



## DR11.1: PROMISE method of self-assessment and peer-reviews (Month 30)

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<b>ABSTRACT</b>	<p>This deliverable presents the methodology and tools that is to be used in self-assessments of the A1 to A11 demonstrators and for the peer-reviews. The self-assessments and peer-reviews will, according to the approved plan, be carried out after month 22. Final reporting of finding and analyses will be, as described in the approved DOW, be available on month 30 of the project.</p> <p>This is a resubmitted version of DR11.1 (month 22).</p>

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## 1 DR11.1 Resubmitted version Month 30 of the PROMISE project

This is the resubmitted version of the deliverable DR11.1 (month 22). The following updates have been carried out:

1. Analytical method for peer-reviews and set targets updated in section 7 Peer-review analysis methodology (UPDATED MONTH 30)
2. Analytical method for self-assessments and targets updated in section 6
3. A more illustrative peer-review package has been added to Appendix A
4. Other updates are marked in each section of this deliverable
5. A supplementary annex has been created in order to show all peer-review packages from Month 22 of the project. This supplementary report consists of all 10 peer-review packages for all applications and is 351 pages long document. Filename: “dr11\_1\_supplementary annex\_all peer-review packages.pdf” – no separate deliverable number.

At the time of preparing the peer-review and self-assessment method (and proved by the gathering the data and information from the Applications), few applications had a clear idea of costs associated with e.g. the PEID and the implementation of the PDKM. Further, the market potential and the associated risks were not clear and fully explored by all the applications. This was also confirmed in the PROMISE Technical Review Meeting January 18<sup>th</sup>-19<sup>th</sup>, 2007, by application owners themselves and communicated to the EU-reviewers by the application owners in this meeting. I.e. the applications themselves did not have clear, specific and concise target to achieve in terms of monetary values, performance improvement etc. Due to this fact, setting specific targets for each application is difficult for the 1<sup>st</sup> self-assessments and peer-reviews.

Based on this, new additional methodologies for self-assessments have been developed. These methodologies have a great emphasize on cost/benefit analyses and on business effects and targets. Work-shops and pilots have been run at Intracom (A9) and Fidia (A6). These new methodologies and results are presented in deliverable DI3.7.

## **2 Introduction (UPDATED MONTH 30)**

This document is the PROMISE deliverable DR11.1 PROMISE method of self-assessment and peer-reviews at month 30 of the PROMISE project. This deliverable presents the methodologies and tools that will be used in self-assessments of the A1 to A11 demonstrators and for the peer-reviews in task TR11.2. This forms the basis for carrying out task TI3.7.

This document is structured as follows:

- Section 3 presents work-package R11's objectives and tasks and information regarding the transfer of WP R11 tasks to WP I3
- Section 4 elaborates the task TR11.1 which is the basis for this deliverable DR11.1 at month 22
- Section 5 outlines the self-assessment tools
- Section 6 presents the method and analytical approach for the self-assessments of PROMISE
- Section 7 outlines the peer-review method and analytical approach for the Ax's of PROMISE
- The appendices A to F contain the elements that constitute the self-assessment method and the peer-review method

### 3 Objectives and tasks of WP R11

#### 3.1 Main objective of WP R11

The main objective of work-package R11 is to evaluate and assess the PROMISE Ax's, WP A1 to A11, including data collection, analysis and reporting, functional, technical, performance and economical assessments. WP R11 includes the detailing of the evaluation including the detailing of the methodologies for the self-assessment carried out by the application owners themselves, and the peer-reviews of the same Ax's. A sub-objective of work-package R11 is, if possible, to involve the IRG and the IMS, into PROMISE and to use the peer-reviews of WP R11 as basis for dissemination activities of the available PROMISE results to these groups. A prerequisite for WP R11 to involve IRG and IMS is that WP I2 has identified, initiated and established good working conditions with these groupings, making it possible to use them as peer-reviewers.

In order to succeed in fulfilling the stated objectives, WP R11 consists of three tasks, namely TR11.1, TR11.2 and TR11.3. These are described in the following sections. Task TR11.1 is also elaborated in section 4 as this task is the basis for DR11.1.

#### **UPDATED MONTH 30:**

**WP R11 tasks have been transferred to WP I3. TR11.3 is now called TI3.7.**

#### 3.2 Task TR11.1: Development of the methodology for evaluation (completed M22)

The goal of this task is to develop a methodology that can be used to evaluate and assess the PROMISE applications A1 to A11. The methodology developed will both consist of a self-assessment method for the involved A1-A11 work-packages of PROMISE, and a peer-review method. The activities to be performed in this task are:

- Development and detailing of a self-audit method that covers, but not necessarily limited to: functional, technical, performance and economical aspects
- Development and detailing of a Peer-review method covering aspects similar as the self-audit method
- Identify the specific peer-reviewers and prepare them by informing of plans, objectives and rationale for their involvement

#### **UPDATED MONTH 30:**

- **Deliverables from task TR11.1 is “DR11.1: PROMISE method of self-assessment and peer-reviews” (PU-deliverable) at month 30 of the PROMISE project (this deliverable).**

### **3.3 Task TR11.2: Self-audit and peer review of the PROMISE Demonstrators (M22-M26)**

The goal of this task is to carry out the self-assessment in all PROMISE Demonstrators (applications A1 to A11) and the peer-reviews. The activities to be performed in this task are:

- Carry out and gather the results of the self-assessments
- Carry out and gather the results of the peer-reviews

There are no deliverables from task TR11.2. Task TR11.2 will be carried out in the period month 22 to month 26. The gathered results from the self-audits and peer-reviews will be incorporated in the deliverable from the following task TR11.3.

#### **UPDATED MONTH 30:**

- **Finalising of this task is carried out in Task TI3.7 (see next section).**

### **3.4 Task TR11.3: Evaluation and conclusions (M24-M30) (UPDATED MONTH 30)**

The task TR11.3 has been transferred to WP I3 and the task TI3.7: First self-assessment and peer reviews of the PROMISE Applications - Evaluation and conclusions [M24-M30]

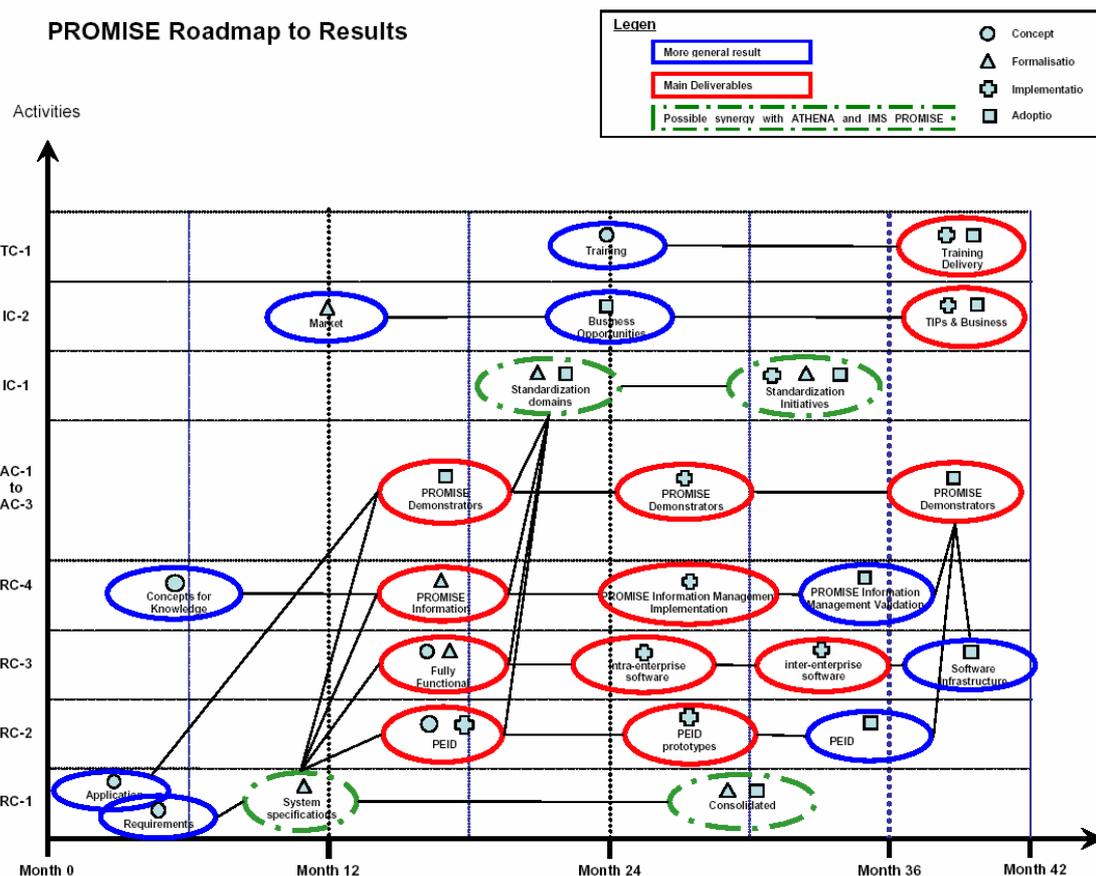
This task is the completion of the discontinued WP R11. Task I3.7 builds on the content of task TR11.2 and TR11.3. The goal of this task is to complete the self-assessments and peer-reviews in all PROMISE Applications (TR11.2) and to evaluate and draw conclusions based on the gathered data (TR11.3). Further, the original gathering of data and analysis of WP R11 is extended with the development of a more detailed economic assessment. Due to the fact that application owners do not have a clear and consistent view of all economic aspects related to PROMISE, the economic assessment that are to be developed, will be tested on two of the applications in full and provide important feedback for possible refinement in TI3.8 before a full roll-out for all applications to be carried out in TI3.8.

The activities to be performed in this task are:

- Complete the gathering of the results of the first self-assessments and peer-reviews
- Develop and carry out a more detailed economic assessment with more detailed and confirmed analyses of applications than found in the self-assessment. This will be based on meetings/workshops planned at application owners' sites. Where the application owner will get support from an I3 team, including the Exploitation manager, to identify and quantify the economic aspects of their application.
- Analyse the data from the results of the self-assessments and the peer-reviews and the more detailed economic assessment.
- Create a common analysis with conclusions etc of all the results.
- Create a PU-deliverable documenting the public results of the evaluation that can be distributed to the peer-reviewers.

## 4 Task TR11.1: Development of the methodology for evaluation

The deliverable DR11.1 is delivered on month 22 according to plan. It contains the structure and evaluation mechanisms needed for carrying out self-assessments of the demonstrators A1 to A11. Further, it presents the framework for carrying out peer-reviews of PROMISE. As recommendation 11 of the PROMISE 1<sup>st</sup> review report<sup>1</sup> moved the delivery date of DR11.1 from month 26 (original proposal for WP R11) to month 18, a preliminary DR11.1 report was delivered at month 18 outlining the methodologies for the final deliverable. As can be seen from the PROMISE roadmap to results in Figure 1, there were several important results needed to be evaluated and considered for inclusion is the self-assessment and peer-reviews which now can be found in the methodologies presented in this deliverable DR11.1 at month 22.



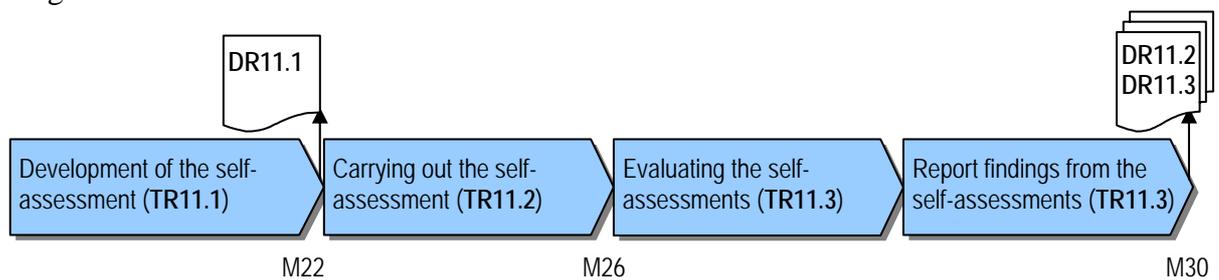
**Figure 1: PROMISE roadmap to results**

As can be found in the overall description of WP R11 a sub-objective is, if possible, to involve IRG and IMS. The work with these constellations is going strong according to the involved in these processes. The peer-review methodology therefore has been designed to also be carried out by these provided the IRG groupings is up and running and the ties to IMS is secured by the work packages responsible for these. However, the stated prerequisite for carrying out WP R11's activities related to the IRG and IMS has not been fulfilled (as described in WP R11's objectives related to WP I2). This has been outside the control and scope of WP R11. However, the peer-review process will be carried out as described in section 7.

<sup>1</sup> Please refer to the PROMISE 1<sup>st</sup> Review report presenting results and recommendations from the first review meeting in Brussels on 13-14 December 2005.

## 5 The self-assessment method of the demonstrators A1 to A11

Figure 2 shows how the method from the development the self-assessment to reporting the findings will be carried out in WP R11.

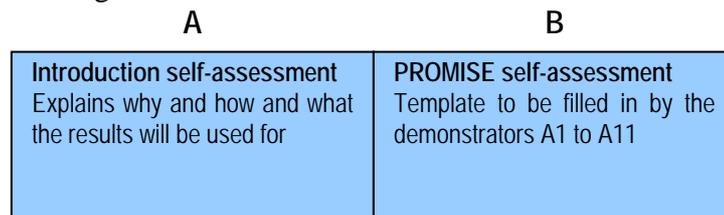


**Figure 2: Illustration of the self-assessment method and deliverables**

The steps illustrated in Figure 2 are detailed in sections 5.1 to 5.4.

### 5.1 Development of the self-assessment

The self-assessments will be carried out by using a template that all demonstrators A1 to A11 are required to complete. The self-assessment template will be part of a self-assessment package consisting of an introduction (A), and the self-assessment template (B). The self-assessment package is illustrated in Figure 3.



**Figure 3: The elements A and B of the self-assessment package to be distributed to the PROMISE demonstrators A1 to A11**

The elements for the self-assessment package illustrated in Figure 3 are found in the following sections of this document:

- Appendix E: Introduction to the self-assessment
- Appendix F: The self-assessment template

#### 5.1.1 A - The introduction to the self-assessment

The introduction to the self-assessment was developed in order to be as brief and concise as possible. It is assumed that all the demonstrators A1 to A11 understand why the self-assessments are carried out as this clearly has been specified in the PROMISE 1<sup>st</sup> review report<sup>2</sup> and subsequent discussions in the PROMISE project. All responsible work-package managers in WP A1 to A11 also have person-months allocated in WP R11 for carrying out this work. The introduction can be found in Appendix E.

<sup>2</sup> Please refer to the PROMISE 1<sup>st</sup> Review report presenting results and recommendations from the first review meeting in Brussels on 13-14 December 2005.

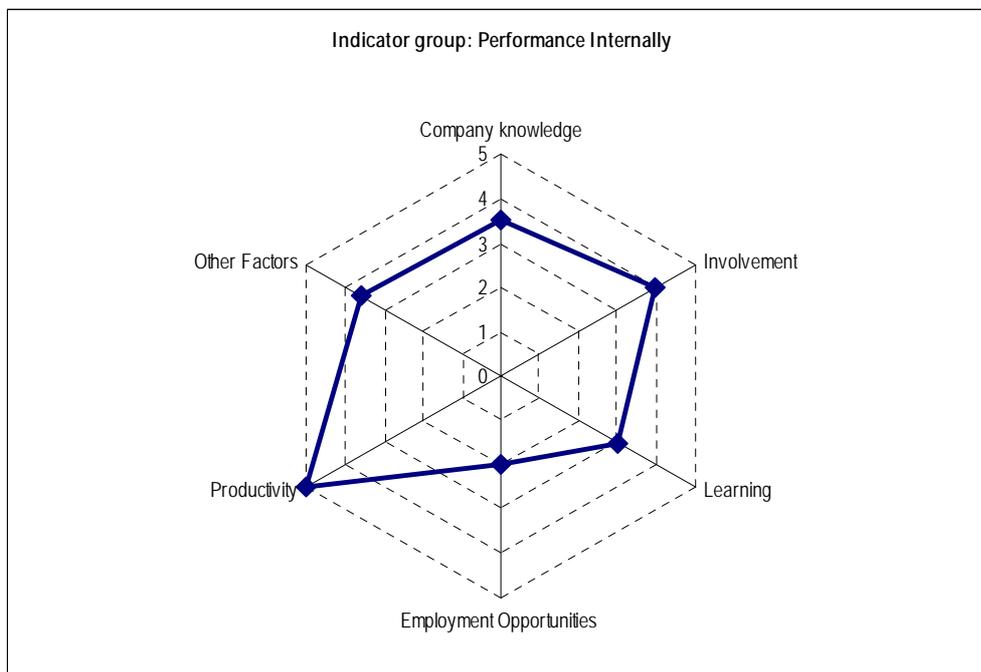
### 5.1.2 B - The self-assessment template

The self-assessment template is an Excel-file consisting of three main sections:

- Functional/Technical assessment
- Overall PROMISE and Application Ax assessment
- Economic/Performance assessment

The whole self-assessment can be found in Appendix F (a print-out of the Excel-file).

The whole idea behind the comprehensive self-assessment is to enable analyses were e.g. (but not limited to) the results found in Figure 4, can be found, assessed and understood. See section 6 for the full PROMISE Self-Assessment Dashboard.



**Figure 4: One example of possible analytical results from the self-assessment (dummy data, not real PROMISE results)**

In the subsequent sub-sections, the sections of the self-assessment are briefly presented. For the full version, please refer to Appendix F.

### 5.1.2.1 Introduction

The introduction (see Figure 5) in the self-assessment is very important as this sets the stage for the rest of the whole assessment. Figure 5 shows part of the first screen that the user is shown.

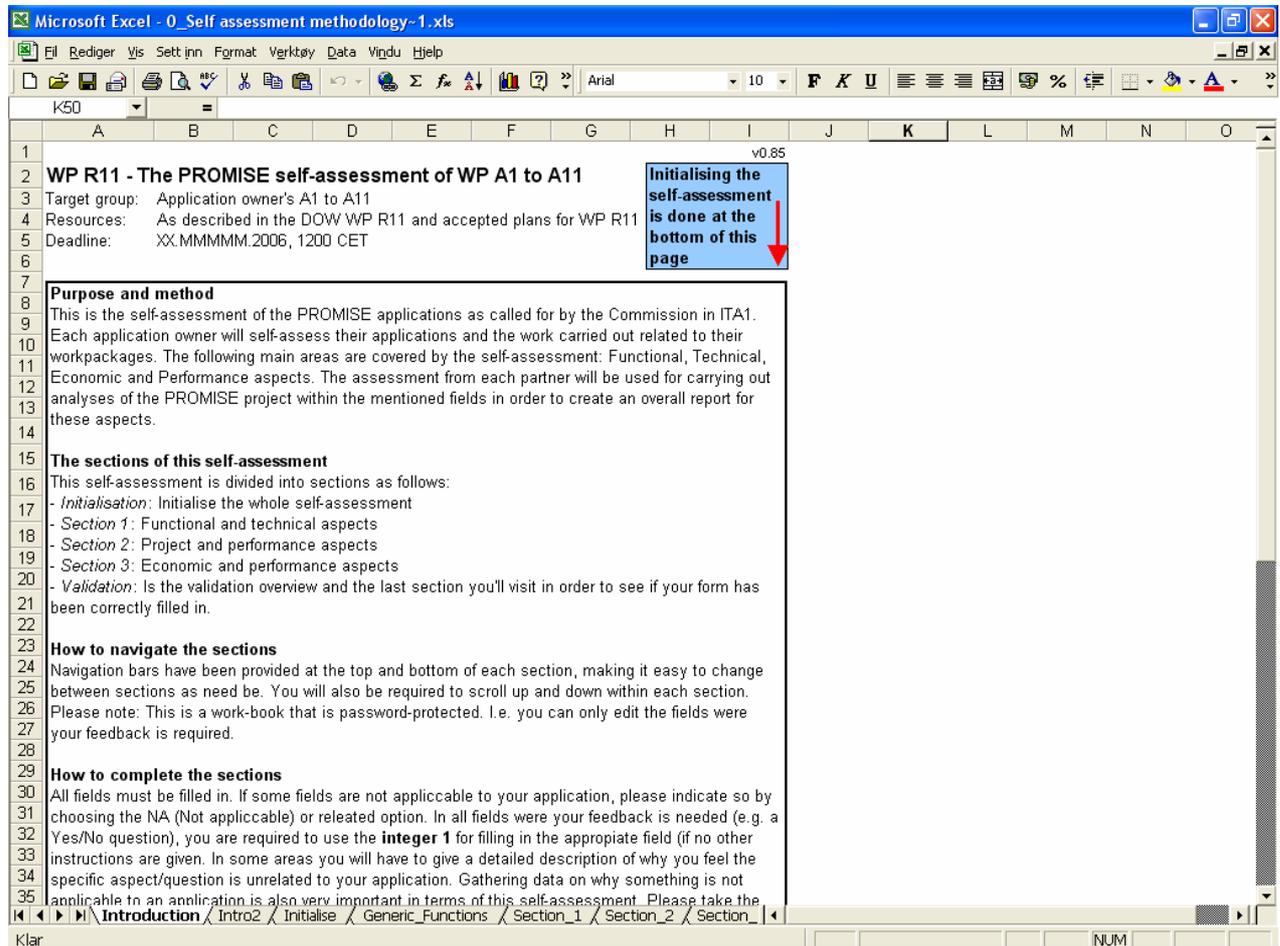


Figure 5: Illustration of the introduction to the PROMISE self-assessment

### 5.1.2.2 Initialisation of the self-assessment

The initialisation of the self-assessment is related to the functional and technical assessment of the application A1 to A11. Each application owner is asked whether a generic function is part of his/hers application or not. There is a total number of 49 generic functions that has been identified as part of the work with DR11.1.

The 49 generic functions have been identified in the following manner:

1. Deliverable DR3.1 and DR3.2, all DAX.x<sup>3</sup> deliverables, deliverables from WP R2, and deliverables from the work with the PEID, Middleware, DSS and PDKM WPs were scrutinized for any mention of functions. When found, the identified functions were compiled into separate lists for all A1 to A11 and for the PEID, Middleware, DSS and PDKM WPs.

<sup>3</sup> E.g. DA1.1, DA1.2, DA1.3 etc

2. The list containing e.g. the functions identified for A4 was sent to the A4 application owner for verification. The same was done with e.g. the PDKM list which was sent to the R9 owner. This were carried out for all A1-A11, PEID, PDKM, DSS and Middleware WP owners in order to receive their latest feedback, updates and have them verify the lists of functions.
3. The lists were then merged into one and used as basis for discussion with the involved partners of R11 (e.g. SAP, EPFL, INFINEON) for identifying the generic functions of PROMISE. A list of 49 generic functions was identified and is the basis for the functional assessment in the self-assessment. Some of them are specific for the PROMISE project, while others are more of a generic nature. As such, the functions described in this section will not necessary be developed by the PROMISE consortium and they should not be used as requirements to the developers of the PROMISE project.

**Table 1: The identified and compiled generic functions of PROMISE**

Generic function	Generic function
PEID can conduct real time measurement of physical values	PDKM have incident management, i.e. can handle information about the usage of the product/ equipment/ component
PEID can store data on itself	PDKM can receive data from a PEID reader
PEID can warn if e.g. measurements are out of range / passed a threshold (e.g. number of starts, temperature etc)	PDKM can receive data from the PEID via the Middleware
PEID can transfer data (read/write) to other PEIDs	PDKM has access control functionality (i.e. creation and use of roles for users)
PEID contains a globally unique identifier	PDKM's web-portal allows the users to possibility to create, change and view data/objects within the limitations of their role
PEID has wireless network capability (i.e. can send and receive data by wireless communication)	PDKM has a web-portal so that different participants in different places all over the world can work via a web-interface.
PEID has network capability (i.e. can send and receive data via permanent, non-permanent, directly or intermittent device)	PDKM can transfer and update data on PEID
PEID can send messages to specified recipient	PDKM can retrieve and share (read/write) data from other data sources than the PEID and the DSS (OEMs, other databases etc)
PEID can transfer and update data on the PDKM	PDKM ability of product and product structure management (e.g. BOMs, as-built, as-designed, serial numbers etc)
PEID can transfer data to the DSS	PDKM can generate notification reports for certain notification types, range of equipments, range of materials or a time period.
PEID can filter out field data and store the filtered data	PDKM capable of tracking the history of products/components
PEID has processing and analysing capability (e.g. of data from measurements, of received data from PDKM etc) so that it can take decisions what to do (notifications, alarms, transmissions etc)	PDKM capable to handle field data in the form of documents like specific reports (e.g. maintenance etc)
Initialise data on the PEID (first writing of ID, data etc on a PEID)	PDKM capable to handle field data in the form of single values like the current mileage, temperature etc
Middleware can read data from PEID	PDKM is able to integrate needed data from related data sources
Middleware can write data to the PEID	DSS has functionality to handle the application's specific decision support requirements (predictive maintenance, logistics, decide actions, aging diagnosis etc)
Middleware can receive notifications of PEID events (such as value changes, alarms etc)	Possibility to enter requests into the DSS by user interface
Middleware can perform simple data processing (such as aggregation of messages, filtering duplicated messages etc)	DSS can access PDKM and get data that is needed for the DSS analyses / decision making etc
Middleware can receive requests (read/write) for PEID data from PDKM, DSS, other applications	DSS can access data sources other than the PDKM (other databases, OEMs, PDMs etc) and get necessary data for carrying out analysis etc
Middleware can provide data to third parties (other companies etc)	Possibility to enter data into the DSS by user interface
Middleware can carry out PEID Management (registration, editing access control rules for devices etc)	DSS can transfer and update data on PEID
Middleware functionality to transfer data from e.g. a technician's interface (e.g. work carried out, incidents etc) to the PDKM	DSS can store data in the PDKM (i.e. DSS can write data to the PDKM)
Middleware functionality to transfer data from the DSS to e.g. a technician's interface (i.e. requests for e.g. best practice / manuals / trouble-shooting information etc out in the field)	DSS can store data in other data-sources beside the PDKM (databases, OEM etc) (i.e. DSS can write data to other datasources)
Middleware can detect the presence of a PEID	DSS can present the results to the user in the user's graphical user interface
PDKM functionality to handle/manage the application's specific data and/or knowledge management requirements (e.g. logistics management, maintenance etc)	Web-interface for using PDKM, DSS etc (e.g. for communicating with suppliers, decision makers etc, also allows use of PROMISE systems by any web-browser)
PDKM has document management functionality for the whole lifecycle of the product/component (i.e. overview of all related documents)	

The initialisation screen of the self-assessment is shown in Figure 6.

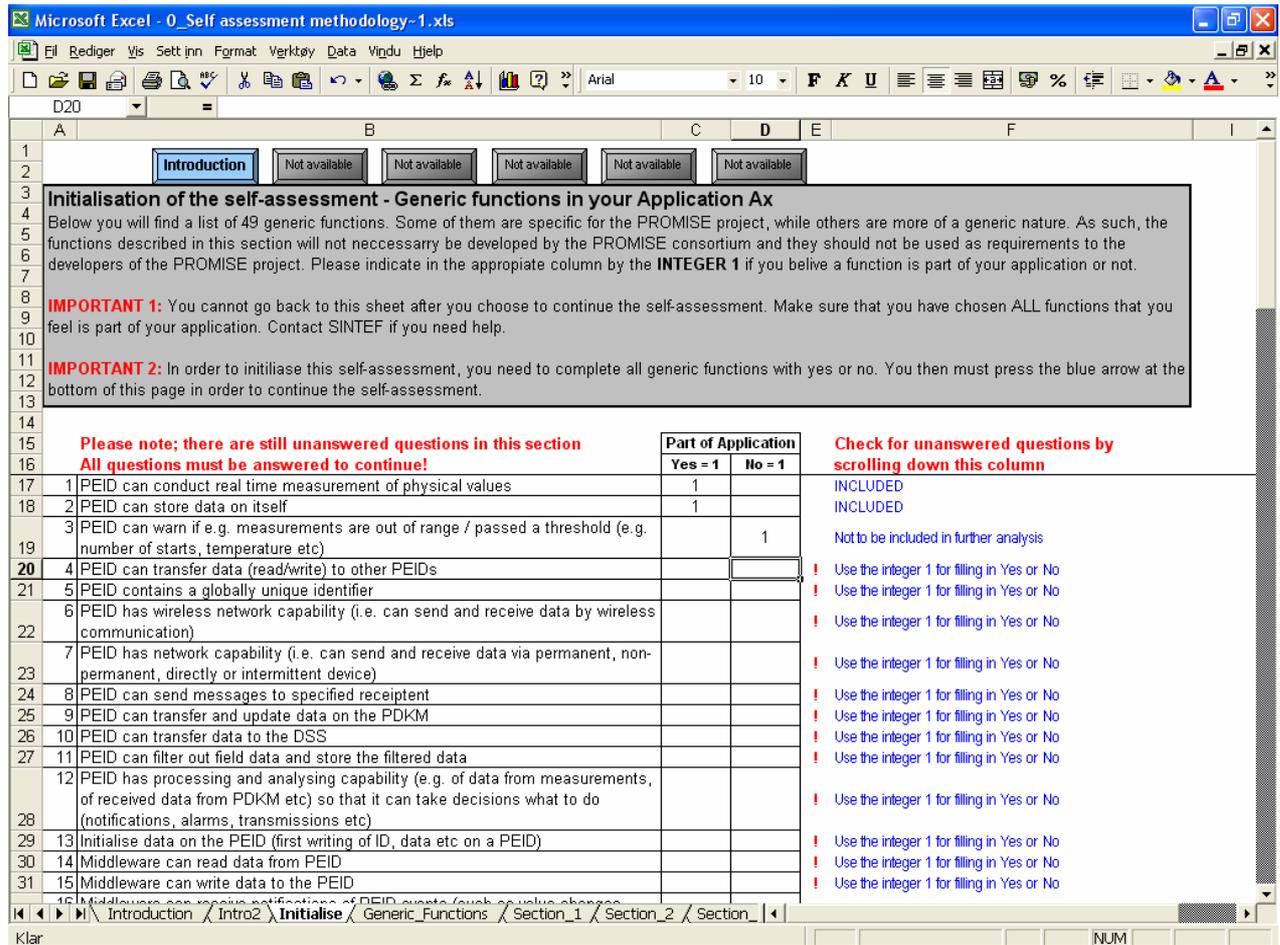


Figure 6: Initialisation of the self-assessment

### 5.1.2.3 Functional/Technical self-assessment

In this section of the self-assessment, the generic functions that the application owner answered were part of his/hers application in the initialisation are found. Each function has 19 questions related to it. These questions are shown in Table 2.

Table 2: PROMISE assessment questions related to generic functions

Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)
Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?
Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?
Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?

How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)
How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)
How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)
How well do you believe that the PROMISE developed technologies will fulfil your requirements related to this specific function?	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)
How important are the other functions of your application for this specific function to work as desired/required?	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?
How important is this specific function for the other functions to work as desired/required in your application?	

All the questions in Table 2 have a Likert scale. Along this scale, the application owner can choose between six categories denoted ---, --, -, +, ++, +++ between the indicated qualitative extremes. This is illustrated in Figure 7.

**SECTION 1: FUNCTIONAL AND TECHNICAL SELF-ASSESSMENT**

In this section you will be presented with a range of generic functionalities based on your initialisation at the start of this assessment. Some of them are specific for the PROMISE project, while others are more of a generic nature. As such, the functions described in this section will not necessarily be developed by the PROMISE consortium and they should not be used as requirements to the developers of the PROMISE project. Each generic functionality is listed with grey. You are then asked to assess your application by using the **integer 1** in the appropriate column along the gliding scale (or use 1 in the NA-column if it's not applicable). All questions/statements must be filled in. Remember that the left and right of the scale is the extremes. If for example one function is important (but not very important), you should fill in the cell in column G, and not column H.

Please note: there are still unanswered questions in this section

		Very inessential					Very essential	
(1)	<b>PEID can conduct real time measurement of physical values</b>							NA
1	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?					1		
2	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	1						
3	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?					1		
4	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very well	! Not yet answered, use 1 for filling in
5	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very well	! Not yet answered, use 1 for filling in
6	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very well	! Not yet answered, use 1 for filling in
7	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very well	! Not yet answered, use 1 for filling in

Check for unanswered questions by scrolling down this column

Figure 7: Section 1 of the self-assessment illustrated

### 5.1.2.4 Overall PROMISE and Application Ax assessment

This section of the self-assessment addresses overall issues related to the PROMISE project and the application Ax. Key-items for this assessment are: strategy, R&D process, effects of EU funding, employment opportunities, overall questions of the application. Assessing the application Ax as a project is also included in this section. A total number of 115 questions are asked to be assessed. The illustration of section 2 is shown in Figure 8.

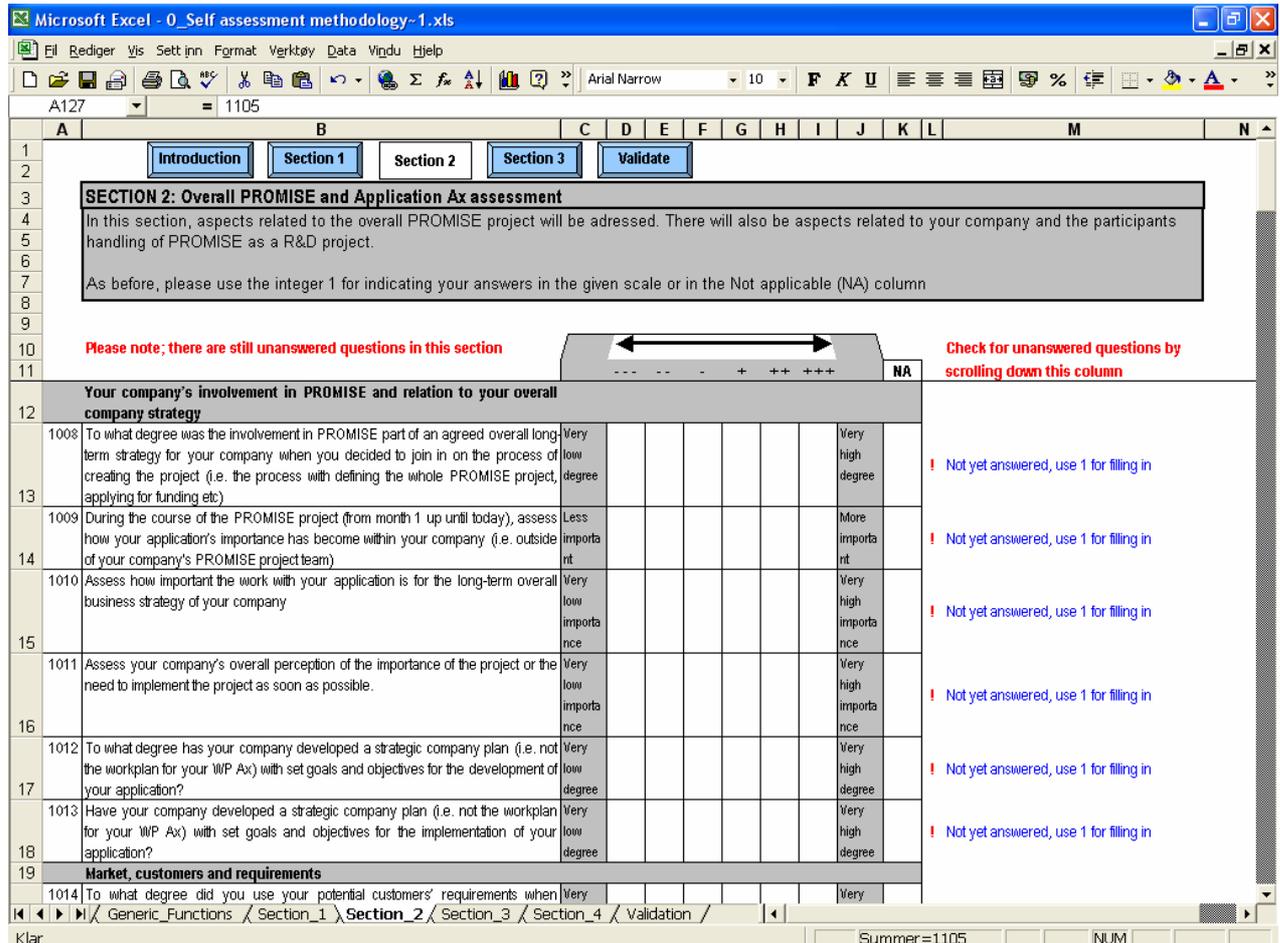


Figure 8: Illustration of section 2 in the self-assessment

### 5.1.2.5 Economic and performance assessment

In relation to the specific application, there are objectives that will determine whether or not the application is a success (either in the market place or as a technology to be used by other projects within each company). These objectives will be part of determining the performance of the application and its economic value. Objectives can be internal in the R&D phase (e.g. spin-off products/applications/new R&D areas discovered), or they can be related to the implementation phase (e.g. implementation of one production line within 6 months in order to reach specific sale dates) etc. This section 3 addresses indicators and will use the data the application owner will input (together with other aspects covered in the self-assessment) to assess the performance of each application).

In this section, the indicators are broken down according to the following lifecycle phases in order to cover all aspects which may be affected by the PROMISE solutions and technologies. For the

lifecycle phases, both for products and processes: indicators which cover the lifecycle of products and processes have been identified in order to understand how they are both influenced by PROMISE solutions and technologies. Phases used are:

- BOL - R&D: this section focuses on BOL and specifically on developing a new solution which means that the application owner has to evaluate how PROMISE technology can impact the future R&D process from the initiation of R&D to finished prototype ready for setting up production. Typical objectives here are related to number of prototypes developed within a specified time, number of spin-off technologies, budgetary objectives related to time and money etc., Implementation stage (into production/use) - typically related to time for implementation etc
- BOL - Operations: typically achievable output, increase in service, decrease in working hours etc
- MOL - Usage: in this section the application owner find indicators on how the new product/service may affect the performance of the application owner's customer usage of the product
- MOL - Maintenance: in this section the application owner finds indicators to evaluate how the maintenance process changes
- EOL - In this section the impact of the PROMISE solution in the End of Life phase of the product lifecycle is evaluated.

For each phase the application owner is asked to evaluate revenues, costs and investments. Moreover, the performance of the PROMISE solution/technologies is also evaluated from the point of view of other indicators. The application owner is asked to assess his/hers application by using the real and forecast values in appropriate columns along the gliding scale.

- In the PRIORITY-column the application owner is to specify how important the indicator is for his/hers company with a scale from 1=very low importance to 6=very high importance in terms of improvement.
- In the column SITUATION PRE-PROMISE the application owner is asked for mean values for each indicator before implementing PROMISE solutions/technologies in his/hers product.
- In the column POST-PROMISE-year 0 to 5 the application owner is asked to forecast the value of the indicators according to previous trends in their company and according to forecast impact of PROMISE solutions/technologies.
- In the column VARIABILITY the application owner is asked to evaluate how stable the values given are as forecasts for the years 0-5.

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1			MA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -gear 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (-/+ -XX%)							
2	<i>economic value in thousands of euro</i>																		
4	<b>OVERALL REVENUES AND MARKET VIEW:</b> this section relates to the assessment of PROMISE impact on your company revenues and in the market development in terms of market share, new customers etc																		
5	<b>revenues from pre-Promise products/services:</b> please quantify the revenues due to product versions -models- previous to the PROMISE-introduction by the company? In case of service providers (like Intracom) quantify income from services provided before PROMISE introduction. If the strategy of the company is to sell these products/services also after PROMISE introduction, as a different version of the product, it is necessary to forecast their value for the future.																		
6	<b>revenues from new products/services with PROMISE technologies/solutions inside:</b> assess revenues PROMISE products/services means products/services with Promise technologies/solutions inside. These may start from gear 0 most probably from gear 1.																		
7	<b>number of services provided per previous versions of product:</b> services integrated with products include: onsite maintenance support, online maintenance support, product customization, recycling support, re-tooling, ...if you are a manufacturing company: Please quantify how many of these services per product you were offering before introduction of PROMISE technologies / solutions? If you are a service provider (like Intracom) evaluate number of different services to evaluate if it increases thanks to PROMISE solutions/technologies.																		
	<b>number of services provided per PROMISE product:</b> services integrated with PROMISE products																		

Ready NUM

Figure 9: Example from section 3 - Economic and performance assessment

### 5.1.2.6 Validation

The validation section is the last section of the self-assessment. This section validates the whole assessment and checks if all questions have been answered. If this is the case, the application owner can submit the completed assessment to the specified recipient.

## **5.2 Carrying out the self-assessment**

Task TR11.2 of the work-package R11 will carry out the self-assessments in the months 22 to 26 of the PROMISE project. The self-assessment package developed in TR11.1 will be distributed to all A1 to A11 for them to complete. This step is finished once the self-assessment template from each partner has been collected.

## **5.3 Evaluating the self-assessments**

The completed self-assessment templates will be analysed together with the results from the peer-reviews (see section 6).

## **5.4 Report findings from the self-assessments**

The analyses, conclusions and recommendations described in section 5.3, form the basis for the CO-deliverable DR11.2 which will contain all the findings. This CO-deliverable also forms part of the basis for creating the PU-deliverable DR11.3 that is to be distributed to the external peer-reviewers.

## 6 Self-assessment analysis methodology (UPDATED MONTH 30)

This section presents the methods that will be used for analysing and interpreting the self-assessments carried out by each of the ten applications A1 to A11 in the PROMISE project.

### 6.1 Introduction to the self-assessment analysis approach

The data that will be used in the analyses of the PROMISE applications consist of collected assessments from the applications themselves. The assessment questions asked are carefully selected to shed light on each applications situation and performance from multiple angles, thus enabling detailed application analyses. The assessment questions are organized in a hierarchy where each question is aggregated together with others into Indicators. Within some of the Indicators there are one or several questions that carry more weight in the analysis of that specific Indicator. The applications will not be informed of this in order to avoid any possible sources of biased errors. The Indicators are further aggregated into Indicator Groups, which constitutes the PROMISE Self-Assessment Dashboard.

When the self-assessments have been collected from all the applications, the data is consolidated into a database for the analysis. Based on the aggregation of data from the assessment questions, a detailed analysis is carried out for each application, and the Indicators are graded for each application. Based on the analyses of each application and the grading of the application Indicators, an overall PROMISE grade is given for each indicator. The Indicators are organized in Indicator Groups by the area they describe. In the PROMISE project the groups are:

#### **The PROMISE Self-assessment Dashboard - PROMISE Indicator Groups**

- Functional/Technical – indicators assessing functional and technical aspects
- Performance Internally – indicators assessing e.g. productivity, knowledge, involvement
- Performance Externally – indicators assessing e.g. national benefits, customer relations
- Performance in Project - indicators assessing e.g. ownership, management, progress, planning
- Economics – indicators assessing e.g. revenues, economic values and targets

When the analysis of the Indicator Groups are completed the results for each group on an overall PROMISE level is presented in Spider-charts on what is called the PROMISE Self-Assessment Dashboard. The Dashboard will illustrate the status of the PROMISE project as of the day of the self-assessment data collection.

Figure 10 shows how the overall from one application for all PROMISE defined Indicators within each Indicator Group will be presented.

<b>Application AX</b>		<b>Failure</b>	<b>Poor</b>	<b>Mediocre</b>	<b>Satisfactory</b>	<b>Good</b>	<b>Excellent</b>
<b>Functional / Technical</b>	Technological advances						
	Adaptability						
	Product / Function Quality						
	Product / Function Complexity						
<b>Performance Internally</b>	Company Knowledge						
	Involvement						
	Learning						
	Employment Opportunities						
	Productivity						
	Other factors (R&D Efficiency, Collaboration and Cross-functionality)						
<b>Performance Externally</b>	National Benefit						
	Customer relations						
	Alliances and Business Networks						
	Focus						
	Company Ambition						
<b>Performance in Project</b>	Project Ownership						
	Strategic Project Emphasis						
	Project Progress and Timeline						
	Project Management						
	Project Planning						
	Project Structure						
	<b>Economics</b>	Revenue					
Funding							
Company Value							
Brand							
Economic values and targets							
<b>Score</b>	Calculated score per grade-category						
	Total calculated score compared to max possible score	<b>of 130</b>					
	Percentage overall score	<b>Y%</b>					

**Figure 10: Example of results from the application analysis of application A4. Indicator Groups and Indicator score within the groups shown. Each Indicator is aggregated from the assessment questions found in the self-assessment.**

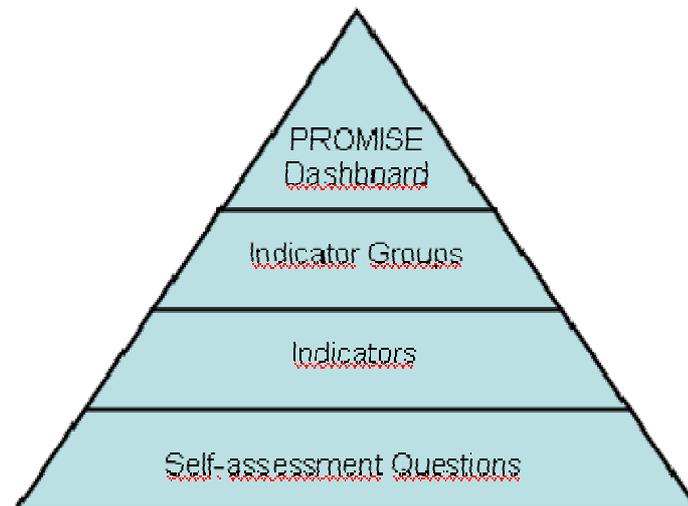
The following section describe in detail the analytical steps presented above of the self-assessment analysis methodology.

## 6.2 Result interpretation

Result interpretation starts when the assessment data has been collected. This means that the results from each application's self-assessment are entered and structured into the database. The basic raw data is then sent to the already established Indicators they belong to. When each Indicator has received the data it requires, the data is processed and calculations can be used for further analysis. The analysis consists of four phases:

- Scoring the Indicators based on a detailed analysis of each application
- Generate Indicator Group Spider-charts
- Analyse overall Indicator Group performance
- Generate PROMISE Dashboard
- Analyse PROMISE performance

In order to get an overview of how the analysis is organised the following hierarchy is provided (Figure 11).



**Figure 11: Analysis hierarchy – From a multitude of self-assessment questions to the PROMISE Self-Assessment Dashboard**

Figure 11 shows the aforementioned self-assessment questions at the bottom, which constitute the foundation of the whole analysis. These questions are organized into Indicators by relevance, and can be part of several Indicators simultaneously. The Indicators target the performance of the applications and the PROMISE project and cover the relevant areas where the companies need to perform in order for the project to be successfully implemented.

The Indicators are then providing input to the organized Indicator Groups to gain an overview of how the project is performing and its status on a “surface” level. These Indicator Groups looks at the larger perspective of the operations; the status of the functional and technical aspects of the project with its applications and products, the internal performance in each application company, the performance affecting the application's external environment, the specific performance within the project and its management, and finally the economic side of the performance.

These Indicator Groups are then implemented in the PROMISE Self-Assessment Dashboard that presents all the findings from the analysis from a management level perspective. The phases of the analysis are described in detail in the following sub-sections.

### 6.2.1 Scoring the Indicators

The score that the applications can use for the self-assessment is divided into six categories six where the extremities had different meanings based on the formulation of the question. When giving scores to the Indicators the grading ranges from 0 to 5 where 5 is the top score. The Indicator grading system also has set meanings associated with each score, ranging from Failure to Excellent. This grading is used throughout the analysis, except in some special occasions where it was not suitable. A more appropriate range from ‘very low’ to ‘very high’ was then adopted to satisfy those Indicators. To give scores to the Indicators each one is addressed separately. The questions that have been given more weight are highlighted and set as the basis for the evaluation and score setting.

0	1	2	3	4	5
Failure	Poor	Mediocre	Satisfactory	Good	Excellent

**Figure 12: The Analysis Grading System**

As the Indicators have received their individual scores for each application, the overall score from the PROMISE project can be decided. This score is calculated as the average of all the applications, disregarding the applications that have not answered enough of the self-assessment questions of the Indicator for a proper grading to be made.

### 6.2.2 Generate Indicator Group Spider-charts

When each Indicator has received its mark, the results are collected in the Indicator Group table. From the table a Spider-chart is constructed that shows the performance and status of the Indicator Group in an overall PROMISE perspective.

### 6.2.3 Analyse overall Indicator Group performance

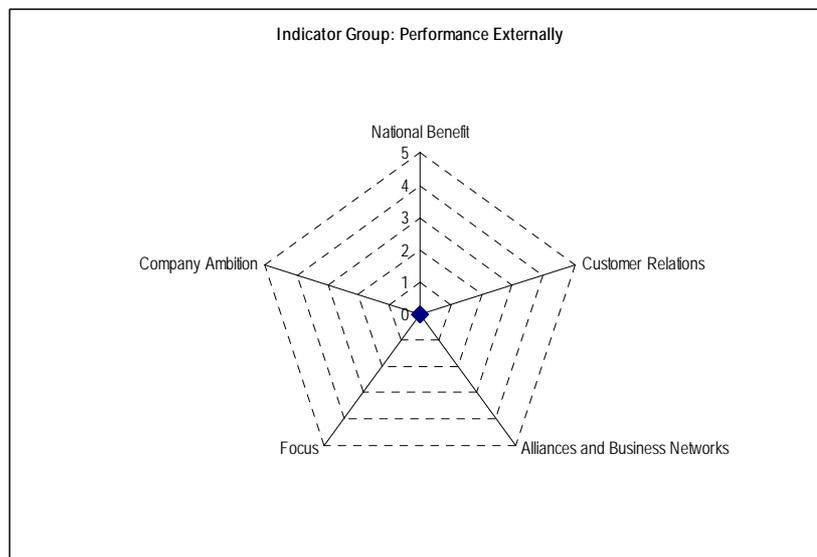
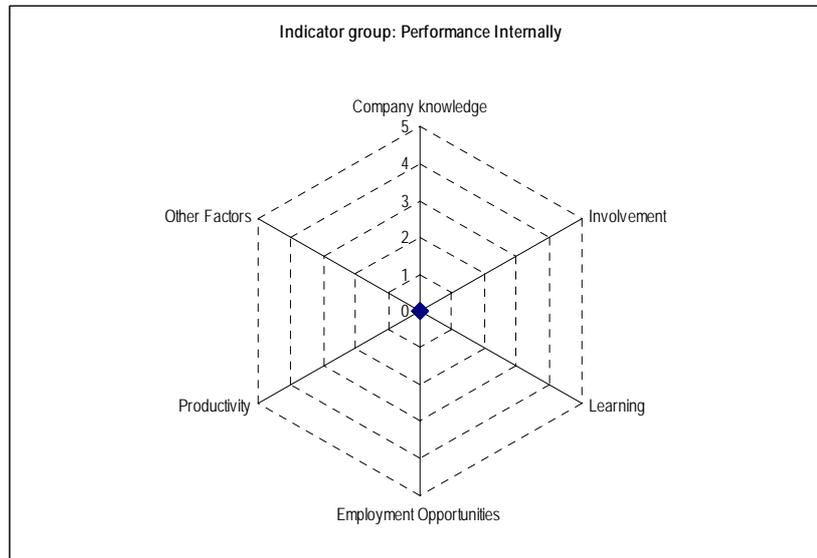
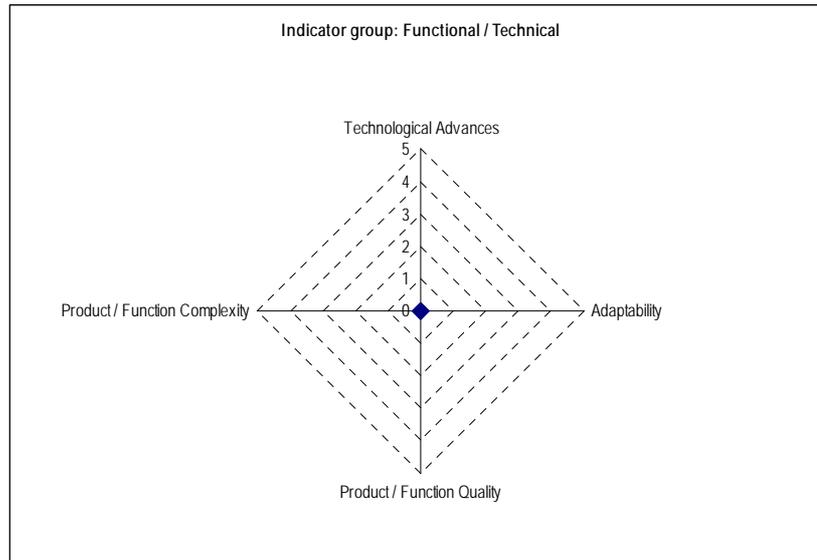
From the Spider-charts each Indicator Group can be evaluated on its performance in that area, and if a more detailed look is preferred the explanation for the performance rating can be found in its underlying Indicators and self-assessment questions. The analysis comments on the presented results and provide some indications on why the results are as they are.

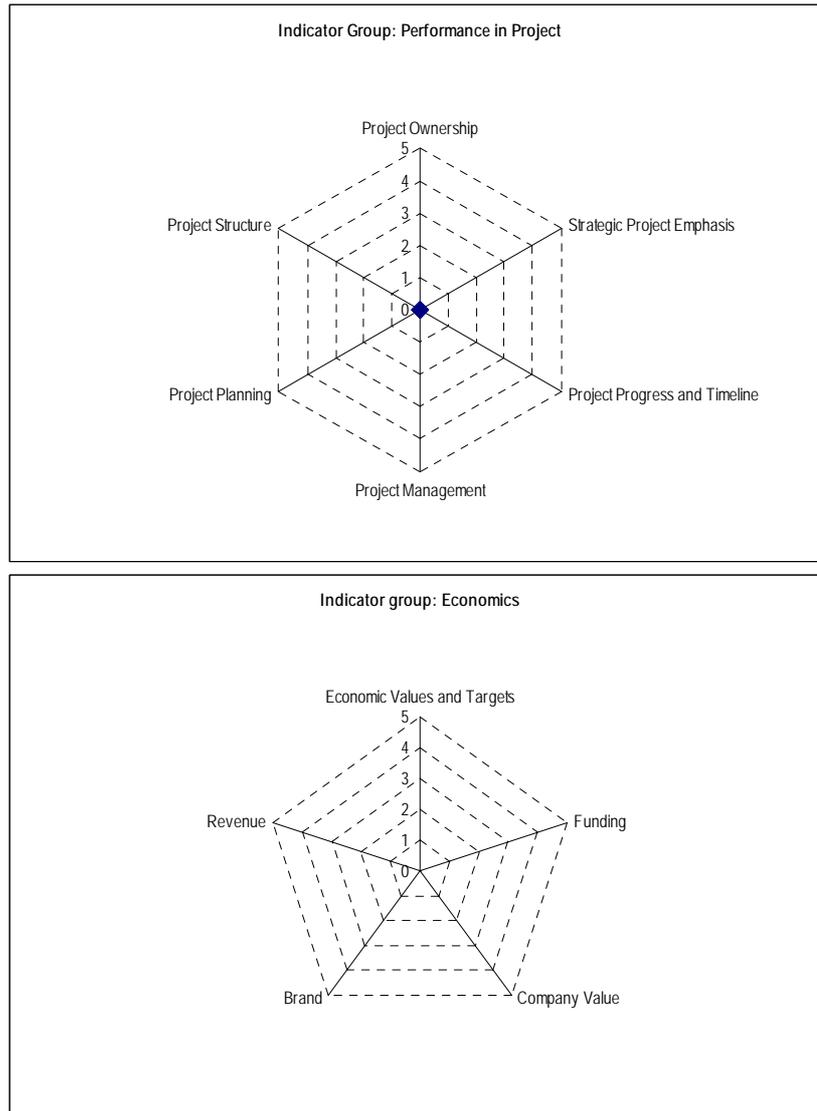
### 6.2.4 Generate the PROMISE Self-Assessment Dashboard

The PROMISE Self-Assessment Dashboard is an aggregation of the Indicator Groups in order to make the results of the analysis as presentable and easy to access as possible. The Dashboard is as the name suggests, a panel that shows by indicators the status quo, gives information about what is going on at the moment, and indicates the road ahead by the distance

By presenting the results with Spider-charts the reader is faced with an easy-to-understand performance grading that summarizes the important aspects in a concise and visual depiction of the performance and situation status. The reader can also pick out a desired area for further investigation and easily find the way to the underlying data of the results. In that way the road is

short to both investigate, find root causes and take action on operations that are not achieving adequate results. The Dashboard elements are shown in the following pictures.





**Figure 13: The Indicator Groups of the PROMISE Self-Assessment Dashboard**

### 6.2.5 Analyse PROMISE performance

The Dashboard is then used to comment on the performance, highlight the areas that are doing well and those that need improvement and further evaluation. A selection of useful measures to straighten up or improve the current performance is offered so that the companies and the PROMISE project management together can find what is best for the continued success of the project and its applications.

### 6.2.6 Detailed Application Analysis – the basis for the PROMISE Self-Assessment Dashboard

The scoring of the Indicators for each application is based on a detailed analysis of each application. An example of such a chart is shown in Figure 10. In this chart all the grades from the different Indicators are collected and summarized. From all the indicator scores an overall score for each Application is calculated by points received. The Application then ends up with a ‘Total calculated score’ as how many points were received out of the total potential score, and a ‘Percentage overall score’. This is the overall score that on a top level shows the applications’ performance and status in the PROMISE project.

## 7 Peer-review analysis methodology (UPDATED MONTH 30)

### 7.1 Introduction - The 1<sup>st</sup> Peer-review of the PROMISE applications

Each application is described by a comprehensive peer-review package presenting the state of the applications at Month 22 of the PROMISE project. The peer-review package is distributed to two peer-reviewers not directly involved in the application work-package. The peer-reviewers assess technical feasibility, potential business impact, innovativeness and risks. Eleven aspects are to be graded and commented using the following scale: A=Excellent, B=Good, C=Average, D=Poor. In addition, the peer-reviewers are asked specifically to name any additional risks, and where the reviewer see the scope/use of this innovation beyond the existing application.

In almost all applications the PROMISE components (PEID, PDKM, Middleware, DSS) will be implemented, integrated and customized to satisfy the application scenarios' requirements. Thus, each application can be considered a summary of results on which the PROMISE project can be reviewed. For this reason the peer-review will be carried out from the application point of view (according to the recommendations of the EU-reviewers and as described in the DOW).

The 1<sup>st</sup> peer-reviews are based on the project status as shown in the PROMISE Roadmap in Figure 14 and reflect the status at Month 22 of the applications and related research. The 2<sup>nd</sup> peer-review will be carried out at based on the status at approximately Month 32-33 of the PROMISE project. At that point in time, the applications will have been developed further.

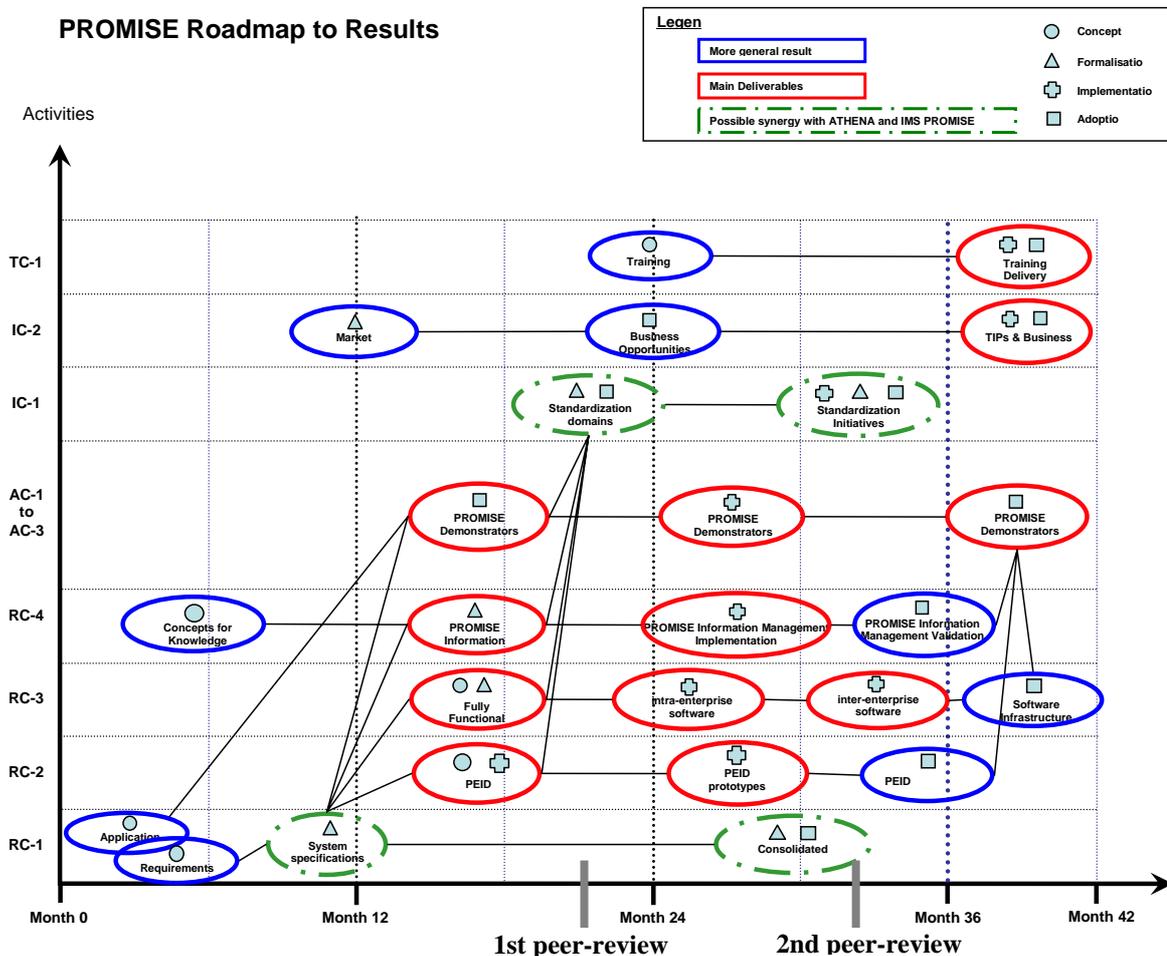


Figure 14: The PROMISE roadmap to results (according to the PROMISE DOW)

## 7.2 Identification of peer-reviewers

As can be found in the overall description of WP R11 a sub-objective is, if possible, to involve the Industrial Reference Group (IRG) and the IMS into the work. A natural choice of peer-reviewers would have been to use representatives from the IRG and IMS. However, the stated prerequisite for carrying out WP R11's activities related to the IRG and IMS has not been fulfilled by WP I2 and outside the control and scope of WP R11 at the time of choosing peer-reviewers and distributing the peer-review packages.

Due to the above, and due to the challenges related to the protection of the Intellectual Property Rights (IPR) in case technical deliverables went outside the Consortium, the following strategy was used for identifying the peer-reviewers:

Each application was reviewed by two different internal peer-reviewers from the PROMISE partners with insights into the technical/business aspects related to PROMISE and, preferably those who were not directly involved in PROMISE activities.

Each PROMISE partner was contacted and asked to propose two peer-reviewers based on the above criterion. Based on the feedback from the partners, the following persons has been chosen as peer-reviewers of the 1<sup>st</sup> peer-review and given the responsibility as shown in Figure 15.

Application	Peer-reviewer 1	Peer-reviewer 2
A1	Christian Baust (SAP)	Marco Sacco (ITIA)
A2	David Mulligan (CIMRU)	Michele Surico (FIDIA)
A3	Michele Surico (FIDIA)	Stavroula Theodorou (CAMB.)
A4	David Mulligan (CIMRU)	Wutthiphat Covanich (CAMB.)
A5	Christian Baust (SAP)	Wutthiphat Covanich (CAMB.)
A6	Tullio Tolio (Polimi)	Julien Mascolo (CRF)
A8	Heiko Duin (BIBA)	Marco Sacco (ITIA)
A9	Heiko Duin (BIBA)	Julien Mascolo (CRF)
A10	Jian Zou (CIMRU)	Tullio Tolio (Polimi)
A11	Jian Zou (CIMRU)	Stavroula Theodorou (CAMB.)

**Figure 15: Overview of peer-reviewers 1st Peer-review**

### 7.3 Structure and contents of the peer-review packages

Each peer-reviewer received a peer-review package consisting of:

#### A - Introduction to peer-review

The first material of the peer-review package is a brief documentation containing the objectives of the peer-review, main deadlines of the peer review process, and references of the Peer Review Coordinator, the person who manages the peer review process.

#### B - Results to be reviewed

The second material of the peer-review package contains the core of the review process; it contains the content to be reviewed by the peer-reviewers, including a short two-page description of the main approach followed in the application and a summary of the obtained results. The main contents revolved around the application results which covered

- Background: general information to the context in which the application has been conceived and designed.
- Objectives: description of the application's targets
- Functionalities: description of the designed functionalities offered by the application
- Innovativeness: clear identification of the original concepts, methods and tools in the application
- Benefits: explanation of the main advantages (business and technical) deriving from the application
- Risks: explanation of the main risks (business and technical) related to the application and the presentation of a contingency plan.

#### C - Peer review guidelines and aspects covered in the peer-review

The third element of the peer-review package contains the criteria on which the peer-reviewers assess the applications. Each aspect covered in the peer-review form addresses an important aspect related to the application. These are the basis for the analysing of the peer-review results. Figure 16 shows the categories and aspects that were covered.

Categories	Aspects
<b>General</b>	<ul style="list-style-type: none"> <li>• The Application's background and objectives are clearly stated in the document and understandable</li> <li>• The Application's functionalities are well presented and understandable in the document</li> <li>• The Application's architecture is well presented and understandable in the document</li> </ul>
<b>Business</b>	<ul style="list-style-type: none"> <li>• The impact on reinforcing competitiveness of the application is understandable and acceptable</li> <li>• The significance of the impact has been demonstrated</li> <li>• The application demonstrates a clear added value in carrying out the work with PROMISE technologies</li> </ul>
<b>Technical</b>	<ul style="list-style-type: none"> <li>• The technologies have been properly implemented in the application (<i>applicable only for 2<sup>nd</sup> Peer-review</i>)</li> </ul>
<b>Innovativeness</b>	<ul style="list-style-type: none"> <li>• The presented results represent clear progress beyond the current state-of-the-art</li> <li>• Where does the reviewer see the scope of this innovation beyond the existing application in your own or in other industries (<i>textual input, not graded A-D</i>)</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Risks have been sufficiently identified</li> <li>• The risks' magnitude has been sufficiently estimated</li> <li>• The risk is acceptable</li> <li>• Do you identify additional critical risks that may compromise the results of the Application not identified? (<i>textual input, not graded A-D</i>)</li> </ul>
<b>Summary</b>	<ul style="list-style-type: none"> <li>• Rate the overall Application</li> </ul>

**Figure 16: The categories and aspects covered in the peer-review**

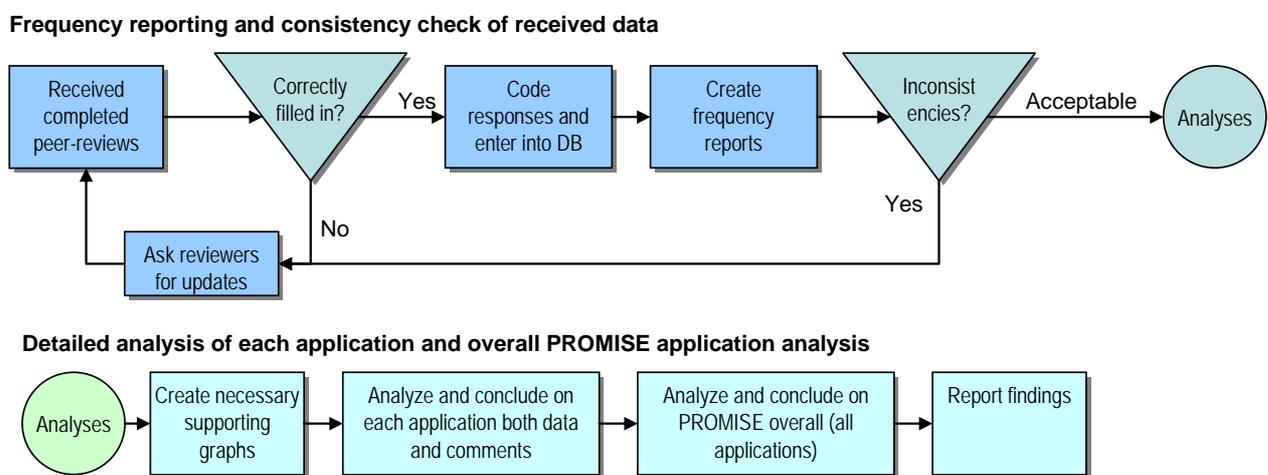
## 7.4 Peer-review analysis approach

After the application owners themselves have contributed and approved their respective peer-review packages, the peer-reviewers were identified and received their packages according to Figure 15. The packages were then completed by the peer-reviewers and received for analyses.

After receiving the assessments from the peer-reviewers, analysing the results is the next step that must be carried out. The analytical methodology consists of four main parts:

- Frequency reporting and consistency check of received data
- Overall analysis of all applications (i.e. concluding on the overall PROMISE project)
- Detailed analysis of each application
- Reporting the results

The overall analytical approach is illustrated in Figure 17.



**Figure 17: The peer-review analysis methodology at a glance**

The overall steps shown in Figure 17 are described in more detail in the following sub-sections.

### 7.4.1 Frequency reporting and consistency check of received data

Upon receiving the completed peer-reviews, a quick check will be carried out to see if all fields have been sufficiently completed. If not, the responsible peer-reviewer will be contacted and asked to provide additional input. When all peer-review forms are found to be acceptable, the given assessments will be coded as:

- A = Excellent = 4
- B = Good = 3
- C = Average = 2
- D = Poor = 1
- No answer = 0

The given assessment coding will be added to a prepared database containing frequency tools (see section 7.4.4). Based on the frequency reports, any inconsistencies will be checked and if any major deviations are identified, the peer-reviewers of that specific application are to be contacted and comments worked into deliverable DI3.7. When any inconsistencies identified are found to be acceptable, the analyses stage starts.

#### **7.4.2 Detailed analyses of each application and overall assessment of the PROMISE applications**

Necessary supporting tables and graphs are created (see section 7.4.4), and each application is then analysed based on grades received for each aspect covered in the peer-review. The peer-reviewers textual comments are also taken into consideration. This leads to a conclusion for each of the applications. The next step is to summarise the findings and conclude on the overall PROMISE application level. The application conclusions and the overall PROMISE application conclusions are then the basis for creating an executive summary ensuring an easy accessible overview of the peer-review results.

#### **7.4.3 Targets to be achieved and evaluation of achievement**

In order to assess the results from the peer-reviewers, specific targets have been set for each category aspect. Even though targets have been specified, the comments from the peer-reviewers also play a role in evaluating whether or not the specific target has been met. The specific target for each application is set as follows:

1. The overall rating of the application must be Good or better. I.e. for concluding that an application has achieved this objective, the target-requirement must be fulfilled.
2. An application must not have more than one Average score within each main category; General, Business, Innovativeness, and Risks. The rest should be Good or better. The comments from the reviewer's will influence the evaluation either negatively or positively in terms of concluding if the application has achieved this objective.

#### **7.4.4 The analytical tools used for analysis**

In order to limit the volume of this part of the report, the analytical tools used for analyses are not illustrated, only briefly described. The following tools were used: Input tables that are the basis for creating frequency reports and graphs that are easy accessible and should instantly give the analyst an overview of each application. The input table is the basis for the consistency checking of the received peer-reviews., Frequency tables, Average score calculations for each aspect per application, and minimum, average, max for each separate aspect. Calculations of overall percentage score of each application. Comparison of the aspect between all reviewers and all applications. All these tools and graphical illustrations together with the reviewers comments and any new comments based on discrepancy checks (see Figure 17), are the basis for carrying out the analyses.





**Appendix A: Introduction to the peer-review - Part A of the Peer-Review Package (UPDATED MONTH 30)**



**P R O M I S E**  
wisdom within

**PEER REVIEW  
PACKAGE**

**Application Scenario A4**

## Part A - Introduction to the peer-review

### Peer-review Package

This Package is divided into three parts:

- *Part A – Introduction to Peer Review*: you are now reading this part where the general information about the objectives of the peer review, the material and the main deadlines is presented.
- *Part B – Results to be reviewed*: the material the reviewer will read and assess
- *Part C – Guidelines*: the criteria to be followed in the peer review.

### Peer-review Coordinator

For all questions related to the peer-review and submittal of the completed review, please contact:

Andrea Matta

Via Bonardi 9, 20133 – Milano, Italy

andrea.matta@polimi.it

### Resource effort (applicable only for internal PROMISE reviewers)

The estimated effort to review one Application has been estimated to be 0.5 person months.

### Goals of the peer review

The main purpose of the peer-review is to assess the validity and applicability of PROMISE applications in terms of:

- Technical feasibility
- Business impact
- Innovativeness
- Risk

This assessment will be carried out by a panel of experts that will judge the project's results application by application.

### Peer review process and deadlines

The peer review of Promise Applications will be executed in one step.

The reviewer will assess the assigned applications on the basis of the peer-review package Part B. Each application is judged by two reviewers.

**Output:** the Review report according to the guidelines contained on the package material Part C.

**Deadline:** 30/01/2007

## Part B - results to be reviewed: Application scenario A4

### Abbreviations

Abbreviations used in this document:

PEID	<i>Product Embedded Information Device</i>
OEM	<i>Original Equipment Manufacturer</i>
IPFMS	<i>IVECO PROMISE Fleet Management System</i>
ROI	<i>Return on Investment</i>
MOL	<i>Middle Of Life</i>
GPRS	<i>General Packet Radio Service</i>
PLM	<i>Product Lifecycle Management</i>
PDKM	<i>Product Data Knowledge Management</i>
PC	<i>Physical Components</i>
DSS	<i>Decision Support System</i>
GSM	<i>Global System for Mobile Communications</i>
GPS	<i>Global Positioning System</i>
ECU	<i>Electronic Control Unit</i>
CAN	<i>Control Area Network</i>
SPC	<i>Statistical Process Control</i>
UPnP	<i>Universal Plug and Play</i>
TCP/IP	<i>Transmission Control Protocol/Internet Protocol</i>
WWAI	<i>World Wide Article Information</i>
ICT	<i>Information and Communications Technology</i>
DB	<i>DataBase</i>

## 8 Rationale

One of the most important aspects concerning the availability of a system is its maintenance policy and related costs.

Conventional maintenance strategies consist of corrective and preventive maintenance. In corrective ones, the system is maintained on an “as-needed” basis, usually after a major breakdown. CRF intends to use the outcome of PROMISE to provide IVECO after-sales with preventive maintenance functions and service. In preventive maintenance, components are replaced based on a conservative schedule in order to “prevent” commonly occurring failures. Although preventive maintenance programs increase system availability, they are expensive because of frequent replacement of costly parts before the end of their life; another disadvantage is that it is time-based, while, frequently, the wear out depends on the type of usage rather than the time of usage.

New challenge is to predict failure times in order to plan the reparation so as to decrease unplanned stops:

- increase in vehicle’s availability;
- decrease in service cost (unexpected repairs are normally more expensive) to reach best class industries in urgent part orders

***Condition-based predictive maintenance*** introduce a new philosophy of maintenance, where components are replaced depending on the effective use of the vehicle. The old concept of “fixed mileage coupon” is replaced with a flexible coupon where the intervention to be performed are dynamically planned according to the wear out level of each component. Optimisation of the current maintenance strategy regards:

- the component replacement when required by the level of wear out and due to the real type of usage;
- the possibility to organise the “optimal” set of interventions for the incoming coupon, minimising the total time of truck stop.

The idea is to embed PEID devices into some mechanical or electronic components where to store data such as characteristics, material, component history and operating conditions. The history includes information vendor, production batch, date of installation on the truck. The operating conditions consist of data concerning the working conditions accumulated in a few counters, and other data used to detect the state of the component; by comparing these functioning characteristics with those measured/estimated at the beginning of the component life or in a predefined normal condition, the system will detect the component performance degradation and the need of a replacement or of a maintenance intervention.

This Demonstrator focuses specifically on how vehicle mission data can be converted in algorithms and strategies for:

- Evaluate degradation profile of some selected critical components
- Evaluate incipient failures
- Suggest a customised (vehicle by vehicle) maintenance plan

## 9 Application description

The overall objective of the IVECO demonstrator is to support the maintenance of a fleet of trucks, optimising the maintenance plan and increasing the overall availability of the trucks. Closing the information loop using the Demonstrator "Information management for predictive maintenance" will improve the knowledge about the customer habits and the mission profile of the vehicle and finally enable to:

- Evaluate degradation profile of some selected critical components
- Evaluate incipient failures
- Implementing an adaptive coupon where the intervention to be performed are dynamically planned according to the true wear out level of each component

In particular the purpose of the scenario is to:

- Assess usability of predictive maintenance strategies during usage of the vehicle in order to optimise maintenance policy in terms of
  - nr. of interventions
  - saving of spare parts
  - increase of vehicle availability
- Evaluate the use of PEID and wireless communication system in order to provide complete and real time feedback to the company (design, production, after sales and marketing) about the:
  - mission profile of the vehicle
  - mission profile and reliability of critical components and vehicle systems

The idea beneath predictive maintenance is the identification of slow degradation trends in the performance of specific systems in order to identify with a reasonable advance the need of an intervention. This allow the optimisation of maintenance intervention with the implementation of a personalised maintenance policy and contribute to make explicit the residual life of the component in order to better manage the total Life Cycle Cost (LCC).

The main objectives that could be achieved with the IVECO demonstrator in A4 are summarized in the following table:

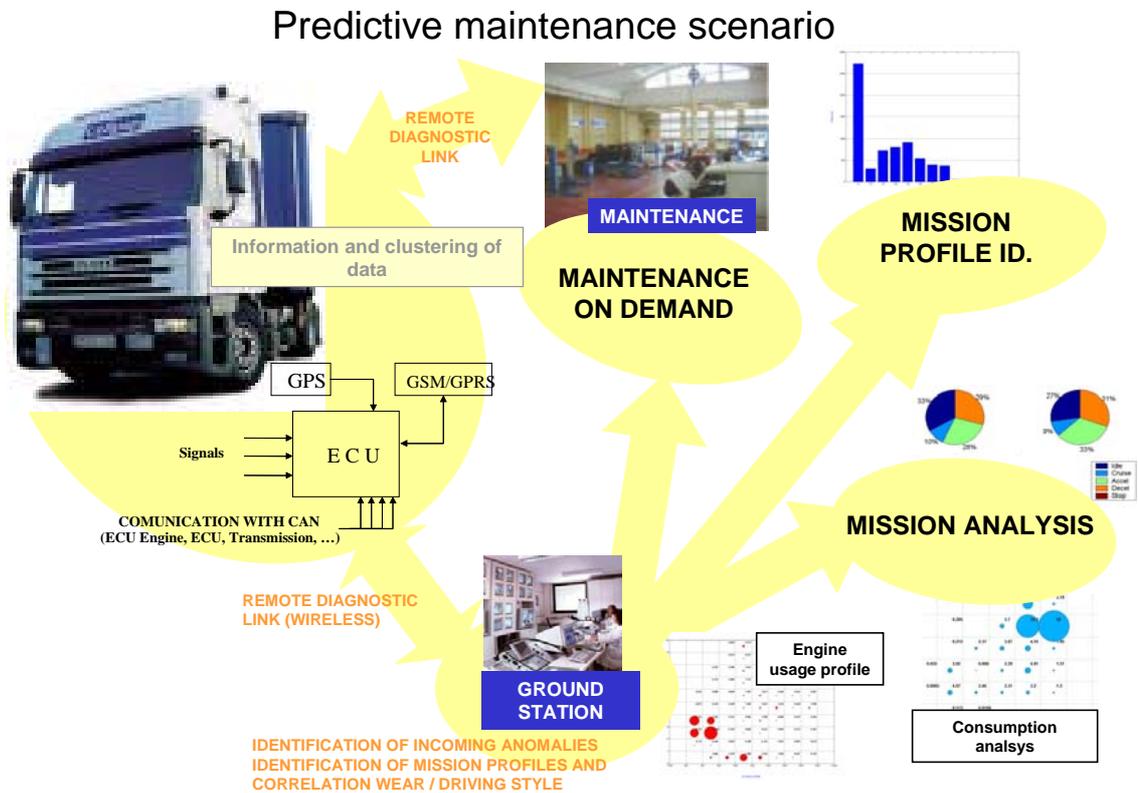
ID	Objective (one per ID)	Describe why
O1	Develop a <b>predictive maintenance algorithm</b> able to predict <b>engine oil wear out</b> for the specific vehicle depending on ad-hoc mission profile indicators	Business point of view: Optimisation of maintenance policy will improve vehicle availability and safe of material. Research point of view: Oil Life Management Strategy is an active R&D field where most important OEM are playing.
O2	Collect prediction values as defined in O1 on a ground station in order to remotely <b>manage a fleet of vehicles</b>	This is a first step for the fleet management. The results of the pred. Maint alg. are transmitted to the ground station. Some first statistics about the fleet behaviour and component wear out are possible.
O3	Collect ad-hoc mission profile indicators as defined in O1 on a ground station in order to remotely monitor a fleet of vehicles, with the application of the predictive maintenance algorithms on the ground station	Monitor and analysis capabilities on the ground station will improve if it would be possible to send to the ground station mission profiles indicator used to define the predictive maintenance algorithms.
O4	Collect ad-hoc mission profile indicators on a ground station in order to remotely monitor a fleet of vehicles, with	Optimal monitor and analysis capabilities on the ground station by using all the useful mission

ID	Objective (one per ID)	Describe why
	<p>the objective to have information about <b>the mission profile of each vehicle belonging to the fleet</b></p> <p>Data elaboration should be able to:</p> <ul style="list-style-type: none"> <li>give residual autonomy for each vehicle</li> <li>feedback about vehicle “correct” usage</li> <li>feedback about fleet mission profile</li> <li>feedback about typical component usage</li> <li>maintenance management (policy, day by day maintenance).</li> </ul>	profiles indicators.

**Table 3: Objectives of the A4 PROMISE demonstrator**

Note that the objective from O1 to O4 are considered to be “incremental”. The starting point is O1, i.e. the development of an algorithm of predictive maintenance applied on a single truck. The capability to send to a ground station some amount of information with a certain frequency will allow to cover objectives from O2 to O4.

The Application Scenario can be summarized in the following figure:



**Figure 18: Application Scenario**

## 9.1 Description of A4 Strategy

Two levels of decision for the IVECO demonstrator in A4 have been planned. The first level of the Demonstrator will develop the first level of decision, with high priority, while the Second Level is going to be designed and implemented only once the first level is completed.

- **First Level of decision** allows the optimisation of the maintenance for one single truck, taking into account its availability and costs related to its maintenance. It is based on predictive-maintenance algorithms. It works remotely.
- **Second Level of decision** is meant to optimise the maintenance of a fleet of trucks, taking into account trucks availability, garage availability and maintenance costs for all the trucks. It is based on a scheduling-optimization algorithm. Interaction needed with each truck (both for receiving information: data from sensors, truck availability) and for providing outputs (calendar).

Both of them will be accessible by the user from the Ground Station PC.

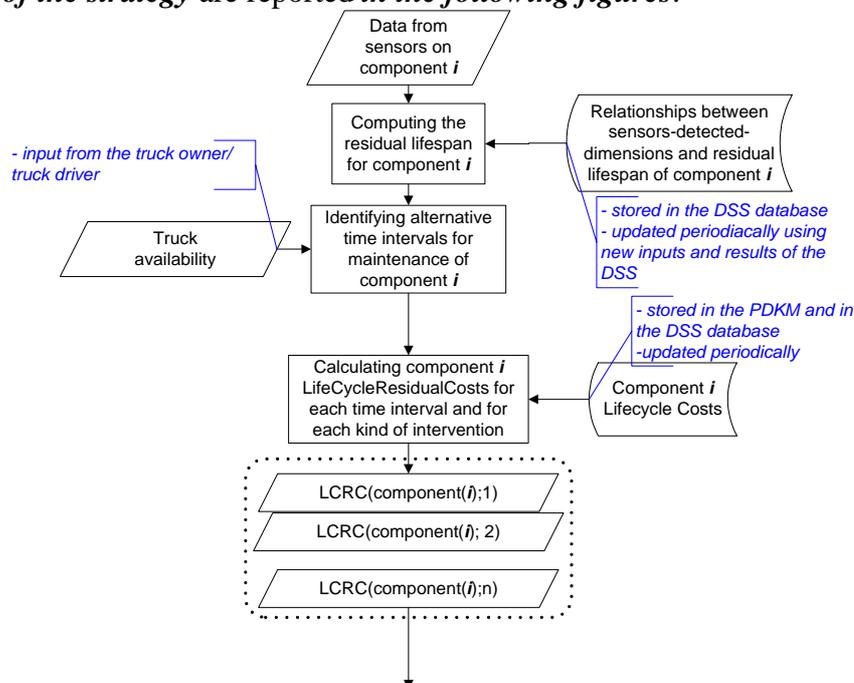
**Input to decision** are:

- Residual lifespan for each monitored component (inferred from a computation of data collected from sensors)
- Costs of components, for performing maintenance, deriving from delays in interventions
- Others (Vehicle average life, Components average life, ...)

**Outputs of the decision procedure** should be:

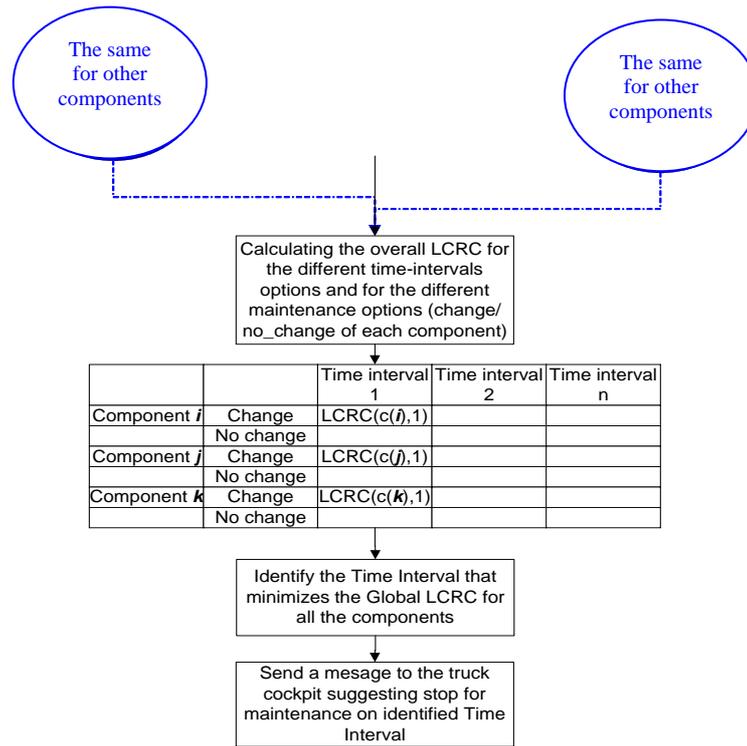
- For each truck: Calendar and kind of interventions planned
- Alert message on the truck cockpit
- For the maintenance crew: Calendar with date and kinds of interventions for each truck

The **main steps of the strategy** are reported *in the following figures*.



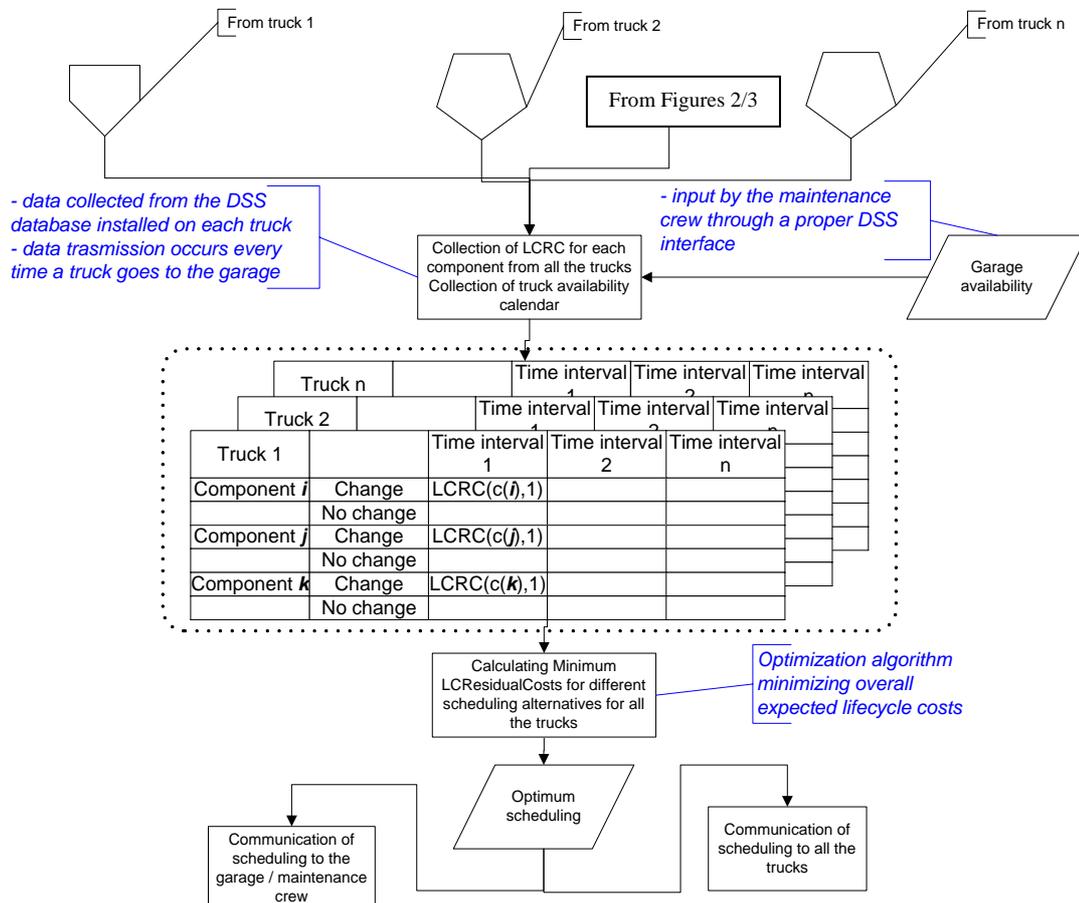
**Figure 19: Step1**

The steps go from collection of data from sensors to Life Cycle Residual Cost computation for a single component (Figure 19). Life Cycle Residual Costs for the different components monitored on a single truck are put together and optimization for the single truck is performed (Figure 20).



**Figure 20: Step2**

Data of the different trucks belonging to the same fleet are here grouped and optimisation for the fleet is performed. Calendar of interventions is sent to the maintenance crew and to the different trucks (Figure 21).



**Figure 21: Step3**

## 10 Background

### 10.1 Purpose of the application

The overall objective of the IVECO demonstrator is to support the maintenance of a fleet of trucks, optimising the maintenance plan and increasing the overall availability of the trucks. Closing the information loop using the Demonstrator "Information management for predictive maintenance" will improve the knowledge about the customer habits and the mission profile of the vehicle and finally enable to:

- Evaluate degradation profile of some selected critical components
- Evaluate incipient failures
- Implementing an adaptive coupon where the intervention to be performed are dynamically planned according to the true wear out level of each component

### 10.2 Objectives

#### 10.2.1 General

In particular the purpose of the scenario is to:

- Assess usability of predictive maintenance strategies during usage of the vehicle in order to optimise maintenance policy in terms of
  - nr. of interventions
  - saving of spare parts
  - increase of vehicle availability
- Evaluate the use of PEID and wireless communication system in order to provide complete and real time feedback to the company (design, production, after sales and marketing) about the:
  - mission profile of the vehicle
  - mission profile and reliability of critical components and vehicle systems

The idea beneath predictive maintenance is the identification of slow degradation trends in the performance of specific systems in order to identify with a reasonable advance the need of an intervention. This allow the optimisation of maintenance intervention with the implementation of a personalised maintenance policy and contribute to make explicit the residual life of the component in order to better manage the total Life Cycle Cost (LCC).

#### 10.2.2 Specific Objectives (Strategic Elements )

The main objectives that will be achieved with the IVECO demonstrator in A4 are summarized in the following table:

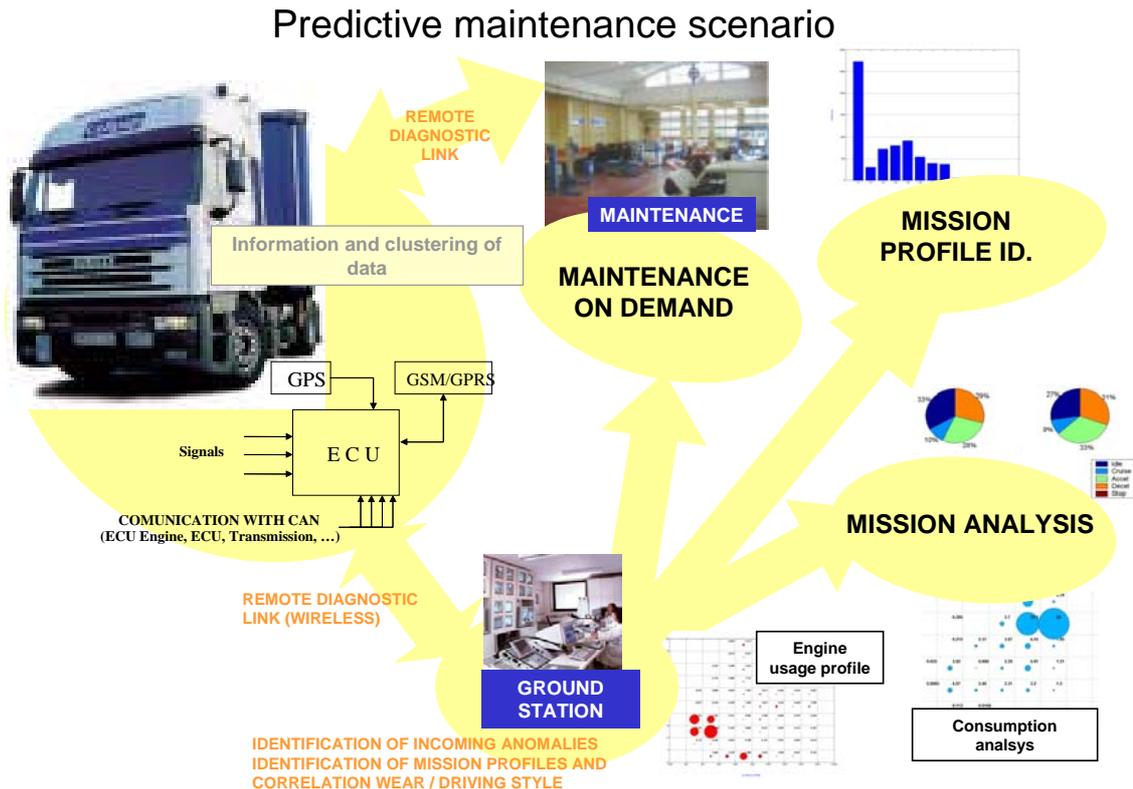
ID	Objective (one per ID)	Describe why
O1	Develop a <b>predictive maintenance algorithm</b> able to predict <b>engine oil wear out</b> for the specific vehicle	Business point of view: Optimisation of maintenance policy will improve vehicle

ID	Objective (one per ID)	Describe why
	depending on ad-hoc mission profile indicators	availability and safe of material. Research point of view: Oil Life Management Strategy is an active R&D field where most important OEM are playing.
O2	Collect prediction values as defined in O1 on a ground station in order to remotely <b>manage a fleet of vehicles</b>	This is a first step for the fleet management. The results of the pred. Maint alg. are transmitted to the ground station. Some first statistics about the fleet behaviour and component wear out are possible.
O3	Collect ad-hoc mission profile indicators as defined in O1 on a ground station in order to remotely monitor a fleet of vehicles, with the application of the predictive maintenance algorithms on the ground station	Monitor and analysis capabilities on the ground station will improve if it would be possible to send to the ground station mission profiles indicator used to define the predictive maintenance algorithms.
O4	Collect ad-hoc mission profile indicators on a ground station in order to remotely monitor a fleet of vehicles, with the objective to have information about <b>the mission profile of each vehicle belonging to the fleet</b> Data elaboration should be able to: give residual autonomy for each vehicle feedback about vehicle “correct” usage feedback about fleet mission profile feedback about typical component usage maintenance management (policy, day by day maintenance).	Optimal monitor and analysis capabilities on the ground station by using all the useful mission profiles indicators.

**Table 4: Objectives of the A4 PROMISE demonstrator**

Note that the objective from O1 to O4 are considered to be “incremental”. The starting point is O1, i.e. the development of an algorithm of predictive maintenance applied on a single truck. The capability to send to a ground station some amount of information with a certain frequency will allow to cover objectives from O2 to O4.

The Application Scenario can be summarized in the following figure:



**Figure 22: Application Scenario**

### 10.3 Current State & Technology

#### 10.3.1 Overview of maintenance strategies

In the market there are many different products for maintenance management, for scheduling activities and optimisation decisions. The choice is between adapting and customizing one of them for the specific case or to design a completely new solution. In both cases new functionalities have to be implemented, especially for what concerns the optimisation starting from real-time collected data and adopting the minimisation of residual life cycle costs, the development of an algorithm based on data deriving from a predictive inspection of the components and, finally, a greater flexibility for the truck driver who has the possibility to choose the stop according to his needs and availability.

Maintenance policies can be grouped into different bunches according to the way the user deals with breakdowns. According to this point of view, three main categories can be used to group maintenance policies: reactive policies, proactive policies, and TPM (Total Productive Maintenance) & RCM (Reliability-Centred Maintenance). Here is a brief description of the three categories:

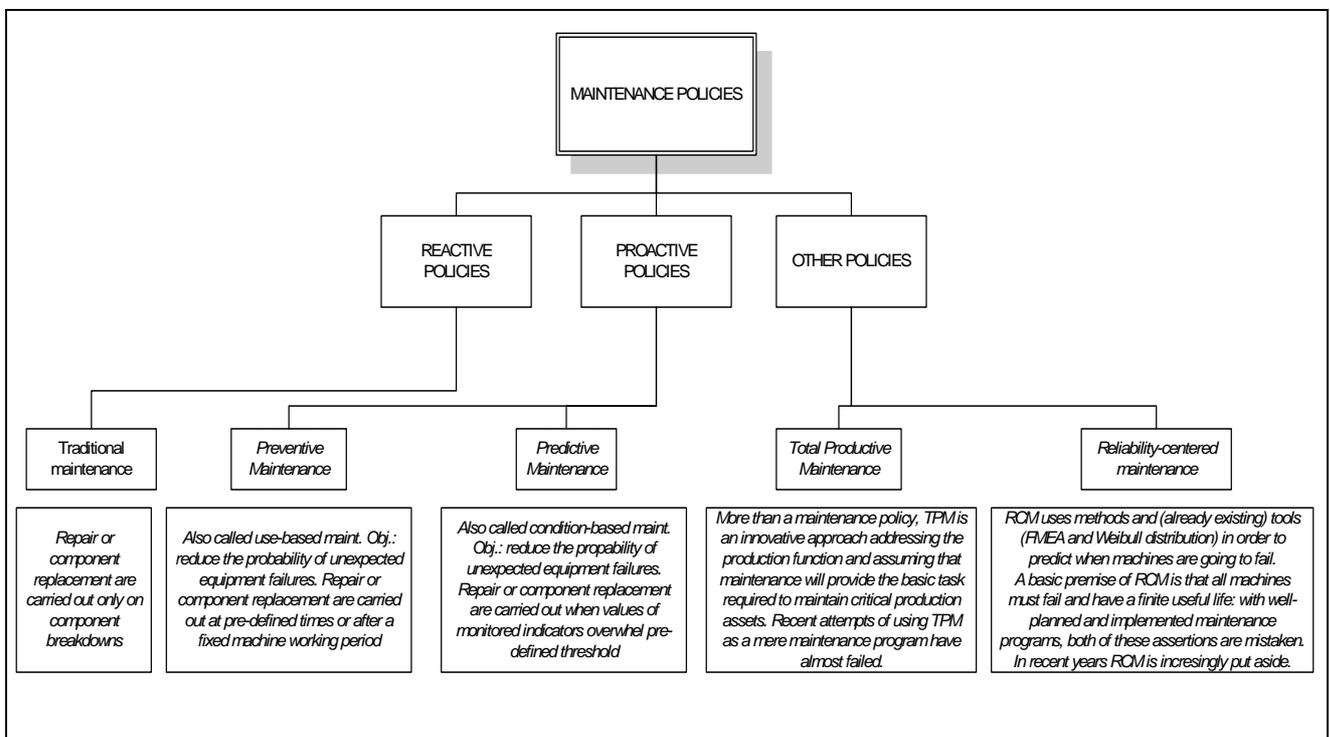
- adopting *reactive policies*, equipment is allowed to work until its failure. All maintenance activities performed after system breakdown are grouped
- *proactive maintenance policies* try to avoid system breakdown and to plan maintenance interventions according to either historical data describing usual components reliability or

real-time monitoring of the system status, consumption and wear in order to plan interventions before its failure

- *TPM and RCM policies* can be defined as “aggressive maintenance strategies”. The goal of this set of approaches goes beyond merely avoiding system breakdown, trying to improve the overall equipment operation and closing the loop between equipment usage and equipment design.

The approach we have chosen within the demonstrator belongs to the “proactive maintenance” group and, specifically, to the “**predictive maintenance**” policies. We have decided to focus on this kind of approach in order on one side to make an important step forward the reduction of maintenance costs and, on the other side, to avoid rejections deriving from too-much demanding goals (like TPM and RCM). Moreover the proposed approach is really innovative in comparison to existing one in the automotive industry.

Predictive maintenance is something more than preventive maintenance. What they have in common is the goal of avoiding as much as possible system breakdown: using historical data, empirical tests and statistical computations, it is possible to put into direct relation the time (working time and/or lifespan) with the probability of system breakdown. What follows is simply a planning of the maintenance activities that maintains the risk of system breakdown under a pre-defined threshold. What distinguishes preventive and predictive approaches is, mainly, the source of the inputs: preventive maintenance is merely based on past experiences, on historical stored data defining the “typical” duration of a specific component. On the other side, expressly installed sensors are devoted to the “measurement” of the actual status of a monitored component, providing something like a photograph of its consumption or wear. Using these data it is possible to perform maintenance only when it is actually needed and not according to a pre-defined historical set of data.



**Figure 23: Maintenance Policies**

### 10.3.2 Overview of failure and anomalies analysis

In order to implement the concept “Design for Reliability”, one of the key tasks is the analysis of the field data flow regarding product failures and anomalies. This analysis is aimed at identify pattern linked to possible anomalies, increase in defectiveness and so on. Company specific DSS are active in this context, where typically these tools are data mining solutions, used to integrate raw “off-line” field data about maintenance, intervention for cleansing and analysis. They usually include:

- Warranty claims
- Product Quality surveys
- Other field reports

Analysis capabilities of these tools in general include:

- Specific model failure (Trends)
- Prediction of cost increases (on specific parts)
- Single integrated view of “Failure Incidents” through integration of multiple data for early alert detection and management
- Correlation of critical symptoms, cause, failure and cost information across multiple data sources to help in faster root cause detection and response (specially low volume products)
- Identification and correlation of Leading and Lagging Indicators on specific parts and vehicle failures on field reports, warranty and consumer discussion boards in order to predict future incidents and costs
- Identifying anomalies and inconsistencies between Field reports symptoms and causes
- Sharing of crucial alert information, failure criticalities, and concerns in order to improve the escalation process to quality experts and design engineers for faster response.

Classical data mining techniques are usually adopted for the identification of “statistical models” used for the failure identification. Models can be based on mileage or days in service, and can be used to estimate costs, failure frequencies or safety related aspects.

### 10.3.3 Technical aspects

The state of the art today indicates that, in mass produced complex systems, a combination of on-board diagnostics and ground-station based diagnostics must be utilised to identify a problem and isolate its cause to economically guide repair procedures. However, for automotive OEMs, on-board diagnostic systems are limited in scope and capability by cost and hardware constraints from legacy designs in vehicles, and accurate diagnostics in the ground-station can only be accomplished after the vehicle is brought to the facility for examination to verify the concern is present or attempt to re-create it, perform fault isolation and initiate action to acquire replacement parts.

Both the development system and the planned production system have on-board computational ability to perform simple analysis for the sake of long-term diagnostic analysis (such as histograms, parameter averaging etc.). The system microprocessor has the capability of performing dozens of common numerical computations in real-time on the parameters being observed to consolidate and analyse the data on-board. This feature and other aspects of the system discussed below are intended to take advantage of the distributed computing environment intrinsic to the system design.

The primary motivations for the on-board analysis are:

- Permit consolidation of information on-board the vehicle in production systems to avoid the need for constant surveillance and reduce the amount of data that must be transmitted.
- Reduce the computational load on the central decision centre by transmitting pertinent information rather than just monitored data for analysis.
- Transmission Costs

The **Decision Centre** requires a computational resource to receive the information, analyse the data, render a diagnosis (whether by automated analysis or expert technician), store and archive the data, and make the data available for a variety of engineering analysis.

The diagnostic analysis of "fault concern data" is completed **using real-time data exchange** with the vehicle and executing diagnostic routines as necessary to accomplish the diagnostic task. The primary goal of the off-board system with respect to diagnosis and prognosis is, to the greatest extent possible, to automatically process the incoming information and reach a decision on what action to take. We will assume that the package of information arriving at the decision centre constitutes a "session". The sequence of events in such a session can be simplified to acquisition, validation, diagnosis, information storage, repair scheduling and repair verification.

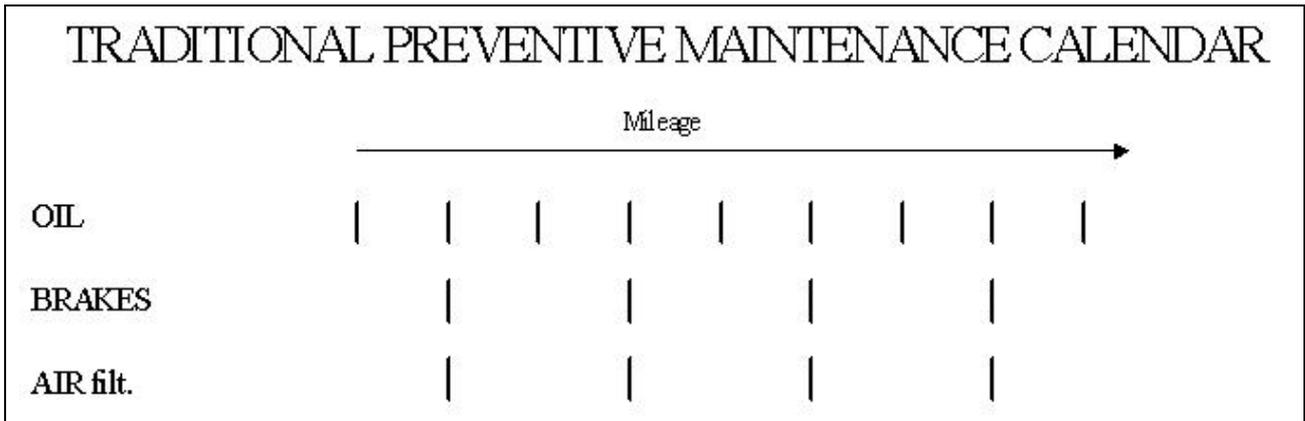
The outcome of this Application Scenario will be addressed to provide IVECO after-sales with preventive maintenance functions and service. The idea is to embed PEID devices into some mechanical or electronic components where to store data such as characteristics, material, component history and operating conditions. The history includes information vendor, production batch, date of installation on the truck. The operating conditions consist of data concerning the working conditions accumulated in a few counters, and other data used to detect the state of the component; by comparing these functioning characteristics with those measured/estimated at the beginning of the component life or in a predefined normal condition, **the system will detect the component performance degradation and the need of a replacement or of a maintenance intervention.**

This information will be stored in the PEID devices and in a centralized DataBase or Knowledge Repository, as well, where knowledge coming from similar machines or components can be used to better assess the individual or overall situation. **The information collected in the Knowledge Repository will be used also for improving knowledge about the customer habits and the mission profile of the vehicle and therefore will have relevant impact on one to one Marketing policy and will feed design division with enhanced design criteria.**

At present predictive maintenance is not yet an industrial application. *As is situation* describes break down maintenance and preventive maintenance only.

- *Maintenance policy* is organised as follows:  
during the warranty period is performed by the company. Maintenance interventions can be preventive or due to a breakdown. Outside the warranty period can be framed in personalised "maintenance contracts" or can be performed "at user request".
- *Preventive maintenance* plan is organised in a predefined and rigid maintenance calendar (See Figure 24, where each line represents an intervention of maintenance). Components are replaced based on a conservative and periodical schedule in order to "prevent" commonly occurring failures.

There is scarce possibility to foresee a breakdown and consequently to plan an intervention of this kind in advance.

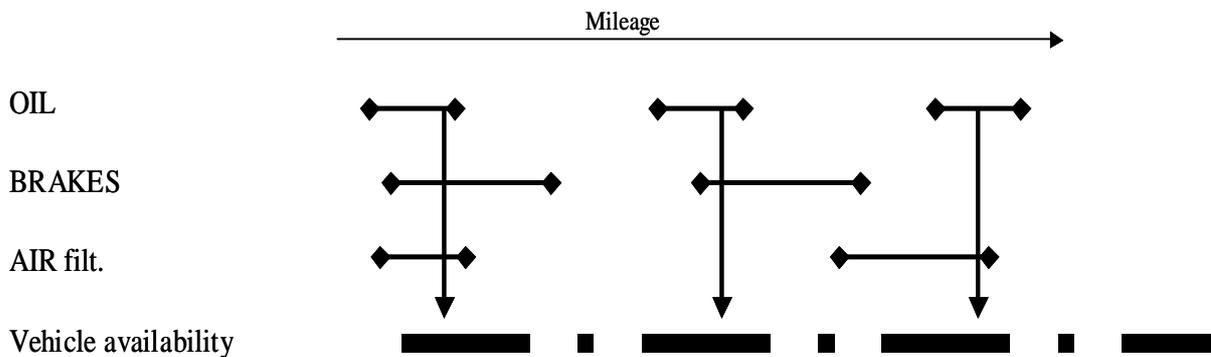


**Figure 24. Traditional Maintenance Calendar**

**Predictive maintenance strategies** will act on 2 sides:

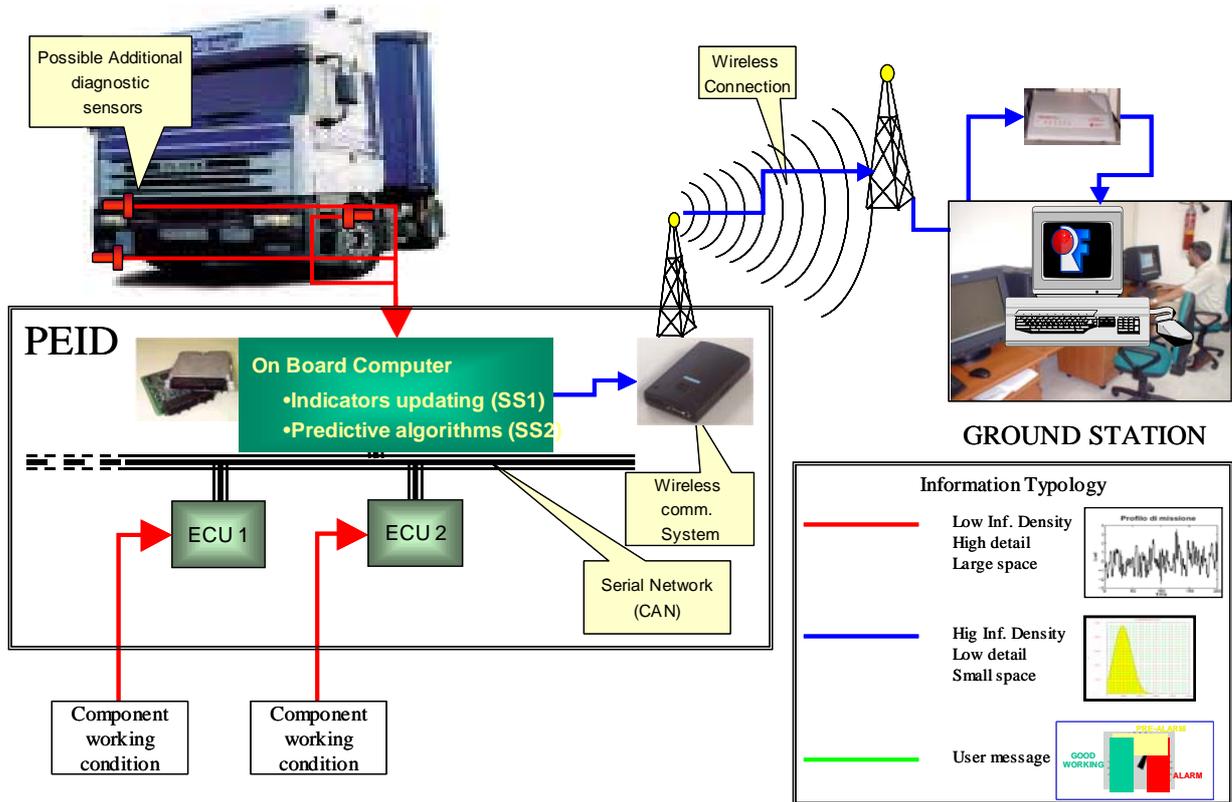
- Regarding the preventive maintenance, it will be possible to define an user defined preventive maintenance calendar. This calendar will be at the same time more flexible and will be based on the actual consumption of the components; it will therefore allow a considerable spare.
- Regarding the break down maintenance, the definition of predictive strategies will allow to increase the foresight of some major breakdown. This will avoid an increasing percentage of breakdown and will give the possibility to plan these intervention.

## PREVENTIVE CUSTOMISED MAINTENANCE



**Figure 25: User Defined Maintenance Calendar**

The following diagram illustrates the flow of data from a technical point of view, starting with the data gathering from e.g. wheel, dampers etc, and flowing into the PEID.



**Figure 26: Information Flow**

The vehicle works in normal condition and acquires data from the field. The data are elaborated and synthetic data (indicators) are calculated and continuously updated. On the ground station the data are stored in the system data base, where diagnostic algorithms work on the stored data for the extraction of prognostics information. For analyzing, ground station should access and receive the gathered MOL data wirelessly.

After analyzing MOL data, if necessary, ground station should send information to each vehicle, garage, design dept., production dept., and suppliers.

**PEID** (on-board computer, built-in sensors, and communication system) should monitor product status data over threshold and should display appropriate messages on the dashboard; should perform synthesis/statistics functions for preventive/predictive maintenance and should communicate with ground stations and garage for information providing and updating.

## 11 Functional Description

The Demonstrator for IVECO focuses on monitoring three main systems: air filter, engine oil and brakes.

In the following tables are summarized at high level the physical components of this Demonstrator and the demonstrator software/support-systems:

Physical component	Describe its functionality
Sensors of measurement (for ex. temperature)	Continuously measure specific vehicle values (for ex. Oil temperature, engine rpm, engine load, etc)
ECU/ On board computer	Manages in real – time vehicle electronics Hosts predictive maintenance strategies
Vehicle to ground communicator	Communicates with ground station
Ground station PC	Hosts Ground station DSS
Middleware	Communicates with Sensors, ECU and Ground station PC

**Table 5: Physical components of the A4 PROMISE demonstrator**

Software / support system	Describe its functionality
Strategies for Mission profiles indicator management	Define, update, reset specific indicators for the description of vehicle mission profile, engine mission profile, engine oil mission profile. These indicators are updated based on sensor values.
Predictive maintenance algorithms	Starting from indicator for the description of the mission profile (vehicle, engine and engine oil), define a “residual autonomy” in terms of mileage for a specific component (for ex. Engine oil replacement)
Ground Station DB	Collects data (vehicle mission profile indicators, engine mission profile indicators, engine oil mission profile indicators, component residual autonomy) for each vehicle of the fleet
Ground station Data miner	Elaborate data from the ground station DB and derive messages / info for: residual autonomy for each vehicle feedback about vehicle “correct” usage feedback about fleet mission profile feedback about typical component usage maintenance management (policy, day by day maintenance).

**Table 6: Software / support systems of the A4 PROMISE demonstrator**

### 11.1 “Scenes”/”Locations”

The A4 Demonstrator consists of the following scenes or locations where the activities take place:

1. **Fleet of IVECO trucks** working with on-board PEIDs and integrated electronic components.
2. **Wireless communication devices** with the ground station (GPRS), and at the same time information collection about the machine usage and condition through sensors or special diagnostic cycles.
3. **Data storage in PDKM** in order to use knowledge coming from similar machines or components to better understand the actual machine status.
4. **Maintenance management in a Decision Support System (DSS).**

Each scene will now be described in some more detail in the following sub-sections.

### **Fleet of IVECO trucks**

The vehicles work under normal conditions and acquire data from the field. The data are elaborated and synthetic data (indicators) are calculated and continuously updated. The components used for the analysis are monitored through sensors.

Data collected from sensors are elaborated in order to pass from physical dimensions (e.g.: RPM, liters/km, °C, ...) to time, expressing the residual lifespan for each one of the three monitored components. This computation is based on statistical evaluation taking into account both data collected from past experiences and specific laboratory tests performed on components.

**PEID** (including on-board computer-ECU, built-in sensors, and communication system) should monitor product status data over threshold; should perform synthesis/statistics functions for preventive/predictive maintenance and should communicate with ground stations and garage for information providing and updating. The PEID and the PDKM communicate through the Middleware.

### **Wireless communication**

Data are transmitted automatically to the ground station via GPRS (General Packet Radio Service).

GPRS is the world's most ubiquitous wireless data service, available now with almost every GSM network. GPRS is a connectivity solution based on Internet Protocols that supports a wide range of enterprise and consumer applications.

The adoption of GPRS is a fast and cost-effective strategy that not only supports the real first wave of mobile Internet services, but also represents a big step towards 3GSM (or wideband) networks and services.

At this stage there is a kind of device controller. That is the ground station with which the truck communicates. The ground station then relays communication to any backend systems, like the PDKM and DSS, via the middleware.

### **Data storage in PDKM**

Data collected from the trucks should be transferred to the central system in the ground station using Promise technologies and stored in the PDKM.

A PDKM (Product Data Knowledge Management) is assumed for management of information collected from the vehicles fleet during its entire life. This software must be therefore able to perform advanced data analysis, statistical elaboration and provide adequate decision.

In particular the PDKM should handle the following data:

- Synthesis/statistics related to predictive maintenance
- Vehicle/component mission profile description information

### **Maintenance management in DSS**

The main objective of this scene is to identify the “best” time interval for stopping the truck or the fleet of trucks and performing needed maintenance activities and, moreover, to define which kind of maintenance has to be performed on which component.

In particular the DSS should support two levels of decision making:

- *first level*: optimization of the maintenance for one single truck, taking into account its availability and costs related to its maintenance;
- *second level*: optimization of the maintenance of a fleet of trucks, taking into account trucks availability, garage availability and maintenance costs for all the trucks.

## 12 Innovation

In this section we summarise the findings of the Business Model prepared in the framework of the PROMISE Work-package I3.

The scenarios detailed have shown an increasing trend on the market of commercial vehicles and of fleets. In Europe the market shows some signs of saturation/ marginal increase, while the other markets will be the major pillars for such growth in the short-to-medium term future. In fact the growth is expected in emerging markets, like India, China, Brazil and East Europe.

Regarding the fleets, the study has shown that the market, following the examples of the US and UK markets are correctly oriented, towards the emergence of bigger fleets, managed by third-parties.

Furthermore the opportunities for Telematics systems, and in particular for remote diagnosis and maintenance management is growing, based on the perceived utility of remote monitoring and predictive maintenance.

These are the driving forces which will sustain the growth of the development of more and more improved and performing Fleet Maintenance Systems. This will constitute an opportunity for companies involved in the production and marketing of FMS.

With respect to the rest of the competition the IVECO PROMISE Fleet Management System (IPFMS) has the following recognised advantages:

- uniqueness of the solution;
- the comprehensiveness of the approach, based on the optimisation of maintenance of the level of the fleet;
- a patenting position which CRF consider to be strong (a patent has been filed and is currently pending);
- the CRF/ IVECO excellent brand image in terms of Industrial Research and Truck OEM.

Still, there are some weak points, which have been analyzed in details in relevant chapters of the Business Model. In particular on the technical side, thorough tests have to ensure to compatibility of the solution, its integrability in the truck/ fleet management ground station, reliability in any circumstances. On the business and legal sides, the selling price and the willingness to pay of the clients, the protection of privacy, the increased responsibility of the solution provider/ fleet manager/ OEM are aspects to be studied further. Not to address other promising markets, where even better opportunities could lay (e.g. the military clients) would also be a major risk.

In the future, from the strategic business point of view, further analyses would include the following activities, building on the advantages of the IPDFM and including a business plan:

- an analysis of the structure of industrial costs,
- analysis of potential economies of scale, maturity and time to market
- the definition of the different market segments or other markets (ambulances, trains, earth-moving machines, marine, military, other vehicles) to be pursued, their specific requirements and their impact on the portfolio of products and business offers;
- scenarios or roadmaps for penetration of the market and economic return expected (ROI, NPV, IRR, DCF) and a pricing policy.

## 13 System Architecture

### 13.1 Component Description

From a technical point of view, the A4 Demonstrator consists of the following main components:

- **PEID**
- **PDKM**
- **MIDDLEWARE**
- **DSS**

Each component is described further below.

#### **PEID**

**PEID** consists of on-board computer-ECU, built-in sensors, and communication system.

They should monitor product status data over threshold; should perform synthesis/statistics functions for preventive/predictive maintenance and should communicate with ground stations and garage for providing and updating information. Therefore the PEID should send appropriate messages to the dashboard of the truck.

Considering the PEID as a “network” of on-board computer + transmission devices, a first hypothesis of data going into the PEID can be classified as “raw data”, (mainly time histories), coming from:

- Normal production sensor
- Added sensors
- Vehicle computer network in general

The amount of data and the typology of information that can flow into the PEID are, in principle, huge. The data that will be handled in PEID should be summed up to 100 different quantities. The size of data should be at least 4 Kbytes.

The PEID should be able to transmit data to different actors (e.g. producer) through the PDKM and should communicate with ground stations by GSM.

The ECU is one component of the on-board computer. It should gather the status data of the engine in a real-time manner and store them in its own memory.

The on-board computer should have enough processing capability in order to manage the vehicle in the real-time and should have storage capacity to store historical data.

A serial network (CAN) should be used for internal communication among several ECUs (Engine Control Units) in the on-board computer.

#### **PDKM**

The **PDKM** (Product Data Knowledge Management) system should be installed at the ground station. It is assumed for the management of information collected from the vehicles of the fleet. This software must be therefore able to perform advanced data analysis, statistical elaboration and provide adequate decision.

In particular it should store the information collected from vehicles during their entire life. The PDKM should handle the following data:

- Synthesis/statistics related to predictive maintenance
- Vehicle/component mission profile description information

It collects data for each vehicle of the fleet while the data miner elaborates data from the ground station DB and derives messages for maintenance management.

The modules that should be included in PDKM are:

- Data mining
- Pattern recognition

### **MIDDLEWARE**

The **MIDDLEWARE** needs to be able to communicate with the PEID and the PDKM.

The data (information) that are output by the PEID are:

- User message to be displayed on the dashboard related to predictive maintenance strategies.
- Synthesis / statistics related to predictive maintenance strategies and vehicle / components mission profile description.

This information should be transmitted to different actors through middleware. The ground station relays communication to any backend systems, like the PDKM and DSS, via the middleware.

The middleware component is maybe not so crucial when only a few trucks are monitored, but in a real life scenario it will become important. In a real life scenario it is possible to have many different application configurations: maybe this will be a service offered by IVECO to the truck owner, maybe the truck owner will host the service himself and send some info to IVECO for them to analyze, maybe there will be service garages that offer this service, etc. The middleware makes it possible to have any of these configurations and to specify how and what data are communicated between organizations/different sites.

The system responsible for connecting and reading data from the PEID is called the *device controller*. The connection between the device controller and the PEID can be realized with UPnP (or any other suitable technology). In the Promise context, we have defined this interface to be an UPnP interface. The actual communication link (used by the PEID and device controller to communicate using UPnP over) can be any communication medium supporting TCP/IP protocols. It can therefore be either wired or wireless.

The device controller communicates with other systems through the Promise middleware inter-enterprise communication infrastructure.

### **DSS**

The **DSS** (Decision Support System) should be installed in the ground station PC. It needs to be able to receive data from PDKM.

The DSS should support two levels of decision making:

- first level: optimization of the maintenance for one single truck, taking into account its availability and costs related to its maintenance;
- second level: optimization of the maintenance of a fleet of trucks, taking into account trucks availability, garage availability and maintenance costs for all the trucks.

The main inputs to the first level DSS should be residual mileage, truck availability and truck life cycle costs and its main outputs should be residual mileage, user message and warning. The data about residual mileage and truck life cycle costs should automatically be translated to the DSS whereas the data about the truck availability should be provided by the driver or the truck owner.

The main inputs to the second level DSS should be trucks' availability, garage availability and trucks' life cycle costs and its main outputs should be scheduling of maintenance for each truck and scheduling of maintenance activities for maintenance crew. The data about the garage availability should be provided by the fleet manager to the DSS.

In particular:

- The DSS should operate in the MOL phase;
- The DSS should support the *truck driver* in determining when it is necessary to stop for maintenance;
- The DSS should support the *fleet manager* in minimizing the overall costs for maintaining the fleet of trucks;
- The DSS should support the *maintenance crew* in coordinating the scheduling of maintenance with garage availability;
- The DSS should support the *design department of truck manufacturer* in monitoring the consumption of components and in establishing the correlation between driving habits and the consumption of the components.

### 13.2 Design and interactions

The design of the Demonstrator described below represents the backbone of an innovative system for the optimisation of maintenance interventions on a fleet of trucks. The proposed approach is based on a predictive maintenance algorithm that exploits the advantages resulting from the installation of a set of sensors constantly monitoring the status of selected engine components. The entire lifecycle of the different monitored components and of the whole vehicle is taken into account since the first stages of the DSS design.

The fleet of trucks work under normal conditions and acquire data from the field. The data are elaborated and synthetic data (indicators) are calculated and continuously updated. On the ground station the data are stored in the system data base (PDKM), where diagnostic algorithms work on the stored data for the extraction of predictive information. As input for the computation, the ground station should access and receive the gathered MOL data via a GPRS wireless connection. After analyzing MOL data, the DSS situated in the ground station PC should send information to each vehicle, garage, design dept., production dept., and suppliers. A calendar of maintenance interventions to be performed on each truck belonging to the analysed fleet is obtained.

The proposed approach for the A4 Demonstrator comprises two main modules: a DSS optimising the maintenance on one single truck is the core of the first part of the tool, while an optimisation of the maintenance activities to be performed on an entire fleet of trucks is the aim of the second module.

#### ***1) Optimising maintenance for one single truck***

The first module of the DSS is devoted to the optimisation of the maintenance interventions on one single truck. The new planned maintenance process passes through the following main steps:

- collection of data from sensors
- sensor data elaboration and component lifespan computation
- definition of truck availability
- definition of a maintenance plan for each truck

The DSS takes as input the data concerning the lifespan and supports the last two steps mentioned.

#### ***Collection of data from sensors***

The designed demonstrator focuses on monitoring three main components: brakes, air filter and engine oil. These components are already monitored through sensors and different data are gathered.

#### ***Sensor data elaboration and components lifespan computation***

Data collected from sensors are then elaborated in order to pass from physical dimensions (e.g.: RPM, litres/km, °C, ...) to time, expressing the residual lifespan for each one of the three monitored components. This computation is based on statistical evaluation taking into account both data collected from past experiences and specific laboratory tests performed on components. Moreover other data like, for example, costs for performing maintenance, potential costs resulting from delays in interventions, are collected and stored.

### ***Definition of truck availability***

The truck owner or the truck manager (hereafter called the user) is then asked to provide the system with time intervals during which the truck is available for maintenance. Maintenance interventions require one-day stop, for almost all kind of maintenance performed (this is an assumption of the algorithm). The user has to define the calendar taking into account his needs and implicitly minimizing the loss of earnings. Defining the truck availability also allows the user to customize the maintenance service. This term is considered within the optimisation algorithm in order to avoid both component breakdown and too frequent interventions

### ***Definition of a maintenance plan for each truck***

This step is the “core” of the DSS for a single truck. The system has collected all the needed inputs:

- residual lifespan for each component
- time intervals of truck availability
- pre-scheduled maintenance milestones

The main objective of this step is to identify the “best” time interval for stopping the truck and performing needed maintenance activities and, moreover, to define which kind of maintenance has to be performed on which component. The intervals defined by the user (truck availability) are taken into account as the preferred options, however it may happen that the DSS schedules maintenance intervention outside them if it is necessary to avoid component breakdown and/or too expensive interventions.

Monetary factors are taken into account for this optimisation. In particular for each one component the following cost entries are considered.

- Costs due to vehicle unavailability [€/day]
- Costs of intervention:
  - Material [€]
  - Manpower [€]
  - Waste disposal [€]
- Extra costs / problems due to intervention delay (all function of the extra mileage):
  - Vehicle inefficiency
  - Risk of major failure with economical loss
  - Risk of failure with potential hazard for the vehicle / people

## ***2) Optimising maintenance of a fleet of trucks***

So far, part of the first DSS module has been described. Using the point of view of the fleet manager, however, optimising the maintenance only at the truck level would be a sub-optimal solution. The main goal of the second module of the DSS is to identify an optimal solution at the fleet level.

All the data from the different trucks belonging to a fleet have to be collected in a ground-station computer, in order to simultaneously take into account the different needs and availability of all the trucks. Therefore, data of the different trucks belonging to the same fleet are grouped and optimisation for the fleet is performed. Calendar of interventions is sent to the maintenance crew and to the different trucks.

Steps belonging to this second module of the DSS which have been so far identified are:

- Collection of data from the different trucks belonging to the fleet
- Collection of garage availability

- Identification of alternative options and optimisation
- Transmission of results (calendar) to the truck drivers and to the maintenance crew

#### ***Collection of data from the trucks***

The ground-station computer receives from each truck the matrix described in the previous paragraph. That matrix embodies data on truck availability and on LCRC for each System Scenario. All these matrixes are then stored in the database.

#### ***Definition of garage availability***

Garage availability is the only missing information, at this point. The fleet manager has to define it, simply conveying how many operators are available for maintenance and when. Future developments of the tool will allow expressing also skills available at a time

#### ***Identification of alternatives and optimisation***

Inputs of this step are: LCRC for each truck and for each System Scenario, garage availability and other data related to interventions duration, location of the garage, ...

The output of this step consists of a calendar where dates and kinds of interventions to be performed for each truck are shown:

In order to identify the scheduling of maintenance interventions that minimizes the overall LCRC, the “fleet maintenance management” algorithm will be implemented so that it searches for the optimum Fleet Scenario, taking into account, through a proper set of constraints, maintenance crew availability (in order to avoid the simultaneous stop of a number of trucks exceeding the garage capacity) and trying, when possible, to respect each truck’s availability.

#### ***Transmission of results***

The calendar with the planned interventions on each truck is finally sent to each truck cockpit and to the maintenance crew.

In the design of this DSS, different stakeholders’ requirements have been taken into consideration. Actors that will use (or interact with) the tool, work in different steps of the solution lifecycle. The main addressees are in the Middle-of-Life phase: truck drivers/owners, fleet manager and maintenance crew. However, comparing actual performance of monitored components with reliability and features assumed at the beginning of their life provides value-adding information also to the design department of the truck manufacturer (Beginning of Life phase) and, finally, to End of Life actors devoted to the re-usage, retrieval and dismantling of the components.

## 14 Benefits

Considering this application as starting point, a series of creative sessions held recently within Fiat Group sectors allowed the identification of some relevant business improvements or new businesses potentially deriving from findings of the A4 Application Scenario.

The following paragraphs report a brief description of business opportunities coming from this application scenario. CRF has developed an extended business model, in collaboration with the PROMISE I3 work-package.

### 14.1 Predictive diagnosis for Reliability improvement.

#### *Description:*

Predictive diagnosis is an “intuitive” way to exploit the possibility to monitor key parameters of each single vehicle. From the business enhancement point of view, one typical application is Reliability improvement. Here a predictive maintenance strategy is typically applied to identify an unexpected failure mode of a key component, in order to reduce the risk of “unpredicted failure” and consequently increase system availability.

#### *Innovativity*

##### *Business improvement*

Regardless of the innovation of the predictive maintenance strategy, from the reliability point of view it represents only a marginal improvement. The reliability itself is not increased: it is worth the effort when a failure of this component could lead to a dangerous situation for someone.

#### *Business Potential*

*Medium / Low*

#### *Actors involved*

Direct benefit: User

OEM: value of the innovation, corporate image

#### *ROI*

*Medium term.*

From a preliminary technical analysis, it seems it is possible to reach up to 80% improvement in detection of malfunctions or poor performance.

### 14.2 Condition-Based maintenance

#### *Description*

Conventional maintenance strategies consist typically of preventive maintenance, where components are replaced based on a conservative schedule in order to “prevent” commonly occurring failures. Although preventive maintenance programs increase system availability, they are expensive because of frequent replacement of costly parts before the end of their life. Another disadvantage is that it is time-based, while, frequently, the wear out depends on the type of usage rather than the time of usage.

Condition-based predictive maintenance introduces a new philosophy of maintenance, where component are replaced depending on the effective use of the vehicle.

A predictive maintenance approach strives to detect the onset of equipment degradation and to address the problems as they are identified. This allows casual stressors to be eliminated or controlled, prior to any significant deterioration in the physical state of the component or equipment. This leads to both current and future functional capabilities.

### ***Innovativity***

*New business*

The old concept of a “fixed mileage coupon” is replaced with a flexible coupon where the interventions to be performed are dynamically planned according to the wear out level of each component.

### ***Business Potential:***

*High*

There are 2 optimisation areas:

- the component replacement at the right level of wear out;
- the possibility to organise the “optimal” set of intervention for the incoming coupon.

### ***Actors involved***

OEM: the OEM savings derived from condition based maintenance are relevant in the case of an “all-inclusive” maintenance contract.

### ***ROI***

*Short term.*

Elements contributing to ROI are:

- Different mission profiles from vehicle to vehicle (and component to component). This estimate depends obviously on the component taken into account. Preliminary results on algorithms developed for Oil Life Management show the possibility to treble the replacement delay in the most favourable cases compared to the delay prescribed with the fixed mileage coupon.
- Percentage of “all-inclusive maintenance contracts” is expected to increase: tangible and quantifiable benefits can persuade a wider number of vehicle owners to adopt this kind of maintenance approach. Currently this percentage applies to the automotive sector. For passenger cars this value is still quite low, whereas for commercial vehicles, trucks, earth-moving machines and for specific European and North-American markets this percentage can be up to 50%. “All inclusive maintenance contracts” are attractive to maintenance providers because they allow to increase customers loyalty and, moreover, they guarantee a (almost) fixed income from customers.
- Components involved in Condition based maintenance
- Efficiency of Predictive maintenance algorithms

Past studies within Fiat Sectors have estimated that a properly functioning predictive maintenance program can provide savings of 8% to 12% over a program utilizing preventive maintenance strategies alone. Depending on a facility's reliance on a reactive maintenance approach and material condition, savings opportunities of 30% to 40% could easily be realized. In fact,

independent surveys indicate the following industrial average savings resulted from initiation of a functional predictive maintenance program:

- Return on investment: 10 times
- Reduction in maintenance costs: 25% to 30%
- Elimination of breakdowns: 70% to 75%
- Reduction in downtime: 35% to 45%
- Increase in production: 20% to 25%

### **14.3 Customised maintenance contracts**

#### ***Description***

Maintenance contracts (especially for trucks) are now somehow customised depending on some general rules and declared vehicle mission.

The on board diary can be used to identify key parameters describing very precisely and truly vehicle mission and driving style. This knowledge can be used to define customised maintenance contracts in a very precise way.

#### ***Innovativity***

*Drastic business improvement*

Following trends developed for other business sectors (especially car insurance), the knowledge of the customer profile allows the identification of most promising contracts.

#### ***Business Potential***

*Medium - High*

#### ***Actors involved***

OEM direct benefits to the business.

User (careful user can obtain convenient maintenance contract).

#### ***ROI***

*Short term.*

Elements contributing to ROI are:

- diffusion of “all inclusive maintenance contracts”
- difference in mission profile, difference in driving style.

### **14.4 Fleet management**

#### ***Description***

The knowledge of the driving style can be used by the fleet manager as a control tool. The correct use of the vehicle can improve its life, and a correct driving style is therefore to be encouraged. The control tool could extend its capability to the mission, and other illegal activities (for example fuel theft).

#### ***Innovativity***

*New Business*

Truck and commercial vehicles only.

**Business Potential:**

Medium

**Actors involved**

Fleet manager  
OEM value of the innovation

**ROI**

Short term.

From a preliminary business analysis, it seems it is possible to reach up to 30% accelerated overall maintenance process of fleet objects.

Elements contributing to ROI are:

- Driving style measurability
- Heterogeneity in driving style
- Fleet dimension.

**15 Risk Assessment**

The following tables summarise the technical and business risks that are foreseen at this point of the project. It is proposed to perform a rolling assessment of risk during the project development and refine the following tables.

The methodology used is the one adopted in the RPP project (“Risk Planning Process”, European Project funded under the 5<sup>th</sup> Framework of the EU) and implemented in software. In particular Risks are negative events<sup>4</sup>, which are rated according to three dimensions: probability of occurrence, impact of the occurrence of the event, uncontrollability of the occurrence of the event (in case no action is taken).

**15.1 Technical Risk Assessment**

Risk	Probability	Impact	Overall	Action
	1=low, 10=high	1=low, 10=high	P*I	
Transmission frequency too low	8	10	80	Evaluate through tests the best compromise between costs and data availability
Transmission cost too high	3	10	30	Idem
Size of the data to be transmitted too huge	8	10	80	Evaluate the maximal size of data and aggregation criteria
Transmission criteria not right	3	8	24	Check directly with IVECO before defining them
Difficulty to transmit data from ECU to ground station through the gate	1	10	10	Tests different solutions for the gates
Transfer rate too low	1	3	3	Test transfer rate

<sup>4</sup> See [1] J. Mascolo, M. Gambera, “Diagnosing Risks in the Automobile Industry: A Fiat Research Center Case Study”, Technical University of Eindhoven Eds., October 24th, 2001  
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Cost of the wireless device too high	1	7	7	Evaluate future scenarios for prices
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**Table 7: technical risk assessment**

### 15.2 Business Risk Assessment

Risk	Probability	Impact	Overall	Action
	1=low, 10=high	1=low, 10=high	P*I	
The technology choice is too short-sighted (validity will be reduced)	3	10	30	Define a technology roadmap
IVECO decides not to take up the business	2	10	20	Define proper business plan Involve private operators
Private data can be stolen (data should not refer to people but vehicle)	3	10	30	Devise or evaluate protection against data stealing
Cost or price too high	4	10	40	Evaluate total lifecycle cost, system price over the medium-long term
Predictive capability of the algorithms not so high	3	10	30	Test on different fleet of trucks

**Table 8: Business risk assessment**

## Part C - Guidelines

This third part of the peer-review package contains the criteria on which the reviewers will assess the applications:

- Business:
  - the application is likely to have an impact on reinforcing competitiveness of the demonstrator owners
  - the application demonstrates a clear added value in carrying out the work with Promise technologies
- Technical
  - soundness of technologies implemented in the demonstrator
  - soundness of integration/customisation issues characterizing the demonstrator
- Innovativeness
  - the results represent clear progress beyond the current state-of-the-art
- Risk
  - Identification of the main critical risks that may compromise the results

Use the following questionnaire in the *Review Form* during the review and, please motivate all your scores.

### **Please e-mail this form to the Peer-review Coordinator**

Andrea Matta

Via Bonardi 9, 20133 – Milano, Italy

andrea.matta@polimi.it

Your contact information will be separated from the main body of the document to ensure its confidentiality.

## REVIEW FORM OF APPLICATION

Reviewer's name :

Reviewer's company :

**Legend:**

- A. Excellent
- B. Good
- C. Average
- D. Poor

Type	Criteria	Judgment			
		A	B	C	D
General	<p><b>The Application's background and objectives are clearly stated in the document and understandable</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>The Application's functionalities are well presented and understandable in the document</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>The Application's architecture is well presented and understandable in the document</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Type	Criteria	Judgment			
		A	B	C	D
Business	<p><b>The impact on reinforcing competitiveness of the application is understandable and acceptable</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>The significance of the impact has been demonstrated</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>The application demonstrates a clear added value in carrying out the work with PROMISE technologies</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Technical	<p><b>The technologies have been properly implemented in the application . (applicable only for the second review)</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Type	Criteria	Judgment			
		A	B	C	D
Innovativeness	<p><b>The presented results represent clear progress beyond the current state-of-the-art</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>Where does the reviewer see the scope of this innovation beyond the existing application ?</b></p> <p><b>In your own industry?</b></p> <p><b>In other industries ?</b></p>				
Risk	<p><b>Risks have been sufficiently identified</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>The risks' magnitude has been sufficiently estimated</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Type	Criteria	Judgment			
		A	B	C	D
	<p><b>The risk is acceptable</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p><b>Do you identify additional critical risks that may compromise the results of the Application not identified ?</b></p>				
Summary	<p><b>Rate the overall Application</b>  <i>Motivate your judgment with a comment:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





## Appendix D: Questionnaire to measure the degree of interest in PROMISE



The core innovation of PROMISE is the concept of smart products / components. Embedded information gathering devices linked to sensors are able to sense their environment and their condition. This is communicated to existing enterprise backend systems where PROMISE decision support systems can influence processes and assist users. PROMISE has the potential to innovate business processes and benefit customers

### INDUSTRIAL REFERENCE GROUP QUESTIONNAIRE - CONFIDENTIAL

<b>Company:</b>  <b>Name:</b> <b>Title:</b> <b>Telephone:</b>	<b>Business description:</b>
<b>What do you see as the main challenges facing your company:</b> <ul style="list-style-type: none"> <li>- Product development?</li> <li>- Production?</li> <li>- Transport/logistics?</li> <li>- Maintenance?</li> <li>- Recycling/end of life?</li> </ul> <p><b>Are there standards, regulations, quality issues</b> that are or will have a major impact on your company?</p> <p style="text-align: center;">Dynamic physically distributed extended enterprise?</p>	<b>Relevance:</b> <input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not  <input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
<b>What is changing in your markets today and in the future?</b> Are there market/customer demands that will seriously change the way your industry and company works?  Provide a summary description of your markets and customers relative to PLM e.g. are they “high tech”, concerned about end of life etc...	

<p><b>Which of the following do you see as the 2-3 main improvement targets for your company:</b></p>	<p><input type="checkbox"/> Faster product lifecycles  <input type="checkbox"/> Savings in R&amp;D time and resources  <input type="checkbox"/> Outsourcing the R&amp;D functions  <input type="checkbox"/> Cost savings  <input type="checkbox"/> Better products feedback from customers  <input type="checkbox"/> Improving product quality with new product versions</p> <p><input type="checkbox"/> Other, Please describe:</p>
<p><b>How long is the typical lifecycle of your products?</b></p>	
<p><b>Are there 3<sup>rd</sup> parties involved in your BOL, MOL and EOL activities?</b></p>	
<p><b>Do you presently collect end user feedback and use this data to improve design and/or manufacturing processes?</b></p>	
<p><b>Are you using IT to support this process? If yes, what kind of system?</b></p>	
<p><b>Is this now done in real time and if not, would you see this important?</b></p>	<p><b>Relevance:</b>  <input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p>
<p><b>How important do you believe it is for your organisation to collect accurate product lifecycle information from all parties that are involved in this process?</b></p>	<p><b>Relevance:</b>  <input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p>
<p><b>How well do you see this happening at the moment?</b></p>	



<p>Core innovation of PROMISE is smart components/products.</p> <p>Embedded information gathering devices linked to sensors</p> <p style="padding-left: 100px;">Sense environment</p> <p style="padding-left: 100px;">Sense condition</p> <p>Communicate this to existing enterprise backend systems</p> <p style="padding-left: 100px;">Communicate this to users</p> <p style="padding-left: 150px;">Potential to innovate business processes</p> <p style="padding-left: 150px;">Benefit to customers</p>	<p><b>Relevance:</b></p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p>
<p><b>Reusable parts</b></p> <p><b>Recycling regulations?</b></p>	
<p><b>PLM can be described as providing control over a company's main asset, its products. Promise extends this control</b></p>	<p><b>Relevance:</b></p> <p><input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not</p>

How relevant do you see the following?	Relevance:
Capturing Product Lifecycle data	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Bringing together fragmented data held in disparate systems	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
People needing the data are themselves distributed	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Processing data and converting to knowledge and decision support	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Integrating people, processes, and information beyond traditional and organisational boundaries	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Dynamics of extended enterprise	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Resistance to “share” information across organisational boundaries	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Cost, complexity and infrastructure platform of PLM	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
Social issues related to privacy of information captured by PLM	<input type="checkbox"/> Extremely <input type="checkbox"/> Very <input type="checkbox"/> Not very <input type="checkbox"/> Not
<b>Any other points you believe should be addressed?</b>	

**Thank you for your time!**

Please e-mail this form to [irg@promise-plm.com](mailto:irg@promise-plm.com)

Your contact information will be separated form the main body of the document to ensure its confidentiality.



## **Appendix E: Introduction to the self-assessments**

The following page is the introduction to the self-assessment that will be distributed to all A1 to A11. This element is part of the self-assessment method.

## Self-assessment of the PROMISE demonstrators A1 to A11

One of the recommendations from the Commission after the month 12 review in Brussels, is that each demonstrator (A1 to A11) must carry out a self-assessment within the following specified aspects:

- Functional aspects
- Technical aspects
- Performance aspects
- Economic aspects
- Other aspects

For each of these aspects, a series of questions have been created and structured in such a fashion that each demonstrator should be able to answer them from a self-assessment view. Full details are included in the attached Excel self-assessment package.

**Important: You must activate Macros when opening the file!!**

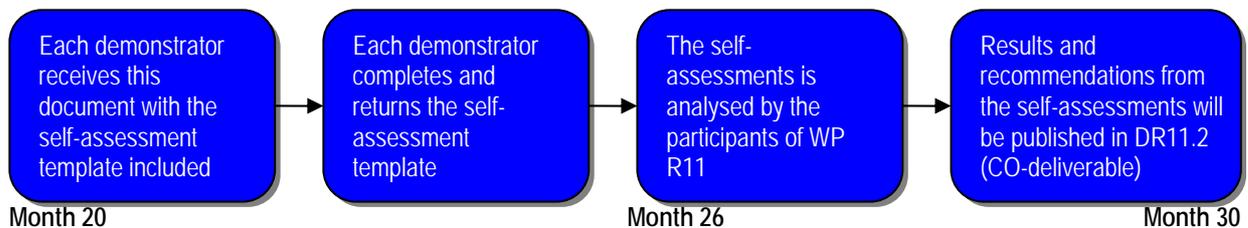
### Deadline and responsibility

The demonstrator owner (A1 to A11) has the responsibility to complete and return the self-assessment to SINTEF.

Deadline for returning a completed self-assessment is: TBD, 2006

### The process of self-assessment

The following figure illustrates the process of self-assessment from month 20 to month 30 of the PROMISE project.



**Figure 1: Illustration of the process of self-assessment with start- and end-months**

### Questions, comments and return of completed self-assessment

Please return the completed self-assessment to the following address. If you have any questions or comments related to the self-assessment, please use the same contact information:

Carl Christian Røstad, SINTEF  
Telephone: +47 73 59 30 46  
E-mail: [carl.c.rostad@sintef.no](mailto:carl.c.rostad@sintef.no)



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## **Appendix F: The self-assessment methodology**

## WP R11 - The PROMISE self-assessment of WP A1 to A11

Target group: Application owner's A1 to A11  
 Resources: As described in the DOW WP R11 and accepted plans for WP R11  
 Deadline: XX.MMMMM.2006, 1200 CET

Initialising the  
self-assessment  
is done at the  
bottom of this  
page 

### Purpose and method

This is the self-assessment of the PROMISE applications as called for by the Commission in ITA1. Each application owner will self-assess their applications and the work carried out related to their workpackages. The following main areas are covered by the self-assessment: Functional, Technical, Economic and Performance aspects. The assessment from each partner will be used for carrying out analyses of the PROMISE project within the mentioned fields in order to create an overall report for these aspects.

### The sections of this self-assessment

This self-assessment is divided into sections as follows:

- *Initialisation*: Initialise the whole self-assessment
- *Section 1*: Functional and technical aspects
- *Section 2*: Project and performance aspects
- *Section 3*: Economic and performance aspects
- *Validation*: Is the validation overview and the last section you'll visit in order to see if your form has been correctly filled in.

### How to navigate the sections

Navigation bars have been provided at the top and bottom of each section, making it easy to change between sections as need be. You will also be required to scroll up and down within each section. Please note: This is a work-book that is password-protected. I.e. you can only edit the fields were your feedback is required.

### How to complete the sections

All fields must be filled in. If some fields are not applicable to your application, please indicate so by choosing the NA (Not applicable) or related option. In all fields were your feedback is needed (e.g. a Yes/No question), you are required to use the **integer 1** for filling in the appropriate field (if no other instructions are given. In some areas you will have to give a detailed description of why you feel the specific aspect/question is unrelated to your application. Gathering data on why something is not applicable to an application is also very important in terms of this self-assessment. Please take the necessary time to give a detailed description.

### Resources available

Each application owner has the resources allocated as described in the DOW WP R11 and accepted by the application owners in the plans for WP R11. Please note that the amount of resources allocated in the DOW must cover both the peer-review process (see separate information related to the peer-reviews), and this self-assessment.

### Validation of completed sections

Each section contains a self-check mechanism. If you see any message at the top of a section marked in red, please address the issue that has been raised. If for some reason you cannot address the issue, you are required to contact SINTEF (see contact details below) before submitting the filled-in self-assessment template. When all sections are completed, you can navigate to the Validation-section. Here you will get an OK if the template has been filled in correctly. You can then submit it to SINTEF.

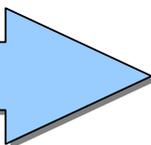
### Submitting this form

A completed and validated self-assessment template (this document) must be submitted electronically to: [carl.c.rostad@sintef.no](mailto:carl.c.rostad@sintef.no) no later than **XX.MM.2006, 1200 CET**.

### Questions?

If you have any questions related to this self-assessment template, please contact:

Carl Christian Rostad  
 SINTEF Technology and Society  
 Tel: + 47 73593046  
 E-mail: [carl.c.rostad@sintef.no](mailto:carl.c.rostad@sintef.no)

Click here to start the initialisation  
of the self-assessment 

**Initialisation of the self-assessment - Generic functions in your Application Ax**

Below you will find a list of 49 generic functions. Some of them are specific for the PROMISE project, while others are more of a generic nature. As such, the functions described in this section will not necessarily be developed by the PROMISE consortium and they should not be used as requirements to the developers of the PROMISE project. Please indicate in the appropriate column by the **INTEGER 1** if you believe a function is part of your application or not.

**IMPORTANT 1:** You cannot go back to this sheet after you choose to continue the self-assessment. Make sure that you have chosen ALL functions that you feel is part of your application. Contact SINTEF if you need help.

**IMPORTANT 2:** In order to initialize this self-assessment, you need to complete all generic functions with yes or no. You then must press the blue arrow at the bottom of this page in order to continue the self-assessment.

**Please note; there are still unanswered questions in this section  
All questions must be answered to continue!**

**Part of Application**  
Yes = 1 No = 1

**Check for unanswered questions by scrolling down this column**

	Part of Application		
	Yes = 1	No = 1	
1 PEID can conduct real time measurement of physical values			! Use the integer 1 for filling in Yes or No
2 PEID can store data on itself			! Use the integer 1 for filling in Yes or No
3 PEID can warn if e.g. measurements are out of range / passed a threshold (e.g. number of starts, temperature etc)			! Use the integer 1 for filling in Yes or No
4 PEID can transfer data (read/write) to other PEIDs			! Use the integer 1 for filling in Yes or No
5 PEID contains a globally unique identifier			! Use the integer 1 for filling in Yes or No
6 PEID has wireless network capability (i.e. can send and receive data by wireless communication)			! Use the integer 1 for filling in Yes or No
7 PEID has network capability (i.e. can send and receive data via permanent, non-permanent, directly or intermittent device)			! Use the integer 1 for filling in Yes or No
8 PEID can send messages to specified recipient			! Use the integer 1 for filling in Yes or No
9 PEID can transfer and update data on the PDKM			! Use the integer 1 for filling in Yes or No
10 PEID can transfer data to the DSS			! Use the integer 1 for filling in Yes or No
11 PEID can filter out field data and store the filtered data			! Use the integer 1 for filling in Yes or No
12 PEID has processing and analysing capability (e.g. of data from measurements, of received data from PDKM etc) so that it can take decisions what to do (notifications, alarms, transmissions etc)			! Use the integer 1 for filling in Yes or No
13 Initialise data on the PEID (first writing of ID, data etc on a PEID)			! Use the integer 1 for filling in Yes or No
14 Middleware can read data from PEID			! Use the integer 1 for filling in Yes or No
15 Middleware can write data to the PEID			! Use the integer 1 for filling in Yes or No
16 Middleware can receive notifications of PEID events (such as value changes, alarms etc)			! Use the integer 1 for filling in Yes or No
17 Middleware can perform simple data processing (such as aggregation of messages, filtering duplicated messages etc)			! Use the integer 1 for filling in Yes or No
18 Middleware can receive requests (read/write) for PEID data from PDKM, DSS, other applications			! Use the integer 1 for filling in Yes or No
19 Middleware can provide data to third parties (other companies etc)			! Use the integer 1 for filling in Yes or No
20 Middleware can carry out PEID Management (registration, editing access control rules for devices etc)			! Use the integer 1 for filling in Yes or No
21 Middleware functionality to transfer data from e.g. a technician's interface (e.g. work carried out, incidents etc) to the PDKM			! Use the integer 1 for filling in Yes or No
22 Middleware functionality to transfer data from the DSS to e.g. a technician's interface (i.e. requests for e.g. best practice / manuals / trouble-shooting information etc out in the field)			! Use the integer 1 for filling in Yes or No
23 Middleware can detect the presence of a PEID			! Use the integer 1 for filling in Yes or No
24 PDKM functionality to handle/manage the application's specific data and/or knowledge management requirements (e.g. logistics management, maintenance etc)			! Use the integer 1 for filling in Yes or No
25 PDKM has document management functionality for the whole lifecycle of the product/component (i.e. overview of all related documents)			! Use the integer 1 for filling in Yes or No
26 PDKM have incident management, i.e. can handle information about the usage of the product/ equipment/ component			! Use the integer 1 for filling in Yes or No
27 PDKM can receive data from a PEID reader			! Use the integer 1 for filling in Yes or No
28 PDKM can receive data from the PEID via the Middleware			! Use the integer 1 for filling in Yes or No
29 PDKM has access control functionality (i.e. creation and use of roles for users)			! Use the integer 1 for filling in Yes or No
30 PDKM's web-portal allows the users to possibility to create, change and view data/objects within the limitations of their role			! Use the integer 1 for filling in Yes or No
31 PDKM has a web-portal so that different participants in different places all over the world can work via a web-interface.			! Use the integer 1 for filling in Yes or No
32 PDKM can transfer and update data on PEID			! Use the integer 1 for filling in Yes or No
33 PDKM can retrieve and share (read/write) data from other data sources than the PEID and the DSS (OEMs, other databases etc)			! Use the integer 1 for filling in Yes or No
34 PDKM ability of product and product structure management (e.g. BOMs, as-built, as-designed, serial numbers etc)			! Use the integer 1 for filling in Yes or No
35 PDKM can generate notification reports for certain notification types, range of equipments, range of materials or a time period.			! Use the integer 1 for filling in Yes or No
36 PDKM capable of tracking the history of products/components			! Use the integer 1 for filling in Yes or No
37 PDKM capable to handle field data in the form of documents like specific reports (e.g. maintenance etc)			! Use the integer 1 for filling in Yes or No
38 PDKM capable to handle field data in the form of single values like the current mileage, temperature etc			! Use the integer 1 for filling in Yes or No
39 PDKM is able to integrate needed data from related data sources			! Use the integer 1 for filling in Yes or No
40 DSS has functionality to handle the application's specific decision support requirements (predictive maintenance, logistics, decide actions, aging diagnosis etc)			! Use the integer 1 for filling in Yes or No
41 Possibility to enter requests into the DSS by user interface			! Use the integer 1 for filling in Yes or No
42 DSS can access PDKM and get data that is needed for the DSS analyses / decision making etc			! Use the integer 1 for filling in Yes or No
43 DSS can access data sources other than the PDKM (other databases, OEMs, PDMs etc) and get necessary data for carrying out analysis etc			! Use the integer 1 for filling in Yes or No
44 Possibility to enter data into the DSS by user interface			! Use the integer 1 for filling in Yes or No
45 DSS can transfer and update data on PEID			! Use the integer 1 for filling in Yes or No
46 DSS can store data in the PDKM (i.e. DSS can write data to the PDKM)			! Use the integer 1 for filling in Yes or No

**Please note; there are still unanswered questions in this section  
All questions must be answered to continue!**

		Part of Application	
		Yes = 1	No = 1
47	DSS can store data in other data-sources beside the PDKM (databases, OEM etc) (i.e. DSS can write data to other datasources)		
48	DSS can present the results to the user in the user's graphical user interface		
49	Web-interface for using PDKM, DSS etc (e.g. for communicating with suppliers, decision makers etc, also allows use of PROMISE systems by any web-browser)		
50	Enter a function you feel is missing here. Please describe it as detailed as possible.		1
51	Enter a function you feel is missing here. Please describe it as detailed as possible.		1
52	Enter a function you feel is missing here. Please describe it as detailed as possible.		1
53	Enter a function you feel is missing here. Please describe it as detailed as possible.		1

**Check for unanswered questions by scrolling down this column**

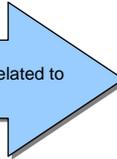
! Use the integer 1 for filling in Yes or No

! Use the integer 1 for filling in Yes or No

! Use the integer 1 for filling in Yes or No

Not to be included in further analysis

**Initialise!** When clicking this arrow, you can no longer go back to this initialisation-page. Please make sure you have included all functions related to your application.



**SECTION 1: FUNCTIONAL AND TECHNICAL SELF-ASSESSMENT**

In this section you will be presented with a range of generic functionalities based on your initialisation at the start of this assessment. Some of them are specific for the PROMISE project, while others are more of a generic nature. As such, the functions described in this section will not necessarily be developed by the PROMISE consortium and they should not be used as requirements to the developers of the PROMISE project. Each generic functionality is listed with grey. You are then asked to assess your application by using the **integer 1** in the appropriate column along the gliding scale (or use 1 in the NA-column if it's not applicable). All questions/statements must be filled in. Remember that the left and right of the scale is the extremes. If for example one function is important (but not very important), you should fill in the cell in column G, and not column H.

Please note: there are still unanswered questions in this section



Check for unanswered questions by scrolling down this column

		Very inessential	Very hard	Very poorly	Very unimportant	Very easy	Very well	Very successful	NA
<b>(1) PEID can conduct real time measurement of physical values</b>									
1	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	
2	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very easy	1
3	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very easy	1
4	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very well	1
5	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very well	1
6	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very well	1
7	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very well	1
8	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very well	1
9	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very important	1
10	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very important	1
11	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very easy	1
12	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very well	1
13	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very well	1
14	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very successful	1
15	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very high	1
16	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very high	1
17	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very high	1
18	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
19	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very important	1
<b>(2) PEID can store data on itself</b>									
20	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
21	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
22	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
23	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
24	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
25	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
26	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1

! Not yet answered, use 1 for filling in

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very poor	poor	moderate	good	Very good	Very essential	
27	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poor					Very essential	1
28	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
29	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
30	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
31	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
32	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
33	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
34	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
35	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
36	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
37	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
38	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(3) PEID can warn if e.g. measurements are out of range / passed a threshold (e.g. number of starts, temperature etc)</b>								
39	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
40	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
41	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
42	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
43	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
44	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
45	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
46	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
47	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
48	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
49	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
50	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
51	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
52	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
53	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
54	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
55	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1

Please note: there are still unanswered questions in this section



Check for unanswered questions by scrolling down this column

		Very inessential	--	-	+	++	+++	Very essential	NA
56	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential						Very essential	1
57	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(4) PEID can transfer data (read/write) to other PEIDs</b>									
58	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
59	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
60	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
61	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
62	How well do you believe the requirements related to this function were defined at the beginning of the application activities (I.e. when work started on your Ax WP)?	Very poorly						Very essential	1
63	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
64	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
65	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
66	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
67	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
68	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
69	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
70	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
71	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
72	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
73	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
74	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
75	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential						Very essential	1
76	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(5) PEID contains a globally unique identifier</b>									
77	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
78	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
79	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
80	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
81	How well do you believe the requirements related to this function were defined at the beginning of the application activities (I.e. when work started on your Ax WP)?	Very poorly						Very essential	1
82	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
83	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
84	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very unimportant					Very essential	
85	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
86	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
87	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
88	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
89	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
90	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
91	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
92	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
93	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
94	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
95	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(6) PEID has wireless network capability (i.e. can send and receive data by wireless communication)</b>								
96	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
97	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
98	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
99	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
100	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
101	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
102	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
103	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
104	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
105	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
106	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
107	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
108	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
109	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
110	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
111	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
112	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
113	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1

Please note: there are still unanswered questions in this section



Check for unanswered questions by scrolling down this column

		Very unimportant								Very essential	NA
114	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant								Very essential	1
<b>(7) PEID has network capability (i.e. can send and receive data via permanent, non-permanent, directly or intermittent device)</b>											
115	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential								Very essential	1
116	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard								Very essential	1
117	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard								Very essential	1
118	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly								Very essential	1
119	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly								Very essential	1
120	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly								Very essential	1
121	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor								Very essential	1
122	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly								Very essential	1
123	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant								Very essential	1
124	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant								Very essential	1
125	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard								Very essential	1
126	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly								Very essential	1
127	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly								Very essential	1
128	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful								Very essential	1
129	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low								Very essential	1
130	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low								Very essential	1
131	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low								Very essential	1
132	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential								Very essential	1
133	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant								Very essential	1
<b>(8) PEID can send messages to specified recipient</b>											
134	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential								Very essential	1
135	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard								Very essential	1
136	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard								Very essential	1
137	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly								Very essential	1
138	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly								Very essential	1
139	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly								Very essential	1
140	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor								Very essential	1
141	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly								Very essential	1
142	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant								Very essential	1



Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA
		Very inessential				Very essential	
172	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential				Very essential	1
173	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard				Very essential	1
174	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard				Very essential	1
175	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly				Very essential	1
176	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly				Very essential	1
177	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly				Very essential	1
178	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor				Very essential	1
179	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly				Very essential	1
180	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant				Very essential	1
181	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant				Very essential	1
182	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard				Very essential	1
183	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly				Very essential	1
184	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly				Very essential	1
185	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful				Very essential	1
186	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low				Very essential	1
187	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low				Very essential	1
188	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low				Very essential	1
189	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential				Very essential	1
190	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant				Very essential	1
<b>(11) PEID can filter out field data and store the filtered data</b>							
191	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential				Very essential	1
192	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard				Very essential	1
193	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard				Very essential	1
194	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly				Very essential	1
195	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly				Very essential	1
196	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly				Very essential	1
197	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor				Very essential	1
198	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly				Very essential	1
199	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant				Very essential	1
200	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant				Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA	
		--	-	+	++	+++		
201	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
202	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
203	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
204	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
205	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
206	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
207	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
208	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential					Very essential	1
209	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(12) PEID has processing and analysing capability (e.g. of data from measurements, of received data from PDKM etc) so that it can take decisions what to do (notifications, alarms, transmissions etc)</b>								
210	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
211	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
212	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
213	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
214	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
215	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
216	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
217	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
218	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
219	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
220	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
221	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
222	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
223	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
224	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
225	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
226	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
227	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential					Very essential	1
228	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(13) Initialise data on the PEID (first writing of ID, data etc on a PEID)</b>								

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA
		Very inessential				Very essential	
229	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential				Very essential	1
230	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard				Very essential	1
231	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard				Very essential	1
232	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly				Very essential	1
233	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly				Very essential	1
234	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly				Very essential	1
235	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor				Very essential	1
236	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly				Very essential	1
237	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant				Very essential	1
238	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant				Very essential	1
239	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard				Very essential	1
240	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly				Very essential	1
241	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly				Very essential	1
242	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful				Very essential	1
243	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low				Very essential	1
244	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low				Very essential	1
245	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low				Very essential	1
246	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential				Very essential	1
247	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant				Very essential	1
<b>(14) Middleware can read data from PEID</b>							
248	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential				Very essential	1
249	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard				Very essential	1
250	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard				Very essential	1
251	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly				Very essential	1
252	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly				Very essential	1
253	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly				Very essential	1
254	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor				Very essential	1
255	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly				Very essential	1
256	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant				Very essential	1
257	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant				Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

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258	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
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264	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
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266	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(15) Middleware can write data to the PEID</b>									
267	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
268	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
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285	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(16) Middleware can receive notifications of PEID events (such as value changes, alarms etc)</b>									

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		Very inessential	-	-	-	+	++	+++		
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304	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant							Very essential	1
<b>(17) Middleware can perform simple data processing (such as aggregation of messages, filtering duplicated messages etc)</b>										
305	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential							Very essential	1
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361	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant									Very essential	1
<b>(20) Middleware can carry out PEID Management (registration, editing access control rules for devices etc)</b>												
362	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential									Very essential	1
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400	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
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418	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(23) Middleware can detect the presence of a PEID</b>								
419	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
420	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
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<b>(24) PDKM functionality to handle/manage the application's specific data and/or knowledge management requirements (e.g. logistics management, maintenance etc)</b>								
438	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential 1
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<b>(25) PDKM has document management functionality for the whole lifecycle of the product/component (i.e. overview of all related documents)</b>								

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		Very inessenti al									Very essential	
457	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?											1
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467	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard									Very essential	1
468	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly									Very essential	1
469	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly									Very essential	1
470	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful									Very essential	1
471	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low									Very essential	1
472	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low									Very essential	1
473	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low									Very essential	1
474	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential									Very essential	1
475	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant									Very essential	1
<b>(26) PDKM have incident management, i.e. can handle information about the usage of the product/ equipment/ component</b>												
476	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential									Very essential	1
477	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard									Very essential	1
478	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard									Very essential	1
479	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly									Very essential	1
480	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly									Very essential	1
481	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly									Very essential	1
482	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor									Very essential	1
483	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly									Very essential	1
484	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant									Very essential	1
485	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant									Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA			
		-	-	-	+	+	+	+		
486	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard							Very essential	1
487	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly							Very essential	1
488	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly							Very essential	1
489	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful							Very essential	1
490	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low							Very essential	1
491	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low							Very essential	1
492	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low							Very essential	1
493	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential							Very essential	1
494	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant							Very essential	1
<b>(27) PDKM can receive data from a PEID reader</b>										
495	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential							Very essential	1
496	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard							Very essential	1
497	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard							Very essential	1
498	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly							Very essential	1
499	How well do you believe the requirements related to this function were defined at the beginning of the application activities (I.e. when work started on your Ax WP)?	Very poorly							Very essential	1
500	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly							Very essential	1
501	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor							Very essential	1
502	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly							Very essential	1
503	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant							Very essential	1
504	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant							Very essential	1
505	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard							Very essential	1
506	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly							Very essential	1
507	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly							Very essential	1
508	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful							Very essential	1
509	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low							Very essential	1
510	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low							Very essential	1
511	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low							Very essential	1
512	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (I.e. can business still be developed without this function)	Very inessential							Very essential	1
513	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant							Very essential	1
<b>(28) PDKM can receive data from the PEID via the Middleware</b>										
514	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential							Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very hard	Hard	Neutral	Easy	Very easy	Very essential	
515	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
516	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
517	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
518	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
519	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
520	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
521	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
522	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
523	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
524	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
525	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
526	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
527	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
528	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
529	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
530	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
531	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
532	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(29) PDKM has access control functionality (i.e. creation and use of roles for users)</b>								
533	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
534	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
535	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
536	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
537	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
538	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
539	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
540	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
541	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
542	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
543	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→							NA
		Very poorly						Very essential	
544	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
545	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
546	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
547	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
548	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
549	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
550	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
551	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(30) PDKM's web-portal allows the users to possibility to create, change and view data/objects within the limitations of their role</b>									
552	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
553	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
554	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
555	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
556	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
557	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
558	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
559	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
560	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
561	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
562	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
563	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
564	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
565	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
566	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
567	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
568	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
569	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
570	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(31) PDKM has a web-portal so that different participants in different places all over the world can work via a web-interface.</b>									
571	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----+-----→						NA
		Very hard					Very essential	
572	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
573	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
574	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
575	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
576	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
577	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
578	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
579	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
580	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
581	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
582	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
583	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
584	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
585	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
586	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
587	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
588	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
589	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(32) PDKM can transfer and update data on PEID</b>								
590	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
591	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
592	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
593	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
594	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
595	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
596	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
597	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
598	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
599	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
600	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1



Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA
		Very hard	Hard	Medium	Easy	Very easy	
629	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential 1
630	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential 1
631	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential 1
632	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential 1
633	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential 1
634	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential 1
635	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential 1
636	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential 1
637	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential 1
638	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential 1
639	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential 1
640	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential 1
641	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential 1
642	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential 1
643	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential 1
644	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential 1
645	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential 1
646	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential 1
<b>(35) PDKM can generate notification reports for certain notification types, range of equipments, range of materials or a time period.</b>							
647	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential 1
648	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential 1
649	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential 1
650	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential 1
651	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential 1
652	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential 1
653	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential 1
654	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential 1
655	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential 1
656	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential 1
657	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential 1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very poorly					Very essential	
658	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
659	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
660	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
661	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
662	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
663	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
664	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
665	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(36) PDKM capable of tracking the history of products/components</b>								
666	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
667	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
668	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
669	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
670	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
671	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
672	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
673	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
674	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
675	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
676	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
677	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
678	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
679	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
680	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
681	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
682	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
683	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
684	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(37) PDKM capable to handle field data in the form of documents like specific reports (e.g. maintenance etc)</b>								
685	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1

Please note: there are still unanswered questions in this section



Check for unanswered questions by scrolling down this column

		Very hard								Very essential	NA
686	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard								Very essential	1
687	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard								Very essential	1
688	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly								Very essential	1
689	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly								Very essential	1
690	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly								Very essential	1
691	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor								Very essential	1
692	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly								Very essential	1
693	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant								Very essential	1
694	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant								Very essential	1
695	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard								Very essential	1
696	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly								Very essential	1
697	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly								Very essential	1
698	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful								Very essential	1
699	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low								Very essential	1
700	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low								Very essential	1
701	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low								Very essential	1
702	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential								Very essential	1
703	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant								Very essential	1
<b>(38) PDKM capable to handle field data in the form of single values like the current mileage, temperature etc</b>											
704	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential								Very essential	1
705	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard								Very essential	1
706	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard								Very essential	1
707	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly								Very essential	1
708	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly								Very essential	1
709	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly								Very essential	1
710	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor								Very essential	1
711	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly								Very essential	1
712	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant								Very essential	1
713	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant								Very essential	1
714	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard								Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----							NA
		Very poorly					Very essential		
715	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1	
716	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1	
717	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1	
718	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1	
719	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1	
720	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1	
721	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1	
722	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1	
<b>(39) PDKM is able to integrate needed data from related data sources</b>									
723	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1	
724	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1	
725	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1	
726	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1	
727	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1	
728	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1	
729	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1	
730	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1	
731	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1	
732	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1	
733	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1	
734	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1	
735	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1	
736	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1	
737	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1	
738	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1	
739	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1	
740	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1	
741	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1	
<b>(40) DSS has functionality to handle the application's specific decision support requirements (predictive maintenance, logistics, decide actions, aging diagnosis etc)</b>									
742	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1	

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

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		--	-	+	++	+++		
743	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
744	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
745	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
746	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
747	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
748	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
749	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
750	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
751	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
752	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
753	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
754	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
755	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
756	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
757	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
758	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
759	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
760	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(41) Possibility to enter requests into the DSS by user interface</b>								
761	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
762	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
763	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
764	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
765	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
766	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
767	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
768	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
769	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
770	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
771	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→							NA
		Very poorly						Very essential	
772	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
773	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
774	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
775	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
776	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
777	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
778	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
779	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(42) DSS can access PDKM and get data that is needed for the DSS analyses / decision making etc</b>									
780	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
781	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
782	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
783	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
784	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
785	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
786	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
787	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
788	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
789	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
790	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
791	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
792	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
793	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
794	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
795	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
796	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
797	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
798	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(43) DSS can access data sources other than the PDKM (other databases, OEMs, PDMS etc) and get necessary data for carrying out analysis etc</b>									
799	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←----- - - - - - + + + + +-----→					NA	
800	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
801	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
802	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
803	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
804	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
805	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
806	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
807	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
808	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
809	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
810	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
811	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
812	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
813	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
814	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
815	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
816	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
817	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(44) Possibility to enter data into the DSS by user interface</b>								
818	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
819	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
820	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
821	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
822	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
823	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
824	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
825	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
826	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
827	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
828	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very poorly					Very essential	
829	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
830	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
831	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
832	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
833	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
834	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
835	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
836	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(45) DSS can transfer and update data on PEID</b>								
837	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
838	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
839	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
840	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
841	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
842	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
843	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
844	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
845	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
846	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
847	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
848	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
849	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
850	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
851	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
852	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
853	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
854	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
855	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(46) DSS can store data in the PDKM (i.e. DSS can write data to the PDKM)</b>								
856	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
857	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA		
		---	--	-	+	++	+++		
858	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
859	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
860	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
861	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
862	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
863	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
864	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
865	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
866	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
867	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
868	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
869	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
870	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
871	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
872	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
873	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
874	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(47) DSS can store data in other data-sources beside the PDKM (databases, OEM etc) (i.e. DSS can write data to other datasources)</b>									
875	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
876	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
877	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
878	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
879	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
880	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
881	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
882	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
883	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
884	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
885	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
886	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→						NA
		Very poorly	poor	fair	good	Very good	Very essential	
887	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
888	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
889	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
890	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
891	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
892	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
893	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(48) DSS can present the results to the user in the user's graphical user interface</b>								
894	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
895	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
896	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
897	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
898	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
899	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
900	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
901	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
902	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
903	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
904	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
905	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
906	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
907	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
908	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
909	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
910	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
911	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
912	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(49) Web-interface for using PDKM, DSS etc (e.g. for communicating with suppliers, decision makers etc, also allows use of PROMISE systems by any web-browser)</b>								
913	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
914	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----→					NA		
		---	--	-	+	++	+++		
915	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
916	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
917	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
918	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
919	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
920	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
921	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
922	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
923	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
924	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
925	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
926	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
927	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
928	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
929	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
930	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
931	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant						Very essential	1
<b>(50) You have not defined any more optional functions in the initialisation of this self-assessment, please continue to the next section</b>									
932	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
933	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
934	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
935	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
936	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
937	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
938	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
939	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
940	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
941	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
942	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
943	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

		←-----						NA
		Very poor	poor	moderate	good	Very good	Very essential	
944	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poor					Very essential	1
945	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
946	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
947	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
948	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
949	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
950	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(51) You have not defined any more optional functions in the initialisation of this self-assessment, please continue to the next section</b>								
951	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
952	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1
953	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard					Very essential	1
954	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly					Very essential	1
955	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly					Very essential	1
956	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly					Very essential	1
957	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor					Very essential	1
958	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly					Very essential	1
959	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant					Very essential	1
960	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant					Very essential	1
961	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard					Very essential	1
962	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly					Very essential	1
963	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
964	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
965	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
966	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
967	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
968	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
969	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1
<b>(52) You have not defined any more optional functions in the initialisation of this self-assessment, please continue to the next section</b>								
970	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential					Very essential	1
971	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard					Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

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972	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
973	Up until today, how well do you believe you have defined your requirements (e.g. technological, functional, interfaces, etc) needed for this function?	Very poorly						Very essential	1
974	How well do you believe the requirements related to this function were defined at the beginning of the application activities (i.e. when work started on your Ax WP)?	Very poorly						Very essential	1
975	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
976	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
977	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
978	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
979	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
980	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
981	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1
982	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly						Very essential	1
983	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful						Very essential	1
984	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low						Very essential	1
985	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low						Very essential	1
986	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low						Very essential	1
987	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential						Very essential	1
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<b>(53) You have not defined any more optional functions in the initialisation of this self-assessment, please continue to the next section</b>									
989	Compared to all the other functions in your application, how essential is this specific function for your application to work/function as intended?	Very inessential						Very essential	1
990	Imagine that your company would have developed your application without the PROMISE project. How easy would it have been for your organisation to research and develop this function without the PROMISE project?	Very hard						Very essential	1
991	Your company is developing your application within the PROMISE consortium. How easy do you feel it is for your organization to develop this function within the project?	Very hard						Very essential	1
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994	How well do you believe you have communicated your requirements related to this specific function to the respective PROMISE partners involved in developing solutions/technologies for this specific function?	Very poorly						Very essential	1
995	How well do you feel the cooperation among the involved PROMISE partners for developing this specific function has been up until today?	Very poor						Very essential	1
996	How well do you believe that the PROMISE developed technologies will fulfill your requirements related to this specific function?	Very poorly						Very essential	1
997	How important are the other functions of your application for this specific function to work as desired/required?	Very unimportant						Very essential	1
998	How important is this specific function for the other functions to work as desired/required in your application?	Very unimportant						Very essential	1
999	Based on your knowledge of this function today: How easy do you believe it will be to integrate this function with the other functions of your application? (Assume that all the other functions are fully developed)	Very hard						Very essential	1
1000	Based on your knowledge, how well can this function be fulfilled by other known solutions/technologies available on the market today and not by the work carried out in PROMISE?	Very poorly						Very essential	1

Please note: there are still unanswered questions in this section

Check for unanswered questions by scrolling down this column

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1001	Based on your knowledge of the development in PROMISE related to this function up until today, how well do you think the project results will work in your specific application related to this function?	Very poorly					Very essential	1
1002	How successful do you believe the development of solutions for this specific function will be at the end of the PROMISE project?	Very unsuccessful					Very essential	1
1003	Assess your organisation's knowledge of solutions/technologies for this type of function before PROMISE started (pre-PROMISE knowledge)	Very low					Very essential	1
1004	Assess your organisation's gained knowledge of solutions/technologies for this type of function up until today in the PROMISE project (status today)	Very low					Very essential	1
1005	Assess what you believe will be your organisation's gained knowledge of solutions/technologies for this type of function when the PROMISE project ends (predicting the future)	Very low					Very essential	1
1006	When taking into account all the functions in your application, assess how essential this specific function in itself is for the implementation of your business model associated with your application? (i.e. can business still be developed without this function)	Very inessential					Very essential	1
1007	How important is the work carried out in PROMISE for developing solutions/technologies for this specific function?	Very unimportant					Very essential	1



Funding - Assess the importance of the EU commissions funding for your company related to:										
1027	R&D partnering (partnering enabler) in PROMISE	Very unimportant							Very important	! Not yet answered, use 1 for filling in
1028	Risky, innovative technologies – participating in a project you otherwise wouldn't have undertaken	Very unimportant							Very important	! Not yet answered, use 1 for filling in
1029	Science and technology knowledge – the importance of EU funding for increasing company knowledge	Very unimportant							Very important	! Not yet answered, use 1 for filling in
1030	Acceleration of R&D within your company related to PROMISE technologies and solutions	Very unimportant							Very important	! Not yet answered, use 1 for filling in
1031	Commercial activity related to PROMISE technologies and solutions	Very unimportant							Very important	! Not yet answered, use 1 for filling in
1032	Assess the impact of own cost-share and EUs funding for your application in regard of national economic benefits (i.e. has your company's development of your Ax any impact on your nation in a very broad sense).	Very low impact							Very high impact	! Not yet answered, use 1 for filling in
1033	Assess the believed Private return on investment (ROI for your company) as a result of participating in PROMISE	Very low							Very high	! Not yet answered, use 1 for filling in
1034	Assess Public return on investment (return to EU on the investments done) in light of your application	Very low							Very high	! Not yet answered, use 1 for filling in
1035	Assess Social return on the investment in PROMISE (number of jobs, better health, better environment, safety etc)	Very low							Very high	! Not yet answered, use 1 for filling in
R&D Projects										
1036	For your company, please assess which type of R&D projects is the most important in regard of Business development.	Long range R&D by corporate							Short range projects by operating divisions	! Not yet answered, use 1 for filling in
Please assess each of this research project categorisations with regard to your application and how well your application fits each category:										
1037	<b>Basic:</b> It has adhoc processes for innovation. These are mostly individual driven to pursue knowledge out of intellectual curiosity. No prior linkages to market requirements. May be inventing new and disruptive technologies, altogether. 'Just doing R&D and more of it!' or 'our research should cost exactly what we have budgeted this year'.	Very low fit							Very high fit	! Not yet answered, use 1 for filling in
1038	<b>Recognized:</b> Projects selected are aligned to business strategy, either at corporate (long range) or at an operating division (short range) level. Market study and tracking technology are commonplace. External linkages are set up as may be appropriate. 'Necessity is the mother of invention'.	Very low fit							Very high fit	! Not yet answered, use 1 for filling in
1039	<b>Managed:</b> Formal Project Management techniques applied. Formal resource allocation methods. Engineer/Scientist (dual career) concept. External linkages are formally managed. 'The more we practice, the luckier we get...' or 'MBWA-management by walking about!'	Very low fit							Very high fit	! Not yet answered, use 1 for filling in
1040	<b>Assessed:</b> Peers assess Projects and outcome from external linkages. Accelerate for quick results due to market conditions, or exit due to unsuitability of a program. The Prototypes/Processes/People and techniques transferred to practices or R&D delivery group. Publications/Patents are commonplace. Change Management. 'Constant change to be in constant control'	Very low fit							Very high fit	! Not yet answered, use 1 for filling in
1041	<b>Learning/Innovating/Improving/optimizing:</b> At this level the organization has methods not only to improve a given innovation, but most importantly has processes to continuously learn and improve the innovation process. The outcome of the launch of innovation is the creation of new stimuli for re-innovation. Projects are reviewed and audited and true lessons to be learned. Organization should avoid 're-inventing the wheel' mode, by suitably adopting knowledge management techniques. 'Innovation is a way of life' or 'our only asset is human imagination'.	Very low fit							Very high fit	! Not yet answered, use 1 for filling in
Assess the newness of your application. As with all questions in this assessment, please use the whole scale when answering.										
1042	New to the world	Not true							Very true	! Not yet answered, use 1 for filling in
1043	New to the firm	Not true							Very true	! Not yet answered, use 1 for filling in
1044	Major revision	Not true							Very true	! Not yet answered, use 1 for filling in
1045	Incremental improvement	Not true							Very true	! Not yet answered, use 1 for filling in
You are now presented with four classifications of development projects. For each group assess your application and how it fits each category										
1046	Breakthrough product/service	Not true							Very true	! Not yet answered, use 1 for filling in
1047	Platform product/service	Not true							Very true	! Not yet answered, use 1 for filling in
1048	Next generation product/service	Not true							Very true	! Not yet answered, use 1 for filling in
1049	Derivative/enhancement of existing product/service	Not true							Very true	! Not yet answered, use 1 for filling in

In the following you are to assess your WP Ax project. All questions ask the degree of what has been done. This information is important as basis for carrying out analyses and find reasons for performance etc.										
1050	A) To what degree have the targets of the work with your Ax been determined based on technological and market trends?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1051	B) To what degree have concrete and clear goals to achieve those targets been set?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1052	C) To what degree have appropriate indicators to measure attainment been established?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1053	D) To what degree are the schedule and budget appropriate for the attainment of goals?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1054	E) To what degree are necessary elemental technologies in place for the attainment of goals?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1055	F) To what degree are the relation and order of elemental technologies appropriate?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1056	H) To what degree is the project formation appropriate to attain the goals?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1057	I) To what degree have researchers been selected appropriately?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1058	J) To what degree does the management office play appropriate roles in your Ax project (provided the management office is involved)?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1059	K) To what degree has the project leader of your WP Ax been selected appropriately? Has an environment to ensure success been created?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1060	L) To what degree is the formation of your WP Ax adequate to urge collaboration and/or competition among the participants?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1061	M) Based on a scenario for practical applications, to what degree is there a system to request the results to stakeholders (target users of applications) and to request their involvement?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1062	N) To what degree has progress been constantly monitored and been properly reflected in the plans for your application?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1063	O) To what degree can there be a timely and appropriate response to changes in the socio-economic situation and political and technological trends?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1064	P) To what degree is the policy for revising the plan consistent?	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
Imagine now that we divide the time-scale in <b>short-term</b> (project running in PROMISE), <b>mid-term</b> (project is completed and implemented), and <b>long-term</b> (post project period). For each of these periods, please assess the following aspects:										
<b>Short-term (PROMISE project running)</b>										
1065	Assess Private return on investment (ROI for your company) as a result of PROMISE in this short-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1066	Assess Public return on investment (return to EU on the investments done in view of your application) in this short-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1067	Assess Social return on investment (number of jobs, better health, better environment, safety etc) in this short-term period	Very low							Very high	! Not yet answered, use 1 for filling in
<b>Mid-term (PROMISE is completed and your application is fully implemented)</b>										
1068	Assess Private return on investment (ROI for your company) as a result of PROMISE in this mid-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1069	Assess Public return on investment (return to EU on the investments done in view of your application) in this mid-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1070	Assess Social return on investment (number of jobs, better health, better environment, safety etc) in this mid-term period	Very low							Very high	! Not yet answered, use 1 for filling in
<b>Long-term (Post-PROMISE, i.e years after the project is finished)</b>										
1071	Assess Private return on investment (ROI for your company) as a result of PROMISE in this long-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1072	Assess Public return on investment (return to EU on the investments done in view of your application) in this long-term period	Very low							Very high	! Not yet answered, use 1 for filling in
1073	Assess Social return on investment (number of jobs, better health, better environment, safety etc) in this long-term period	Very low							Very high	! Not yet answered, use 1 for filling in
<b>General questions</b>										
1074	To what degree has your organisation increased R&D spending within related fields based on PROMISE (i.e. additional funding on related areas)	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1075	To what degree has your organisation increased R&D spending on the PROMISE project (if any) (i.e. additional funding than the planned resource-usage)	Very low degree							Very high degree	! Not yet answered, use 1 for filling in
1076	To what degree has your organisation expanded the goals of the application as the project has progressed	Very low degree							Very high degree	! Not yet answered, use 1 for filling in

1077	To what degree has your organisation decreased the goals of the application as the project has progressed	Very low degree								Very high degree	! Not yet answered, use 1 for filling in
1078	To what degree has there been more R&D-collaboration in your organisation as a consequence of the PROMISE project (i.e. involvement of others than your organisations PROMISE team)	Very low degree								Very high degree	! Not yet answered, use 1 for filling in
1079	Assess the technological advances during the course of the project up until present day for your organisation	Very low								Very high	! Not yet answered, use 1 for filling in
1080	To what degree have you identified spin-off products based on your participation and work in PROMISE	Very low degree								Very high degree	! Not yet answered, use 1 for filling in
1081	Assess the spill-over effect of product improvements in relation to costs for other existing products in you company	Very low effect								Very high effect	! Not yet answered, use 1 for filling in
1082	Assess the spill-over effect of product improvements in relation to quality for other existing products in you company	Very low effect								Very high effect	! Not yet answered, use 1 for filling in
<b>Employment opportunities as a result of your application for your own organisation and subsidiaries. Please note that a "negative" answer is not "wrong" this can indicate more efficient processes and greater competitive power due to e.g. less manual labor</b>											
1083	Assess the effect of your application related to increase in employment opportunities in Production in your organisation	Very low								Very high	! Not yet answered, use 1 for filling in
1084	Assess the effect of your application related to increase in employment opportunities in Production in your subsidiaries/cooperating service partners etc	Very low								Very high	! Not yet answered, use 1 for filling in
1085	Assess the effect of your application related to employment opportunities in Distribution in your own organisation	Very low								Very high	! Not yet answered, use 1 for filling in
1086	Assess the effect of your application related to employment opportunities in Distribution in your subsidiaries/cooperating service partners etc	Very low								Very high	! Not yet answered, use 1 for filling in
1087	Assess the effect of your application related to employment opportunities in Service in your own organisation	Very low								Very high	! Not yet answered, use 1 for filling in
1088	Assess the effect of your application related to employment opportunities in Service in your subsidiaries/cooperating service partners etc	Very low								Very high	! Not yet answered, use 1 for filling in
1089	Assess the effect of your application related to employment opportunities in R&D in your own organisation	Very low								Very high	! Not yet answered, use 1 for filling in
1090	Assess the effect of your application related to employment opportunities in R&D in your subsidiaries/cooperating service partners etc	Very low								Very high	! Not yet answered, use 1 for filling in
<b>Statements</b>											
1091	How does the following statement fit with the development of your application (Ax) in your company: "Senior executives recognise the importance of the new product/service and act accordingly. This may include senior executive executives dedicating personal time to projects, allocating adequate funds and actively encouraging the process to be improved".	Very low fit								Very high fit	! Not yet answered, use 1 for filling in
1092	How does the following statement fit with the development of your application (Ax) in your company: "Multi-functional teams, with representatives from all relevant sites, have been used from the initial stages of PROMISE"	Very low fit								Very high fit	! Not yet answered, use 1 for filling in
1093	How does the following statement fit with the development of your application (Ax) in your company: "Information on customer's requirements, representative of all regions/countries that the product is to be sold in, are actively sought and incorporated in product improvements and designs".	Very low fit								Very high fit	! Not yet answered, use 1 for filling in
<b>Summary assessments. The following assessment questions have been included in order to create room for analyses. Some of them might remind you of other questions, but please answer all questions as they will be used for analytical purposes.</b>											
1094	Assess the initial clarity of your Ax project (goals and general direction)	Very unclear								Very clear	! Not yet answered, use 1 for filling in
1095	Assess top management support (willingness of top-management to provide the necessary resources and authority/power) for your Ax success	Very low								Very high	! Not yet answered, use 1 for filling in
1096	How well do you feel the Ax's project plan for developing the application has been working?	Very poorly								Very well	! Not yet answered, use 1 for filling in
1097	Overall, assess your amount of client consulting related to your application (degree of communication, consultation, and active listening to all impacted parties)	Very low								Very high	! Not yet answered, use 1 for filling in
1098	Assess the availability of the required technology and expertise to accomplish the specific technical action steps (these could be directed not only towards PEID, MW etc, but also towards other technical aspects) of your application in the PROMISE project	Very bad								Very good	! Not yet answered, use 1 for filling in
1099	Assess how the communication within your company has been related to your application – the provision of appropriate network and necessary data to all key actors for the project/application implementation	Very bad								Very good	! Not yet answered, use 1 for filling in
1100	Assess to what degree trouble-shooting has been part of your Ax project	Very low								Very high	! Not yet answered, use 1 for filling in
1101	Assess the trouble-shooting ability of your Ax project – the project's ability to handle unexpected crises and deviations from plan	Very low								Very high	! Not yet answered, use 1 for filling in
<b>PROMISE and your application - summary</b>											
1102	Assess the complexity of product-user interfaces (is it an interface driven product or other type of product with less complexity on the interface side)	Very low								Very high	! Not yet answered, use 1 for filling in
1103	Assess the complexity of the internal product structure (number of distinct components, production steps, number of interfaces, and technological difficulty of and severity of the trade-offs among different components)	Very low								Very high	! Not yet answered, use 1 for filling in
1104	How much adaptation of the PROMISE technologies / solutions are needed in order to use it/them in your application?	Very little								Very much	! Not yet answered, use 1 for filling in

1105	How well do you believe that the PROMISE developed technologies/solutions will fulfil your expectations/requirements related to your application?	Very poorly								Very well	! Not yet answered, use 1 for filling in
1106	How well do you believe that the results from the project will work in your application?	Very poorly								Very well	! Not yet answered, use 1 for filling in
1107	Based on your knowledge and involvement in the PROMISE project up until today, what is the probability that your application Ax will be a technological success?	Very low								Very high	! Not yet answered, use 1 for filling in
1108	Based on your knowledge and involvement in the PROMISE project up until today, what is the probability that your application Ax will be a market success?	Very low								Very high	! Not yet answered, use 1 for filling in
1109	In Section 1 of this self-assessment you answered questions related to integration of needed functions in your application. From an overall perspective, how easy do you think the integration of all needed functions will be?	Very hard								Very easy	! Not yet answered, use 1 for filling in
1110	Assess the believed increase in performance due to PROMISE compared to today in your related services (if applicable)	Very low								Very high	! Not yet answered, use 1 for filling in
1111	Assess the believed increase in performance due to PROMISE compared to today in your related products (if applicable)	Very low								Very high	! Not yet answered, use 1 for filling in
1112	Up until today, to what degree have your company implemented any of the results from PROMISE into your current running business	Very low degree								Very high degree	! Not yet answered, use 1 for filling in
1113	To what extent do you feel that your Ax is exploiting the technical and technological capabilities within PROMISE.	Very little								Very much	! Not yet answered, use 1 for filling in
1114	From an overall perspective and based on your company's participation in PROMISE up until today, assess how much your company has learned from this participation.	Very little								Very much	! Not yet answered, use 1 for filling in
1115	On the given scale, how easy will it be for your company to continue work in this area without the PROMISE consortium after the termination of the project.	With difficulty								With ease	! Not yet answered, use 1 for filling in
Please give an assessment related to what work with your PROMISE application has resulted in related to the following five statements:											
1116	New applications identified	None								Many	! Not yet answered, use 1 for filling in
1117	New products and processes identified	None								Many	! Not yet answered, use 1 for filling in
1118	New business opportunities identified	None								Many	! Not yet answered, use 1 for filling in
1119	New business alliances identified	None								Many	! Not yet answered, use 1 for filling in
1120	Patents	None								Many	! Not yet answered, use 1 for filling in

## ECONOMIC AND PERFORMANCE EVALUATION

### Objective of this section

In relation to your specific application, there are objectives that will determine whether or not the application is a success (either in the market place or as a technology to be used by other projects within your company). These objectives will be part of determining the performance of your application and its economic value. Objectives can be internal in the R&D phase (e.g. spin-off products / applications / new R&D areas discovered), or they can be related to the implementation phase (e.g. implementation of one production line within 6 months in order to reach specific sale dates) etc. This section addresses indicators and will use the data you will input (together with other aspects covered in the self-assessment) to assess the performance of your application and the evaluate its economic value.

### SMART-indicators structure

We have broken down and identified indicators which covers the lifecycle of products and processes to understand how they are both influenced by PROMISE solutions/technologies. Phases considered are:

**BOL - R&D:** this section focuses on BOL and specifically on developing a new solution which means that you have to evaluate how PROMISE technology/solutions can impact the future R&D process from the initiation of R&D to finished prototype ready for setting up production. Typical objectives here are related to number of prototypes developed within a specified time, number of spin-off technologies, budgetary objectives related to time and money etc., Implementation stage (into production/use) - typically related to time for implementation etc

**BOL - Operations:** it may be that PROMISE solutions/technologies can affect the performance of your operations typically achievable output, increase in service, decrease in working hours etc

**MOL - Usage:** in this section you find indicators on how your new product/service may affect the performance of your customer's usage of the product. These indicators may be more difficult to assess, but please make an assessment/best guesstimate.

**MOL - Maintenance:** in this section you find indicators to evaluate how the maintenance process changes due to PROMISE solutions/technologies.

**EOL:** in this section you find indicators to evaluate how the End of Life process changes and how your solution get benefits in this area thanks to the introduction of PROMISE solutions/technologies.

### Colour codes in the economic/performance assessment

In the assessment, each generic phase of the product/process lifecycle is listed with grey. For each phase we want to evaluate revenues, costs (in orange) and investments (pink). Moreover we also evaluate performance of the PROMISE solution/technologies from the point of view of other indicators (listed in green) more difficult to be economically quantified. You are asked to assess your application by using the real and forecast values in appropriate columns along the gliding scale.

### How to complete the assessment

We ask you to describe the effects of PROMISE technology/solutions on the company as a whole, evaluating the direct and indirect impacts at different levels. Please consider it not specifically an evaluation of prototypes coming out at the end of PROMISE, but you should evaluate the general impact of PROMISE on your company and your customer. For ex. when we ask impact on R&D we mean in the future generation of products. Please put economic value in thousand of euro.

### The columns in the assessment

**NA** - Use the integer 1 when in your company the indicator is not affected by Promise solution.

**PRIORITY** - here you should specify how important the indicator is for your company with a scale from 1=very low importance to 6=very high importance) in terms of desired improvement.

**SITUATION PRE-PROMISE** - you should say what was the mean value for each indicator before implementing PROMISE solutions/technologies in your product. Please put economic value in thousand of euro.

**POST-PROMISE-year 0 to 5** - please forecast the value of the indicators according to previous trend in your company and according to forecast impact of PROMISE solution/technologies. Please put economic value in thousand of euro.

**VARIABILITY** please evaluate how stable the values given as forecast for the years 0-5 are. This means that writing e.g. 10 % in this column indicates that the forecast values for the six years are correct with an error of +/-10%.

	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)
<i>economic value in thousands of euro</i>										
<p><b>Your application:</b> Please state very briefly your PROMISE product/service in the cell to the right. As an example it may be that your company generally produce white goods but you apply PROMISE solutions/technologies only to Refrigerators. All the following sections will address specifically this product/service and processes related to it. In some cases (as with R&amp;D), the effects of the PROMISE inside product or service will also be assessed, as there might be tangible effects such as better information gathering leads to improvements in future R&amp;D etc.</p>										
<p><b>OVERALL REVENUES AND MARKET VIEW:</b> this section relates to the assessment of PROMISE impact on your company revenues and in the market development in terms of market share, new customers etc</p>										
<p><b>revenues from pre-Promise products/services:</b> please quantify the revenues due to product versions -models- previous to the PROMISE-introduction by the company ? In case of service providers (like Intracom) quantify income from services provided before PROMISE introduction. If the strategy of the company is to sell these products/services also after PROMISE introduction, as a different version of the product, it is necessary to forecast their value for the future.</p>										
<p><b>revenues from new products/services with PROMISE technologies/solutions inside:</b> assess revenues PROMISE products/services means products/services with Promise technologies/solutions inside. These may start from year 0 most probably from year 1.</p>										
<p><b>number of services provided per previous versions of product:</b> services integrated with products include: onsite maintenance support, online maintenance support, product customization, recycling support, re-tooling, ...if you are a manufacturing company: Please quantify how many of these services per product you were offering before introduction of PROMISE technologies / solutions? If you are a service provider (like Intracom) evaluate number of different services to evaluate if it increases thanks to PROMISE solutions/technologies.</p>										
<p><b>number of services provided per PROMISE product:</b> services integrated with PROMISE products include: maintenance support, product customization, recycling support, re-tooling, ...</p>										
<p><b>market share:</b> total company's sales/overall market sales. Please relate only to sales of products/services which are affected by PROMISE. As an example if you produce white goods but PROMISE technologies/solutions will be applied only to one category (like refrigerators) consider only market share for this category.</p>										
<p><b>number of new customers per year:</b> this permits to evaluate the capability of the company to acquire new customers every year. It may be that this capability is influenced by PROMISE since the product /service is more attractive to the market.</p>										
<p><b>customer retention:</b> customer doing more than one order in the year / total number of customer in the year. It is important to evaluate the capability of PROMISE to reduce loss of disappointed customers.</p>										
<p><b>other:</b> If there are other categories of revenues or market developments which you feel is not covered by the above statements for your specific Application Scenario, please provide them in the rows below giving also a short explanation.</p>										

	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)

**BOL-R&D:** This section focuses on BOL and specifically on developing new solutions, from concept to design to engineering. This means that you have to evaluate how Promise can impact your company's future R&D processes from the initiation of R&D of new products/services to e.g. finished prototypes ready for setting up production. This can be an indirect effect that Promise solution has since it gives the possibility to collect data directly from the product (see indicators). Please note that we here are trying to assess if your company's involvement in the PROMISE project and the results from the project will have also any effect on other R&D undertakings (e.g. reduction of costs, the availability of new structured information and its impact on the R&D processes etc). In this section we are also trying to assess the amount of resources your company uses for R&D (e.g. cost of research per year) and the amount of investments done and forecast in order to be able to evaluate direct and indirect impact of Promise on your company business

<b>overall Cost of research per year:</b> It may be that costs for research increases in year 0 because of introduction of new technologies through Promise project. During the years after Promise, costs of management of overall research activities might be influenced by the fact that it will be easier to know which are the functionalities of the product/process that need to be improved thanks to information gathered directly from the product through PEID etc. shortening the time or decreasing the costs of some phases. This category includes costs for people involved in the R&D department, cost for training, costs of materials, ..										
<b>cost of outsourcing research activities:</b> cost for outsourcing design of products, prototypes, market researches etc. It maybe be that as an indirect effect the possibility to have a lot of information from previous product version (usage of the product, services used) may support the capability to perform internally some research phases.										
<b>cost for market analysis on new trends:</b> This may be calculated as cost for market analysis outsourced to consultants, or performed by internal marketing department. In fact it may be that as an indirect effect the possibility to have a lot of information on usage of the product, services used may ease the capability to perform forecasts on new market trends thanks to larger number of historical data.										
<b>cost to collect feedback from customer on previous product versions /customer requirements collection:</b> this may be calculated as cost to collect information with interviews, questionnaires, or cost to collect all the feedback given to the product by customers during lifecycle -for ex. Feedback on problems met in usage, collection of all interventions required ,... This may be positively influenced by information embedded in the product which permits to collect customer's habits on product usage										
<b>cost of designing new plant layout:</b> time to design new plant layout per cost of people involved. This can be specifically for A11 scenario.										
<b>cost of changing plant layout</b> time required for changing * (manpower cost + production lost) . This is also related only to A11 scenario										
<b>investments on hardware for R&amp;D:</b> this includes long term investments in new machineries (PCs, machines, ...) , premises, acquisition of patents, training, ... which are necessary for R&D activities. Please include also investments due to Promise project.										

	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)
<b>investments on software for operations:</b> including new software, licensing, implementation, training, ... for R&D activities. Please include also investments due to Promise project.										
<b>Mean Time to market:</b> mean time from idea generation to product on the market. This might be influenced because of communication on product performance with MOL and EOL.										
<b>mean time to collect feedback from customer on previous product version</b>										
<b>number of new solutions per year:</b> it can be that Promise solution for BOL permits to have more attendible information on products /services so to avoid wasting time for developing new products										
<b>Number of new functionalities per product:</b> it may be that the Promise solution permits to increase the number of functionalities of the product										
<b>Mean lifecycle for a product/service:</b> it may be that the Promise solution permits to change lifecycle duration of the product or service										
<b>other:</b> if you think it necessary please provide some other categories which are influenced by Promise technologies, directly and indirectly. For ex. Number of Prototypes, costs of prototypes etc. Make a clear and understandable description of each category. Only one category per row.										
<b>BOL -OPERATIONS:</b> this section is to evaluate how promise technology can influence your own production process and generally speaking also other operations like logistics, distribution of the product, provision of the service (in the case of service provider -like Intracom, think that production process is the process to offer a service to customer).										
<b>production costs per year:</b> operative costs for manufacturing a product or operative costs to provide a service including manpower, energy consumption, overhead, materials, ... generally speaking, it can be that the production costs increase in the first years after Promise, due to the fact that also the production process change (since you have to install extra components in the product etc , you have to buy extra materials etc, you have to change production process) but then they may decrease										
<b>cost of not planned production interruptions:</b> costs for production lost due to unplanned interruptions due to damage, breaks, etc.). This may be valid also for service provision where interruption in internet connections, problems with servers can cause problems to the normal flow of the service										
<b>investments on hardware for operations:</b> including new machineries (PCs, machines, ...) , licensing, implementation services, training, ... which are necessary to improve the operations either manufacturing or service provision. For service provision it may include also installation of call centers, investments in new networking systems ..										
<b>investments on software for operations:</b> including new software, licensing, implementation, training, ...										
<b>internal productivity:</b> n of piece /hour -day -year. From the producer point of view. For the service providers please consider, average n.of contacts /hour										
<b>flexibility (time to change product family):</b> capability of the system to change production from one product family to another										

	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)
<b>flexibility (time to change order production):</b> time necessary to start processing a new order										
<b>flexibility (volume flexibility)</b> capability of the system to change volumes of production - orders for large amounts vs orders for small quantities.										
<b>time to order:</b> time to satisfy an order, from receiving it to delivering product/service to the customer										
<b>time to assembly:</b> time to assemble product, from components availability to final product at the warehouse.										
<b>mean number of defected products during production per year</b>										
<b>mean number of rejected products from customers per year</b>										
<b>other:</b> please specify other economic or performance impact on operations thanks to the usage of products and services supported by Promise technologies. Make a clear and understandable description of each category. Only one category per row.										

**MOL- USAGE:** in this section you should quantify how promise technology can impact the usage of the product or service that you offer to the customer. This means that you should evaluate improvement in the performance from the customer point of view.

<b>mean energy consumption -during usage - per year:</b> This is valid for ex. especially for locomotives which receive positive impact thanks to Design for Environment in Bombardier. It may be applied to other cases as well. Where feasible please estimate the value of energy consumption costs during usage of the product.										
<b>breakdown cost (production lost, ...):</b> cost for interruption of usage of the product / service caused by failures, defects etc. This may be calculated as production lost during the time of breakdown duration										
<b>cost for internal logistics:</b> cost for distribution of products and service within the production process (energy consumption, manpower, ... ). This may be valid for A3 application scenario										
<b>mean time to receive orders:</b> this permits to evaluate how relationships with supplier may benefit from improved in field data management regarding their scope of supply. This is specifically requested for Bombardier case but may be applied also to other cases.										
<b>number of incidents per year:</b> as an example in the case of Bombardier, application of Design for Safety knowledge on safety for the operator of locomotives increases thanks to improvements in product management systems										
<b>other:</b> please specify other economic or performance impact that the customer can have thanks to the usage of products and services supported by Promise technologies. Make a clear and understandable description of each category. Only one category per row.										

**MOL- MAINTENANCE:** In this section you should evaluate the impact of the Promise solution in the maintenance phase of the product lifecycle. Please consider it from your point of view of producer of the product or provider of the service supported by the Promise solution

	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)
<b>revenues for maintenance service contracts per year:</b> please provide revenues that your company has from maintenance service provision. Where necessary you can also better specify the terms of the service contracts										
<b>revenues for warranty contracts per year:</b> revenues to the company for the definition of warranty contracts with the customer. Where necessary you can also better specify the terms of the warranty contracts here below										
<b>Cost of intervention onsite per year:</b> cost for intervention at customer site. It includes cost of personnel + cost of materials + overhead+ travel costs										
<b>Cost of online intervention per year:</b> cost of intervention made online on the product /service for maintenance reasons or for upgrading product/service status. This may include personnell dedicated to online intervention + overhead.										
<b>investments on hardware for maintenance:</b> this could include devices needed for supporting maintenance service (tags, rfid, PCs, servers...), implementation of devices, training of maintenance personnell, ...										
<b>investments on software for maintenance:</b> including new software, licensing, implementation, training, ...										
<b>mean number of breakdowns per year:</b> number of breakdowns on the product during the year. This permits to evaluate the change in reliability of the product thanks to the introduction of Promise solution.										
<b>MTBF:</b> mean time between failure. Time from one failure to another										
<b>MTTR:</b> mean time to repair the product or to make the service start again .										
<b>Number of onsite maintenance intervertions</b>										
<b>Number of online maintenance intervertions</b>										
<b>Mean time duration of onsite maintenance intervention</b>										
<b>Mean time duration of online maintenance intervention</b>										
<b>other:</b> please specify other economic or performance impact that the maintenance phase performance thanks to the usage of products and services supported by Promise technologies. Make a clear and understandable description of each category. Only one category per row.										

**EOL:** In this section you should evaluate the impact of the Promise solution in the End of Life phase of the product lifecycle. Please consider it from your point of view of producer of the product or provider of the service supported by the Promise solution. Some categories may be difficult to evaluate because some of these phases can be outsourced to external dealers specialized in recycling -dismissal activities.

<b>revenues from providing servicing for recycling products-components per year:</b> revenues due to support to recycling products and /or components.										
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	NA = 1	PRIORITY (1 = lowest, 6 = highest)	SITUATION PRE-PROMISE	post-promise -year 0	forecast value 1 year after promise	forecast value 2 year after promise	forecast value 3 year after promise	forecast value 4 year after promise	forecast value 5 year after promise	variability (+/- XX%)
<b>Revenues/ costs for dismantling, analysing, re-install components:</b> this is a cost that the customer has to sustain when the product has reached end of life and he wants to dismantle it and check whether some components can be still used. It can be a revenue for the company if it is an activity carried on by the company itself. Otherwise it is an estimation of how much the customer has to spend for this activity done internally or externally. It may include cost of personnell, costs of materials, costs of machines, overhead etc. for activities like inspection& part analysing (before deciding wether it can be re-used) cost avoidance thanks to DSS for EOL, identification of parts (cost avoidance with part tracking capability using RFID), costs for classification of part..										
<b>costs of logistics for EOL:</b> cost for managing travels at the end of life of the product, for dismantling, for recycling, for dismissing parts and components and for distributing recycled pieces (personnell, travel costs, overhead, ... )										
<b>Revenues /costs for treating retired products:</b> in the case your company retires from the customer products and components at the end of their life it could be useful to evalaute revenues and costs that the company has from this process. These are due to personnell needed to manage products and components, overhead, materials, energy consumption etc. (exclude logistics which is already listed in previous category)										
<b>investments on hardware for recycling:</b> this could include devices needed for supporting recycling service (tags, rfid, PCs, servers...), implementation of devices, training of maintenance personnell, ...										
<b>investments on software for recycling:</b> including new software, licensing, implementation, training, ...										
<b>Number of recycled components per product</b>										
<b>Number of recycled components per year</b>										
<b>Number of recycled products per year</b>										
<b>%of second hand market on total market:</b> amount of products based on recycled parts/total amount of products										
<b>other:</b> please specify other economic or performance impact that the EOL phase performance thanks to the usage of products and services supported by Promise solution. Make a clear and understandable description of each category. Only one category per row.										