the EC, and circulation of respective information and communications; organization of GA and PSC meetings, project reviews, and co-coordination of dissemination and exploitation events; manage all the aspects connected with payment of financial contributions.

Role: GA representatives and deputies
Appointed persons:

Partner	Representative	Deputy
FC.ID	Pedro Ferreira	Guilherme Graça
AAU	Per Kvols Heiselberg	Anna Marszal-Pomianowska
POLIMI	Lorenzo Pagliano	Silvia Erba
CYPE	Pablo Gilabert	Benjamin Gonzalez
CORE	Nikos Kyriakoulis	Ilia Kantartzi
XTEL	Kenneth Skou Willumsen	Lisa Christensen
VL	Marco Lopes	José Lopes
EDP CNET	Paul Kessler	David Leitão
SONAE	Marlos Silva	Nuno Gouveia
FB	Michael Skovsgaard	Brian Thomsen
AMES	Philippe Bollinger	António Biscaia
MIL	Stefano Bartolotta	Marco Mazziotti
SIP	José Pereira	Catarina Pires
KI IT	Francesco Cavicchioli	Francesca Rampogna
EKAG	Christoph Ospelt	Thomas Fehr
SAGOE	Gerhard Engelbrecht	Danilo Valerio

Main responsibilities: approval of the management structure; decisions of general nature within the frame of the Grant Agreement signed with the EC and the Consortium Agreement signed among all Partners; changes in the management structure, changes in the consortium composition, changes in the

work plan, major technical decisions, contingency plans and planning decisions affecting the resources or the time for the implementation of the project.

Role: MST members
Appointed persons:

Member	Role
Mafalda Pinto Basto	FC.ID project administrative and financial manager
Patrícia Gomes Almeida	FC.ID project administrative and financial manager
To be appointed	SATO project manager

Main responsibilities: assist the General Assembly and the Coordinator in project management, administrative, legal, and financial aspects of the project.

Role: PSC members
Appointed persons:

Partner	Member
FC.ID	Pedro Ferreira
EDP CNET	Paul Kessler
AAU	Per Heiselberg
CYPE	Pablo Gilabert
CORE	Nikos Kyriakoulis
POLIMI	Silvia Erba

Main responsibilities: report to and be accountable to the General Assembly; decide about various management issues, namely of technical, financial, exploitation, dissemination, planning and control matters, provided these are not major project issues handled by the General Assembly; commencing the strategic planning and direction of the project; monitoring the project's progress and the revision of milestones and risk assessment; the establishment of the risk assessment and contingency plan and its follow-up; the approval of the Stakeholder Management Plan and the revision of the Data Management Plan; the approval of the periodic technical and financial reports, the final report and the project deliverables before submission to the EC; the approval of networking activities with other related European projects and initiatives.

Role: Work Package Leaders
Appointed persons:

Work Package	Partner	Leader
WP1	EDP CNET	Paul Kessler
WP2	FC.ID	Pedro Ferreira
WP3	AAU	Per Heiselberg
WP4	FC.ID	Guilherme Graça
WP5	CYPE	Pablo Gilabert
WP6	EDP CNET	David Leitão
WP7	CORE	Nikos Kyriakoulis
WP8	POLIMI	Silvia Erba
WP9	FC.ID	Pedro Ferreira

Main responsibilities: managing the tasks grouped in the Work Packages (WP) as well as overseeing and monitoring the work under their coordination; report to the PSC, ensuring the timely fulfilment of duties from the scientific and technical point of view; inform the PSC in cases when modifications to the WP content or budget need to be made (including budget allocations, content and quality of deliverables provided, subcontracting); assure the coordination between the different project teams that collaborate with the aim of exchanging intermediate results; ensure the timely execution of tasks included in each WP; consolidation of the reports and execution of the tasks within each WP.

Role: Task leader

Appointed persons: Since most tasks have not started at the time of writing this document, most task leaders are not designated.

Main responsibilities: technical follow up of their specific task and the detailed coordination with the other dependent tasks within the work package and project; assure the timely and proper execution of their tasks and report to the WPL in case of any deviation or risk; lead the preparation of the deliverables corresponding to their tasks and coordinate the contributions from other Partners of this task as well as for the preparation and delivery of internal task progress reports to the WP leader.

Role: SAB members

Appointed persons: At the time of writing this document, the SAB members had not been invited yet. Desired member profiles have been specified and some names designated for some of the profiles.

Main responsibilities: give qualitative advice to the PSC regarding requirements, project objectives, impacts, standardization, exploitation and dissemination of the designed tools; participate in formal meetings (usually connected to GA meetings) and conference calls, providing written feedback.

3.3. Consortium procedures and rules for decision

Day-to-day scientific and management decisions are taken by the PC. Other strategic decisions and major technical or operational decisions (rescheduling of deliverables, milestones, tasks, effort) are taken by the GA, which is the ultimate decision-making body of the Consortium, having the highest decision-making responsibility and policy setting power. Decision-making on technical aspects affecting a specific WP or task will be preferably solved by the participants in this WP or task. In case of disagreement or when the decision affects more than one WP, first, the Partner or Partners involved will make an effort to immediately deal with the contingency. In case this is not achieved, the steps listed below will be followed in their respective order to i) involvement of the WP leader (if applicable) to resolve the issue, ii) involvement of the Project Coordinator, iii) notification to the GA, and iv) if resolution is not achieved after all the above steps are taken, the issue will be brought to the attention of the EC.

Any Partner which is a member of a Consortium Body should be present or represented at any meeting. A Partner may appoint a substitute or a proxy to attend and vote at any meeting and shall participate in a cooperative manner in the meetings.

Each Consortium Body shall not deliberate and decide validly unless two-thirds (2/3) of its Members are present or represented (quorum). If the quorum is not reached, the chairperson of the Consortium Body shall convene another ordinary meeting within 15 calendar days. If in this meeting the quorum is not reached once more, the chairperson shall convene an extraordinary meeting, which shall be entitled to decide even if less than the quorum of Members is present or represented. Each Member of a Consortium Body present or represented in the meeting shall have one vote. A Partner, which the General Assembly has declared according to Section 4.2 of the Consortium Agreement, to be a Defaulting Partner may not 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. When the decision is foreseen on the original agenda, a Member may veto such a decision during the meeting only. When a decision has been taken on a new item added to the agenda before or during the meeting, a Member may veto such decision during the meeting and within 15 calendar days after the draft minutes of the meeting are sent. A Partner that is not a Member of a particular Consortium Body may veto a decision within the same number of calendar days after the draft minutes of the meeting are sent. When a decision has been taken without a meeting, a Member may veto such decision within 15 calendar days after written notification by the chairperson of the outcome of the vote. In case of exercise of veto, the Members of the related Consortium Body shall make every effort to resolve the matter, which occasioned the veto to the general satisfaction of all its Members. A Partner may neither veto decisions relating to its identification to be in breach of its obligations nor to its identification as a Defaulting Partner. The Defaulting Partner may not veto decisions relating to its participation and termination in the consortium or the consequences of them. A Partner requesting to leave the consortium may not veto decisions relating thereto.

The chairperson of a Consortium Body shall produce written minutes of each meeting, which shall be the formal record of all decisions taken. He/she shall send the draft minutes to all Members within 15 calendar days of the meeting. The minutes shall be considered as accepted if, within 15 calendar days from sending, no Member has sent an objection in writing to the chairperson with respect to the accuracy

of the draft of the minutes. The chairperson shall send the accepted minutes to all the Members of the Consortium Body and to the Project Coordinator, who shall safeguard them. If requested the Project Coordinator shall provide authenticated duplicates to Parties.

3.4. Issue management

Since the roles of each Partner have been well defined, conflict is not expected to be a significant factor in project management. Conflicts resolution must use the principle that disputes should be resolved by consent and as near the source as possible. Therefore, conflicts on a specific and localized sphere are managed by the people involved (e.g. a dispute between Partners participating in a WP should be addressed by that WP team). Either the PSC or the PC can initiate the conflict resolution procedure.

In case of conflicts arising regarding the execution of the project or any other matters related to the project, the following steps are taken:

- The Partners will try to resolve the conflict issue amicably between them.
- If a conflict cannot be resolved amicably within the specific and localized sphere, it will be raised to the PC. The PC may propose an alternative solution for the conflict. If this is agreed, the issue is solved.
- If the previous attempt fails, the question will be escalated to the GA on the first scheduled meeting or, in case of urgency, on an ad hoc meeting scheduled by the Project Coordinator for that purpose.
- The issue will be approached by the PC within the GA in such way that a consensus solution will be tried. If this is not possible, a voting procedure among the Partners may be used. The GA will decide the procedures to follow and the corresponding correction measures that should be taken. The participant that provoked the conflict will declare acceptance of the procedure and the corrective measures.
- If the conflict cannot be resolved by the previous procedures, the PC declares the participant "not in line" with the project execution and the Consortium will ask for a contract termination for the participant concerned, with the contractually stated consequences. The Project Officer will be immediately notified of the situation and of the measures to be taken to solve it. An appropriate review of the work plan will be suggested by the PC, approved by the GA, and sent to the Commission for acceptance.

3.5. Stakeholder management

As SATO project objectives include the upgrade of existing buildings through innovations for legacy equipment, the proposed solutions and demonstration pilots will interact with the personal/intimate space of the occupants of the building and, if not appropriately managed, may cause major disruptions and discontentment. Hence, from the very first hour stakeholder engagement and management will be a priority of SATO. The stakeholder management incorporates four steps:

1 Stakeholder identification to characterize each stakeholder and gather thorough information such as identity, contact person data, classification (client, supplier, Partner, legal authority etc.), associated risks, mitigation measures;

2 Stakeholder assessment to assess and understand the stakes and classify the roles of the stakeholders such as classification of their capacity to influence (positively or negatively) the project, exposition of the stakeholders to the project, motivation, interests and expectations;

3 Strategy development to describe the strategies and actions that will be used to manage the stakeholders according to their power and interest in the project;

4 Action plan creation to ensure execution discipline in stakeholder management according to the project's progress. This step includes behavior prediction, stakeholder monitoring and the

implementation of mitigation measures and responses to address each stakeholder's expected behavior.

SATO will support and engage five kinds of stakeholders, that belong to three categories: external, internal, expanded:

1 Individual/residential users;

2 Building owners/managers;

3 Energy providers, aggregators, and/or citizen energy community managers;

4 General public / future users;

5 Appliance and building equipment manufacturers.

The stakeholder management will consider the approaches and describe the strategies and actions that will be used to manage the stakeholders according to their power and interest in the project. Once known, the behaviors and attitudes of various stakeholders towards the project will be analysed and appropriate mitigation measures will be designed and implemented. Stakeholder management will be articulated with SATO's communication plan to ensure the continuous communication with the identified stakeholders.

4. Schedule

The baseline detailed schedule of the SATO project is provided in Annex 1. This schedule will be updated regularly to reflect the progress of the work. Besides this process, this section addresses how action items are documented, tracked, and closed.

The SATO project schedule will be managed by a change control process and a comprehensive monitoring and reporting system to ensure that the project schedule is correctly refined to reflect the updated information on project execution. The PC has the responsibility of gathering information on schedule status from all Partners.

The project overall schedule management is handled by the Project Coordinator. The schedule management within each WP is the responsibility of that WP leader. The detailed schedule for each task will be managed by the leader of that task. A monthly monitoring (centered on monthly GA meetings) is performed, so that the PC may identify schedule deviations and identify measures to get the project back on schedule. The PC will immediately inform the GA if they determine that any milestones are at risk of being missed.

If a change occurs, the PC shall incorporate proposed change(s) into an updated work-plan. This document, stored in the project repository, contains a revision history log where the following information should be recorded: the incremented version number; the date; the name of the person authorizing the change; the description of the change; and the effects of the change on the progress of the work.

Project activities are traced by the report given during monthly GA meetings, by the relevant minutes of meetings, and by interim reports each WP and task Leader must upload to the project repository. Each interim report includes the following information: WP and task identifier; action responsible; reporting period; attached documents.

5. Budget and financial management

The financial contribution of the Funding Authority to the Project shall be distributed by the Coordinator according to:

- the Consortium Plan
- the approval of reports by the Funding Authority, and
- the provisions of payment in Section 7.3 of the Consortium Agreement.

A Partner shall be funded only for its tasks carried out in accordance with the Consortium Plan.

5.1. Payments

The coordinator must distribute the payments to the beneficiaries without unjustified delay. According to the Grant Agreement Article 21, the following payments will be made to the Coordinator:

- one pre-financing payment;
- one or more interim payments, on the basis of the request(s) for interim payment, and
- one payment of the balance, on the basis of the request for payment of the balance.

The aim of the pre-financing is to provide the beneficiaries with a float. It remains the property of the EU until the payment of the balance. The amount of the pre-financing payment will be EUR 4 698 685.00. The Agency will make the pre-financing payment to the coordinator within 30 days, either from the entry into force of the Agreement or from 10 days before the starting date of the action, whichever is the latest. An amount of EUR 293 667.81, corresponding to 5% of the maximum grant amount, is retained by the Agency from the pre-financing payment and transferred into the 'Guarantee Fund'.

Interim payments reimburse the eligible costs incurred for the implementation of the action during the corresponding reporting periods. The Agency will pay to the coordinator the amount due as interim payment within 90 days from receiving the periodic report. Payment is subject to the approval of the periodic report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

The payment of the balance reimburses the remaining part of the eligible costs incurred by the beneficiaries for the implementation of the action. If the total amount of earlier payments is greater than the final grant amount, the payment of the balance takes the form of a recovery. If the total amount of earlier payments is lower than the final grant amount, the Agency will pay the balance within 90 days from receiving the final report. Payment is subject to the approval of the final report. Its approval does not imply recognition of the compliance, authenticity, completeness or correctness of its content.

At the payment of the balance, the amount retained for the Guarantee Fund (see above) will be released and:

- if the balance is positive: the amount released will be paid in full to the coordinator together with the amount due as the balance;
- if the balance is negative (payment of the balance taking the form of recovery): it will be deducted from the amount released. If the resulting amount:
    - is positive, it will be paid to the coordinator
    - is negative, it will be recovered.

The payment schedule, which contains the transfer of pre-financing and interim payments to Parties, will be handled according to the following:

- Funding of costs included in the Consortium Plan will be paid to Parties after receipt from the Funding Authority without undue delay and in conformity with the provisions of the Grant Agreement. Costs accepted by the Funding Authority will be paid to the Partner concerned.
- The Coordinator is entitled to withhold any payments due to a Partner identified by a responsible Consortium Body to be in breach of its obligations under the Consortium Agreement or the Grant Agreement or to a Beneficiary which has not yet signed the Consortium Agreement.
- The Coordinator is entitled to recover any payments already paid to a Defaulting Partner. The Coordinator is equally entitled to withhold payments to a Partner when this is suggested by or agreed with the Funding Authority.

A Partner that spends less than its allocated share of the budget as set out in the Consortium Plan or – in case of reimbursement via unit costs - implements less units than foreseen in the Consortium Plan will be funded in accordance with its actual duly justified eligible costs only.

A Partner that spends more than its allocated share of the budget as set out in the Consortium Plan will be funded only in respect of duly justified eligible costs up to an amount not exceeding that share.

A Partner leaving the consortium shall refund all payments it has received except the amount of contribution accepted by the Funding Authority or another contributor. Furthermore, a Defaulting Partner shall bear any reasonable and justifiable additional costs occurring to the other Parties to perform its and their tasks.

More details can be found in the Consortium Agreement and in the Grant Agreement.

5.2. Budget/Cost management

Cost management ensures the project is completed within budget and implements the process of gathering, tracking and managing the financial resources during project execution. Cost estimation and budget determination was done at the proposal stage of the project. The budget considers the whole estimated eligible costs that SATO consortium Partners need to execute the project. It is detailed in the overall project budget in the Grant Agreement.

To keep track of the estimated and real budget of each Partner, the PC requests a financial report with aggregated figures every 6 months, where real personnel costs, other direct costs, and indirect costs are indicated. By using the data provided in the financial reports, the PC shall prepare a status update every 6 months, including tracking and evaluation of trends and deviations in the costs associated with the project. This allows timely management reporting which will enable rapid response and mitigation to budget related issues that may arise, before they become milestone impacts.

The PC continuously monitors project costs and available contingency amounts and ensures there is adequate funding to cover necessary budget changes (must be approved by the GA).

6. Risk Management

Since SATO will impact the very homes of users and adopters and thus directly influence their personal, private surroundings, it is crucial that adequate risk management is ensured. The focus must be on guaranteeing the integrity of people's personal environment and of the appliances therein. This needs to be addressed already in the prototype phase. The risk management strategy for the project SATO is based on an early identification of all relevant risks, assessment of their impact level, allocation of their ownership, resolution or mitigation by the respective owners, follow-up, and report.

The responsibility of risk management relies with the PC. Identified risks are dealt with and alerts are raised in case any of the identified risks increases its priority. All risk management activities are monitored by the PC in collaboration with each WP leader.

6.1. Risk management strategy and implementation

The risk management process is composed of five stages as show in

Figure 2: identification of risks; assessment of impact; prioritization of risks; risk mitigation; and evaluation of mitigation results. For each risk that enters the risk management process, these stages are executed in sequence. Implementation of the risk management will include the following steps:

1 At the SATO project kick-off, the risks associated with each WP were revisited to detail the information about risk identification, assessment, mitigation actions, ownership and monitoring processes.

2 Create a risk register as described below to track and report risk management progress. This will be maintained throughout the project life.

3 Based on the risk register, establish the adequate risk management control mechanisms and communication to guarantee the adequate project development and share of positive outcomes it generates.

4 Develop the risk related plans: Data Management Plan, Stakeholder Management Plan and System Failure Management Plan.

Figure 2 - Risk management process stages

The project risk register will be maintained by the PC and stored in a dedicated folder of the project repository. Each of the identified project risks (R) will be scored using the product of probability (L) and impact (I) as depicted in below.

Risk (R)		Likelihood (L)		
		Low	Medium	High
Impact (I)	High	3	6	9
	Medium	2	4	6
	Low	1	2	3

Figure 3 - Risk register scores

Green indicates that the project is on track. The risks already identified are not expected to impact the other project metrics or overall business outcomes. Yellow indicates the necessity of some corrective action. At least one identified risk may impact negatively on some project metric, outcome, or stakeholder. There might be needed to implement some corrective actions. Red indicates that significant corrective actions are required. One or more identified risks may impact the project. All Partners must place their best efforts to bring risks to acceptable levels by implementing the necessary actions.

The risk register will be updated during project execution to add new risks found and to update the status of identified risks.

7. Reporting

The SATO project reporting plan includes an internal reporting strategy that generates and prepares information required to track project progress and to feed the external periodic and progress reports to the EC. The plan encompasses three main reporting workflows:

- The first is related to the internal technical and progress reporting;
- the second is concerned with the two periodic reports to the EC at months 18 and 36;
- the third consists of five progress reports at months 6, 12, 24, 30, and 36.

7.1. Internal reporting

Considering the required periodic and progress reports, the internal reporting plan addresses continuous technical and progress reporting that enables not only the preparation of the periodic and progress reports to the EC, but also adequate project progress tracking.

Each WP leader is requested to continuously report progress in a dedicated file in the project repository. Updating the WP progress report files should be done prior to every monthly GA meeting. Then, at months 4, 10, 16, 22, 28, and 34, the PC checks the status of the WP reporting files and takes any necessary corrective measures in case any reporting is missing or incomplete. At these times, the preparation of EC periodic or progress reports is initiated.

At each update of the WP progress report file, the following information must be provided:

- Work carried out during the specified period of time;
- Main results achieved;
- Status of WP tasks;
- Work carried out by involved Partners and their main contributions;
- Status of ongoing deliverables preparation;
- Update of risk analysis of the WP;
- Progress assessment: time or technical deviations from initial plan, proposed measures, and impact on other tasks;
- Planning of activities for the next specified period.

In addition, the WP progress report file will be updated regarding the following progress indicators:

- Number and type of meetings in the period;
- Participants in meetings;
- Reference to the meeting notes;
- Publications;

- Effort dedicated by the Partners;
- Progress of costs compared to the WP overall cost;
- Achievement of milestones;
- Deliverables submission dates;
- Tasks execution compared to time planning.

7.2. Periodic reports

The periodic reports include a technical and a financial report that must be prepared using the forms and templates provided in the EC electronic exchange system.

The technical report will be prepared in cooperation with the WP leaders. The main sources of information will be the WP progress report files generated by the internal reporting strategy, considering the relevant reporting period (M1 to M18 or M19 to M36). The reference timeline for the preparation of this report starts 2 months before the end of the reporting period (check on the WP progress report by the PC), and ends one month after submitting the report to the EC.

The financial report is prepared by the PC using the information data provided by each Beneficiary through the Portal concerning declared costs, requested reimbursement, and use of resources. Rules of eligibility of costs and procedures for computing them are described in the GA.

7.3. Progress reports

The progress reports consider only the technical and progress report. They will be prepared using the deliverable template that was prepared for the project and submitted as all other project deliverables. In fact, the five progress reports correspond to deliverables D9.3 to D9.7.

As for the EC periodic reports, the technical report will be prepared in cooperation with the WP leaders. Again, the main sources of information will be the WP progress report files generated by the internal reporting strategy, considering the relevant reporting period (M1 to M6, M7 to M12, M19 to M24, M25 to M30, or M31 to M36). The reference timeline for the preparation of these reports start 2 months before the end of the reporting period (check on the WP progress report by the PC), and ends on the deliverable due date.

8. Financial management

The PC will periodically request WP leaders to report on the use of resources of their WP, using resources and time reporting templates. Although the financial statements will be according to the Partners accounting rules, each Partner must ensure that:

- The project costs are correctly identified within their accounts;
- Only well identified eligible costs are claimed;
- All records (timesheets, invoices, receipts) are properly stored and available for audit purposes.

Additionally it must be assured that the actual costs are:

- incurred by the beneficiary during the action;
- Indicated in the estimated budget (Annex 2 of the Grant Agreement);
- Incurred in connection with the action as described in Annex 1 of the Grant Agreement and necessary for its implementation;

- Identifiable and verifiable – recorded in the beneficiary's accounts in accordance with the accounting standards applicable in the country where the beneficiary is established and with the beneficiary's usual cost practices;
- Reasonable, justified, and complying with the principle of sound financial management;
- Complying with applicable national law, labor and social security.

Partners may check the eligibility of costs by contacting the project management support team.

Timesheets are not required only for personnel that spends 100% of their time working on the project for the full reporting period. Timesheets are compulsory for all other staff. These should be completed on at least a monthly basis and must record the time down to the work package level. Timesheets are the basis for reporting the use of resources.

The PC is responsible for collecting, checking, and compiling the project Financial Statements and will inform the Project Officer of any unexpected difficulties in the preparation of the financial statements, including delays in receiving information from Partners or a major discrepancy, and where necessary propose a contingency plan.

Annex 1

Timing of SATO project work packages, tasks, and deliverables.

	Work Packages and Tasks	Lead	Month Start	Month End	Year 1												Year 2												Year 3											
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	SATO Project	FC.ID	1	36																																		
WP1	Specifications and requirements for SATO	EDP CNET	1	36																																		
T1.1	Analysis of actors, roles, and interfaces related to SA&O services	FC.ID	1	6							D1.1																											
T1.2	Analysis of self-assessment framework & requirements	AAU	2	7								D1.2																										
T1.3	Requirements and system architecture for the SATO platform and for it to support SRI calculation	FC.ID	2	9					D1.3					D1.4																								
T1.4	Definition of use cases and operational test experiments	EDP CNET	3	10											D1.5																							
T1.5	Definition of the pilots demonstration framework and KPIs to evaluate SATO SA&O services and business models	EDP CNET	3	12													D1.6																					
T1.6	Extension and validation of business case, business model and financing for SATO platform and SA&O services	CORE	4	36														D1.7																				D1.7
WP2	Development of integrated technical platform for SATO	FC.ID	4	33																																		
T2.1	Development of the SRI enabled SATO platform concept	FC.ID	4	12								D2.1					D2.2																					
T2.2	Sensors and upgrade of existing devices to non-intrusively monitor and manage building environment and energy	AAU	4	33														D2.3																				D2.3
T2.3	Development and extension of the existing cloud-based Platforms	EDP CNET	5	33													D2.4																					D2.4
T2.4	Development and integration of the SATO platform	FC.ID	5	33															D2.5																			D2.5
WP3	Development of SATO self-assessment framework	AAU	3	33																																		
T3.1	Development of automatic parameter and system identification toolbox for SATO assessments	AAU	3	33																	D3.1																	D3.1
T3.2	Development of data quality and sensor/device failure assessments for fault tolerance	FC.ID	4	24													D3.2												D3.2									
T3.3	Development of BIM-based sensor placement assessment for desired level of SA&O of building and appliances	CYPE	5	24															D3.3										D3.3									
T3.4	Development of reference energy consumption/performance database	FC.ID	4	24													D3.4												D3.4									
T3.5	Development of equipment/appliances energy performance assessments	SAGOE	3	33													D3.5							D3.5													D3.5
T3.6	Development of building energy performance assessments	Polimi	3	33													D3.6							D3.6													D3.6
T3.7	Development of user and accupancy behaviour assessments	AAU	4	33													D3.7							D3.7													D3.7
T3.8	Integration of self-assessment framework into the SATO platform	FC.ID	9	23											D3.8												D3.8										
WP4	Development of SATO self-assessment and self-optimisation services toolbox	FC.ID	7	33																																		
T4.1	Development of energy efficiency optimisation services	AAU	7	33																		D4.1															D4.1
T4.2	Development of coordinated flexibility optimisation services	Polimi	7	33																		D4.2															D4.2
T4.3	Development of aggregated optimal control for energy resources	FC.ID	9	33																				D4.3													D4.3
T4.4	Prototype, development, and final energy performance self-assessment services	SAGOE	9	33															D4.4						D4.4												D4.4
T4.5	Integration of the SATO services toolbox	FC.ID	13	22															D4.5							D4.5											
WP5	Development of SATO User Interaction and Interfaces	CYPE	8	33																																		
T5.1	Definition of actors interaction with SATO A&O services through BIM-based interfaces	CYPE	8	15															D5.1																			
T5.2	Definition of actors operational interaction with SATO platform and services through friendly user-centred design	FC.ID	8	15															D5.2																			
T5.3	Development of BIM-based interfaces for SA&O services	CYPE	9	33																				D5.3													D5.3
T5.4	Development of easy to use user operational interfaces for SATO platform and services	FC.ID	9	33																				D5.4													D5.4
T5.5	Evaluation of the SA&O and operational interfaces with the actors	EDP CNET	16	33																						D5.5											D5.5
WP6	Pilot Deployment and Evaluation of SATO	EDP CNET	16	36																																		
T6.1	Deployment and integration of SATO platform and SA&O services	FC.ID	16	30																						D6.1							D6.2				
T6.2	Residential multi-apartment pilots (Aalborg, Milan, Seixal): SA&O operational experiments and monitoring	Polimi	19	33																																	D6.3	
T6.3	Office building pilots (Aalborg, Aspern, Seixal, Lisboa): SA&O operational experiments and monitoring	EKAG	19	33																																	D6.4	
T6.4	Appliance retail store pilots (Lisboa, Madrid): SA&O operational experiments and monitoring	SONAE	19	33																																	D6.5	
T6.5	Evaluation and validation of the pilots and SA&O experiments	EDP.CNET	25	36																																		D6.6
WP7	Economic Evaluation, Exploitation and Replication	CORE	1	36																																		
T7.1	Compliance and certification plans	SONAE	1	36																																		D7.1,2
T7.2	Replication plan of the SATO SA&O platform and services	CORE	21	36																																		D7.3
T7.3	Exploitation plans	EDP CNET	25	36																																		D7.4
WP8	Market Actors Engagement through Communication and Dissemination	Polimi	1	36																																		
T8.1	Communication and dissemination plan	CORE	1	36				D8.1.2																														D8.2
T8.2	Creation of informational and promotional material	CORE	1	36				D8.3																														D8.3
T8.3	Outreach at EU level through effective use of media and online channels	CORE	1	36							D8.4									D8.4															D8.4			
T8.4	Engaging relevant (market) actors and stakeholders through webinars, workshops, events and a final conference	Polimi	1	36											D8.5																						D8.5,6
WP9	Project, risk, data, and innovation management	FC.ID	1	36																																		
T9.1	Definition of management and quality assurance procedures	SONAE	1	3				D9.1																														
T9.2	Governance and coordination	FC.ID	1	36				D9.2			D9.3						D9.4												D9.5					D9.6				D9.7