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| Project full name: | Proactive Cloud Resources Management at the Edge for efficient Real-Time Big Data Processing |
| Grant agreement number: | 732339 |

D9.2 Project KPI report

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2. List of Tables and Figures

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3. Executive Summary

Deliverable name: Project KPI report (to be delivered in month 4)

The goal of this project deliverable is to provide a set of key performance indicators (KPIs) that support the project management team in monitoring and steering the project within the project execution phase.

The KPIs are requested to reflect the management structures that have to be set up and maintained as well as the procedures defined for this project.

This entails a set of KPIs covering the categories of intra-project communication, decision-making and conflict resolution, quality assurance and progress monitoring.

In addition to the above mentioned categories, also “impact maximisation” and “gender awareness” have been identified as categories that need to be monitored. This is due to the conclusion that they add value to the existing ones in that they support to monitor and steer special project focus topics.

The metrics that are being used for KPI assessment are numbers, specifying the number of occurrences of a specific event or numbers representing a percentage.

In addition, four maturity levels have been introduced which represent the maturity of a specific indicator situation, ranging from an *initial*, *developing*, *advanced level* to a *matured level*.

The indicators are assessed by the project and/or technical management board as part of their regular meetings.

4. Introduction

In order to ensure a qualified steering of the PrEstoCloud project, the definition of project monitoring KPIs is requested at an early project state. This will support the management team in monitoring the project execution and triggering corrective actions whenever necessary. According to the underlying task description in T9.3, the set of KPIs is to reflect the activities described in Part B Section 3.2.2 of Annex 1 of the Grant Agreement.

Section 3.2.2 ("Management structure and procedures") describes the intra-project communication, the decision-making and conflict resolution procedures as well as the quality assurance and progress monitoring activities. Responsibility for monitoring and steering these topics is given to the Quality Manager, the Scientific-Technical Manager and the WP Leaders along with the Project Coordinator. Each of the mentioned partner members in their specific role, as well as the management team as a whole, is responsible for driving the project towards the envisioned results together.

In the following sections, the project aspects to be monitored ("intra-project communication", "decision-making and conflict resolution" and "quality assurance and progress monitoring") will be presented on a detailed level that allows the deduction of indicators which is then complemented by a gap assessment. This presentation is followed by the identification of Indicators and Key Performance Indicators and their metrics.

A monitoring and steering plan will round up this deliverable about the development of project KPIs.

5. Intra-project communication

Following the assumption made in the corresponding Section 3.2.2.1 of Part B of the Grant Agreement, effective intra-project communication is a key enabler for successful collaborative projects. This comprises physical meetings, teleconferences at work package level and management board meetings as forms of direct communication methods. These direct communication methods are to be complemented by supporting communication instruments like a collaborative tool, mailing lists and a project website.

In detail, the above mentioned methods and instruments will be implemented as listed below. The presentation of each method and instrument includes the requirements defined in the project proposal plus additional or optimization measures taken so far.

Physical Meetings

Per year, four physical meetings should be planned. The goal of the physical meeting is to exchange in-depth knowledge and ideas, ensure integration between work packages, overall alignment and progress monitoring. It is the Project Coordinator's responsibility to schedule the physical meetings. Regarding the organization of the physical meetings, the partners agreed in the project kickoff to have each partner host one physical meeting. This includes the choice and provisioning of a meeting location including a light lunch and one evening dinner at the partner's expenses. A physical meeting typically spans over two days, starting time on the first day is 9 a.m. In addition to the formal project meeting time, informal socializing is planned for the evening prior to the physical meeting depending on the personal arrival time.

Teleconferences

According to the project description, weekly teleconferences should be organized. The goal is to discuss in detail project progress and to take decisions at work package level.

In practice, teleconferences on a fixed weekly basis are not regarded as efficient at this early project stage. Currently, teleconferences are scheduled short-term on request of a work package or task leader. This practice ensures an efficient time management for all partners as well as a problem/solution oriented meeting format exactly when needed. This short term scheduling of a teleconference is supported by the identification of generally preferred meeting days and times in a week. In addition, email exchange is heavily utilized.

Teleconferencing is conducted via the Cisco tool WebEx (<https://www.webex.com/>).

Management Board Meetings

According to the project description, the project management board should meet physically at least twice a year, the technical management board should meet at least four times a year. Urgent board topics might as well be addressed via email exchange or phone conferences.

In practice, the physical meeting schedule already includes four physical meetings per year, each spanning over two days. These meetings have been intensively used for technical discussions so far. Therefore, until otherwise decided, the communication method for the project and technical management board meeting is a phone conference.

Collaborative Tool

According to the project description, a collaboration tool will act as an instrument for exchanging and storing all the documents relevant for the project. It will contain directories for the different work packages and contain directories for the deliverables as well.

In practice, two collaborative tools have been introduced so far: The first one serves as a container for general project related and less fluctuating information, Labcase (<http://labcase.org/>), whereas the second tool serves as a collaborative tool that allows the development and discussion of work-in-progress, Airwatch Content Locker (<http://www.air-watch.com/solutions/airwatch-content-locker/>).

Mailing Lists

According to the project description, four types of mailing lists should be established for communicating and exchanging documents:

- a project level mailing list including all project team members,
- a project management mailing list,
- work package specific mailing lists,
- an admin mailing list for administrative and reporting tasks.

Currently, the following mailing lists have been created in addition so far:

- a technical board management mailing list,
- an ethic-advisory-board mailing list,
- a communication-team mailing list.

On the other hand, the admin mailing list has become superfluous as it would be identical with the project management mailing list.

Project Website

The project website (www.prestocloud-project.eu) should make all public project outcomes available: the deliverables, publications, presentations, demonstrators and showcases and all promotion material. It has to remain up-to-date regarding dissemination and community building activities.

6. Decision-making and conflict resolution

Special attention has to be paid to situations of disagreement or conflict as these may heavily impact the planned execution of the project in all aspects and therefore require monitoring.

Following the rules given in the corresponding Section 3.2.2.1 of Part B of the Grant Agreement, decision making is generally based on the consensus principle. Achieving a consensus is the preferred decision making approach at every level of the project. In case a consensus is not reached, the technical and project management board are asked to take a decision following a defined process. However, some specific conflict situations require involvement of the project officer before a decision can be taken by the project management board. In general, all project participants are held responsible for identifying and raising conflicts or potential conflict situations.

In detail, the decision making and conflict resolution rules and escalation levels as outlined in the Grant Agreement and Consortium Agreement are as follows:

All levels

Decision making should be achieved via working towards a consensus.

Work package level

Any disagreement should be reported to the work package leader or the project coordinator who will moderate the conflict until a solution is reached or the issue is escalated. The preferred communication method for reaching consensus is verbal, either by phone conference or by email exchange. In case a consensus cannot be reached, the issue is escalated to the technical management board.

Technical Management Board Level

The preferred communication method for reaching consensus is also verbal (phone conference or email exchange). If necessary, a decision can be taken as described for the project management board level below.

Project Management Board Level

At this level, a decision can be taken if at least two-third of the partners are represented in the meeting (quorum). In case this quorum is not reached, the chairperson convenes an additional meeting within 15 calendar days. In case the quorum is not reached again, the chairperson convenes an extraordinary meeting which is entitled to decide without the quorum being reached.

Each member of the consortium body has one vote and decisions are taken by a majority of two-thirds. A special situation arises if interests of a partner would be severely affected: In this case the member can veto the decision immediately during the meeting only if the topic has been on the original agenda. In case the decision topic has been added before or during the meeting, the member can veto within 15 days after the draft minutes have been sent out.

Project Management Board Level together with the Project Officer

The project management board can take decisions only after consultation of the project officer for the following issues:

1. approval of budgets and timing and content of work plan issues,
2. approval of major changes in the work to be delivered in the project,
3. changes in the consortium and amendment of partners,
4. proposed changes to the grant and consortium agreement,
5. suspension or termination of the project or parts of it,
6. actions to be taken in case of misconduct of a partner.

A project log file that lists all decision making and conflict issues is being kept. Once voting becomes necessary, a log entry will be added to the project log file that states the topic and result of the vote, as well as the voting numbers.

7. Quality Assurance and Progress Monitoring

According to the project description, ensuring quality of the contractual deliverables is a central building block of the quality assurance procedure to be installed. This requires monitoring in order to achieve results in time and in the desired quality. Therefore, prior to submitting a deliverable to the European Commission, it has to undergo the following three-step quality check:

1. The deliverable is checked by an appointed reviewer. The appointed reviewer needs to be external to the team which produced the deliverable. Reviewers outside the project consortium can also be appointed upon approval of the technical management board and in accordance with the deliverable’s IPR. The result of this step is a review document that holds recommendations to be implemented by the deliverable authors.
2. The deliverable is evaluated by the respective work package lead.
3. The deliverable is evaluated by the Quality Manager.

The above steps have to be initiated four weeks prior to the submission deadline.

The second building block of the quality assurance procedure is the monitoring of the project progress. This progress monitoring procedure will be implemented as follows:

1. The technical management board will carry out a risk assessment at its regular meetings. A risk assessment includes the identification of project risks, the assessment of their probability and the nature of their consequences. This also includes the initiation of corrective actions. In case a re-planning of a detailed task at work package level becomes necessary, decisions can be taken by the work package leader in consultation with all partners involved in the work package. The decision and the results of the re-planning should be reported to the technical management board and the project coordinator. In case the risk level is judged high and changes in project planning may be necessary, the issue should be escalated to the project management board.
2. The project management board will also carry out a risk assessment at its regular meetings. In case corrective action is to be taken, this can be carried out by the project management board itself, except for the following situations where approval of the Commission is required:
 1. Modification to the Consortium Agreement or to the management structures and principles,
 2. changes in project policy concerning ethical issues,
 3. problems with the performance of any partner or the desire of a partner to leave the consortium,
 4. reallocation of budget between work packages and/or partners.

It is the responsibility of the project coordinator to contact the Commission in those cases.

Corrective actions can be initiated whenever discrepancies between plan and progress are observed or can be predicted.

Risk assessment is a core method for identifying and/or predicting project risks in the context of the project monitoring. Section 1.3.5 of Part A of the Grant Agreement holds an overview of the critical implementation risks and their corresponding mitigation actions to be taken. Nevertheless, the project management board will regularly elaborate on identifying further risks that might show up during the execution of the project.

8. Gap Assessment

The purpose of this deliverable is to develop a set of indicators and key performance indicators that support the management teams in monitoring and steering the project progress and the quality of the deliverables.

In addition to this, the project description holds three other project aspects that should be assessed in the context of project monitoring and steering:

1. Effectiveness of the scientific-technological methodology

The implementation of the project is described in Section 3 of Part B of the Grant Agreement. Special focus has been set on Section 3.2 (“Management structure and procedures”) which has been presented in detail in the first sections of this document. Following the procedures given there will support the management team in monitoring and steering project progress and quality. No attention has been paid so far to the *effectiveness* of the project execution.

The project goals require a two-fold approach: research-oriented work on one side and software development that meets the requirements of three specific use cases on the other side. An agile work methodology was chosen which is expected to ensure that both approaches stay in a regular dialogue and don’t drift apart. A process that iterates on the capturing of requirements from the use cases, evaluation checks and an agile software development has been mapped to the work plan. This ensures that

5. research and development activities stay properly focused,
6. risk assessment can be continuously performed,
7. activities for creating impact can be derived frequently in a synchronized way.

An additional project phase layer complements the iterative process:

8. Phase 1: The initial specification sets the focus on the mutual understanding of goals, the understanding of concepts and the refinement of the objectives and case study requirements.
9. Phase 2: The initial development will result in the realization of prototypes to be shown for demonstration.
10. Phase 3: The recalibration and adoption check focuses on the recalibration of the research and development objectives together with an increased technology adoption by the use cases, in order to achieve an advanced and fully functional case study-oriented deployment platform.
11. Phase 4: This phase comprises of the evaluation regarding usability and scalability, the preparation of the business plan, the final public roll-out of the platform and a final project evaluation.

The result of the described iterative and phase-oriented implementation approach is one intermediate release in month 18 and the final release in month 36.

2. Maximizing impact

Monitoring the successful execution of the work plan alone does not necessarily entail a *sustainable impact in the post-execution project phase*. Special attention needs to be paid to dissemination activities as well as the creation of business models and a go-to-market strategy.

Dissemination, standardization and exploitation work packages cover the project activities that are related to generating impact in addition to the development of a joint business plan for all project partners.

Apart from that, the project description holds in Section 2.2.1 of Part B a methodology for

implementing “Innovation Management as a Service”, a process definition for transforming an innovative idea into a marketable product. The process interactively combines two activity streams, namely the technological and the business development stream in four steps as follows:

1. The requirements specification for the platform results in a minimal viable product as part of a business model draft.
2. Problem-Solution Fit: The development of a component enables the refinement of the definition of real world problem that is to be solved. This phase of the research project is regarded as critical because a solution is developed without the problem being precisely defined.
3. Product-Market Fit: The integration and testing activities contribute to the iterative refinement (Build-Measure-Learn) that leads to the definition of a set of features that the user will like. This phase of the research project is also regarded as critical because a product is developed without a market.
4. Piloting activities enable iterative trials and the expansion of the test user base in order to define the strategy for further investment and go to market.

3. Gender considerations

According to Section 5.1.2 of Part B of the Grant Agreement, the research partners are requested to encourage equal opportunities of career among women and men in their staff. This will help address the European Commission goal of reaching 40% participation of women at all levels in implementing and managing research programmes. Therefore, the project management board is requested to perform the following two tasks:

1. Adopt appropriate measures that encourage the participation of women in the management of the project in order to achieve a balanced representation.
2. Support the implementation of recommendations given by the “Helsinki Group” about the situation of women in scientific research.

In order to derive appropriate action regarding gender equality, a corresponding monitoring needs to be established.

9. Indicators and Key Performance Indicators

Each of the above mentioned aspects of project management need to be monitored in order to ensure a proactive steering of the project execution.

In this section, we propose a set of indicators that covers the categories of communication, decision-making and conflict resolution, quality assurance and progress monitoring, the effectiveness of the methodology that was chosen for project execution, the sustainable impact generation for the post-execution phase and also gender equality as requested in the project description. We also explain why an indicator serves as a key performance indicator or not.

| Category: Intra-project communication | | |
|---------------------------------------|---|---------------|
| Indicator | Comment | Key Indicator |
| Physical meetings | Physical meetings are regarded as <i>highly-effective</i> communication methods for project planning and execution and are therefore essential for a successful project implementation. | yes |
| Teleconferences | Teleconferences serve as a <i>highly-efficient</i> and quickly-to-arrange | yes |

| | | |
|--------------------|---|-----|
| | synchronization and execution method and therefore are also essential for a successful project implementation. | |
| Board meetings | Board meetings, both project and technical, are the main method for risk assessment, decision-taking, project monitoring and steering and are therefore an essential indicator for a successful project monitoring. | yes |
| Collaborative tool | Collaborative tools are essential for project execution. The partner Software AG has already setup a collaborative tool at project start as requested in deliverable D9.1. (Project Collaboration Platform) in month 2. The indicator shall therefore not describe the existence of collaborative tools but rather the acceptance of the tools. | yes |
| Mailing lists | Mailing lists are essential for project communication. They have already been setup as requested in the project description and are constantly enhanced as needed. The indicator shall therefore not describe the existence of mailing lists but rather their acceptance. | yes |
| Project website | The project website has been setup at project start as requested in the project description and is constantly enhanced. The website is essential for the communication of results and the current work status. Specific and detailed indicators that monitor the usage of the website have already been defined in the deliverable D8.4 (Communication roadmap and activities report – iteration 1) in month 3. The indicator “project website” assesses those specific website indicators as a cluster and is therefore regarded as a key indicator for the project website. | yes |

| Category: Decision-making and conflict resolution | | |
|--|---|---------------|
| Indicator | Comment | Key Indicator |
| Conflict resolution at work package level | Discussions and disagreements on work package level is part of the nature of any project and in particular with different partner organizations working together for a defined time period. Their existence can indicate a fruitful discussion and express the struggling for the best solution. Conflict resolution on work package level shall therefore not be regarded as meaningful in the monitoring context. | no |
| Decision-making quality at the technical board level | In case decision-making can be reached verbally by consensus, it shall not be regarded as critical rather than being a means of all partners doing their best to execute the project and generate value together. Voting situations on the other hand have the potential to escalate disagreement between the partners into a critical project state and need monitoring. They are therefore also regarded as key indicators for the project steering. In order to avoid goal conflicts, the decisions taken at the technical board level will be assessed by the project management board. | yes |
| Decision-making quality at the project board level | The same applies to voting situations on the technical board level: they have the potential to turn the project into a critical state where successful project execution is endangered and are therefore also regarded as key indicators. In order to avoid goal conflicts, the decisions taken at the project board level will be assessed by the technical management board. | yes |
| Decision-making quality at the project board level together with the project officer | The project situations where the involvement of the project officer is requested are very critical for the successful execution of the project and the successful generation of results. They are therefore regarded as key indicators. In order to avoid goal conflicts, these decisions will also be assessed by the technical management board. | yes |

| Category: Quality assurance and progress monitoring | | |
|---|--|---------------|
| Indicator | Comment | Key Indicator |
| Timely submission of quality assured deliverables | The submission of deliverables in time as well as on the expected quality level indicate the project progress and are a key indicator for the desired result generation. | yes |

| | | |
|---|--|-----|
| Risk assessment and corrective actions taking | The outcome of the risk assessment is twofold: 1. The number of risks that have been identified. This indicator is regarded as essential to the project in case several risks are identified at the same time and two or more risks even correlate with each other. 2. The corrective actions that are derived, their implementation and usefulness. As the success of the corrective actions are essential for the success of the project, the effectiveness of the actions shall be considered as a key indicator. | yes |
|---|--|-----|

| Category: Effectiveness of the scientific-technological methodology | | |
|---|---|------------------|
| Indicator | Comment | Key Indicator |
| Result generation along the iterations | This indicator supports the monitoring of critical steps during project execution where research-oriented work and use case development need to be synchronized. This is essential for the successful result generation of the project. It is already reflected in the deliverables within work packages 3, 4 and 5 and therefore their iterating nature does not need to be treated additionally as an indicator in this indicator definition context. However, in the phases of assessing risks, deriving actions and monitoring their impact, the effectiveness of the result generation may serve as a guideline for decision taking. | not an indicator |
| Value generation along the project phases | This indicator supports the monitoring of the four different project phases during project execution. This is essential for the successful value generation within the project which is reflected in the deliverables of work package 6 (Integration and testing) and therefore does not require an additional separate monitoring. However, in the context of progress monitoring and steering they may serve as a guideline for risk assessment and decision-taking. | not an indicator |

| Category: Impact maximization | | |
|-------------------------------------|---|---------------|
| Indicator | Comment | Key Indicator |
| Creating sustainable project impact | This indicator supports the monitoring of activities related to dissemination. Specific and detailed dissemination indicators have already been defined in the deliverable D8.4 (Communication roadmap and activities report – iteration 1) in month 3. The indicator “creating sustainable project impact” assesses those specific dissemination indicators as a cluster and is therefore regarded as a key indicator in the context of impact maximization. | yes |

| Category: Gender awareness | | |
|----------------------------|---|---------------|
| Indicator | Comment | Key Indicator |
| Gender diversity | This indicator monitors diversity regarding gender. As diversity is commonly acknowledged to be beneficial for the project execution process and due to the fact that its monitoring is strongly advised by the European Commission, this indicator is regarded as a key indicator. The European Commission set a goal to reach 40% participation of women at both, the implementing and managing level. | yes |

10. Indicator Metrics

In this section we define concrete metrics for each of the indicators within their category.

Metrics will be assigned to an indicator in two variants:

1. A number larger or equal to 0, indicating a number of occurrences for this indicator.
Example: The number of physical meetings in a year.
2. A maturity level, indicating a development of a defined indicator situation in four levels:
 - The *initial level* where the indicator situation does not exist yet or has just evolved.
 - The *developing level* where the indicator situation is showing improvements.
 - The *advanced level* where the indicator situation has not reached maturity yet.
 - The *matured level* where satisfaction regarding the indicator situation is reached.

Example: The acceptance of the collaborative tools over time.

The below table lists the PrEstoCloud project indicators within their category, their metrics, when the measurement is being taken and who is doing the measurement:

| Category: Intra-project communication | | | |
|---------------------------------------|----------|--------------------------------------|------------------------------------|
| Indicator | Metric | Time of measurement | Who |
| Physical meetings | number | Project management meeting | Project management board |
| Teleconferences | number | Technical management meeting | Technical management board |
| Board meetings | number | Project/Technical management meeting | Project/Technical management board |
| Collaborative tool | maturity | Technical management meeting | Technical management board |
| Mailing lists | maturity | Technical management meeting | Technical management board |
| Project website | maturity | Technical management meeting | Technical management board |

| Category: Decision-making and conflict resolution | | | |
|--|----------|--|--|
| Indicator | Metric | Time of measurement | Who |
| Decision-making quality at the technical board level | maturity | Project management meeting | Project management board |
| Decision-making quality at the project board level | maturity | Technical management meeting | Technical management board |
| Decision-making quality at the project board level together with the project officer | maturity | Project and Technical management meeting | Project and Technical management board |

| Category: Quality assurance and progress monitoring | | | |
|---|----------|--|--|
| Indicator | Metric | Time of measurement | Who |
| Timely submission of quality assured deliverables | maturity | Project management meeting | Project management board |
| Risk assessment and corrective actions taking | maturity | Project and Technical management meeting | Project and Technical management board |

| Category: Impact maximization | | | |
|-------------------------------------|----------|----------------------------|--------------------------|
| Indicator | Metric | Time of measurement | Who |
| Creating sustainable project impact | maturity | Project management meeting | Project management board |

| Category: Gender awareness | | | |
|----------------------------|--------|----------------------------|--------------------------|
| Indicator | Metric | Time of measurement | Who |
| Gender diversity | number | Project management meeting | Project management board |

11. Monitoring and Steering Plan

The following table gives an overview of all project KPIs and will also be used as a template for the regular measurements taken. The table also tracks all previous measurement for each KPI.

The following abbreviations apply:

Project management board: PMB

Project management meeting: PMM

Technical management board: TMB

Technical management meeting: TMM

| Intra-project communication | When | Who | Metric | Date | Value | Comment | Action |
|--|------------|------------|----------|--------|-------|---------|--------|
| Physical meetings | PMM | PMB | number | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Teleconferences | TMM | TMB | number | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Board meetings | PMM TMM | PMB TMB | number | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Collaborative tool | TMM | TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Mailing lists | TMM | TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Project website | TMM | TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Decision-making and conflict resolution | When | Who | Metric | Date | Value | Comment | Action |
| Decision-making quality at the technical board level | PMM | PMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Decision-making quality at the project board level | TMM | TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Decision-making quality at the project board level together with the project officer | PMM TMM | PMB TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |

| Quality assurance and progress monitoring | When | Who | Metric | Date | Value | Comment | Action |
|---|------------|------------|----------|--------|-------|---------|--------|
| Timely submission of quality assured deliverables | PMM | PMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Risk assessment and corrective actions taking | PMM TMM | PMB TMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Impact maximization | When | Who | Metric | Date | Value | Comment | Action |
| Creating sustainable project impact | PMM | PMB | maturity | yymmd1 | | | |
| | | | | yymmd2 | | | |
| Gender awareness | When | Who | Metric | Date | Value | Comment | Action |
| Gender diversity | PMM | PMB | % number | yymmd1 | | | |
| | | | | yymmd2 | | | |

At each point of measurement:

- The new assessment is entered into the log.
- All previous data is being revised:
 - Have the actions taken been successful?
 - Any learnings to be found?
 - Any predictions possible?
 - Are there any dependencies or correlations found to other KPIs?

As can be seen in the overview, most KPIs are not measured in numbers rather than in their maturity. This implicitly holds the need to discuss the assessment and come to a joint conclusion which in addition facilitates the derivation of actions.

12. References

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13. Appendices

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| Deadline date | Action | Responsibility |
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