DI3.8: First peer-review of the PROMISE applications - Summary

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ABSTRACT	This report presents the results from the 1st Peer-review of the PROMISE applications. All applications receive an overall rating of Good or Excellent on a scale from Poor to Excellent by the peer-reviewers. Some applications have received lower marks on business and risk evaluations, significance of impact demonstrated and the impact on reinforcing competitiveness and benefits. The peer-reviews were carried out based on the status of Month 22 of the PROMISE project.

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Abbreviations

Abbreviations used in this document:

BOL	Beginning of life
DfX	Design for X (X=manufacturing, design etc)
DSS	Decision Support Systems
EOL	End of life
LCC	Life cycle cost
MOL	Middle of life
PDKM	Product Data Knowledge Management
RAM	Reliability Availability Maintainability
RFID	Radio Frequency Identification

1   Executive summary of the 1ˢᵗ peer-review results

Main findings: *All applications receive an overall rating of Good or Excellent on a scale from Poor to Excellent by the peer-reviewers. Some applications have received lower marks on business and risk evaluations, significance of impact demonstrated and the impact on reinforcing competitiveness and benefits. The peer-reviews were carried out based on the status of Month 22 of the PROMISE project.*

Each PROMISE application A1 to A11 has been reviewed by two peer-reviewers assessing, technical feasibility, potential business impact, innovativeness and risks. Eleven aspects were graded and commented using the following scale: Excellent, Good, Average, Poor. In addition, the peer-reviewers were asked specifically to name any additional risks, and where the peer-reviewer saw the scope/use of this innovation beyond the existing application.

Of the eleven aspects graded, the main summary overall rating of the application was assessed as Good/Excellent for all applications (see Figure 1). I.e. there seems to be consensus among the reviewers regarding the overall quality of the applications.
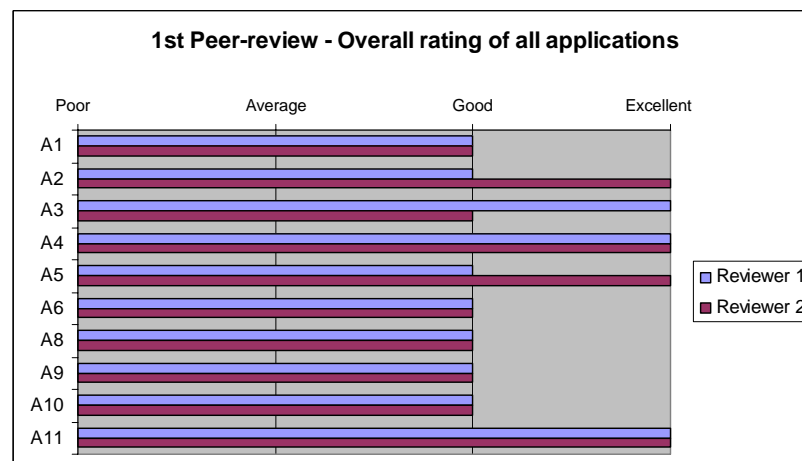
Figure 1: Overall rating of the applications A1 to A11 – Reviewers answer to: ”Rate the overall Application”

In Figure 2 all eleven aspects for each application covered in the peer-review have been summarized and an adjusted %-score has been calculated for each application. The adjustment is according to the aspect Progress beyond state-of-the-art which were not assessed by the peer-reviewers for A1 (1 aspect not assessed by 1 reviewer); A5 (1 aspects not assessed by 2 reviewers); and A9 (1 aspect not assessed by 1 reviewer). Reasons for not assessing this aspect were insufficient descriptions/comparisons between the application and the current state-of-the-art.

Please note: the overall score in Figure 2 does not necessarily reflect the quality of the applications as the following factors influence the score:
- Harsher assessments from some reviewers on specific aspects. E.g. business aspects can receive a low assessment and comments are given. In another application, the assessment can be high by both peer-reviewers, but the comments given states the same overall problem identified in an application with low score.

- A low assessment given to one aspect results in lower score on the following aspects related to the first.
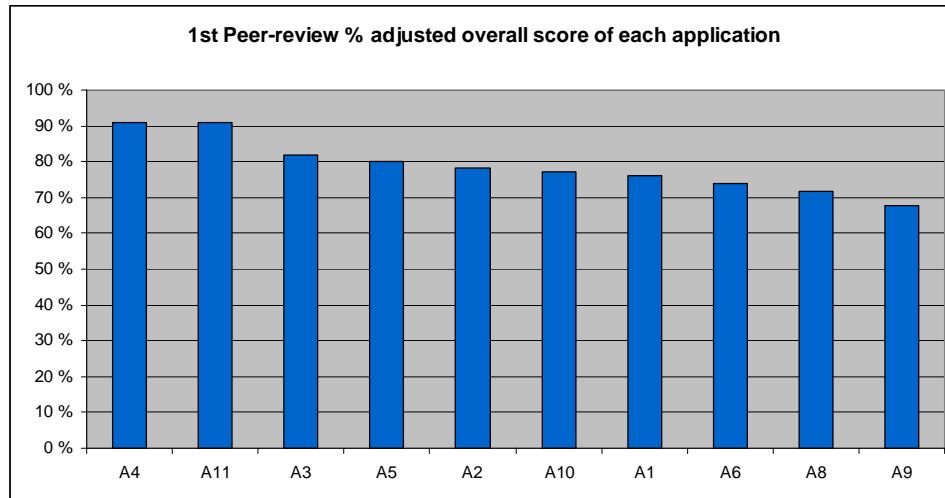
Figure 2: Overall adjusted %-score for all aspects covered in the 1st Peer-review (unanswered aspects not counted towards percentage score)

The main reasons for the lower overall percentage scores are:
- Risks have not been sufficiently identified (both technical and business, but mostly related to business)
- The magnitude of risks have not been sufficiently identified
- Significance of (business) impact not clearly demonstrated
- The impact on reinforcing competitiveness and benefits not sufficiently demonstrated

This is consistent with the findings of the self-assessments and other I3 activities. At the time of gathering the data and information from the Applications (month 22), 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 18th-19th, 2007, by application owners themselves and communicated to the EU-reviewers by the application owners in this meeting.

Figure 3 summarizes the target fulfilment/achievement as described in section 2.4.3 for all applications. As can be seen, all applications achieve the main target, (Summary - Overall rating of the application). Business and risk aspects are the categories were most applications fail to achieve the specified targets. Failure to reach the target on the General aspects is related to poor/insufficient descriptions in the applications.

	A1	A2	A3	A4	A5	A6	A8	A9	A10	A11
General aspects		Fail			Fail					
Business aspects							Fail	Fail	Fail	
Innovativeness_aspects					*					
Risk aspects	Fail							Fail		
Summary-Overall rating										

* Target for A5 not evaluated for achievement due to the fact that the reviewers did not assess progress related to state-of-the-art

Figure 3: Target fulfilment of all applications: Red-shaded area = target not achieved

2   1st Peer-reviews of the PROMISE applications A1 to A11

2.1   Introduction - The 1st Peer-review of the PROMISE applications

In this report the assessments from the peer-reviews of the PROMISE applications are reported. Each application was described by a comprehensive peer-review package presenting the state of the applications at Month 22 of the PROMISE project. The peer-review package was distributed to two peer-reviewers not directly involved in the application work-package. The peer-reviewers assessed technical feasibility, potential business impact, innovativeness and risks. Eleven aspects were graded and commented using the following scale: A=Excellent, B=Good, C=Average, D=Poor. In addition, the peer-reviewers were asked specifically to name any additional risks, and where the reviewer saw 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 has been carried out from the application point of view (according to the recommendations of the EU-reviewers and as described in the DOW).

The 1st peer-reviews are based on the project status as shown in the PROMISE Roadmap in Figure 4 and reflect the status at Month 22 of the applications and related research. The 2nd 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.
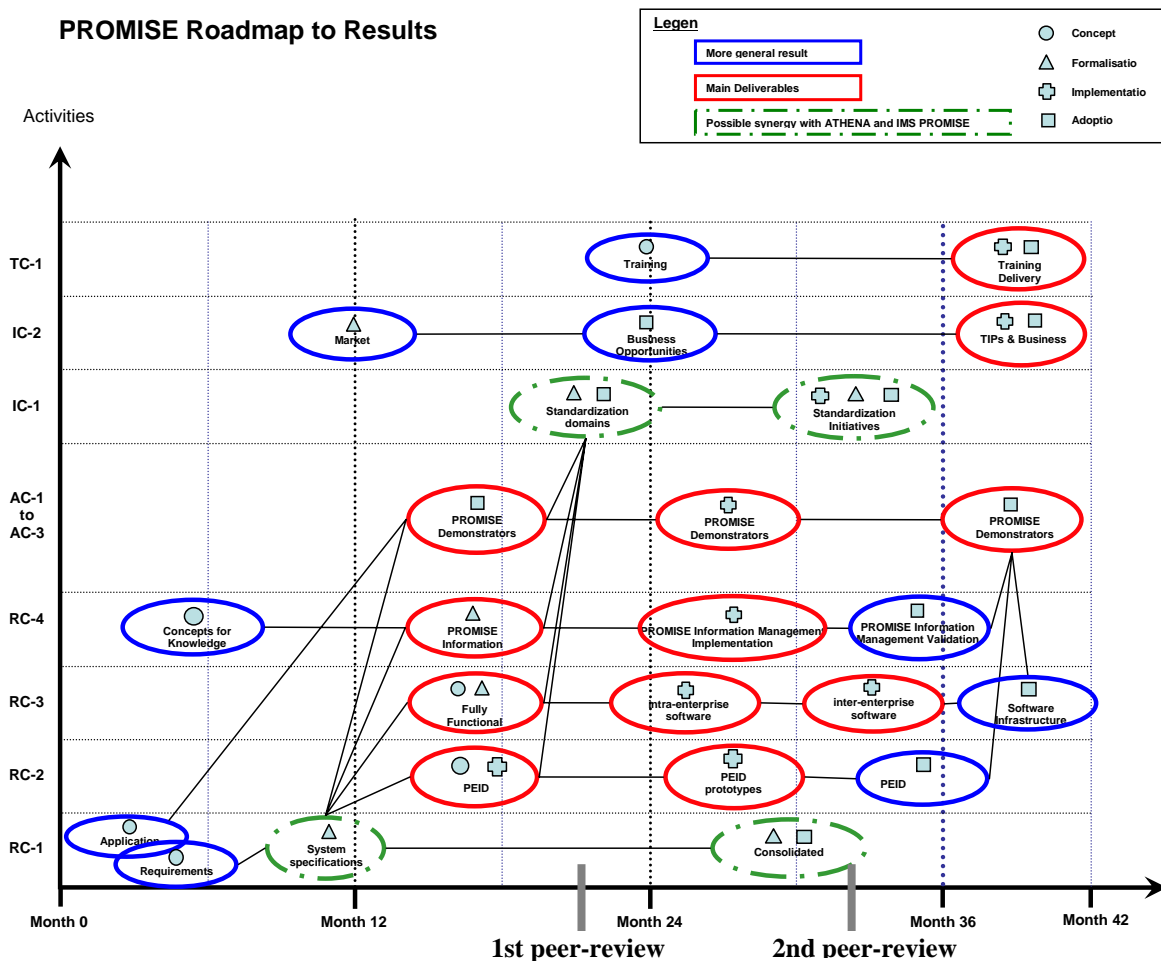
Figure 4: The PROMISE roadmap to results (according to the PROMISE DOW)

2.2 Identification of peer-reviewers

As can be found in the overall description of WP R11 a sub-objective was, 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 was not 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 were chosen as peer-reviewers of the 1st peer-review and given the responsibility as shown in Figure 5.

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 5: Overview of peer-reviewers 1st Peer-review

2.3 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 contained the core of the review process; it contained 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 contained the criteria on which the peer-reviewers assessed 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 6 shows the categories and aspects that were covered.

Categories	Aspects
General	• The Application's background and objectives are clearly stated in the document and understandable • The Application's functionalities are well presented and understandable in the document • The Application's architecture is well presented and understandable in the document
Business	• The impact on reinforcing competitiveness of the application is understandable and acceptable • The significance of the impact has been demonstrated • The application demonstrates a clear added value in carrying out the work with PROMISE technologies
Technical	• The technologies have been properly implemented in the application *(applicable only for 2nd Peer-review)*
Innovativeness	• The presented results represent clear progress beyond the current state-of-the-art • Where does the reviewer see the scope of this innovation beyond the existing application in your own or in other industries *(textual input, not graded A-D)*
Risks	• Risks have been sufficiently identified • The risks' magnitude has been sufficiently estimated • The risk is acceptable • Do you identify additional critical risks that may compromise the results of the Application not identified? *(textual input, not graded A-D)*
Summary	• Rate the overall Application

Figure 6: The categories and aspects covered in the peer-review

2.4 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 5. 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 7.

Frequency reporting and consistency check of received data

Detailed analysis of each application and overall PROMISE application analysis
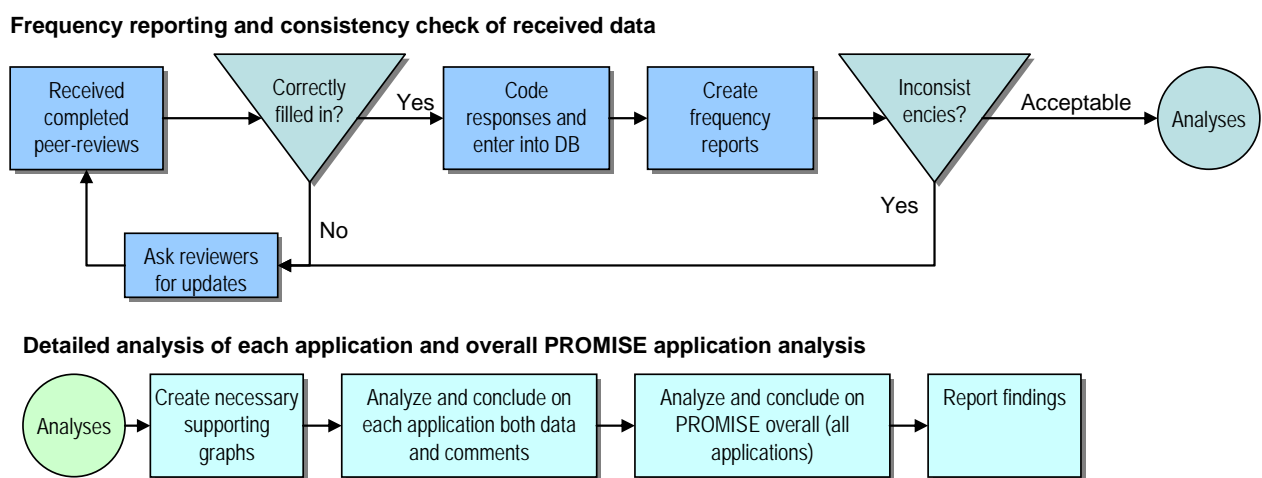
Figure 7: The peer-review analysis methodology at a glance

The overall steps shown in Figure 7 are described in more detail in the following sub-sections.

2.4.1 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 2.4.4). 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.

2.4.2 Detailed analyses of each application and overall assessment of the PROMISE applications

Necessary supporting tables and graphs are created (see section 2.4.4), 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.

2.4.3 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.

2.4.4 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 7), are the basis for carrying out the analyses.

2.5 Peer-review results

In the subsequent sections, the peer-review results for each application are presented and discussed. An overall assessment is provided in the section 1 Executive summary of the 1st peer-review results.

The structure of the detailed analysis per application is as follows:
- Brief recap of the main focus of the application
- Summarized graphs and results of the peer-review
- A discussion/summary of each main aspect covered

2.5.1 Peer-review results: Application A1 CRF (EOL)

2.5.1.1 Main focus of application

The ELV (End of Life Vehicle) directive (EU/2000/53) introduced by the EU in 2000 addresses pollution arising from vehicles that have reached the end of their useful life. The directive specifies thresholds for the reuse, recycling and recovery of materials from ELVs. By 2006 the ratio of materials in an ELV which should be reused, recycled or recovered will reach 85% of the total vehicle weight and 95% by 2015. The objective of CRF is to assess the use of PEID for improved decision making (based on information concerning parts status and history stored on the PEID, materials tracking and for testing the achievement of recycling and reuse targets as stated by the European directives.

2.5.1.2 A1 – summarized results based on peer-reviewers comments and assessments

Comparing A1 with all applications, A1 is ranked as number 7 out of 10 with a total score of 64 out of 84 (adjusted max score - Reviewer 2 did not rate the aspect: Clear progress beyond state-of-the-art). Any discrepancies between the reviewers are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A1	33	31	*32,0*	64	73 %	1	84	76 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.
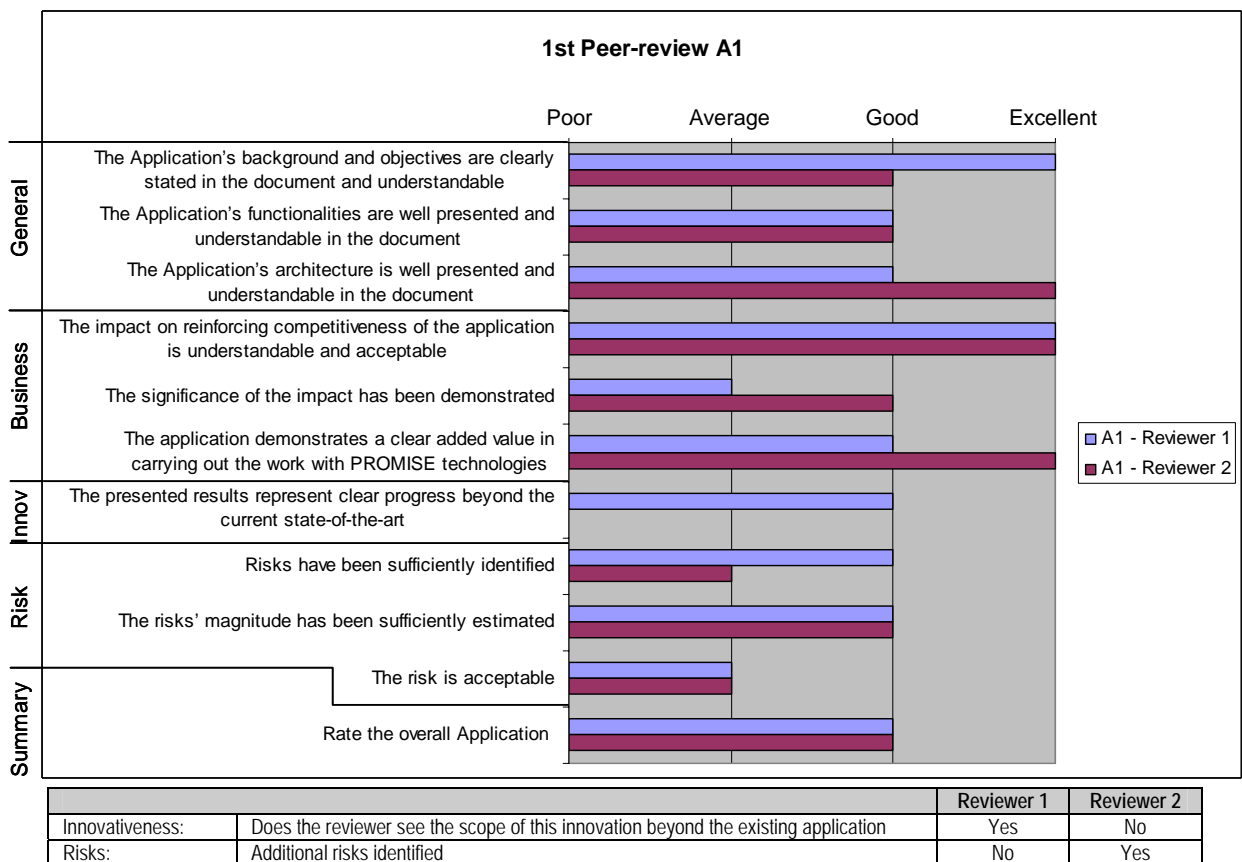
Figure 8: Peer-review results A1 (Reviewer 2 did not assess Clear progress beyond state-of-the-art)

General aspects ►*Target achieved.*
The A1 general aspects have received high scores of Excellent/Good. Only minor items have been mentioned by the reviewers.

Business aspects ► *Target achieved.*
The overall impression of the business aspects of A1 is assessed as good. However, the results show that a more detailed business analysis should have been provided in order to get a more precise idea of the economic benefits.

Innovativeness aspects ► *Target achieved.*
The application solution is found to be usable in other industries as well. Only Reviewer 1 evaluated whether the results represents a clear progress beyond the current state-of-the-art and found this to be the case.

Risk aspects ► *Target not achieved.*
The weakest part of A1 is associated with the risk aspects. Compared to the other scores of this application, the score on risks are on an average level. This is especially true for the evaluation whether the risks are acceptable or not. The main items missing are some technical risks related to data protection/security and risks associated with market reactions to introduction of the applications solutions.

Summary aspect ► *Main target achieved.*
The A1 application receives an overall rating of Good. Reviewer 2 poses several suggestions to the economic/business assessments (mainly cost aspects and where data could be retrieved) which should be taken into consideration by application A1.

2.5.2 Peer-review results: Application A2 CATERPILLAR (EOL)

2.5.2.1 Main focus of application

This demonstrator is designed to improve EOL management of CAT engines using smart embedded systems and IT infrastructure to efficiently transform data into decision and knowledge. During multiple life cycles of engine components, useful information will be collected to be able to improve decision-making at end of life of the engine for deciding whether to re-use or salvage components or purchase new ones for building remanufactured engines.

2.5.2.2 A2 – summarized results based on peer-reviewers comments and assessments

Comparing A2 with all applications, A2 is ranked as number 5 out of 10 with a total score of 69 out of 88. After a discrepancy check, any discrepancies are found to be acceptable, as the peer-reviewer 1 has a stricter attitude towards grading the covered aspects. The decision is therefore to leave the grades at their initial level showing the original scoring.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A2	29	40	*34,5*	69	78 %	0	88	78 %
	Mean score all applications			68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.
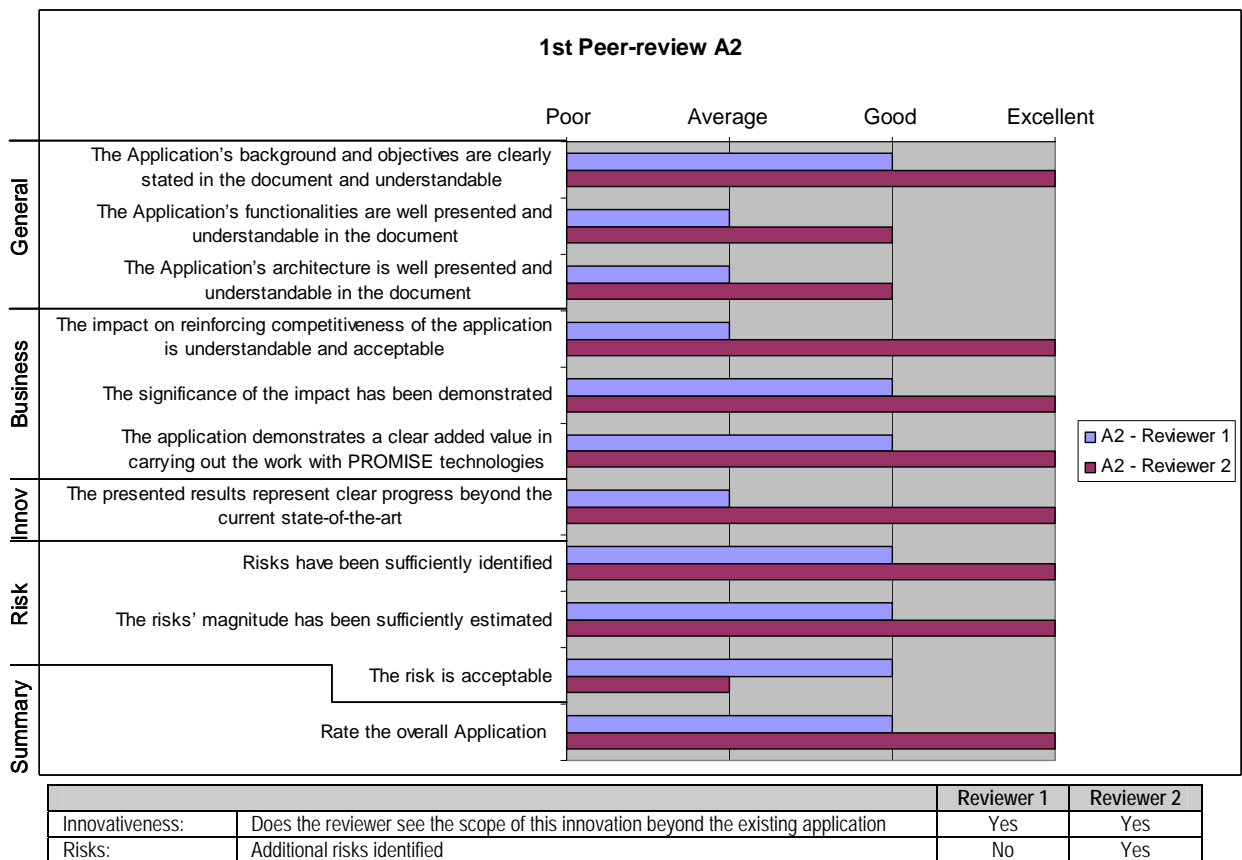
Figure 9: Peer-results A2

General aspects ► *Target not achieved.*
After a discrepancy check (see Figure 7) and addressing the comments from the reviewers, it becomes clear that the application description, functionalities and architecture contain a lot of information, what is lacking is the overall picture. In this respect the reviewers are asking for illustrations that can aid the interpretation of those unfamiliar with the application. Further, there are questions raised concerning the Decision Support Systems and what decisions really should be made as this is not clear.

Business aspects ► *Target achieved.*
The significance of impact on business has been found to be Good/Excellent, and the application demonstrates clear added value by the work with PROMISE technologies. However, the reviewers are split in the assessment of the understandability and acceptability of the impact on reinforcing the competitiveness. The main reason for this is that Reviewer 1 would like the application to address benefits for the customer better as this is not covered sufficiently.

Innovativeness aspects ► *Target achieved.*
Both reviewers comment that the scope of this innovation is applicable to other industries (car/trucks/maintenance all manufacturing where suited). The reviewers disagree on the progress beyond state-of-the-art. From a theoretical point of view, this application provides the missing link in product recovery (Reviewer 2). At the same time, there already exist elements currently in state-of-the-art already in use (Reviewer 1).

Risk aspects ► *Target achieved.*
The risks of this application have been sufficiently identified. However, some risks are rated as very high (80-100%) such as life span of RFID tags. These high-rated risks seem to be fundamental for the application success. Further, the risk related to adoption of this system by the key stakeholders has not been covered.

Summary aspect ► *Main target achieved.*
The A2 application receives an overall rating of Good/Excellent.

2.5.3 Peer-review results: Application A3 INDYON (EOL)

2.5.3.1 Main focus of application

The aim of the scenario is to improve the information flow throughout the EOL phase of the chosen product (e.g. car bumpers) and the BOL phase of the resulting recycled material (e.g. granular plastic), bridging the information gaps present in the state-of-the-art and completing the information loop. On that basis, it aims to optimise processes within these phases by providing real-time product and context information to a number of back-end systems, and by integrating DSS into the existing backend in order to more effectively and efficiently handle these processes. The objective of the A3 Demonstrator is to show how the tracking and tracing of products identified for recycling can be enhanced using the PROMISE PEID technology and PDKM/DSS system in combination with automated indoor and outdoor navigation systems.

2.5.3.2 A3 – summarized results based on peer-reviewers comments and assessments

Comparing A3 with all applications, A3 is ranked as number 3 out of 10 with a total score of 72 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A3	36	36	*36,0*	72	82 %	0	88	82 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.

			Reviewer 1	Reviewer 2
Innovativeness:	Does the reviewer see the scope of this innovation beyond the existing application		No	Yes
Risks:	Additional risks identified		No	No

Figure 10: Peer-review results A3

General aspects ► *Target achieved.*
The general aspects of A3 are assessed as Good/Excellent. No comments from the reviewers.

Business aspects ► *Target achieved.*
The business aspects are assessed as Good or Excellent. Reviewer 2 has one important comment related to that the added value of carrying out the work with PROMISE technologies is not very high, as PROMISE related technologies already are in use in the application.

Innovativeness aspects ► *Target achieved.*
The progress beyond state-of-the-art is assessed as Average/Good. The reviewers do not see any use of the innovation beyond the existing application except from in other companies recycling products.

Risk aspects ► *Target achieved.*
The risk aspects of this application are assessed to be Good. Still, the peer-review points out that business risks only have one item and that the business risks probably have been underestimated.

Summary aspect ► *Main target achieved.*
The A3 application receives an overall rating of Good/Excellent.

2.5.4 Peer-review results: Application A4 CRF (MOL)

2.5.4.1 Main focus of application

The overall objective of the A4 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

2.5.4.2 A4 – summarized results based on peer-reviewers comments and assessments

Comparing A4 with all applications, A4 is ranked as number 1 out of 10 with a total score of 80 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A4	42	38	*40,0*	80	91 %	0	88	91 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.
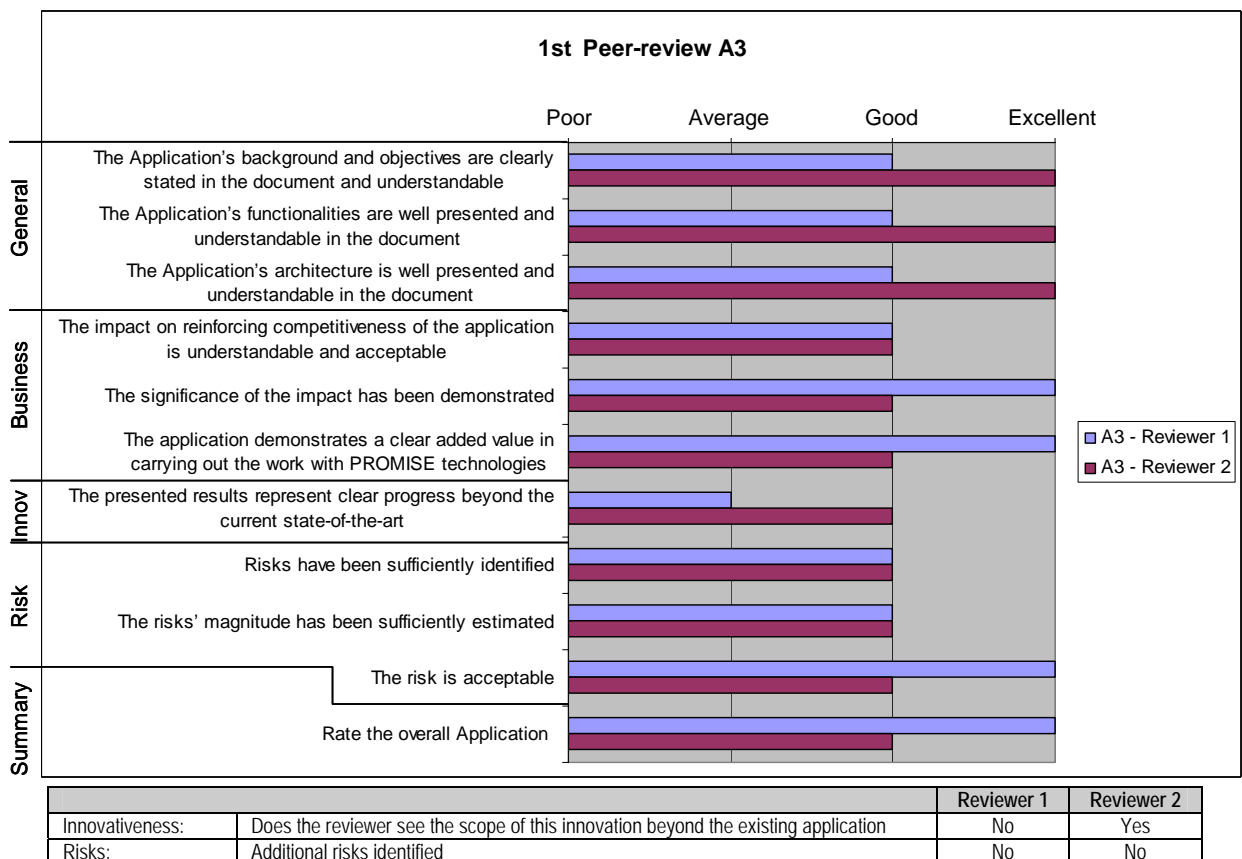

Figure 11: Peer-review results A4

General aspects ► *Target achieved.*

The presentation of the application's background, objectives and functionalities are assessed as Excellent. The architecture is found understandable and assessed as good, but both reviewers comment that there should be more use of diagrams in order to ease the understanding of the architecture.

Business aspects ► *Target achieved.*

The business aspects are assessed to be Excellent for this application.

Innovativeness aspects ► *Target achieved.*

The presented results represent clear progress beyond the current state-of-the-art, and Reviewer 2 comments that it adds significant value to the domain. The scope of the innovation beyond the existing application is also assessed to be very good as both reviewers point out opportunities within aerospace, food, and pharmaceuticals. Other opportunities are within customer relationship management and all manufacturing maintenance/electronic technologies.

Risk aspects ► *Target achieved.*

The reviewers assess the risks as sufficiently identified. However, Reviewer 2 comments that not all technologies appear to be considered, and Reviewer 1 asks for the assessment of risk of obsolescence to be covered. The magnitude of risks receives a grade of Excellent/Good, but Reviewer 2 points out that the probability of some risks appears to be a little low. The acceptability of the risks is assessed as Good/Excellent. Comments to this aspect are that the potential benefits outweigh the risks. Further, some data risks may not be suitable for the DSS. Both reviewers identify additional risks not covered: the potential for obsolescence of technologies over the lifetime of the product and usability with key decision makers and the interactiveness with customers.

Summary aspect ► *Main target achieved.*

The A4 application receives an overall rating of Excellent. Reviewer 2 comments that the application provides much needed RTD activities to overcome the current limitations in this area.

2.5.5   Peer-review results: Application A5 CAT (EOL)

2.5.5.1   Main focus of application

The A5 application deals with the capability of product lifecycle management of heavy vehicles and Structures through fatigue monitoring of Structures by using new devices attached onto the structures indicating fatigue damage of local points. These physical measures, as well as data collection linked to machine configuration and application type will specify customer use of their machine and will enable scheduling maintenance operations accordingly. Furthermore, owners could use remaining value of the structure for any resale decisions. For a fleet of vehicles, field data collection will be used for improving the Design of CAT structures dedicated to different applications and markets.

2.5.5.2   A5 – summarized results based on peer-reviewers comments and assessments

Comparing A5 with all applications, A5 is ranked as number 4 out of 10 with a total score of 64 out of 80 (adjusted max score - Reviewer 1 and 2 did not rate the aspect: Clear progress beyond state-of-the-art). After a discrepancy check (see Figure 7), any discrepancies have been found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A5	32	32	*32,0*	64	73 %	2	80	80 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.
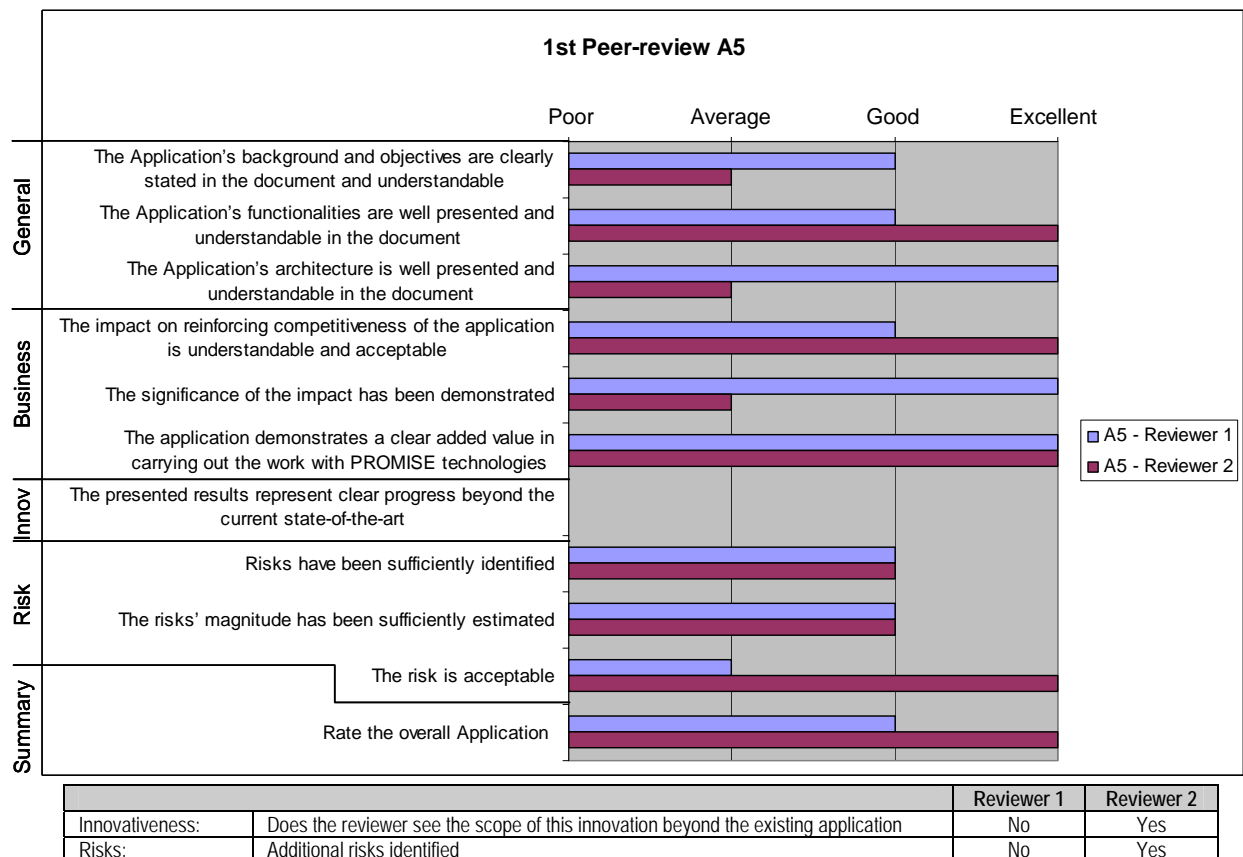
Figure 12: Peer-review results A5 (Both reviewers did not assess Clear progress beyond state-of-the-art

General aspects ► *Target not achieved.*
The general aspects of this application are assessed from Average to Excellent. I.e. there is a wide gap between the General aspects. The main reasons for the lower assessments are due to the fact that important diagrams are missing that could have aided the understanding of the architecture. Further, that there are some confusing use of industrial jargon and phrases with unclear meaning, like "develop predictive maintenance".

Business aspects ► *Target achieved.*
The application demonstrates a clear added value in carrying out the work with PROMISE technologies, and the impact on reinforcing competitiveness of the application is found to be understandable and acceptable. However, the reviewers differ in the opinion whether the significance of the impact has been demonstrated or not. Reviewer 2 has given the grade of Average due to the fact that the significance of impact only has been mentioned qualitatively. Approximate quantifications should have been given. Reviewer 1 chose not to put weight on this, and therefore rated this aspect as Excellent. This discrepancy has been checked and found to be acceptable as the comments from the reviewers highlights the rationale for the grade given.

Innovativeness aspects ► *Not evaluated for target achievement.*
Both reviewers have chosen not to assess the progress of this application beyond the current state-of-the-art. Reviewer 1 comments that the state-of-the-art related to this field is not familiar enough by the reviewer to give a fair assessment. Reviewer 2 has chosen not to grade this aspect due to the fact that the presented results lead to several research questions on managing product information throughout the lifecycle.

Risk aspects ► *Target achieved.*
According to the reviewers, the risks have been sufficiently identified. However, Reviewer 1 comments that an overall risk assessment is missing. Reviewer 1 has still chosen to grade the application as Good due to the factors covered. Reviewer 2 points out that there is a risk of obsolescence present that has not been covered in the identification of risks. This risk outweighs the other factors present. Further, Reviewer 2 comments that some RF problems seem to be underestimated. On the aspect whether the risk is acceptable, Reviewer 1 grades this aspect as Average due to the fact that an overall risk assessment is missing. Reviewer 2 assesses this aspect as Excellent due to that the potential benefits and probability of obtaining the benefits outweighs the risks.

Summary aspect ► *Main target achieved.*
The A5 application receives an overall rating of Good/Excellent. Reviewer 1, assessing the grade as Good, points out that the descriptions of the application found in the peer-review package is well written. However, since some of the explanations of abbreviations are missing, the descriptions are sometimes hard to understand.

2.5.6 Peer-review results: Application A6 FIDIA (MOL)

2.5.6.1 Main focus of application

Fidia machines (e.g. high-speed milling systems; and servo drives for milling systems) are often customised according to the needs of each individual customer, and high costs are usually incurred in production losses due to machinery breakdown, customers 'on-site' assistance during the set-up stages, as well as during the later stages of the life cycle of the machine, whenever maintenance work is needed, especially in the frequent case where the user site is several hundreds or thousands of kilometres from the supplier site. Modern Information Technologies offer the opportunity of dramatically reducing machine unavailability enhancing their diagnostic performances.

2.5.6.2 A6 – summarized results based on peer-reviewers comments and assessments

Comparing A6 with all applications, A6 is ranked as number 8 out of 10 with a total score of 65 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A6	33	32	*32,5*	65	74 %	0	88	74 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.

1st Peer-review A6

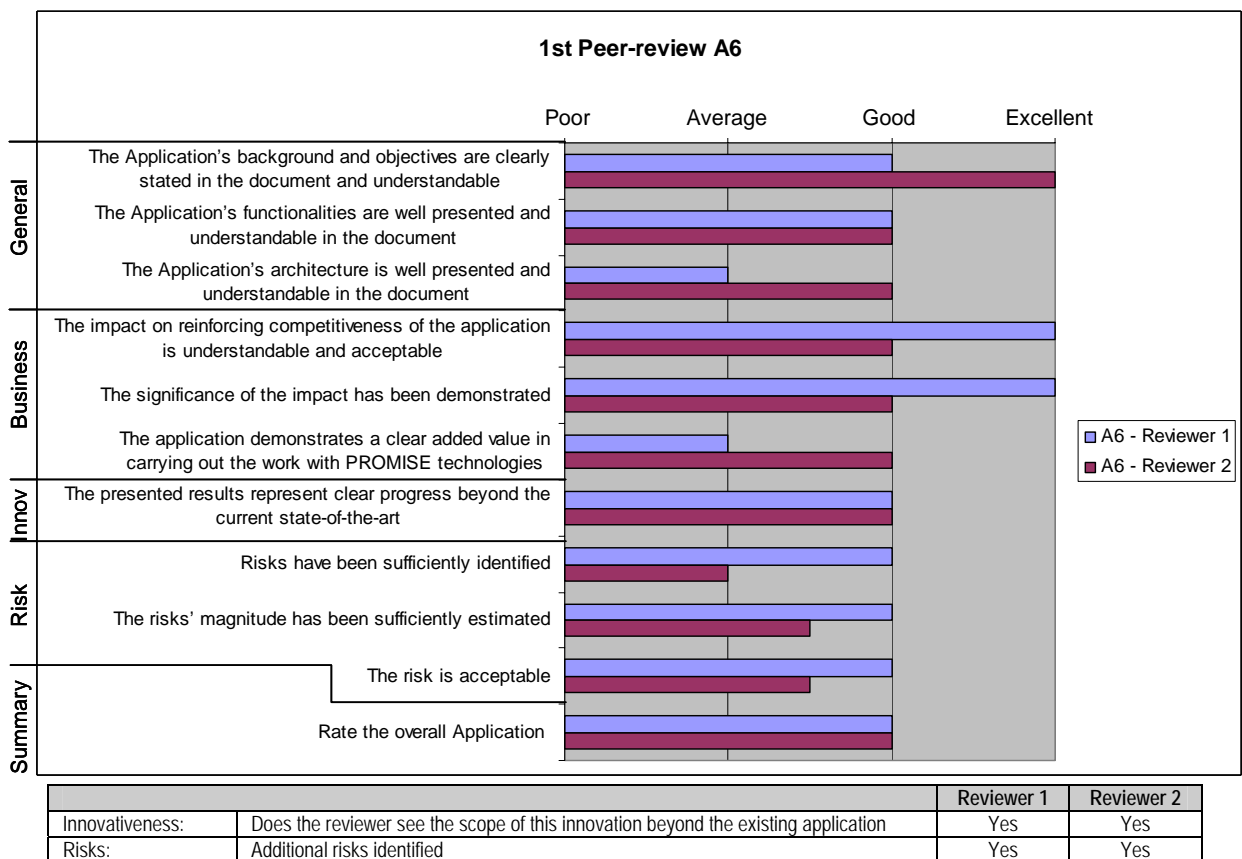|	Reviewer 1	Reviewer 2
Innovativeness: Does the reviewer see the scope of this innovation beyond the existing application	Yes	Yes
Risks: Additional risks identified	Yes	Yes

Figure 13: Peer-review results A6

General aspects ► *Target achieved.*

The reviewers grades the application's background and objectives as Good/Excellent. Reviewer 1 comments that the positive aspects concerning traceability are less precisely reported than the impact of better diagnosis of machines both on the user and the machine producer. The application functionalities are assessed as Good by both reviewers. However, Reviewer 1 comments traceability (which type of data is of interest, which analysis tools should be provided, are the required data the same for different applications and objectives) should be addressed. The application's architecture is graded as Average/Good. Reviewer 1 comments that two architectures have been proposed, but the motivation for them is lacking. Why only these two different aspects have been taken into account has not been justified as there could be other architectures. Reviewer 2 has identified a misalignment/discrepancy in the application description. It is not clear if the Decision Support System (DSS) is located at the client or at the central level.

Business aspects ► *Target achieved.*

The impact on reinforcing competitiveness is rated Excellent/Good. The impact has been particularly stressed in the application and the motivation are fully convincing according to Reviewer 1. Reviewer 2 comments that the impact is clearly addressed with some benefits indicated. The significance of the impact is also rated Excellent/Good. Reviewer 1 finds that the impact of the application has been widely investigated and its economical rough evaluation has been provided. The evaluation seems to be reasonable and the gains are evident. The aspect, demonstrating clear added value through the work of PROMISE, scores Average/Good. Reviewer 1 has commented that technological aspects haven't been adequately addressed. Alternative technologies which could be used to accomplish the same task and to support the same application are not analyzed. Therefore, it is assumed that PROMISE technologies are the only one enabling the application, but this assumption should be clarified in the text.

Innovativeness aspects ► *Target achieved.*

The presented results represent clear progress beyond the current state-of-the-art (assessed as Good). Reviewer 1 comments that even if the idea of collecting data from a workshop to perform statistical analysis and support preventive maintenance is not innovative if referred to the scientific state of the art, the application of such a kind of architecture and automated tool represents an innovation if referred to the industrial background. Again, the innovation derived by the use of the PROMISE technology is not properly stressed in the document. Both reviewers point out other uses of the solutions beyond the current A6 application, e.g. predictive maintenance for other products (like vehicles) is identified.

Risk aspects ► *Target has partly been achieved.*

Reviewer 1 points out that there is doubt related to the capability of RFID and the other technologies to correctly measure the data required to perform residual life-time estimation. Reviewer 2 highlights the business risks as the business model does not show any Return on investment, nor are the total costs of implementation covered sufficiently. A business risk assessment related to implementation should be put in place.

Summary aspect ► *Main target achieved.*

The A6 application receives an overall rating of Good. Reviewer 1 comments that the overall application is quite well explained and it is reasonably applicable to the real case. The technological aspects of the proposal should be improved, since the evaluated alternatives are not clear. This comment holds also for the architecture selection and the models to be adopted. Finally, the data measurement risks should be considered, since they have high probability and possibly high impact (depends on the models adopted). Reviewer 2 comments that apart from the business aspects, the application is very convincing.

2.5.7 Peer-review results: Application A8 WRAP (MOL)

2.5.7.1 Main focus of application

The main goal of PROMISE WPA8 MOL cluster is to develop appropriate technology, including product lifecycle models, PEID (Product Embedded Information Devices) with associated firmware and software, components and tools for decision-making based on data gathered through a product lifecycle system. The aim of WRAP in this project is to develop technical requirements for a household appliance, in particular for a refrigerator, in order to monitor it, during its functioning period at end-user's house, (MOL) by a remote monitoring centre able to perform predictive maintenance.

2.5.7.2 A8 – summarized results based on peer-reviewers comments and assessments

Comparing A8 with all applications, A8 is ranked as number 9 out of 10 with a total score of 69 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A8	33	30	*31,5*	63	72 %	0	88	72 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.

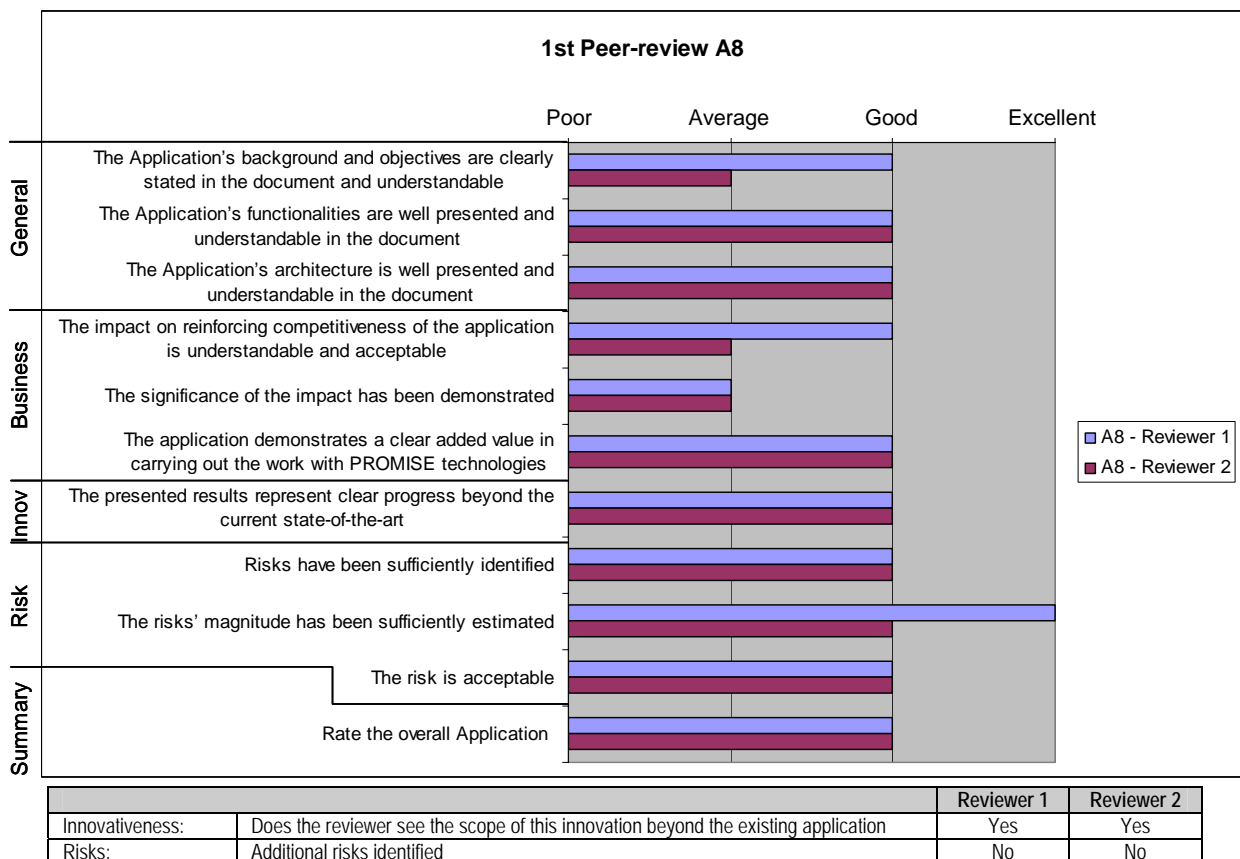|			Reviewer 1	Reviewer 2
Innovativeness:	Does the reviewer see the scope of this innovation beyond the existing application		Yes	Yes
Risks:	Additional risks identified		No	No

Figure 14: Peer-review results A8

General aspects ► *Target achieved.*

The general aspects of application A8 are assessed to be Good by both reviewers, with exception of the application's background and objectives where Reviewer 2 points out that the application's background and objectives should be detailed a bit more putting in evidence the strategic vision of the solution. Reviewer 1 comments for all aspects that the text needs revision (see Summary aspects below).

Business aspects ► *Target not achieved.*

Although the impact on reinforcing the competitiveness is shown, the application is missing figures on the market potential. Further, the significance of impact might be better demonstrated by projected time series of turnover and surplus in conjunction with an implementation plan. In summary, the impact on the company is shown, but not the impact on the market. The application demonstrates a clear added value in carrying out the work with PROMISE technologies.

Innovativeness aspects ► *Target achieved.*

Both reviewers agree that the presented results represent clear progress beyond the current state-of-the-art. The scope of the innovation can also be utilised beyond this application in other white goods appliances, but also in the automotive sector etc.

Risk aspects ► *Target achieved.*

Based on the assessment of the peer-reviewers, all risk aspects are rated as Good. Further, the reviewers do not identify additional risks.

Summary aspect ► *Main target achieved.*

The A8 application receives an overall rating of Good from both reviewers. Reviewer 1 makes one comment on the presentation (the text) of the application. The table of abbreviations is not complete, Ultra low cost power cable communicator is abbreviated both as ULC and ULP in the text. The whole text could be shortened as information (text and figures) is often repeated.

2.5.8 Peer-review results: Application A9 INTRACOM (MOL)

2.5.8.1 Main focus of application

INTRACOM's demonstrator is based on the company's Next Generation Multi-Service Access Node featuring broadband and narrowband subscriber interfaces. It is the last element in the access network before the subscriber's home, and is thus the vehicle for delivering broadband services. The main goal of A9 demonstrator is to present how INTRACOM technicians and engineers could be supported in key areas of their workflow by utilizing PROMISE technologies. The aim is to improve the information creation and flow throughout the Middle-of-Life (MOL) phase by exploiting PROMISE technologies. Technologies used to optimize the MOL processes will be PROMISE PEID-RFID technology, PROMISE Middleware, PDKM and DSS. The areas are decision making about problems solving, preventive maintenance and product improvements.

2.5.8.2 A9 – summarized results based on peer-reviewers comments and assessments

Comparing A9 with all applications, A9 is ranked as number 10 out of 10 with a total score of 57 out of 84 (adjusted max score - Reviewer 1 did not rate the aspect: Clear progress beyond state-of-the-art).

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A9	24	33	*28,5*	57	65 %	1	84	68 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.
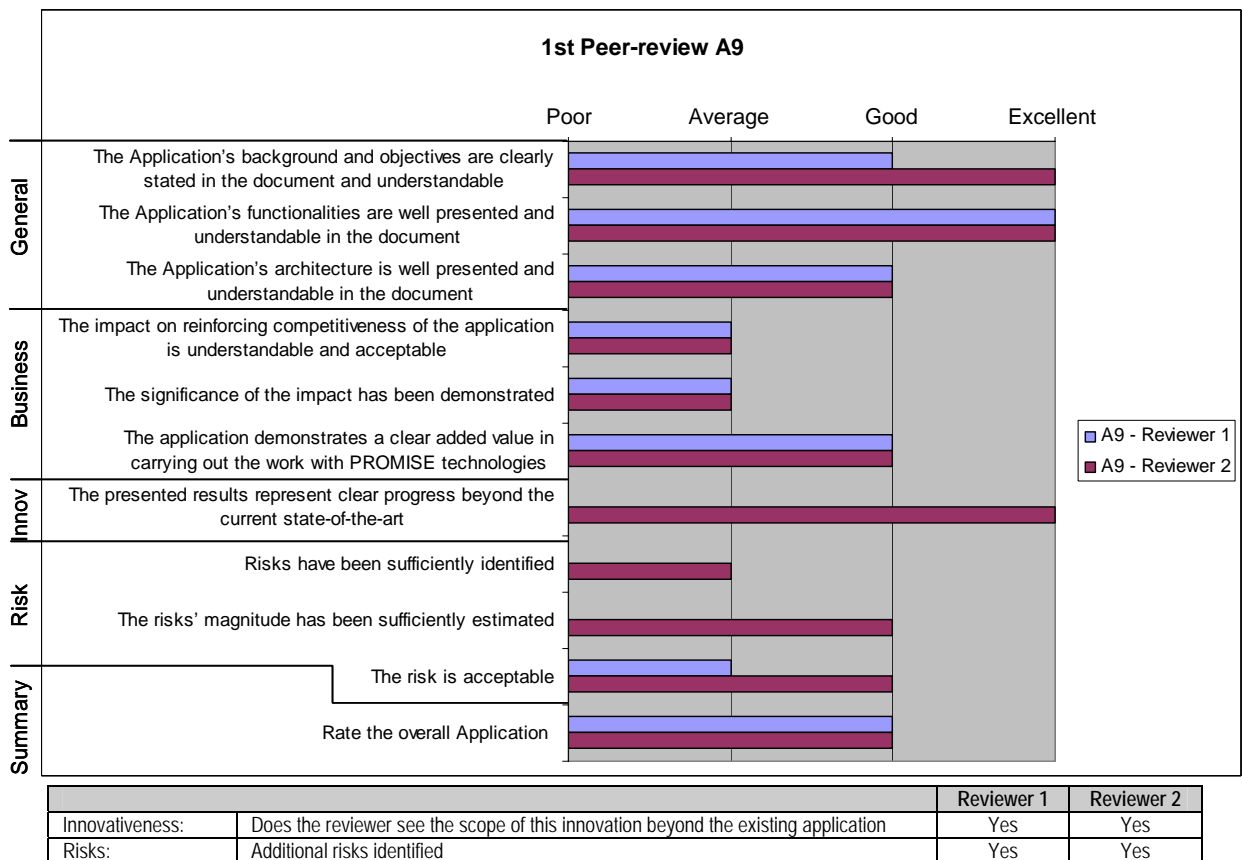
Figure 15: Peer-review results A9 (Reviewer 1 did not assess Clear progress beyond state-of-the-art)

General aspects ► *Target achieved.*
The application's background and objectives are assessed as Good/Excellent. However, Reviewer 1 comments that it is not always very clear who are the main internal client of the system developed in the application. Further, some more aspects should be more understandable like which savings will be made (only time?) for the client and the company; who else may benefit from the system in the company or elsewhere. The application's functionalities are assessed as Excellent by both reviewers. The architecture is assessed as Good by them both.

Business aspects ► *Target not achieved.*
The impact on reinforcing competitiveness and the significance of impact have been assessed as Average by both reviewers. The reviewers especially stress that the business objectives are not sufficiently described. Benefit dimensions should be included for all the actors. Further, which savings and for whom is not clear. The total cost of the system (training crews, implementation, maintenance on-site and maintenance of central PDKM/databases) is not clear. On the aspect of demonstrating clear added value in carrying out the work with PROMISE technologies both reviewers assess this aspect as Good.

Innovativeness aspects ► *Target achieved.*
Reviewer 2 states that the communication products and underlying services are pushed beyond current state-of-the-art. Reviewer 1 comments that the state-of-the-art in this specific domain is not known to the reviewer and has therefore not assessed this aspect. Both reviewers see the scope of this innovation beyond the existing application within predictive maintenance e.g. predictive maintenance of product and production systems and support to maintenance crew are highlighted.

Risk aspects ► *Target not achieved.*
Reviewer 2 comments that the technical risks are OK, but the business risks could also include risks concerned with expected costs and benefits. Reviewer 1 is harsher in the assessment as the lack of a business risk assessment yields a score of Poor. The business risk assessment should focus on the risks linked to the implementation of the system from a business point of view. In this application, the total cost of the system is found not to be sustainable, and the business model does not show any ROI.

Summary aspect ► *Main target achieved.*
The A9 application receives an overall rating of Good by both reviewers. Reviewer 1 comments that from a technical point of view the application is promising and valid. The application needs to evaluate business and risks aspects. Reviewer 2 motivates the assessment with that a good and detailed description of the application scenario concerning background, objectives, functionality and architecture has been given. This together with the use of Use Case Diagrams to demonstrate the different cases and flowcharts for the information flow is appreciated. Reviewer 2 also comments on the missing descriptions and risk analysis of business as important to put focus upon.

2.5.9 Peer-review results: Application A10 BT-LOC (BOL)
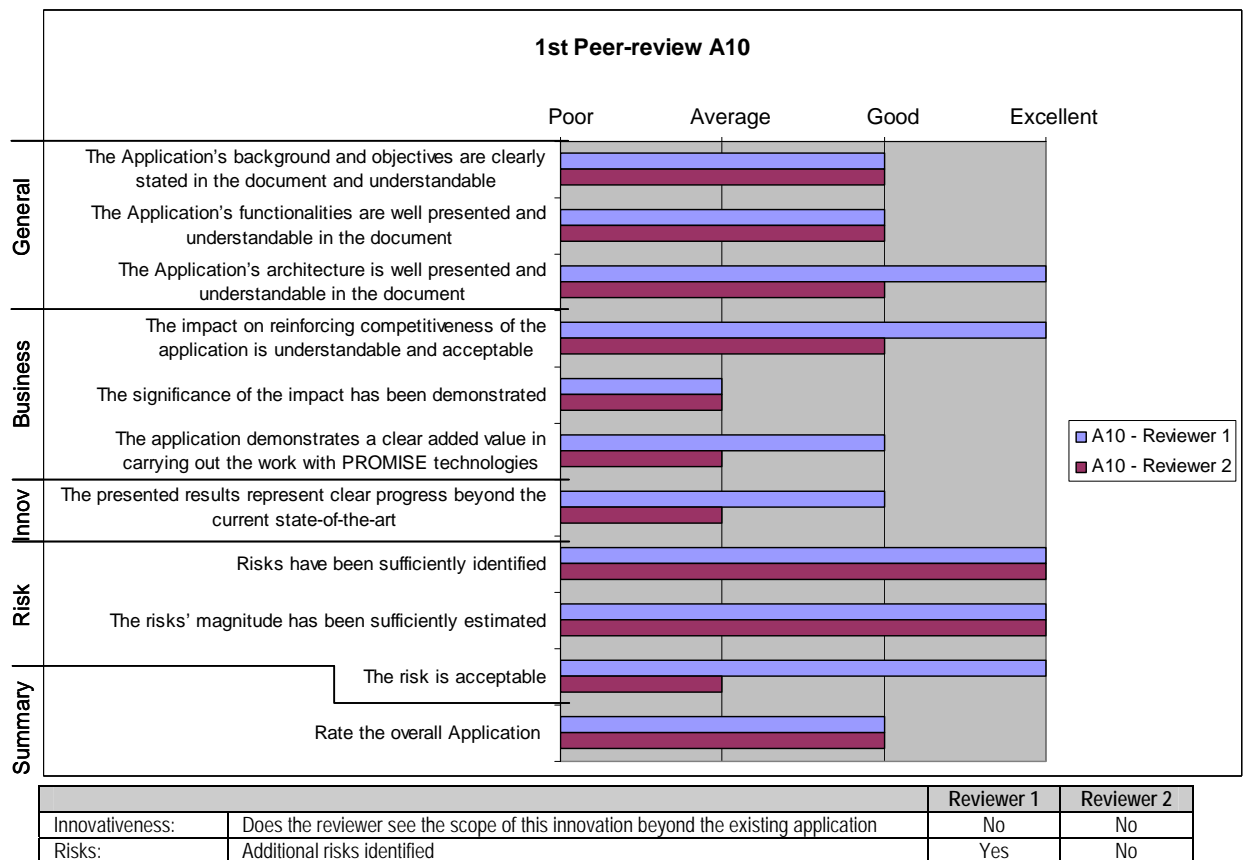
2.5.9.1 Main focus of application

The main focus of this demonstrator is to develop and assess the DfX decision strategy within PROMISE DSS (Decision Support System) and DfX knowledge management within Product Data Knowledge Management (PDKM). The reason of this focus is that the main interest of BT-LOC is to improve the availability of locomotives to reduce life cycle costs and increase the satisfaction of customers. In addition to the knowledge regarding RAM/LCC (reliability, availability, maintainability/life cycle cost), the demonstrator aims also at generating knowledge regarding safety and environment.

2.5.9.2 A10 – summarized results based on peer-reviewers comments and assessments

Comparing A10 with all applications, A10 is ranked as number 6 out of 10 with a total score of 68 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A10	37	31	*34,0*	68	77 %	0	88	77 %
Mean score all applications				68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.

			Reviewer 1	Reviewer 2
Innovativeness:	Does the reviewer see the scope of this innovation beyond the existing application		No	No
Risks:	Additional risks identified		Yes	No

Figure 16: Peer-review results A10

General aspects ► *Target achieved.*
The general aspects of A10 are assessed by the reviewers as Good/Excellent. The reviewers mostly address the many repetitive discussions and rather long first part of the document. Some more details about the components and their relationships should have been included. However, the use of graphs and figures are effective.

Business aspects ► *Target not achieved.*
The impact on reinforcing competitiveness is assessed as Excellent/Good. However, Reviewer 2 points out that it is not so clear what the added value of this application is in respect to what is found in literature. The role of the technology adopted should be better explained and addressed. Further, the impact only has been stated and not analyzed. Therefore the significance of impact demonstrated scores Average from both the reviewers. On the added value by carrying out the work with PROMISE technologies, the reviewers comment that no efforts have been used to analysis and demonstrate this added value. It is a potential interesting application. However, also from the risk analysis, it is not clear to the reviewers if a study on the possibilities of using PROMISE technologies has been carried out extensively.

Innovativeness aspects ► *Target achieved.*
Reviewer 1 comments that the presented results are reasonable and have surely made clear progress beyond the current state-of-the-art. Reviewer 2 answers this question like this: Remaining at the level of the results presented in this report, the answer should be no. However, it is easy to think that after the implementation and use of the system, new results and knowledge will be generated. On the aspect Scope of innovation beyond existing application, Reviewer 1 comments that the presented results are reasonable and have surely made clear progress beyond the current state-of-the-art. Reviewer 2 answers this question like this: Remaining at the level of the results presented in this report, the answer should be no. However, it is easy to think that after the implementation and use of the system, new results and knowledge will be generated.

Risk aspects ►*Target achieved.*
Reviewer 2 comments that the risk analysis is excellent. However, the risks seem to be too high at the moment, especially regarding data reliability. On the aspect of if the risk is acceptable, the reviewers differ in opinion. Reviewer 1 finds the risk acceptable. Reviewer 2, on the other hand, believes that by studying the available information, it seems that the answer should be no. However, more stress on the positive potential impact should be done in the application, trying to quantify in terms of quality of the design process or in terms of time gained by the designer the benefits. Maybe simple examples should help in understanding the potential impact that is high. Reviewer 2 also identifies an additional risk not covered in the risk analysis, namely: if the impact can not be obvious in a reasonable term, the customer may probably give up the implementation and application mentioned here which cost tremendous additional efforts and investment.

Summary aspect ► *Main target achieved.*
The A10 application receives an overall rating of Good/Good from the reviewers. Reviewer 1 points out that some sections in the description of the application are missing and that there are several paragraphs which are totally the same and appear repetitively in different location. Reviewer 2 states that the overall application is good. The only remark, even if he understands that it is difficult at this stage of development of the architecture, is that more stress to the technological aspects should be pushed, since the reviewer thinks that this could really be the innovative part of the application.

2.5.10 Peer-review results: Application A11 POLIMI (BOL)
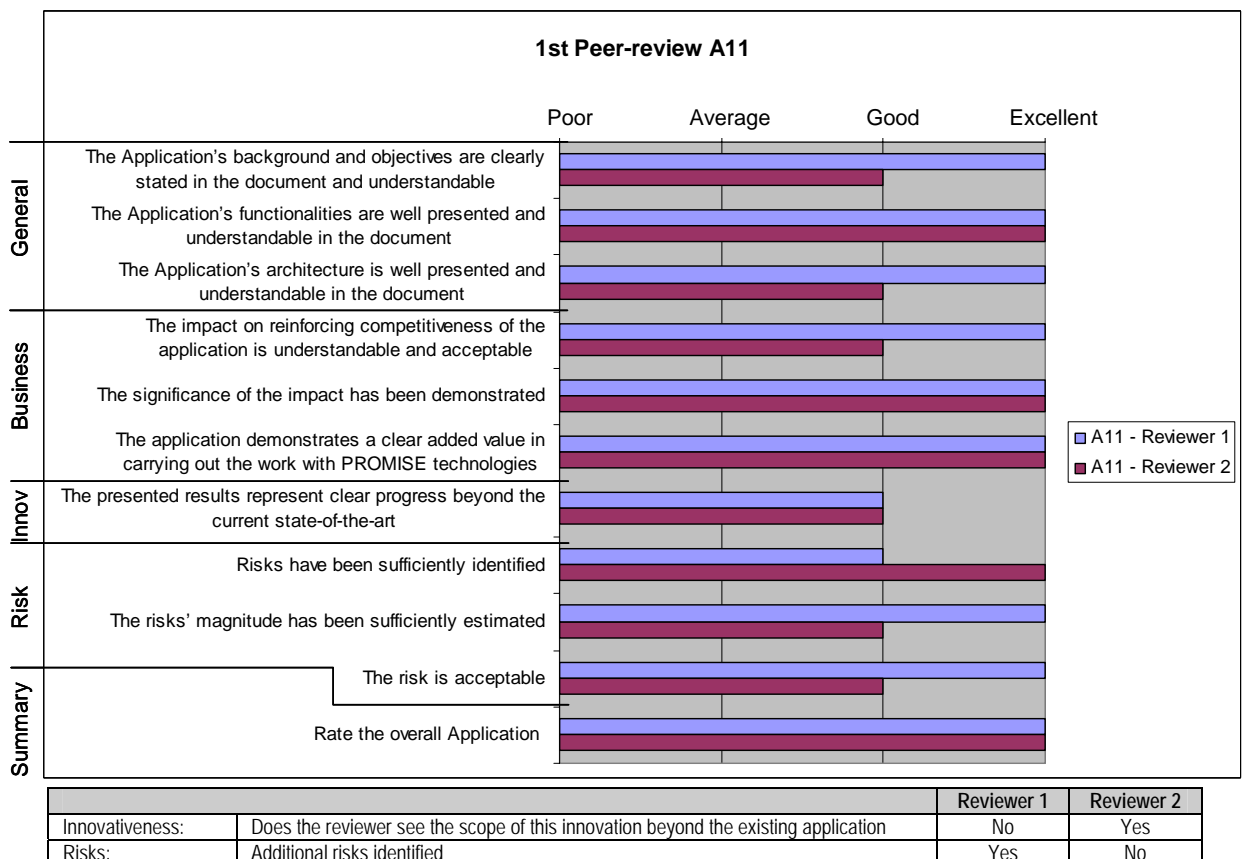
2.5.10.1 Main focus of application

The application aims at closing the information loops between the experience in the product's MOL and EOL phases and the decisions needed to adapt a production system in the BOL phase, by supporting the decisions on designing the production system reconfiguration, in order to properly react to product changes derived directly from the filed data collected on the product; and enabling engineers to carry out What…If? analyses concerning the impact of product changes on the production system performance and its profitability.

2.5.10.2 A11 – Score and illustrated results

Comparing A11 with all applications, A11 is ranked as number 2 out of 10 with a total score of 80 out of 88. Any discrepancies are found to be acceptable.

Score of applications	Reviewer 1	Reviewer 2	*Mean score*	Total score	% score	Aspects un-assessed	Adj Max points possible	Adj %score
A11	42	38	*40,0*	80	91 %	0	88	91 %
	Mean score all applications			68,2	78 %			79 %

Max score per reviewer is 44, i.e. max total is 88. Some aspects in some of the applications were left unassessed by the peer-reviewers. This yields a new Adj. max point possible for these applications, which in turn yields the Adj. % score.

Figure 17: Peer-review results A11

General aspects ► *Target achieved.*

All aspects within this category are rated Good or Excellent by the reviewers. Reviewer 1 comments that the application's background is presented clearly and understandably from the project aspect of PROMISE as well as from the application background aspect of TEKSID. The reviewers also assess the application's functionalities as to be very understandable and that they are very detailed and comprehensively described.

Business aspects ► *Target achieved.*

Both reviewers assess all the business aspects as Excellent, with the exception of Reviewer 1's Good on the impact on reinforcing competitiveness. The significance of the impact has been demonstrated through SWOT analysis and the benefit comparison. The clear added value in carrying out the work with PROMISE technologies are rated Excellent by the reviewers. Reviewer 1 comments that the added value as well as the benefit comparison has been addressed together with necessary analysis. Reviewer 2 supports this by stating that this is a very good and representative example of a BOL application.

Innovativeness aspects ► *Target achieved.*

Both reviewers assess the progress beyond the current state-of-the-art as Good. Reviewer 1 states that the presented results are reasonable and have surely made clear progress beyond the current state-of-the-art. The scope of this innovation beyond the existing application is found to be in companies like e.g. Caterpillar.

Risk aspects ► *Target achieved.*

The risks have been sufficiently identified according to the reviewers, grading this aspect Good/Excellent. Reviewer 1 feels that there is a need to further discuss business risks. The risks magnitude has been analysed and estimated sufficiently. On the acceptability of the described risks, the reviewers grade this aspect as Excellent/Good. However, Reviewer 2 points out that it would be useful if the overall risk had been measured. Reviewer 1 identifies an additional risk not covered. Reviewer 1 comments that this work is theoretically based on the statistical correctness which means that there will bring the application a big problem if the field data are not sufficient or can not be analyzed and used properly.

Summary aspect ► *Main target achieved.*

The A11 application receives an overall rating of Excellent, and Reviewer 2 states that this is a very promising application bringing a number of different benefits to the end-users.