



## Project Management Plan

UPGRADE OF OFFICE FACILITIES  
FOR SUSTAINABLE AND SMART  
OFFICE FUNCTIONALITY

Project ID: CA02977



### Document Information



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### Project Summary

<b>Title</b>	Upgrade of Office Facilities for Sustainable and Smart Office Functionality
<b>Description</b>	This project provides planning and subsequently steps for the creation of a concept and its' implementation as an IoT based energy management for the customer office facilities located in Germany. The project plan provides detailed steps for meeting the objectives listed below and achieving all product properties while highlighting constraints.
<b>Objectives</b>	<p>Create an IoT based energy management solution for an office building to ensure the lowering of power consumption. This is achieved through monitoring and automated controlling of relevant electronic devices and office features.</p> <p>The utilization of commercially available smart technology helps to yield a healthy atmosphere while allowing the customer company to meet cost saving goals, ultimately improving the company's efficiency and productivity.</p> <p>Furthermore, training materials for the IoT system must be provided and demonstrated to the customer employees.</p>
<b>Project Duration</b>	01.06.2022 – 31.10.2022
<b>Milestones</b>	Refer to <a href="#">Deliverables and Milestones</a>
<b>Constraints</b>	<ul style="list-style-type: none"><li>• Only commercially available smart technology must be used. The development of new devices is out of scope for this project.</li><li>• The installations of the developed solution will be done by a sub-contracted installation team</li><li>• Alternating parts of the customer facility need to be closed during the installation</li><li>• Disturbances in trade and delivery can impact the timing of installations</li></ul>
<b>Assumptions</b>	<ul style="list-style-type: none"><li>• The facilities are already equipped with sufficient network infrastructure to support the IoT-based system</li><li>• The development team has access to the network for the development and implementation phase(s)</li><li>• An ID card based access control system is installed already and the customer employee presence data can be used to support the IoT-based decision making for energy control</li><li>• The usage of the presence data can be achieved in accordance with data privacy regulations</li></ul>
<b>Project Exclusions</b>	<p>The following aspects are not in the scope of this project:</p> <ul style="list-style-type: none"><li>• The facility security system is neither handled by, nor connected to the IoT system</li></ul>

Table 1 - Project Summary for Executives

The original and signed charter of the project can be found at Documents/Project\_Charter.xlsx and authorized personnel can request it from the project manager.



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### Introduction

TBD

### Abbreviations

CR	Change Request
CCB	Change Control Board
HVAC	Heating, Ventilation, Air Conditioning
IoT	Internet of Things
MS	Milestone
PDM	Precedence Diagramming Method
WBS	Work Breakdown Structure

- Every project document must have an assigned owner, who is responsible to keep the document up to date. Owners are assigned by the project manager who is automatically responsible for any unassigned documents.

### Scope & Work Breakdown Structure

#### 1. Scope & Product description

This section provides a high-level overview for the projects scope and expected product that is yielded in the process. Depending on change requests the scope can be adjusted. In that case the document owner must update this section in order to reflect the changes for the project team.

The following development contents and product properties are agreed on with the customer:

- Analysis of the current energy consumption and saving potentials
- Cooperation with the customer for definition of requirements
- Development of an IoT system concept based on commercially available IoT devices
  - The system must automatically control facility functions (e.g. HVAC, shutters, lights and wallplugs)
  - Users must be provided control capabilities for personal and shared devices over an intranet frontend (possibility to override the automated behavior temporarily)
  - Suitable backend solutions must be implemented and rolled out, too
  - The installations (positioning, electrics, integration) are part of the concept as well
- Selection of suitable replacement devices and necessary device additions
- Installations of the hardware based on the concept, possibly with a subcontracted installations team
- Implementation and setup of the concepts' contents in the facilities
- Testing to ensure proper functionality must be carried out by the project team
- Rollout of the finished solution
- Creation of maintenance plans and documents
- User training must be provided in form of handbooks and presence training

#### 2. Deliverables & Milestones

- Milestone 1: Scope agreed with customer
- Milestone 2: Energy Study & Market Analysis reviewed and provided

- Milestone 3A: Technical concept (Device Control, Chained Rules, Frontend, Backend)
- Milestone 3B: Installations concept (multiphase setup in facilities)
- Milestone 4: Concept reviewed and Parts ordered
- Milestone 5: Parts delivered
- Milestone 6: Documentation and training documents ready
- Milestone 7: Installation, Implementation & Testing for IoT Upgrade ready
- Milestone 8: Site acceptance granted
- Milestone 9: Project closed

## Project Structure and Communication

### 1. Project Organization Structure

The project organization structure for the project can be found below in [Figure 1](#). Only personnel needed according to Chapter [\[Activities & Effort Estimates\]](#) are reflected in the organizational chart. The rightmost team is not directed by the PM, they are organized by their respective teamlead but serve the project nonetheless (and hence are considered in the effort estimation). Team members can get consultation from these members and are controlled by the company wide QA processes and responsables. This structure is enforced to ensure independent QA in order to deliver quality work to our customers.

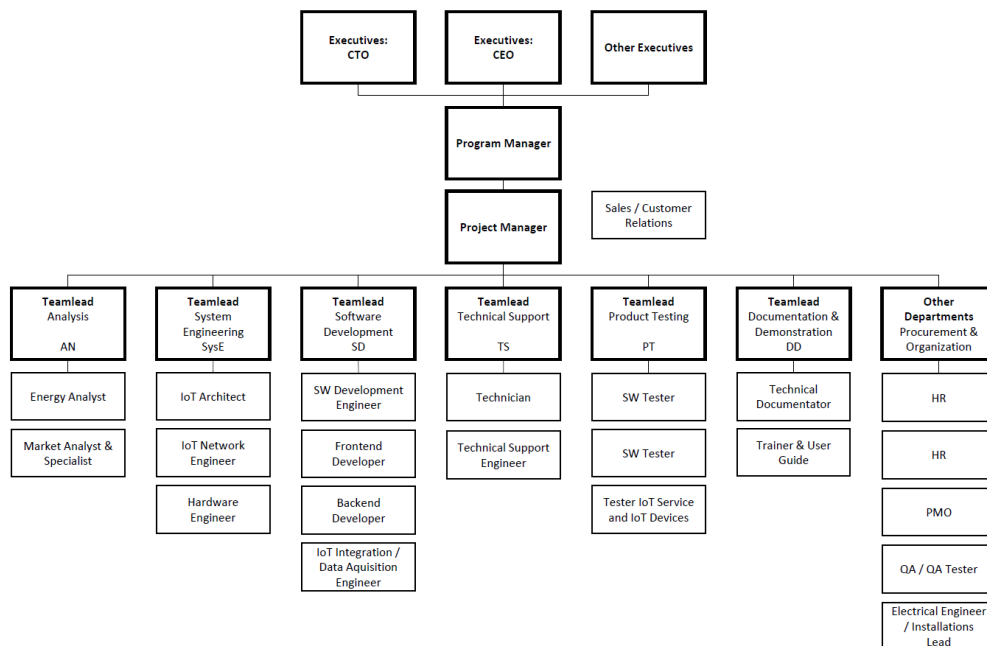


Figure 1 - Organizational chart of the project team and the upper management structure for reporting. Sales is considered the project sponsor and assists in monetary discussions and legal considerations.

### 2. Stakeholders

#### a) Internal Stakeholders

Name	Role	Phone	E-mail
Katharina Schüttler	Sales	+4915xx-xxx-xxxx	<a href="mailto:katharina@iotech.de">katharina@iotech.de</a>



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Table 2 - Internal Stakeholders, the whole team is listed to provide a list of contact persons for everyone involved in the project.

### b) External Stakeholders

Name	Role	Phone	E-mail
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Capital Bra	CEO	+4915xx-xxx-xxxx	<a href="mailto:bra@customer12x2.de">bra@customer12x2.de</a>
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Visa Via	Installations	+4915xx-xxx-xxxx	<a href="mailto:visa@dmr.de">visa@dmr.de</a>
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SXTN	Installations	+4915xx-xxx-xxxx	<a href="mailto:sxtn@dmr.de">sxtn@dmr.de</a>

Table 3 - List of important customer stakeholders.

### 3. Escalation Paths

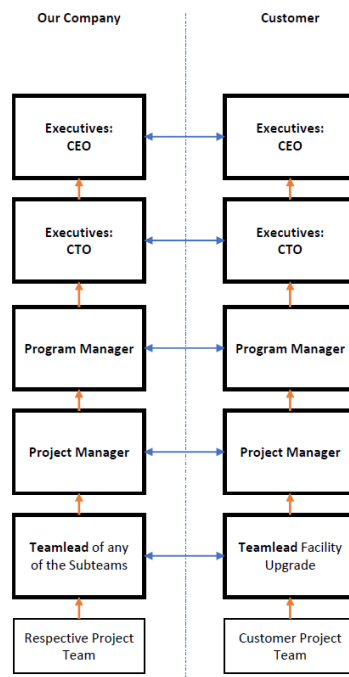


Figure 2 - Escalation Flowchart. During the initiation process it has been decided between the project partners that the project structures are on equal terms. Escalation should only be initiated or raised to the next level if no agreement can be found between the corresponding layers.

In case any decisions cannot be done in the usual project communication between the customer and our project team, an escalation to the next layer can be initiated. This can be the case if either no settling on an agreement can be met between the project teams or the necessary decision exceeds the decisive power / authority of the current escalation level.



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### 4. Communication & Reporting

This section provides the meeting planning and communication schemes, as well as reporting intervals. The meetings listed in [Table 4](#) are obligatory for all participants listed in the respective column. Meetings may be cancelled by the owner given a reason to do so.

Communication Type	Description	Frequency	Format	Participants/ Distribution	Deliverable	Owner
Project Team Meeting	Meeting to evaluate and register current status of project & take actions accordingly	Twice a week	In Person	Project Team members	Updated Action Register	Project Manager
Weekly Status Report	summary of project status through E-mail	Weekly	E-mail	Project Manager, Project Team and Project Sponsor, External Stakeholders	Status Report	Project Manager
Weekly Change Control Board	Meeting for impacted areas by reviewing & analyzing the change requests	Weekly	In-person	CCB	Change Report, CR Decision	CCB Chairman
Project Monthly Review (PMR)	Hand over metrics and monthly status	Monthly	In Person	Project Sponsor, Management, (Exec Mgmt every 2 <sup>nd</sup> meeting)	Status and Metric Presentation	Project Manager
Project Gate Reviews	Submit closeout of project state and kickoff next phase	For every Milestone	In Person	Project Sponsor, Project Team and Stakeholders	Phase completion report and phase kickoff	Project Manager
Meeting with Suppliers	Meeting to highlight requirements of necessary supplies	Twice a Month	In Person	Suppliers, Project Team, Project Sponsor, and Stakeholders	Supplies and resources	Project Manager





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Technical Issues Report and Development Review	Review of any technical Issues, changes & development	As Needed	In Person	Project Team	Technical and development Report Status	Project Manager
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Table 4 - Overview of regular meetings that are to be held throughout the project runtime.

### 5. Work Breakdown Structure

For the further planning of activities and efforts, all work packages of this project are presented in a work breakdown structure (WBS). The WBS is provided as a high-level overview and a detailed breakdown table in [Figure 3](#). Any project changes that affect work packages and activities must be documented in the WBS by its document owner.

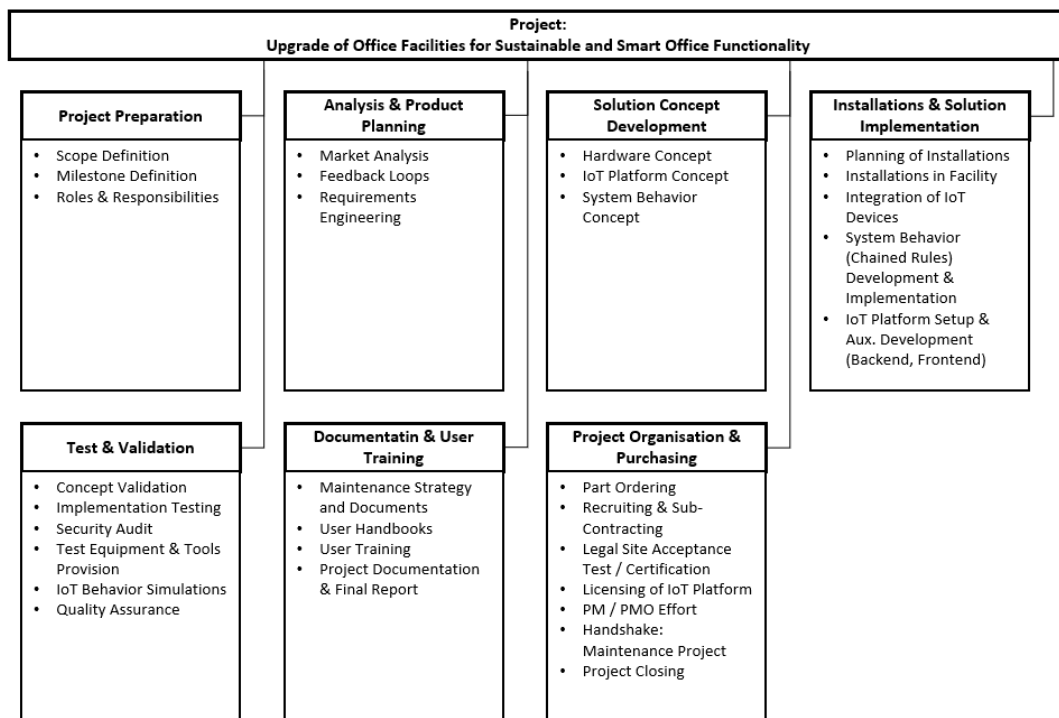


Figure 3 - Highlevel overview of identified work packages. The headers represent work categories and listed items represent 2nd level descriptions of project contents.

The complete WBS can be found in the separate WBS Excel file, where all work activities are broken down into 4 levels of detail. Hence, the WBS is divides the work activities into the levels: category, sub-category, work package and work sub-package. An exemplary excerpt of the detailed WBS structure is shown below in [Figure 4](#).



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5	Test & Validation	5.1	Concept Validation	5.1.1	Validate hardware concept		
				5.1.2	Validate IoT platform concept		
				5.1.3	Validate platform integration concept		
		5.2	Implementation Testing	5.2.1	Test Plan Development	5.2.1.1	Develop test plan for hardware replacements
						5.2.1.2	Develop test plan for user guides
						5.2.1.3	Develop test plan for IoT platform
				5.2.2	User oriented Testing	5.2.2.1	Usability Testing
						5.2.2.2	End user application testing
						5.2.2.3	Verify user guide gives good introduction
						5.2.2.4	Privacy Testing
				5.2.3	Soft-/Hardware oriented Testing	5.2.3.1	Interface Testing
						5.2.3.2	Compatibility Testing
						5.2.3.3	Security Testing
		5.3	Security Audit				
		5.4	Test Equipment & Tools	5.4.1	Protocol simulators		
				5.4.2	Automated Deployment tools		
				5.4.3	Security testing tools		
				5.4.4	API testing tools		
		5.5	IoT Behavior Simulations				

Figure 4 - Excerpt taken form the complete WBS. This snippet describes the activities in Test & Validation and uses all 4 levels of detail.

## Activities and Estimates

### 1. Activities & Effort Estimates

The activities from the WBS described in the chapter above have been collected and estimated in their duration based on feedback from the expert teams in [Figure 5](#). Every activity is linked to the corresponding position in the WBS, so the items are interconnected to provide a better overview. The responsible department (see chapter [\[Project Organization Structure\]](#) for more information) are referenced. [Table 5](#) below shows the resource estimation and total project hours.

Resources	People	Effort	Duration (Working Days)	Hours
Project Manager (Project Supervision)	1	100%	109	872,00
Project Manager (PMO)	1	50%	109	436,00
Analysts & Analyst lead	3	40%	31	297,60
System Eng. Team & Content Development & Lead	4	60%	44	844,80
Software & Development Team & Lead	4	80%	44	1126,40
Technical Support Team & Lead	4	60%	10	192,00
Product Testing Team & Lead	4	70%	152	3404,80
Documentation & Demonstration Team & Lead	4	60%	60	1152,00
Procurement Team	3	60%	8	115,20
Installations	5	100%	15	600,00
Quality Team	1	50%	33	132,00
Human Resources	2	100%	9	144,00
Electrical Engineer/Installations Lead	1	100%	15	120,00
Hours in total:				9436,80

Table 5 - Resource estimation for the project



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Tasks	Start Date	End Date	Duration	WBS Refere	Responsible Department
Define preliminary scope + objectives	01.06.2022	15.06.2022	15	1.1.1	PM
Identify relevant workpackages and project contents	01.06.2022	15.06.2022	15	1.1.2	PM
Agree on a scope definition with customer	01.06.2022	15.06.2022	15	1.1.3	PM
Develop Prelim. Budget	01.06.2022	15.06.2022	15	1.1.4	AN
Scope agreed on with customer -> MS1	15.06.2022	15.06.2022	1	1.2.1	PM
Study of energy consumption and saving potential	15.06.2022	30.06.2022	16	2.1.1	PM, AN
List of to-be-replaced devices	21.06.2022	30.06.2022	10	2.1.2	AN, SysE
Market analysis: define applicable devices	30.06.2022	07.07.2022	8	2.1.3	AN
Market analysis: select supplier	07.07.2022	14.07.2022	8	2.1.5	AN
Budget Development	30.06.2022	15.07.2022	16	2.1.4	AN, PM
Feedback loops energy consumption, requirements, market analysis	30.06.2022	15.07.2022	16	2.2.1	AN
Recruiting	15.06.2022	15.08.2022	62	7.2	HR
Energy Study & Market Analysis reviewed and provided -> MS2	15.07.2022	15.07.2022	1	1.2.2	AN
Installations concept (multiphase setup in facilities) -> MS3B	22.07.2022	22.07.2022	1	1.2.3	SysE
Develop test plan for user guides	15.08.2022	30.08.2022	16	5.2.1.2	DD, PT
Develop test plan for IoT platform	15.08.2022	30.08.2022	16	5.2.1.3	PT
Hardware Replacement Concept	30.06.2022	29.07.2022	30	3.1	SysE
IoT platform concept	30.06.2022	29.07.2022	30	3.2	SysE, SD, AN
Frontend Development	29.07.2022	30.08.2022	33	4.5.1	SD
Backend & API Development	29.07.2022	30.08.2022	33	4.5.2	SD
Maintenance strategy development	29.07.2022	30.08.2022	33	8.1	PM, AN, SysE
Technical concept (Device Control, Chained Rules, Frontend, Backend) -> MS3A	22.07.2022	22.07.2022	1	1.2.3	SysE, SD
Part ordering	15.07.2022	22.07.2022	8	7.1	PMO
Subcontracting for Installations	15.07.2022	29.07.2022	15	7.2.1	PMO
Concept Reviewed & Parts ordered -> MS4	29.07.2022	29.07.2022	1	1.2.5	SysE, SD, AN, PM
Monitor delivery progress	15.07.2022	30.08.2022	47	7.1	PMO
Parts delivered -> MS5	30.08.2022	30.08.2022	1	1.2.8	External
Create information handouts & usage guidelines	01.09.2022	27.09.2022	27	6.1.1	DD
Development documentation	30.06.2022	30.08.2022	62	6.1.2	DD
Handbook: Maintenance & Setup	15.08.2022	27.09.2022	44	6.1.3	DD
Documentation and Training Documents ready -> MS6	27.09.2022	27.09.2022	1	1.2.9	DD
Installation Floor 1	01.09.2022	08.09.2022	8	4.2.1	External
Installation Floor 2	08.09.2022	15.09.2022	8	4.2.2	External
Installation Floor 3	15.09.2022	22.09.2022	8	4.2.3	External
Implementation Floor 1	09.09.2022	16.09.2022	8	4.4.1	SysE, SD
Implementation Floor 2	16.09.2022	23.09.2022	8	4.4.2	SysE, SD
Implementation Floor 3	23.09.2022	30.09.2022	8	4.4.3	SysE, SD
Testing Floor 1	16.09.2022	23.09.2022	8	5.2.1	PT
Testing Floor 2	23.09.2022	30.09.2022	8	5.2.2	PT
Testing Floor 3	30.09.2022	07.10.2022	8	5.2.3	PT
Installation, Implementation & Testing for IoT Upgrade ready -> MS7	14.10.2022	14.10.2022	1	1.2.6	SysE, SD, PT
Security audit	14.10.2022	17.10.2022	4	5.3	SysE, PT
Building / Site Acceptance Test	14.10.2022	17.10.2022	4	7.3	PM, PMO
Dashboard Opening / Frontend-Rollout	08.09.2022	17.10.2022	40	4.5.1	SD
Final report	17.10.2022	31.10.2022	15	9.1	DD, PM
Closing of Project	14.10.2022	31.10.2022	18	9.2	PM
Site Acceptance granted -> MS8	17.10.2022	17.10.2022	1	1.2.7	PM, SysE
Project Closed -> MS9	31.10.2022	31.10.2022	1	9.2	PM
<b>Total</b>	<b>01.06.2022</b>	<b>31.10.2022</b>	<b>152</b>		

Figure 5 - Activity definition and their duration estimates that are used for the scheduling of the project. The start and end dates are taken from the scheduling section.

## 2. Activity Sequence

The sequencing of activities is presented in a way so that the milestones are reached in the order presented in [Deliverables]. It includes the initiation process only partly but highlights all other processes, namely planning, execution, controlling and closing. The complete sequence can be seen in Figure 6. Cross-referencing for WBS and efforts is achieved by referencing the WBS items in the sequence.

***a. Analysis and Preparations***

To put it in a nutshell, after the project requirements are outlined via the charter and scope the analytics team analyses the status quo and determines saving potentials and the needed materialistic resources. Completion and acceptance of the analysis corresponds to milestone 2. When the milestone is reached, the system engineering team and development team define the requirements in cooperation with the customer.

***b. Concept Phase***

Subsequently a complete concept for the system architecture as well as hard- and software implementations and installations are developed. The focus in this part of the project is to define a platform and compatible devices necessary to fulfil the requirements. This includes electrical and hardware replacements and additions as well as IoT control mechanisms (chained rules) and the necessary front- and backend technology.

If the concept cannot be validated with the customer or additional requirements are identified, all steps after MS2 need to be revisited and updated as needed. Otherwise, the concept is handed over to the development and implementation team.

***c. Implementation Phase***

Development and implementation of the final solution will start directly after the concept is validated and parts are ordered. This step will be done in a “simultaneous engineering” approach, where soft-/ hardware as well as testing and documentation are carried out simultaneously and influence each other constantly. Installations, Implementation, and their testing are laid out in a stepwise process where each floor has its own phase for each of the steps. After installations on the first floor, implementation for that floor is started in parallel to installations on the second floor and so on.

This phase also contains the creation of user training materials, training courses and maintenance plans.

***d. Roll-out and Closing***

Afterwards the building must be cleared and accepted legally and the system is rolled out. All users are instructed on the usage of the system (incl. control over frontend etc.). Then project closing and maintenance handover can be done.

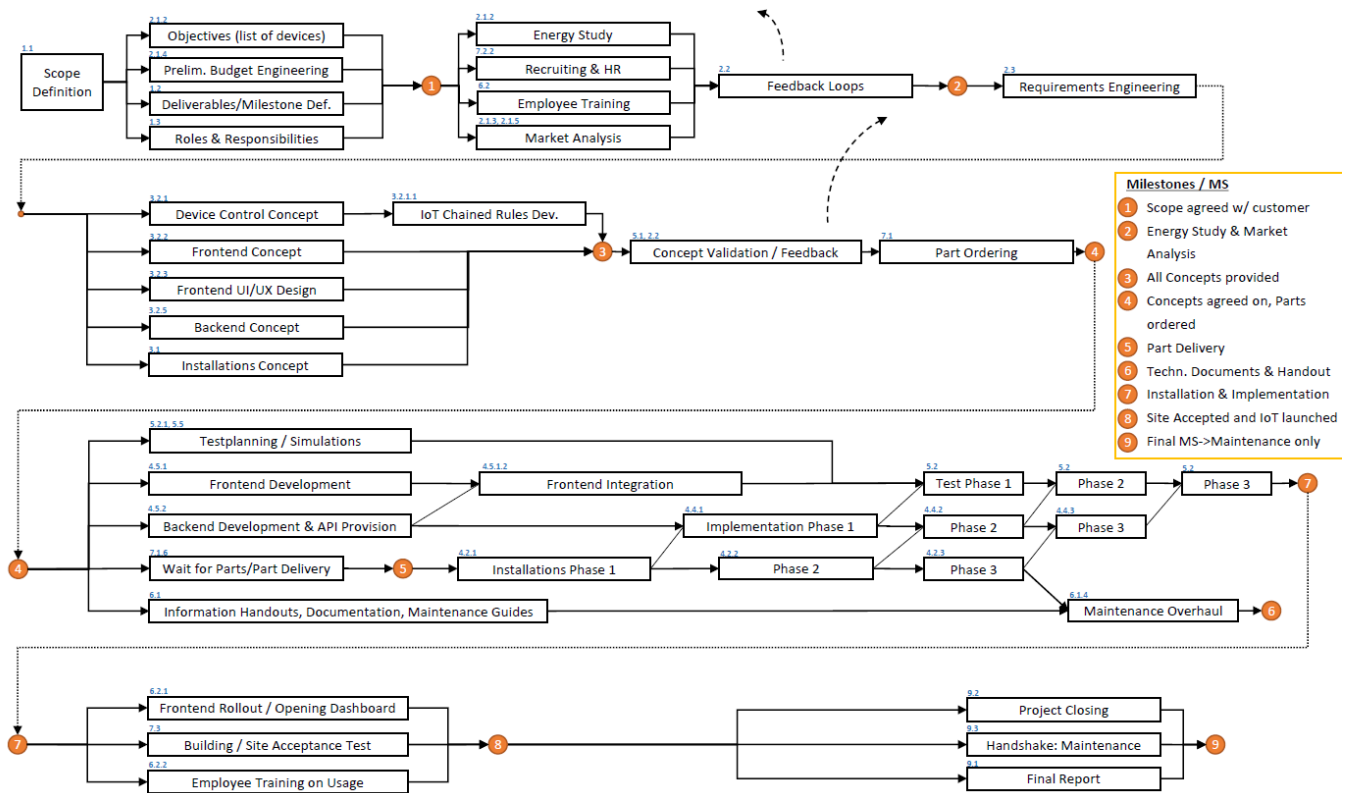


Figure 6 - Activity sequence displayed using the precedence diagramming method (PDM) to highlight relations and the activities that lead to the milestones shown. Blue numbers indicate their corresponding item in the WBS and allow cross-referencing with the effort estimates from the chapter before.

## Schedule & Milestones

### 1. Schedule

Based on the activities defined in chapter [Activities & Effort Estimates] and the effort estimation the following schedule for the project has been defined. Milestones are marked as red dots and preconditions for each step can be found in the activity sequencing. Deviations from the time schedule must be requested via a CR using the [Change Control Management] process.

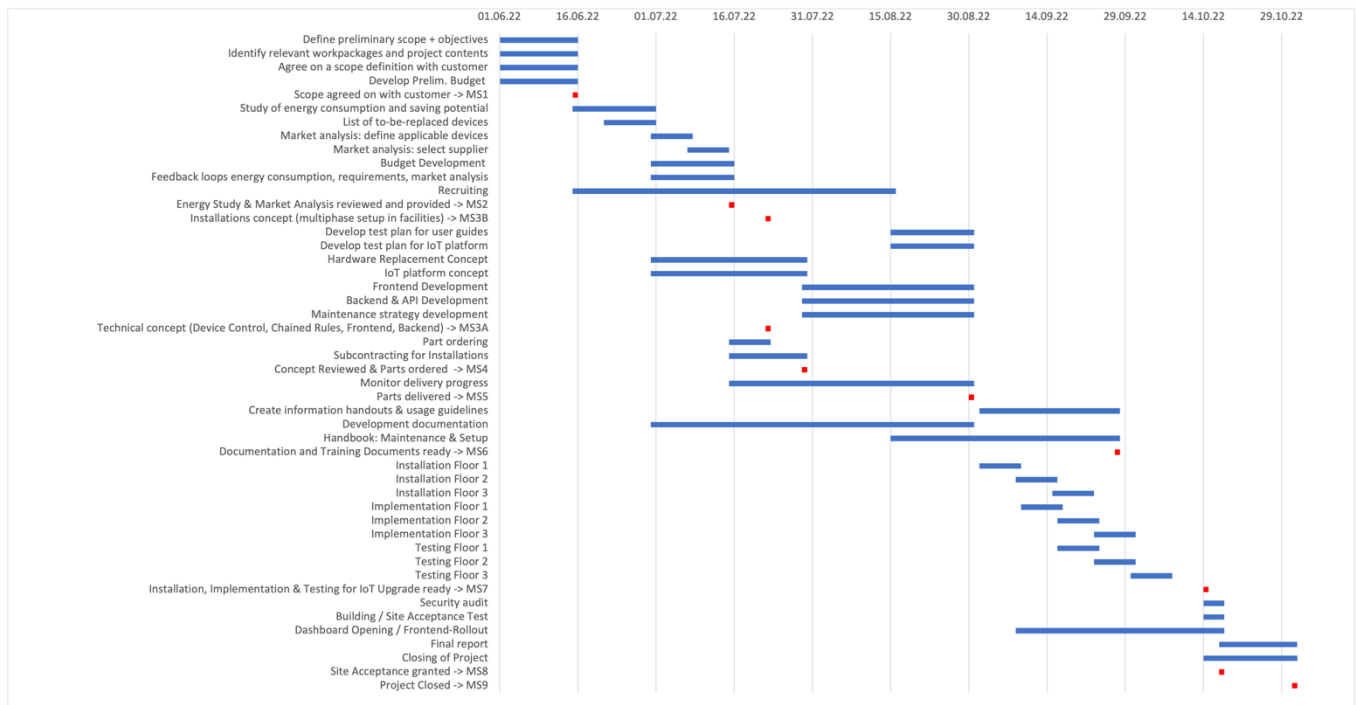


Figure 7 - Gantt-chart of the project plan. All milestones (shown in red) are fixed and must be reached in order to achieve the project objectives in time.

## 2. Milestones Schedule

The milestones of the schedule in [Figure 7](#) for this project are summarized in [Table 6 - Milestone Schedule](#).

Milestone	Due Date
Milestone 1: Scope agreed with customer	15.06.22
Milestone 2: Energy Study & Market Analysis reviewed and provided	15.07.22
Milestone 3A: Technical concept (Device Control, Chained Rules, Frontend, Backend)	22.07.22
Milestone 3B: Installations concept (multiphase setup in facilities)	22.07.22
Milestone 4: Concept reviewed and Parts ordered	29.07.22
Milestone 5: Parts delivered	30.08.22
Milestone 6: Documentation and training documents ready	27.09.22
Milestone 7: Installation, Implementation & Testing for IoT Upgrade ready	14.10.22
Milestone 8: Site acceptance granted	17.10.22
Milestone 9: Project closed	31.10.22

Table 6 - Milestone Schedule

## Project Processes

### 1. Change Control Management

This section describes the change management process which has to be used for all adjustments of agreed project documents. This applies especially but is not limited to changes in scope, schedule and requirements.

It describes the process of raising, reviewing, evaluating and change requests (CR) raised to the project, as well as the decision instances communication of changes. The process must be always used to ensure gapless investigation and documentation with all stakeholders informed.

Any change that impacts the project baseline must be evaluated and decided by the change control board (CCB), a group formally appointed for the CR decision. It is highly recommended to involve a representative of every stakeholder group in the CCB to reduce process efforts.

Additional consultations for the legal, technical or organizational evaluations are possible but unless stated otherwise not mandatory.

The process summary can be found below in the list and graphically illustrated in [Figure 8](#).

- 1) A CR can be raised by any stakeholder in the project, i.e. customers, sponsors, project team members etc. are all allowed to raise a change request. For further descriptions, the person(s) raising the CR will be called requester (Req.)
- 2) The project manager or designated change manager (CM) can be involved for the CR creation to help with clarification and formalization. The PM/CM is also under obligation to log all CRs in the Change Log and to determine whether the change could be allowed based on the contracts.
- 3) If it is allowable, the CR must be evaluated under technical and project-oriented aspects. This includes but is not limited to technical feasibility, baseline impact. Evaluations must yield a complete overview of possible risks, side-effects, cost impact and other baseline properties (schedule, quality, resources).
- 4) Small changes (i.e. absence of risks, side-effects and baseline impacts) can be directly approved by the PM and project team. Any other change must be submitted to the CCB for evaluation, along with all evaluation documents from steps 1-4.
- 5) The CCB can either Reject, Defer or Approve the change and the decision is added in the Change Log by the PM. Deferred CRs can be reworked and updated by the Requester.
- 6) If the CCB does not include the customer or sponsor, formal approval must be requested. Other stakeholders are informed.
- 7) In case of all-around approval of the change all affected documents must be updated (Change Log, Requirements, Project Scope, Risk list etc.) and the project team implements the project according to the new documents.



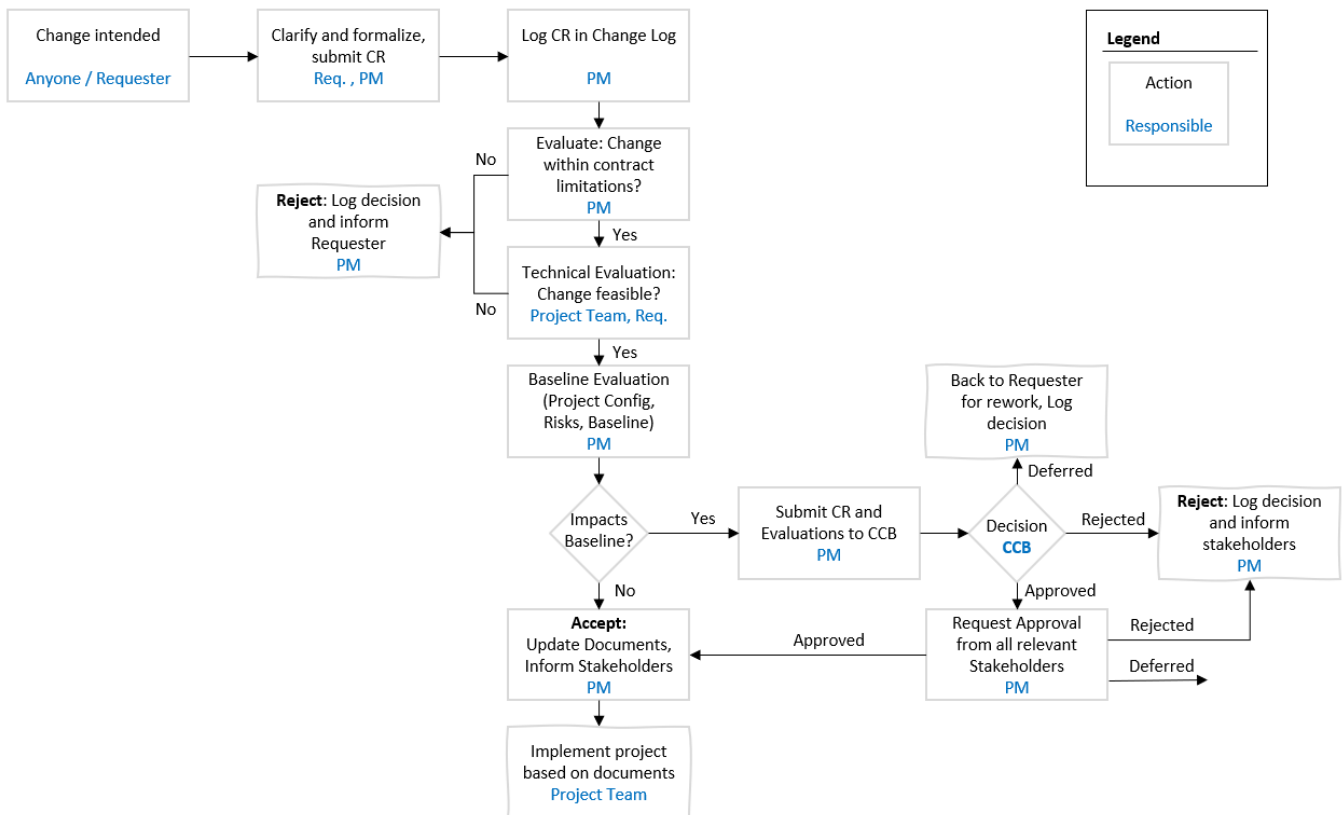


Figure 8 - This figure shows the flowchart of the change management process which has to be performed for all changes. The process is described above and all steps have to be performed in the shown order. Direct acceptance of CRs by the project team and PM should only rarely be done and for minor changes. In case of any changes, all affected documents need to be updated and their owners must be notified so the changes are communicated to everyone on the project team.

## 2. Risk Management

The risk management of the project can be found at Documents/Risk\_management.xlsx.

By employing methodical process for managing risks in this project, the project teams determine, prioritize, compute risk probabilities and their consequences to the project objectives. With the aim of lessening risks by mitigation action plan, efforts will be considered dynamically to distinguish the probable risks beforehand. The anticipated risks with high, medium and low probabilities along with corresponding impacts are attached to the risk tracking sheet by ensuring designated risk managers (recognized by the respective team members and then will be informed to the team leaders) to take required actions to apply the risk mitigation plan at the apparent time. In every meeting (whenever it's needed), the team leaders will represent concurrent risks happening to their teams and then they will take final decisions for mitigation process. By implying change requests, every risk will be controlled and monitored accordingly. Final decision and action will be partaken by the project





## Project Management Plan

UPGRADE OF OFFICE FACILITIES  
FOR SUSTAINABLE AND SMART  
OFFICE FUNCTIONALITY

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manager, change control board (CCB) and project sponsors by having discussion with the team leaders. At the last stage of project completion, each risk as well as the risk management plan will be examined for identification of any kind of developments for future projects.

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